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Paving the way to electrified road transport

Publicly funded research, development and demonstration projects on electric and plug-in vehicles in Europe

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Contents

LIST OF FIGURES

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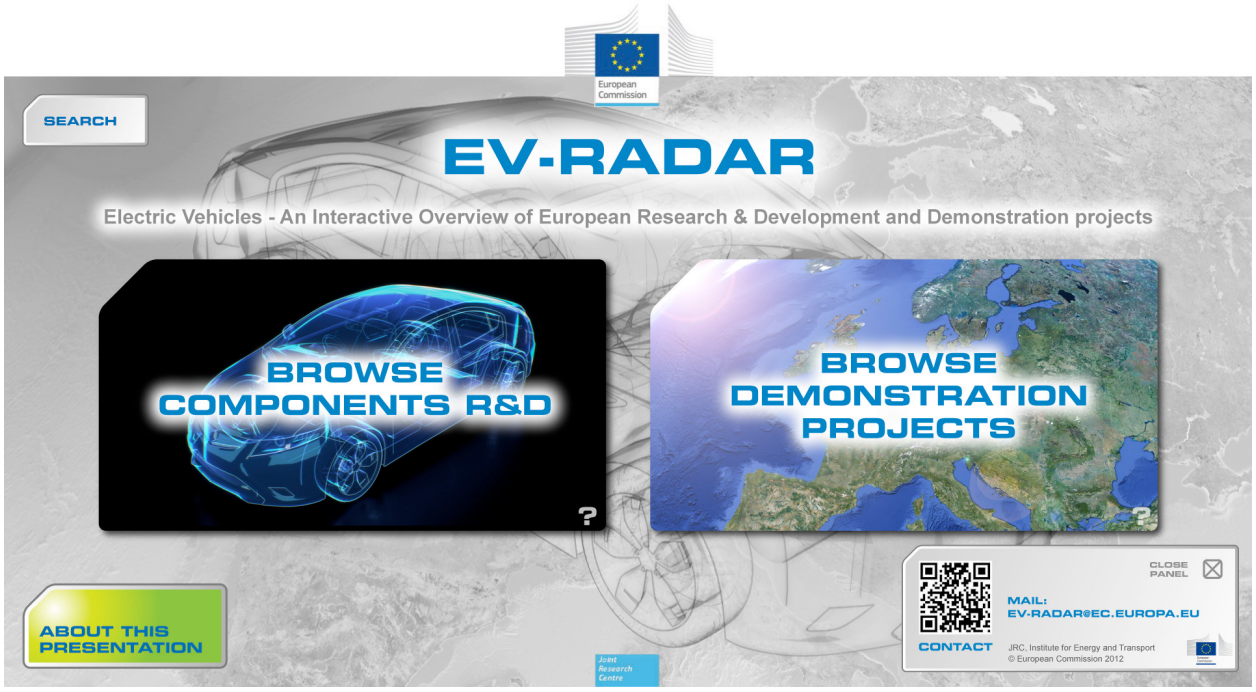
EXECUTIVE SUMMARY

The electrification of road transport or electro-mobility is seen by many as a potential game-changing technology that could have a significant influence on the future cost and environmental performance of personal individual mobility as well as short distance goods transport. While there is currently a great momentum vis-à-vis electro-mobility, it is yet unclear, if its deployment is economically viable in the medium to long term. Electro-mobility, in its early phase of deployment, still faces significant hurdles that need to be overcome in order to reach a greater market presence. Further progress is needed to overcome some of these hurdles. The importance of regulatory and financial support to emerging environmentally friendly transport technologies has been stressed in multiple occasions. The aim of our study was to collect the information on all on-going or recently concluded research, development and demonstration projects on electric and plug-in hybrid electric vehicles, which received EU or national public funding with a budget >1mln Euro, in order to assess which of the electric drive vehicles (EDV) challenges are addressed by these projects and to identify potential gaps in the research, development, and demonstration (R, D & D) landscape in Europe. The data on R, D & D projects on electric and plug-in vehicles, which receive public funding, has been collected by means of (i) on-line research, (ii) validation of an inventory of projects at member state level through national contacts and (iii) validation of specific project information through distribution of project information templates among project coordinators. The type of information which was gathered for the database included: EDV component(s) targeted for R&D, location and scope of demo projects, short project descriptions, project budget and amount of public co-funding received, funding organisation, project coordinator,

number and type of partners (i.e. utilities, OEMs, services, research institutions, and local authorities), start and duration of the project.

The validation process permitted the identification of additional projects which were not accounted for in the original online search. Statistical elaboration of the collected data was conducted.

More than 320 R, D & D projects funded by the EU and Member states are listed and analyzed. Their total budgets add up to approximately 1.9 billion Euros. Collected data allowed also the development of an interactive e-mobility visualization tool, called EV-Radar, which portrays in an interactive way R&D and demonstration efforts for EDVs in Europe. It can be accessed under http://iet.jrc.ec.europa.eu/ev-radar.



1. INTRODUCTION

The transport sector plays a crucial and growing role in world energy use and greenhouse gas emissions. To enable the EU to meet its ambitious future overall greenhouse gas emission reduction targets, the transport sector needs to significantly improve its environmental performance. The introduction of electric-drive vehicles (EDV) is a promising option to attain a win-win situation in achievement of decarbonisation objectives, energy security, improved urban air quality and increase in energy efficiency. However, there are a number of challenges for the large scale deployment of EDV both on global and European level. These, in particular, are the high cost of the battery, lack of a standardized recharging infrastructure, relatively low range of battery electric vehicles (BEV) or lack of interesting value proposition for consumers. Moreover, this new mobility solution requires the integration of several new market actors such as niche EDV producers, supply chain (i.e. battery, power electronics and electric motor producers), charging infrastructure providers, network operators, energy utilities and service providers with new business models or innovative V2G solutions (*1*). The importance of regulatory and financial support to emerging environmentally friendly transport technologies has been stressed in multiple occasions. The key

BOX 1. Definitions

EDV – *electric drive vehicles comprise BEV, PHEV, and fuel cell vehicles (FCV). FCV are not covered in this report.*

BEV *– vehicles that use an electric motor for propulsion with batteries for electricity storage. The energy in the batteries provides all motive and auxiliary power onboard the vehicle. Batteries are recharged from grid electricity and brake energy recuperation, and also potentially from non-grid sources, such as photovoltaic panels at recharging centers.*

PHEV *- vehicles which retain the entire internal combustion engine (ICE) system, but add battery capacity to enable the extended operation of the electric motor.*

target of research and technological development in the road transport sector, and usually the aim of public financial support for such activities is to bring the innovative vehicles to the market.

The aim of our study was to collect the information on all on-going or recently concluded research, development and demonstration projects on electric and plug-in hybrid vehicles, which received EU and national public funding with the total budget of more than 1 million Euro, in order to assess which of the EDV challenges are addressed by projects and to identify potential gaps in the R, D & D landscape. While we have taken big efforts to ensure the accuracy and completeness of the data, it is inevitable that we have overlooked some activities. The authors of this report take the sole responsibility for any mistakes that might have slipped in the information contained in this report. We would like to encourage readers who observe any incorrect or lack of information to contact us so that we can improve our report in future updates.

BOX 2.

Advantages and Challenges of BEV/PHEV

Potential Advantages of BEV/PHEV

- *Lower environmental impact if powered by low-carbon electricity mix*
- *Increased energy security through displacement of petroleum based fuels*
- *Synergistic with non-dispatchable renewable electricity through demand management and storage (vehicle to grid)*
- *Better air quality in urban areas*
- *Reduced noise*

Current Challenges of BEV/PHEV

- *High cost of battery*
- *Lack of standardized charging infrastructure and its business model*
- *Relatively low range*
- *Inconveniences through charging process*

The report consists of a brief review of the relevant studies on EU market perspectives of EDVs (Section 2) and policies affecting EDV deployment (Section 3). Section 4 describes methodological aspects of data collection and analysis, while sections 5 and 6 are dedicated to the description of the results per project category – Research & Development and Demonstration projects

respectively. In Section 7 we draw conclusions based on the results obtained. The complete catalogue of the projects included in the database is provided in Annexes 2 and 3.

2. EU MARKET PERSPECTIVES OF ELECTRICAL DRIVEN VEHICLES

Since the early 2000s niche Original Equipment Manufacturers (OEMs) are offering EDVs and service providers propose new business models for EDV Location and geographical scale of demonstration projects (Source: JRC, EV-Radar 2012) marketing (i.e. Better Place). Several OEMs form partnerships for joined EDV and component research and development with other OEMs, battery manufacturers and suppliers and redirect a sizable share of their R&D budget to EDV development. As all these recent developments demonstrate there is a growing momentum with regards to EDV deployment. However, it is yet uncertain if this will also translate in a sustained broad EDV market penetration in the future.

There are several studies analyzing the effect of large scale deployment of electrical driven vehicles (EDVs), i.e. BEVs and PHEVs, in Europe up to 2050 (*1-5*). Pasaoglu et al (*5*) provides an overview and comparison of several recently published studies (Figure 1). It reveals that the total assumed market penetration rates of BEVs and PHEVs in Europe in different studies varies between 3% and 25% for 2020 giving a strong indication on the uncertainties associated with the future prospects of EDVs in Europe.

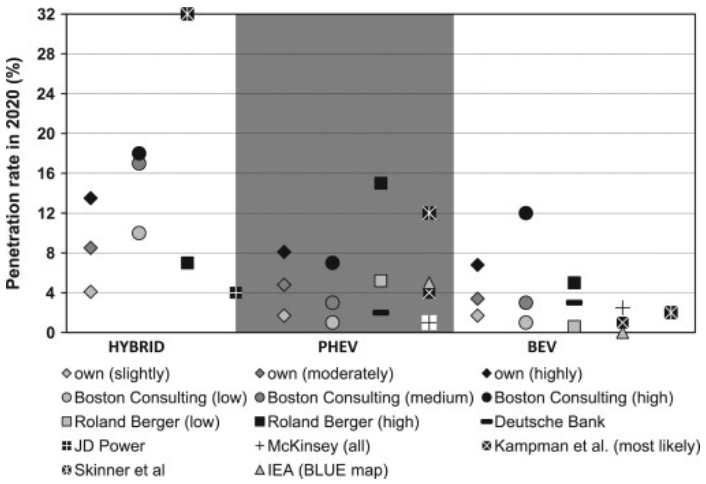


Figure 1 Comparison of vehicle market penetration rates in Europe in 2020 (reprinted from publication Pasaoglu et al (5) with permission from Elsevier)

A high degree of this uncertainty is linked to the relatively high purchase costs of EDVs. Thiel et al. (*6*) compared the payback periods of several advanced vehicle powertrain options versus an advanced gasoline vehicle option (Figure 2). The study clearly demonstrates that only through significant cost reductions EDVs can evolve to offer an interesting value proposition to consumers.

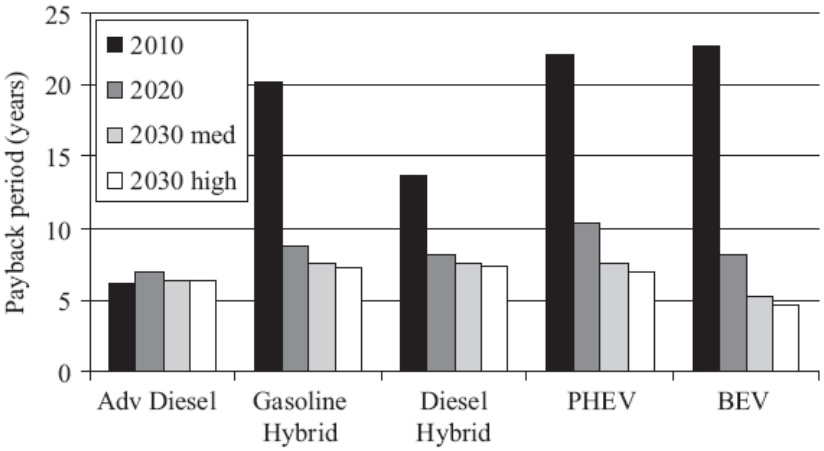


Figure 2 Payback period versus advanced gasoline vehicle (reprinted from publication Thiel et al (6) with permission from Elsevier)

Most authors and studies agree that a larger deployment of EDVs could lead to significant reductions in road transport related CO2 emissions. Pasaoglu et al (*5*) estimated that the total well-to-wheel emissions from passenger and light commercial vehicles in Europe could be reduced by up to 45% in 2050, if a large scale deployment of EDVs, fuel cell vehicles and other alternative vehicles is achieved (Figure 3).

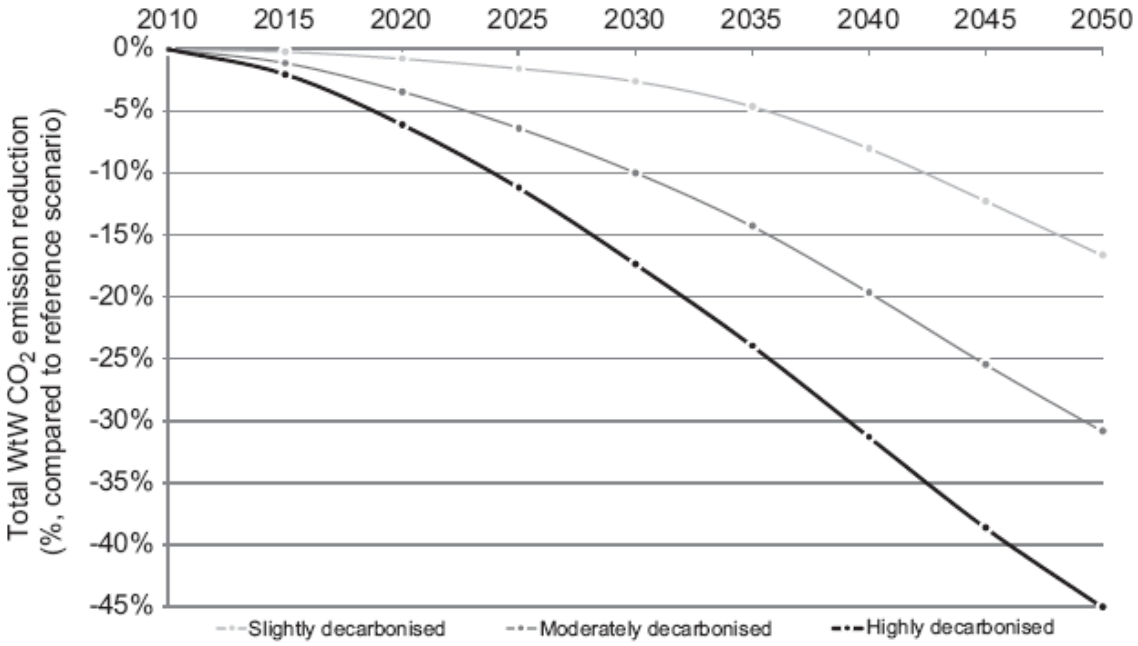


Figure 3 Evolution of total WtW CO2 emissions reduction of the EU passenger and light commercial vehicle fleet under three scenarios compared to the reference scenario (reprinted from publication Pasaoglu et al (5) with permission from Elsevier)

The beginning deployment of EDVs will mainly be driven by early adopters and will regionally be focused on a number of lead markets where favourable conditions for an EDV deployment exist. Based on expert elicitation and using a multi criteria assessment methodology, Zubaryeva et al (*7*) have developed a tool to identify potential future lead markets for EDVs in Europe (Figure 4).

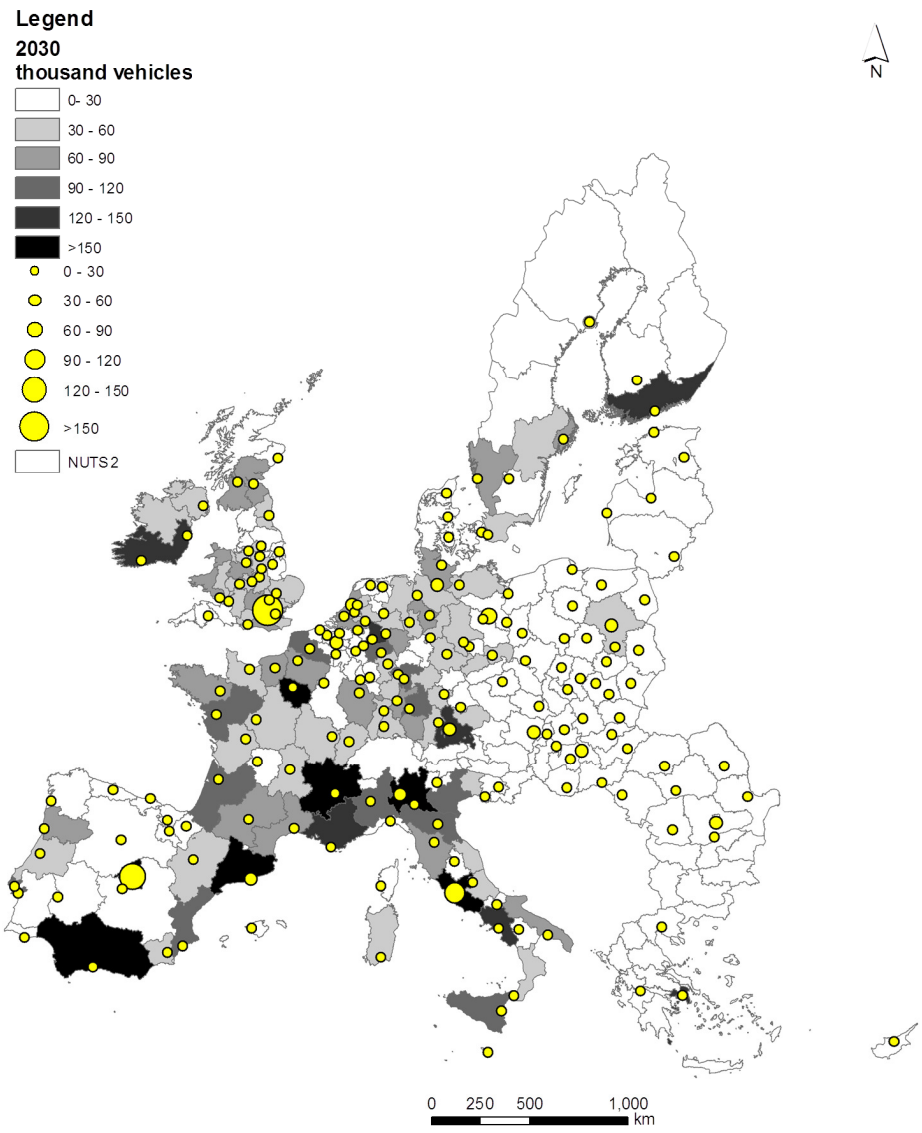


Figure 4 Potential future lead markets in Europe in 2030 under a moderate EDV deployment scenario (reprinted from publication Zubaryeva et al (7) with permission from Elsevier)

3. POLICIES AFFECTING EDV DEPLOYMENT

The appearance of EDVs on the market can primarily be seen as an environmental innovation. It has been argued that environmental innovations have a so called double-externality problem, when the costs are borne by the innovator alone, although the society benefits from it as well (*8-10*). This problem reduces incentives for businesses to invest in

environmental innovations. Therefore, policy measures stimulating the adoption of environmental innovations are necessary (*10*).

Governing bodies at the international and national scale, accelerated public funded programs both in support for fundamental and applied research in battery and propulsion technologies as well as for infrastructure and demonstration projects, forming public private partnerships, such as the European Green Car Initiative in the frame of the European Economic Recovery Plan (*11*) or the European Industrial Initiative on Electricity Grids as part of the SET-Plan (*12*). Similar programs run globally. In the US there is a substantial funding available for battery manufacturing, demonstration projects, clean cities for EV deployment under the American Reinvestment and Recovery Act. The Chinese government dedicated around 770 million Euro to projects associated with energy-efficient and new energy vehicles under its National High-Technology R&D program with the aim to reach 15% BEVs and PHEVs shares in 2015 (*13, 14*).

Several EU Polices in the context of clean and energy-efficient road transport vehicles directly or indirectly promote the electrification of road transport. Examples are regulations on pollutant and CO2 emissions, R&D funding, standardization of charging infrastructure and vehicle to grid communication, urban mobility actions and taxation framework schemes for energy products and electricity. The 95 g CO2 target for the fleet average of 2020 passenger vehicles, as laid down in (*15*), will possibly require a substantial market roll-out of advanced vehicle technologies such as strong hybrids, electric vehicles and hydrogen fuel cell vehicles (*15, 16*). The "European Strategy for Competitive, Sustainable and Secure Energy 2020" states that the creation of market conditions which stimulate more low carbon investments into key technologies for electro-mobility, i.e. electric vehicles, are needed (*17*). The Roadmap on Regulation and Standards for Electric Cars (*18*) and the

respective follow-up activities aim at creating the necessary conditions for a market deployment of EDVs in Europe.

With Clean Power for Transport initiative (*19, 20*), the European Commission aims at the development of comprehensive mix of alternative fuels in different transport modes. As part of this initiative the proposed Directive focuses on the infrastructure and standards (*20*). It tackles one of the major obstacles for the EV market uptake – the lack of a charging infrastructure with common technical specifications by legislating a minimum number of recharging points of EVs to be installed in the Member States.

The Automotive Working Group of the European Technology Platform on Smart System Integration/ERTRAC and SmartGrids (*21*) have issued recommendations concerning the actual and future coverage of R&D topics in the field of electrification of road transport (Figure 5).

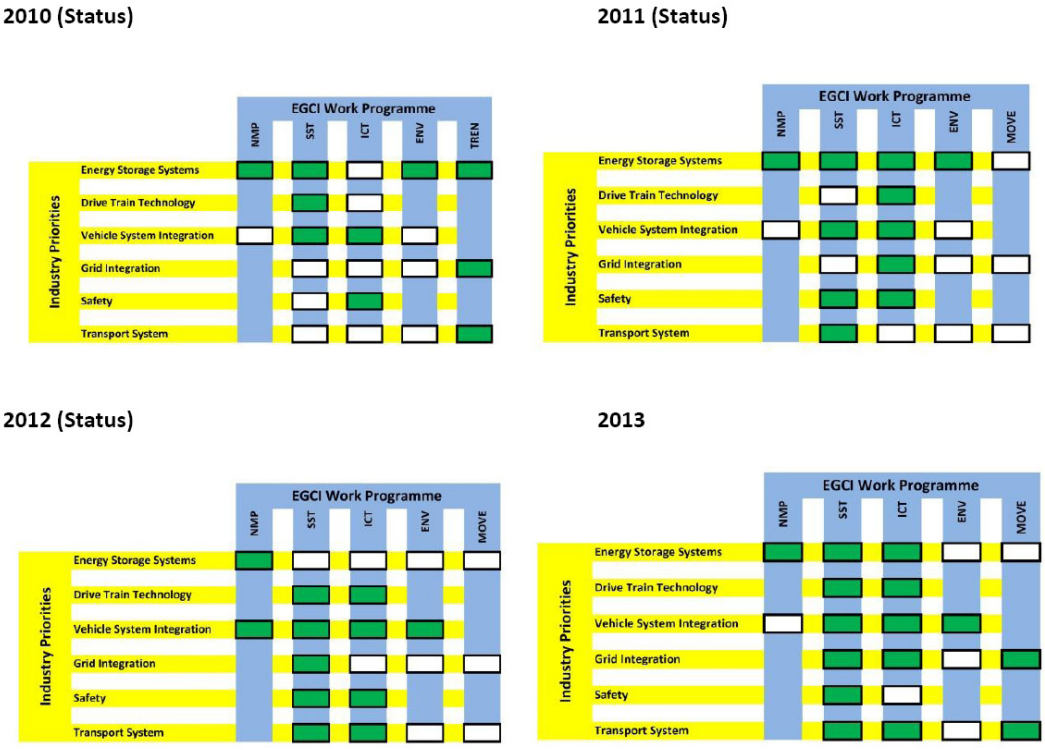


Figure 5 Actual and suggested future coverage of R&D topics in the FP7 work programs of the Green Cars Initiative (white: match of programme and R&D need, green: suggested objective in resp. year (after (18))

From this perspective the main goal of this report is to conduct a European-wide inventory of publicly funded research and development (R&D) and demonstration projects to assess and understand the overall picture of the R&D and D for BEV/PHEV public financing and identify possible gaps for the future development.

Box 3. R&D of components

Energy Storage

R&D in this area focuses on improving the performance and reducing the costs of lithium-based batteries, and on studying alternative energy storage means such as ultracapacitors or other types of batteries. Projects dealing with research and development, recycling of all energy storage types for electric vehicles were included in this category.

Electric motor

R&D focus is on cost and weight reduction, refinement of motor controls, alternative materials and on alternative concepts such as in-wheel-motors. Projects related to electric motor are in this category.

Controls

R&D focus is on ensuring failure safe and robust control systems, optimization of energy management and on new electric architectures for future electric vehicle concepts. Projects in this category include research and development of all kind of control systems and their functions specific to electric vehicles

Thermal management

The projects in this category cover research and development in the field of advanced new technologies needed for more efficient heating/cooling of electric vehicles, including thermal modeling and optimization of the passenger compartment, interior air handling, cooling loop, front airflow and engine thermal loops; battery cooling systems.

4. METHODOLOGY

The data on research, development and demonstration projects on electric and plug-in vehicles, which receive public funding, has been collected by means of (i) on-line research, (ii) validation of an inventory of projects at member state level through national contact points and (iii) validation of specific project information through distribution of project information templates among project coordinators. Only indirect funding actions have

been considered in this report. Hence, this report does not cover direct funding of for example University staff or laboratories. On-line search of the existing projects has been performed in the period of September 2011-March 2012. With the iterations regarding the information exchange with the project coordinators and national contacts the cut-off date for updating the information was end of July 2012. Based on the obtained data, EU co-funded and Member state co-funded on-going or recently concluded projects were identified. Projects were classified under two categories: Research and Development (R&D) and Demonstration projects. For R&D projects a further classification was developed per the components of a vehicle that are subject to the R&D activities. These subcategories included: energy storage, electric motor, controls, thermal management, vehicle (body and architecture), chassis, charger, multiple components and others. The type of information which was gathered for the database included: EDV component(s) targeted for R&D, location and scope of demo projects, short project descriptions,

Box 4. R&D of components

Vehicle body and architecture

R&D focus is for the packaging of the (large and heavy) battery. A typical opportunity would be the use of in-wheel-motors, enabling new design freedom. Projects developing new electric vehicle concepts and designs are included in this category, as well as projects that develop dedicated architectures with improved aerodynamics, innovative lightweight materials and modular structures.

Charger

Projects dealing with research and development of advanced charging solutions for electric vehicle are included in this category.

Chassis

R&D focus is on chassis that need to be modified and adapted to electric vehicles in order to fully exploit potential efficiency improvements, such as brake energy recuperation, or to enable new concepts such as in-wheel-motors.

Others

This category includes projects for modeling, coordination and monitoring of research and development for electric vehicles in Europe and projects that could not be associated to any of the other categories

project budget and amount of public co-funding received, funding organisation, project coordinator, number and type of partners (i.e. utilities, OEMs, services, research institutions, local authorities), start and duration of the project (Annex I). Lists of projects were administered to contact points in the respective Member States to validate the completeness of the lists. The project coordinators were asked to validate and/or complete the project information sheets as in Annex 1. The validation process permitted the identification of additional projects which were not accounted for in the original online search. Statistical elaboration of the collected data was conducted. Collected data allowed also the development of an e-mobility visualization interactive tool, called EV-Radar, which portrays in an innovative way R&D and demonstration efforts for EDVs in Europe. The tool can be accessed under (http://iet.jrc.ec.europa.eu/ev-radar)

5. RESULTS: R&D PROJECTS

In this section, we describe the main findings for the information that we collected on the R&D projects.

5.1. R&D projects: distribution across countries

Overall, the key R&D investment priorities throughout Member States mirror the ones at EU level, focusing in particular on improvement of energy storage systems, improvements regarding the vehicle system integration and control systems of the vehicle and its components.

According to our study, the majority of ongoing or recently concluded R&D projects are co-funded by Germany, the European Union France, the Netherlands, and UK (Figure 6). While there is a strong dominance of the EU15 countries in the number of projects related to R&D in EDVs, several EU12 countries such as Czech Republic, Poland and Romania feature activities in projects that are included in our project list. German projects

have the largest total budget (Figure 7), followed by EU, France, UK and Sweden. In terms of types of partners that are forming consortiums of co-funded R&D projects, there is diversity in nature of these partners, dominated, however, by academic as well as public and private research entities, industries/supply chain and original equipment manufacturers, among which both niche OEMs and large producers, as shown in Figure 8.

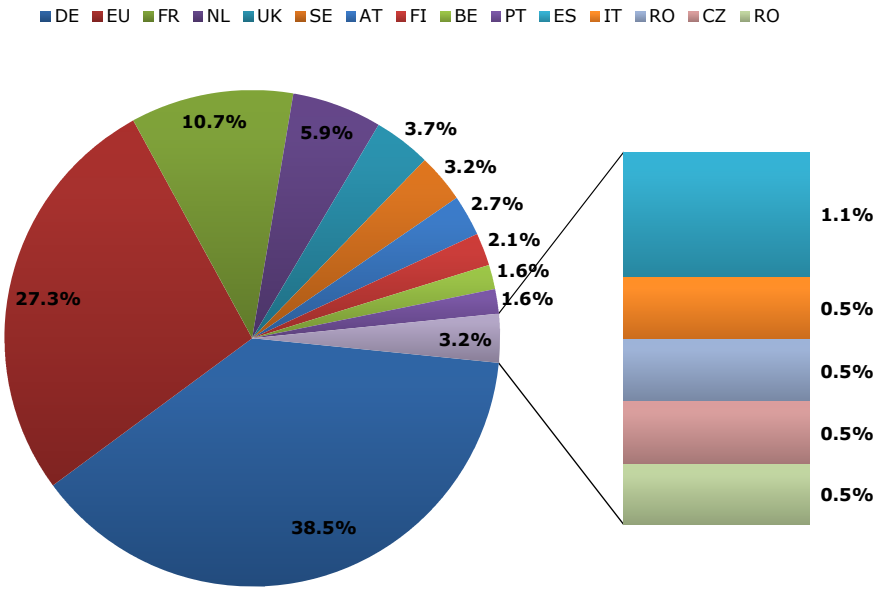


Figure 6 Distribution of projects per funding country (number of projects)

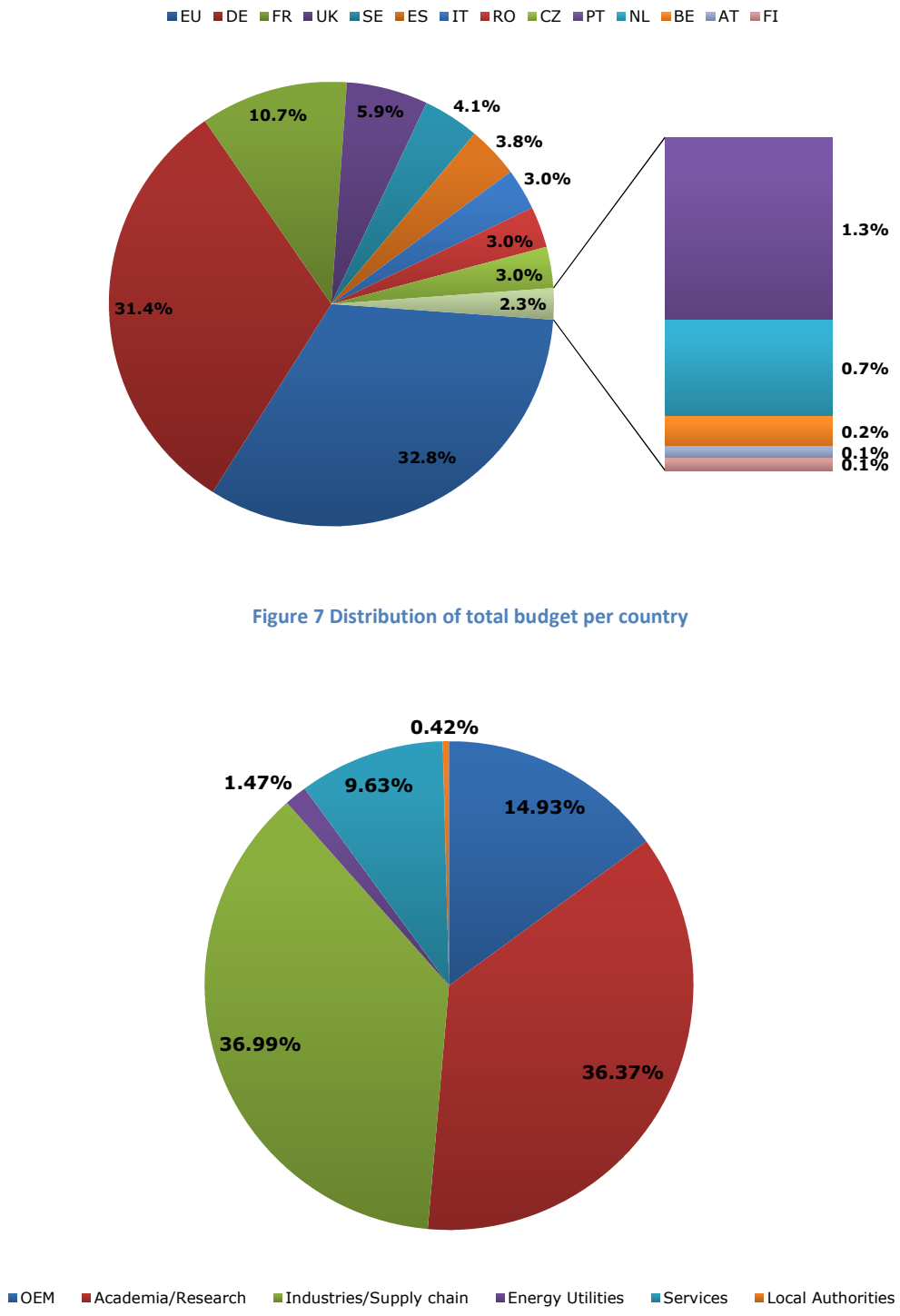


Figure 7 Distribution of total budget per country

Figure 8 Distribution of types of consortium partners in publicly co-funded R&D projects

In terms of the components that are being targeted by publicly funded R&D projects, the largest number of investments are related to controls, energy

storage, and vehicle body and architecture while there are also significant investments that focus on multi-component R&D (Figure 9). The total investment of the electro-mobility R&D projects shown in this report adds up to 1.4 billion Euro.

The EU co-funded projects focus largely on energy storage and controls. Among the Member States, in Germany, the primary focus mirrors the one of the EU; interestingly, in France the number of projects per components is rather evenly distributed.

Figure 9 shows the total budgets of R&D projects, broken down by component. Figure 10 shows the distribution of EU and Member State level investments in R&D per component. Taking a closer look controls related projects (Figure 9, Figure 10) receive a total investment of more than 220 Mln Euro. Second biggest component field in terms of budget are energy storage related projects (Figure 9) followed by vehicle and electric motor.

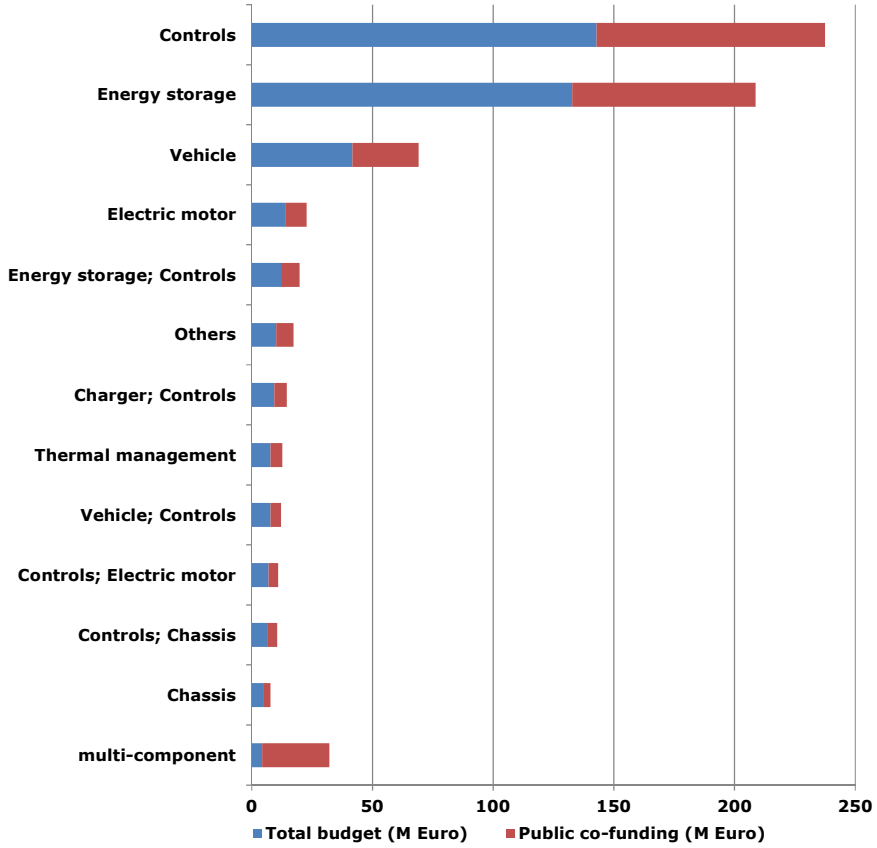


Figure 9 Distribution of total investments and public co-funding in publicly co-funded R&D projects

Figure 11 shows the composition of type of consortium partners per component. Overall, academic and research partners together with the industrial partners constitute the highest share of partner types. Academia and research partners are very strongly involved in energy storage related projects, indicating a large bias towards more fundamental research activities for future energy storage solutions that are investigated in publicly funded R & D projects in the field.

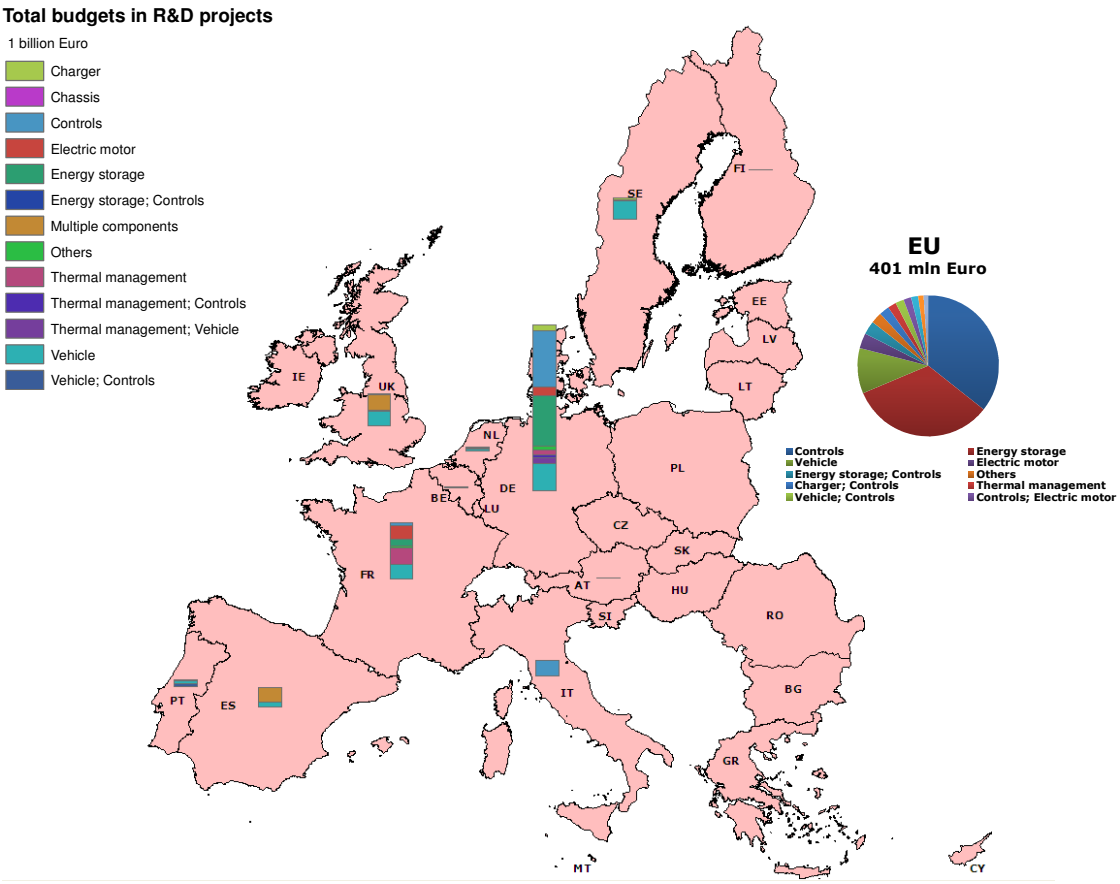


Figure 10 Total investments in R&D projects in Member States per vehicle component

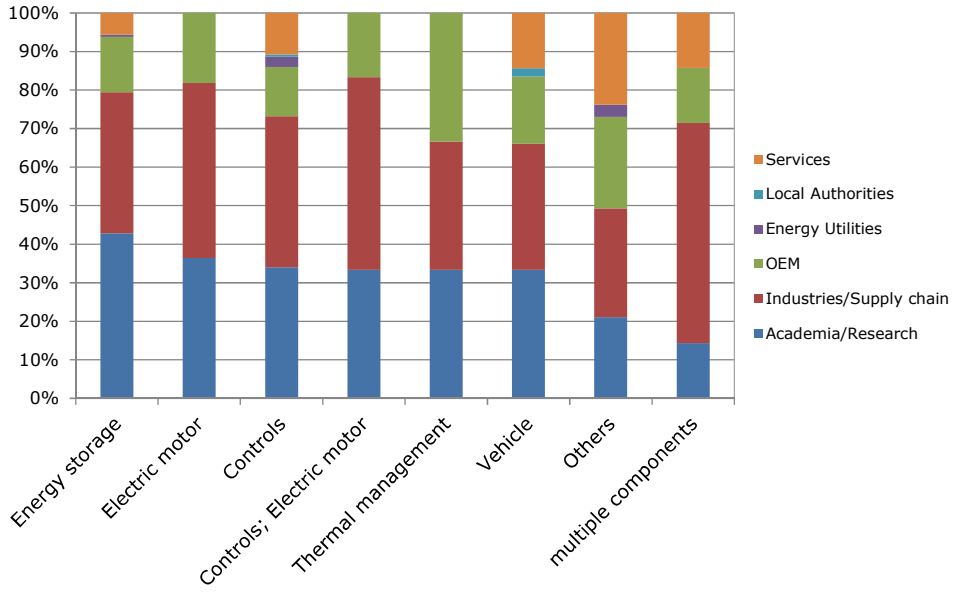


Figure 11 Type of partners involved in the publicly co-funded R&D projects per component.

Industry and supply chain partners show their strongest presence in electric motor, energy storage, controls, and multi-component related projects. Due to the interdisciplinary nature of its scope of R&D, more types of partners are involved in controls related projects. The OEMs show their biggest presence in R&D projects related to thermal management, which demonstrates that this topic needs a strong input from a vehicle integration perspective.

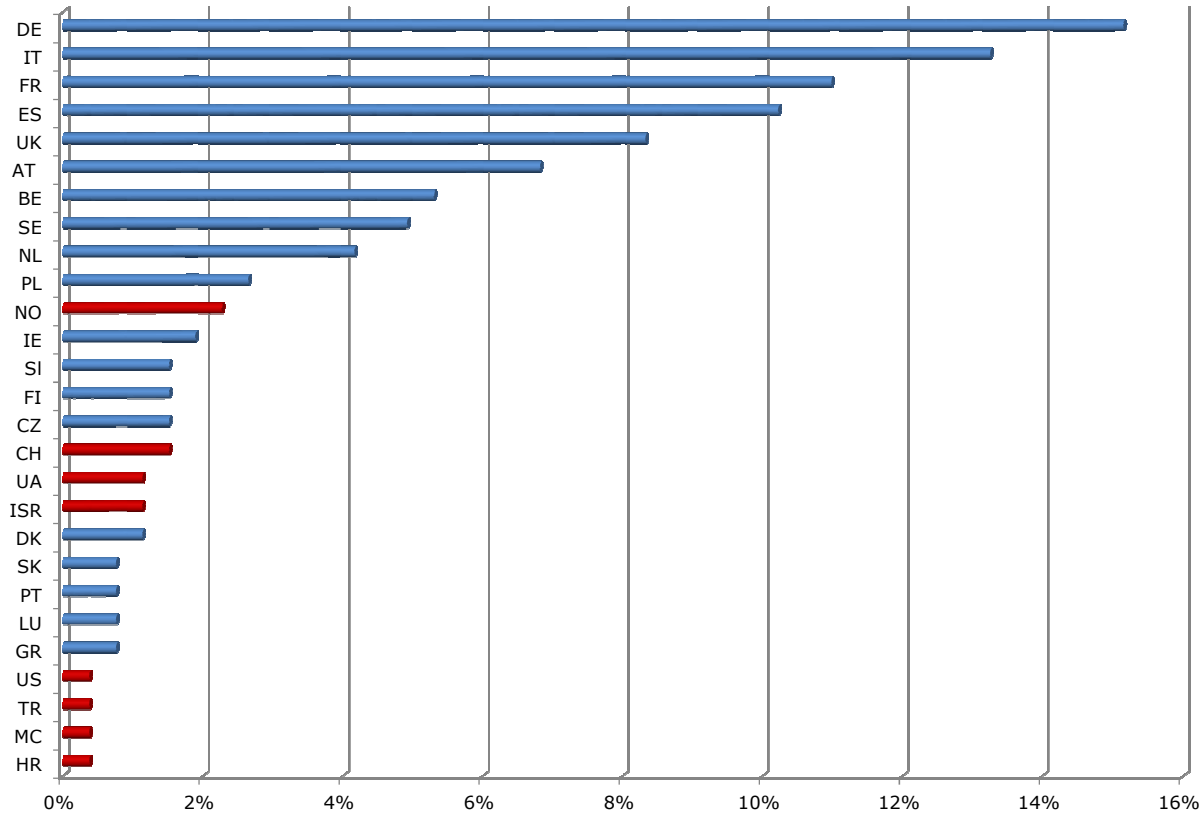


Figure 12 Countries (per partner) involved in EU co-funded R&D EDV projects

Considering the composition of the origin of partners in the EU co-funded R&D projects, it can be noted that partners come from most of EU member states, with more than 50% of the partners coming from Germany, Italy, France, Spain, and the UK. Interesting is the presence of several partners that originate from non-EU countries, such as the FP7 associated countries Israel, Norway and Switzerland, EU candidate countries (Croatia, FYR of

Macedonia and Turkey), one of the European Neighbourhood policy partner countries – Ukraine, and United States of America (Figure 12).

Major sources of funding in Europe in the area of R&D include:

- At EU level, the European Green Car Initiative as a part of the EU economic recovery plan since 2009 made available 500 million Euro of public funding through the 7th Framework Program, ARTEMIS and ENIAC Joint Undertakings[1]. Parts of this funding has been dedicated to electro-mobility related R, D & D;
- The 4 German Federal Ministries for Education and Research; for Environment, Nature Conservation and Nuclear Safety; for Economics and Technology; and for Transport, Building and Urban Development together release funding under the National Electromobility Programme that in the period 2009-2011 provided 500 million Euro to R&D and D in the field of e-mobility[2].
- The UK Low Carbon Vehicle Innovation Platform of Technology Strategy Board (LCVIP TSB) in period 2007-2012 with about 250 million pounds (about 300 million Euro[3]) of joint government and industry investments[4];
- French Fonds Demonstrateur de Recherche of French Environment and Energy Management Agency (ADEME) and Fonds unique interministériel[5];
- Swedish Energy Agency through the Strategic Vehicle Research and Innovation Programme[6];

[1] http://www.green-cars-initiative.eu/public/
[2] http://www.foerderinfo.bund.de/de/3052.php
[3] Exchange rate 1.20257
[4] http://www.innovateuk.org/ourstrategy/innovationplatforms/lowcarbonvehicles.ashx
[5] http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=24712; http://competitivite.gouv.fr/les-appels-a-projets-fui/les-appels-a-projets-de-r-d-dans-le-cadre-du-fui-fonds-unique-interministeriel-380.html
[6] http://www.vinnova.se/en/FFI---Strategic-Vehicle-Research-and-Innovation/

- Austrian Alternative Propulsion Systems and Fuels (A3plus) Programme[7i];
- Danish research programme FORSKEL[8];
- Portuguese national MOBI.E programme;
- Dutch government through its integrated initiative - HTAS Electric vehicle technology research programme[9];
- Spanish Ministry of Industry, Tourism and Trade through Competitiveness Programme for the Automotive Sector; CENIT Programme;
- Finnish EVE – Electric Vehicle Systems programme[10];

5.2. Energy storage

R&D in this area focuses on improving the performance and reducing the costs of lithium-based batteries, increasing the specific energy and operational time, on studying alternative energy storage means such as ultracapacitors or other types of batteries. Energy storage projects are the most numerous projects among the portfolio and second most important based on budget figures of publicly co-funded projects mentioned in this report. The projects in this field can be largely classified in different categories:

- Projects related to materials and packaging (i.e. AUTOSUPERCAP, ELECTROGRAPH and OPERA4EV);
- Li-ion batteries in fields of safety, energy density, power capability, cycle and calendar life (Cell components/cell level R&D; Battery modules R&D);

[7] http://www.bmvit.gv.at/innovation/mobilitaet/a3plus/index.html
[8] http://energinet.dk/EN/FORSKNING/ForskEL-programmet/Sider/default.aspx
[9] http://www.htas.nl/
[10] http://www.tekes.fi/programmes/EVE

- Post Li-ion batteries (Lithium-air, lithium sulfur, zinc-air);
- Standardization of electrical, mechanical and thermal interfaces;
- Cell components/cell level R&D;
- Battery modules R&D;
- R&D in the area of battery management systems and grid integration (i.e. EASYBAT, IoE);
- Battery recycling.

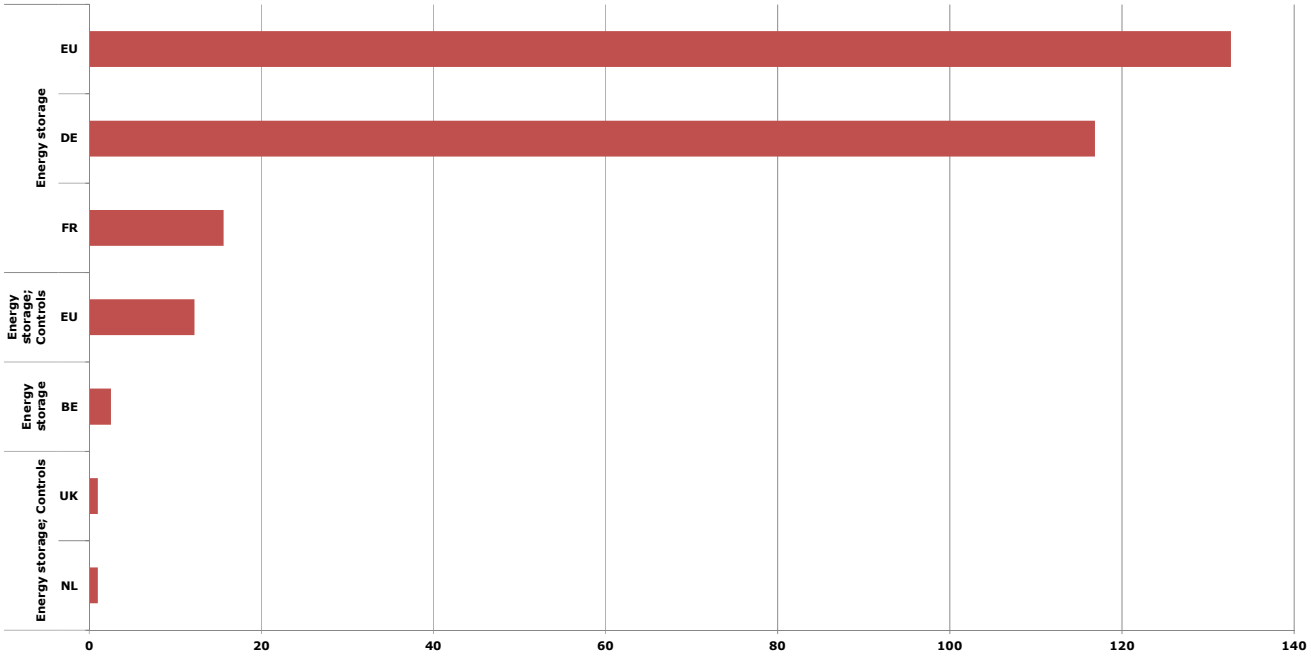


Figure 13 Budget (million Euro) distribution of energy storage related projects per co-funding MS

Overall, the largest budget amount on energy storage related projects is co-funded by the EU (Figure 13). Some of these projects integrate also other components, such as controls (i.e. SuperLIB, P-MOB). Germany has the largest amount of projects dedicated to R&D in energy storage for automotive applications. The joint co-funding of Federal Ministry of Education and Research with "Elektrochemie Kompetenz Verbund Süd" "Innovationsallianz LIB 2015" and Federal Ministry for the Environment, Nature Conservation and Nuclear Safety with funding for Battery recycling

projects ensure a comprehensive approach. France invested approximately 15 Mln Euro in energy storage related publicly funded R & D projects. Energy storage research and development is often performed together with the research of other components, such as controls (Figure 13).

5.3. Electric motor

Research and development in this area focuses on cost and weight reduction, refinement of motor controls, alternative materials and on alternative concepts such as in-wheel-motors.

For example the German project PerEMot is looking into further refining permanent magnet electric motors, improving their performance and developing new engine concepts with improved energy efficiency, while the project MORE is focusing on the recycling and especially enhanced recovery of strategic metals of these motors. The French project AREMA focused on the improvement of performance of electric motors. The EU project CASTOR is dealing with the innovative concept of better integrating the EV-power train components such as inverter, accumulator and engine. France, Germany and EU have the highest budgets for electric motor related public funded R & D projects (Figure 14).

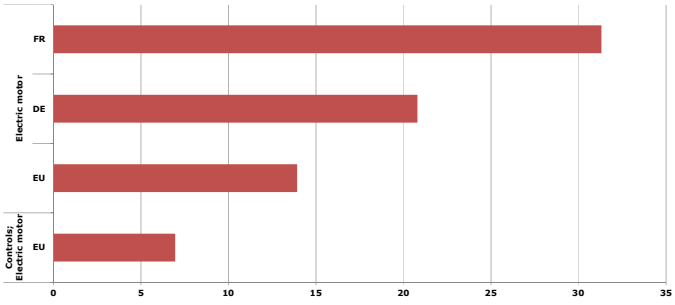


Figure 14 Budget distribution (million Euro) of electric motor related projects per co-funding MS

5.4. Controls

Overall, research and development in this area is looking into controls for vehicle energy management systems, power grid communication, battery life monitoring, temperature management systems, EV sensors, and predictive control. Several types of projects can be identified that address research and development of different types of control systems in EDVs.

One of the directions of research is enabling technologies for controls for e-drive train technologies. For example there are large scale projects, co-funded by the ENIAC Joint Undertaking, such as E3Car, which focuses on building a solid nanoelectronics technology for powertrain and power and high-voltage electronics for EDVs, and MOTOBRAIN, developing fault tolerant drive systems and control architectures. Several German projects are centered towards the development of compact and more efficient electronics modules for EDVs (ProPower, NeuLand).

Other directions of research and development include research for new materials in control systems (i.e HI-WI, iKRAVT); controls for energy storage systems (i.e. EU's SuperLIB, P-Mob, SMART-LIC, Dutch "Databox", UK's IHEPU, French MOV'EO E-CEM, German PELICAn), and chassis system management (i.e. ID4EV); controls allowing grid integration (i.e. e-Dash, IoE, SMARTV2G); and controls enabling road and vehicle communication.

Many of the member states and EU are investing in the R&D of control systems. Germany, EU, France, Portugal and Netherlands have an important share of the total budget spent on public funded R & D projects in this field (Figure 15).

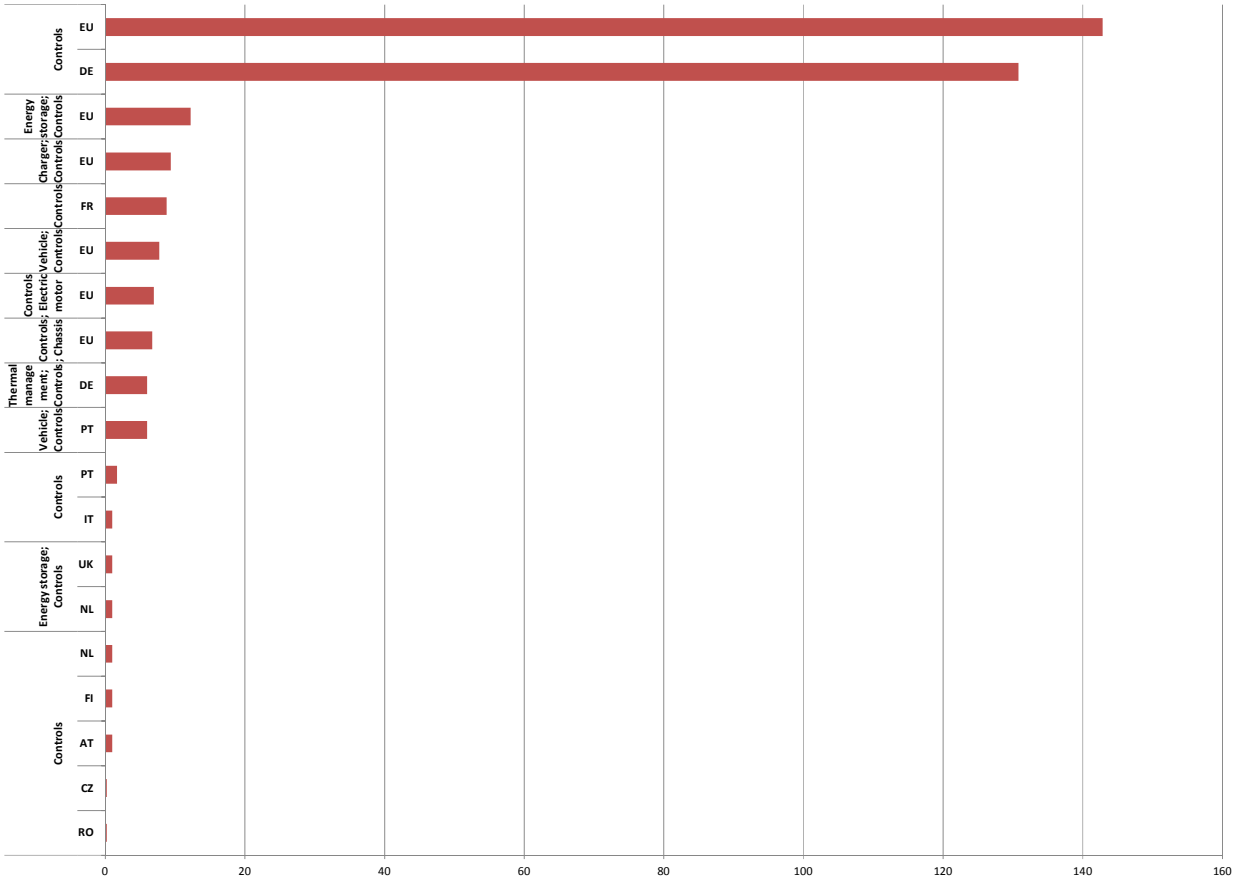


Figure 15 Budget distribution (million Euro) of controls related projects per co-funding MS

5.5. Thermal management

Research and development in this area covers the field of advanced new technologies needed for more efficient heating/cooling of electric vehicles, including thermal modeling and optimization of the passenger compartment, interior air handling, cooling loop design, front airflow and e-motor and battery cooling systems. In this category we also included the projects that investigate options to recover waste heat such as thermoelectric generation.

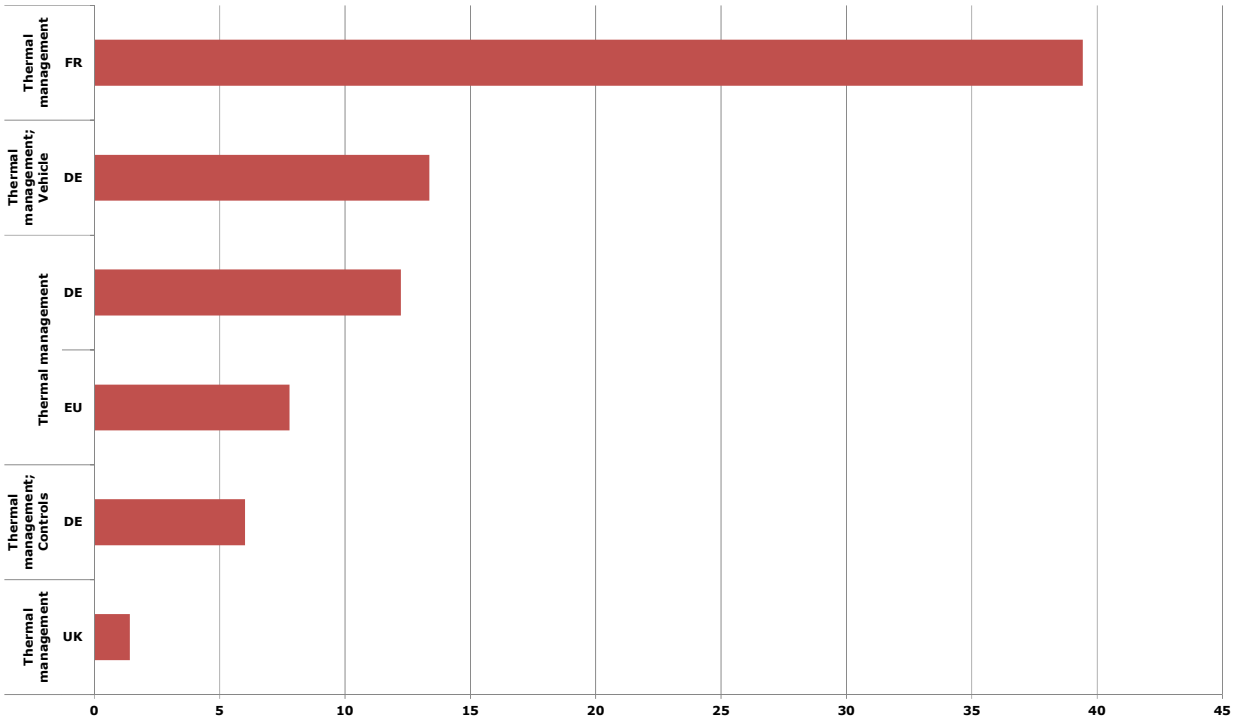


Figure 16 Budget distribution (million Euro) of thermal management related projects per co-funding MS

Thermal management related R&D is in most cases associated with R&D of other components (i.e. controls, vehicle body and architecture) (Figure 16).

A series of French projects look into heating and cooling systems of electric vehicles (COMPACITE, MOV'EO Memoire) and the improvement of the overall passenger compartment with respect to thermal management aspects (VEGA/THOP). German projects in this category are involved in R&D of improved heating/cooling systems (i.e. E-Comfort), and thermoelectric generation (eGeneration, HiTEG, HotGAMS). The EU FP7 co-funded projects such as ICE and TIFFE investigate efficiency improvements for thermal systems for EDVs.

5.6. Vehicle (body and architecture)

A typical challenge in electric vehicles is the packaging of the (large and heavy) battery. A typical opportunity in electric vehicles would be the use of in-wheel-motors, enabling new design freedom. Projects in the area of

vehicle (body and architecture) may be largely divided into 3 sub-categories: a) development of a new vehicle, especially realising new mobility concepts; b) EV design and architecture optimisation, and c) light-weight materials use and lightweight design solutions.

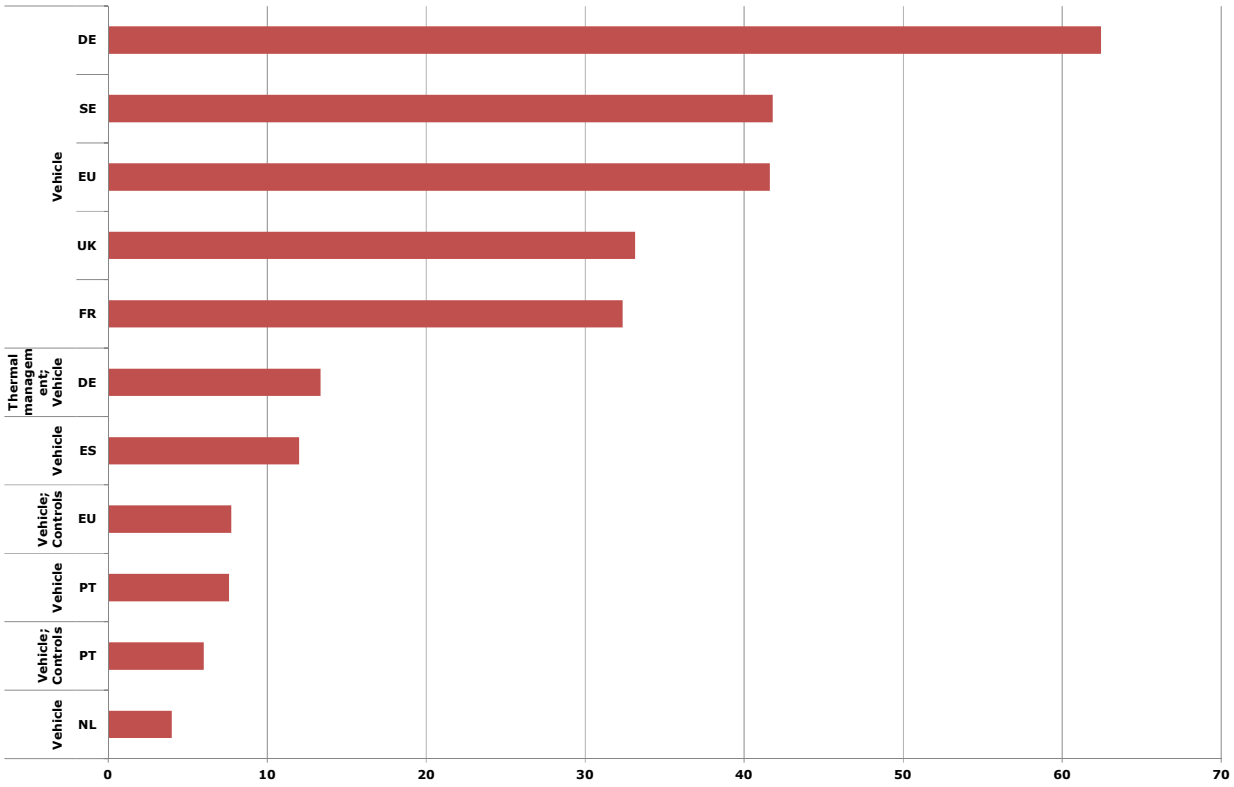


Figure 17 Distribution of vehicle body and architecture related projects per co-funding MS

Many of the member states invest in projects related to the development of innovative EDVs in passenger and light-duty segments. To some degree, R&D for EDVs bodies and architecture is performed together with selected other components R&D (Figure 17). The German projects 1PeFZ, Go-Innvello, and E2V develop small EDV based new mobility concepts; ExtraLight and Light-eBody investigate specific lightweight solutions tailored to EDV needs. In the Swedish Innovatum project several EDV test vehicles are built up to study in detail the integration of specific EDV subsystems in the overall vehicle. The EU co-funded projects E-Light and ELVA develop vehicle

architectures optimised for EDV applications, DELIVER and FURBOT focus on light commercial vehicle applications, while V-FEATHER aims at developing a EV architecture for urban light duty vehicles. The two UK co-funded projects E Van and HIUCV investigate the development of electric commercial vehicle applications.

5.7. Charger

There are generally two main types of charging systems: on-board or stationary. These charging systems are intended to complement one another, with each being more suitable for different charging scenarios (e.g. slow versus fast charging). Research and development is focused on advanced charging solutions for electric vehicles such as (wireless) inductive charging. There are only a few projects that are related to charger only R&D. Funding comes prevalently from Germany, Sweden and the EU (Figure 18).

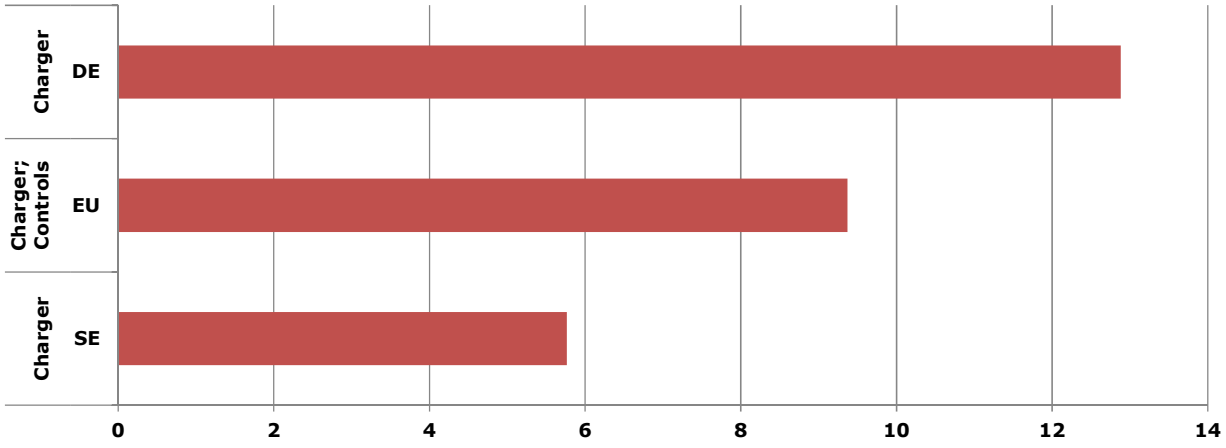


Figure 18 Budget distribution (million Euro) of charger related projects per co-funding MS

5.8. Chassis

Chassis related R&D research topics for EDVs aim at fully exploiting potential efficiency improvements. Also vehicle dynamics aspects are to be addressed when adapting conventional vehicle technologies to electric and hybrid vehicles. In particular, projects focus on global chassis control systems for

stability and safety (i.e. stability during regenerative braking, traction force control) or enabling new concepts such as individual wheel motors (IWM) and R&D for energy recovery through regenerative braking (i.e. combining regenerative and friction braking technology ensures maximum energy recovery whilst ensuring safety). EU co-funded projects play a major role in the R&D for this type of component. Sweden and the Netherlands also focus some of their R&D budget on chassis research (Figure 19).

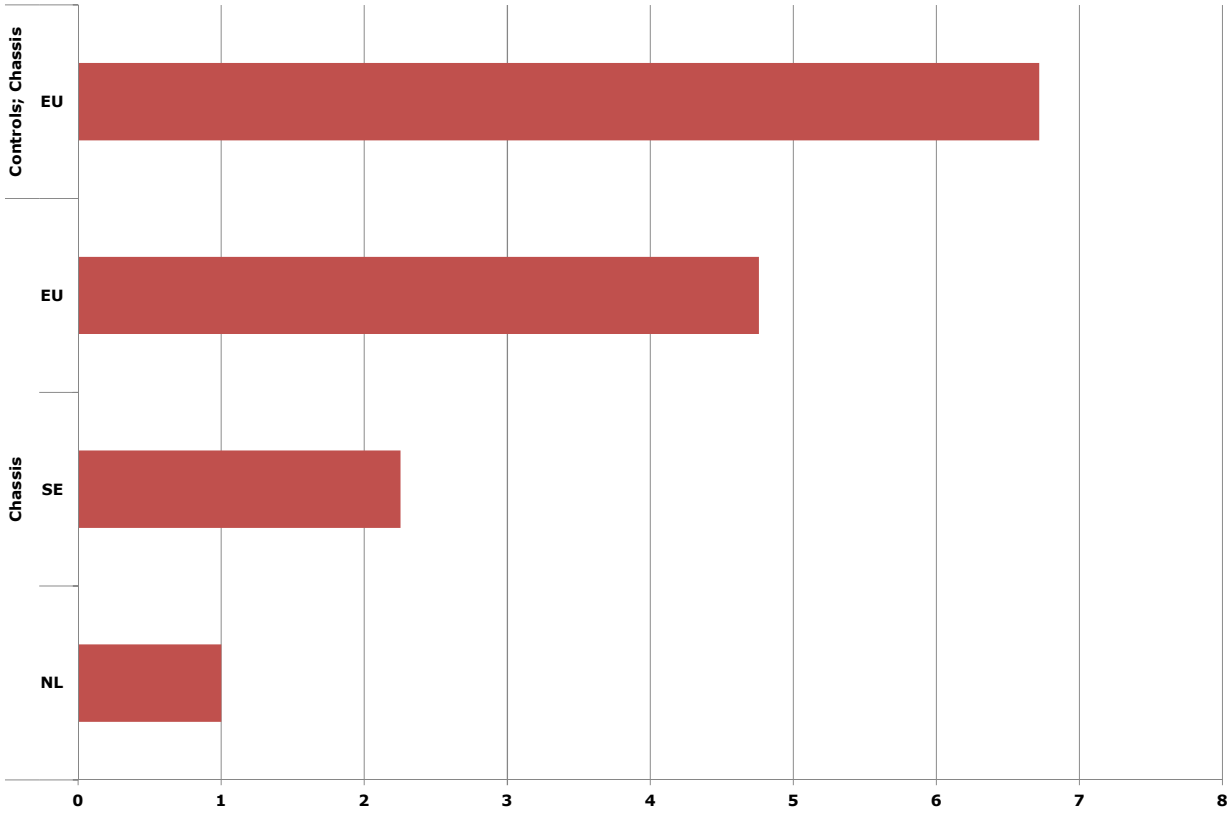


Figure 19 Budget distribution (million Euro) of chassis related projects per co-funding MS

5.9. Multiple components

There are a number of projects that cover several components in their research and development activities. We included in this category projects that aim at research and development of more than 2 components simultaneously. The UK with its "Low Carbon Vehicle Technology Project"

addresses in an integrative way all EDV components with a total project budget of 37 Mln Euro. For instance, this project in the part of drive motors is analysing the traction motor designs used in current hybrid and electric vehicles in order to simplify the selection of specific motor designs for particular vehicle applications.

The Spanish project "VERDE" and EU project P-MOB are other examples of such projects. The budget figures reflect the strategy of Spain and the UK to co-fund R&D on multiple components in an integrated way with a higher budget dedicated to such multi-component projects (Figure 20).

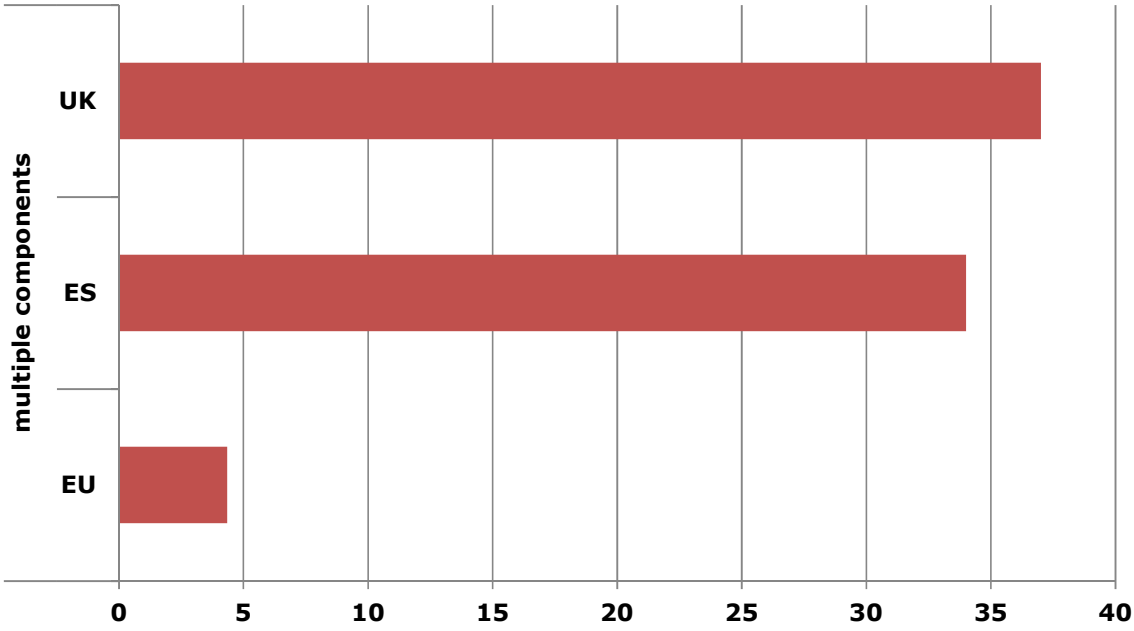


Figure 20 Budget distribution (million Euro) of projects related to multiple components of EDVs per co-funding MS

5.10. Other types of R&D projects

This category includes projects for modelling, coordination and monitoring of research and development for electric vehicles in Europe and projects that could not be associated to any of the other categories. These projects often assist in better coordination between different R&D directions; contribute to clustering of different projects with similar objectives and promote collaboration between project consortiums. Moreover, road mapping at EU

and national level of future prospects of R&D in electrification of road transport and informing the policy-makers on the advancements in the R&D field together with annual adjustments of roadmaps are the priorities of such projects.

Projects as for example CAPIRE (EU), ICT4FEV (EU), TU9/CN (Germany) are part of this category. The EU, Germany, France, and the Netherlands play a dominant role in co-funding these projects (Figure 21).

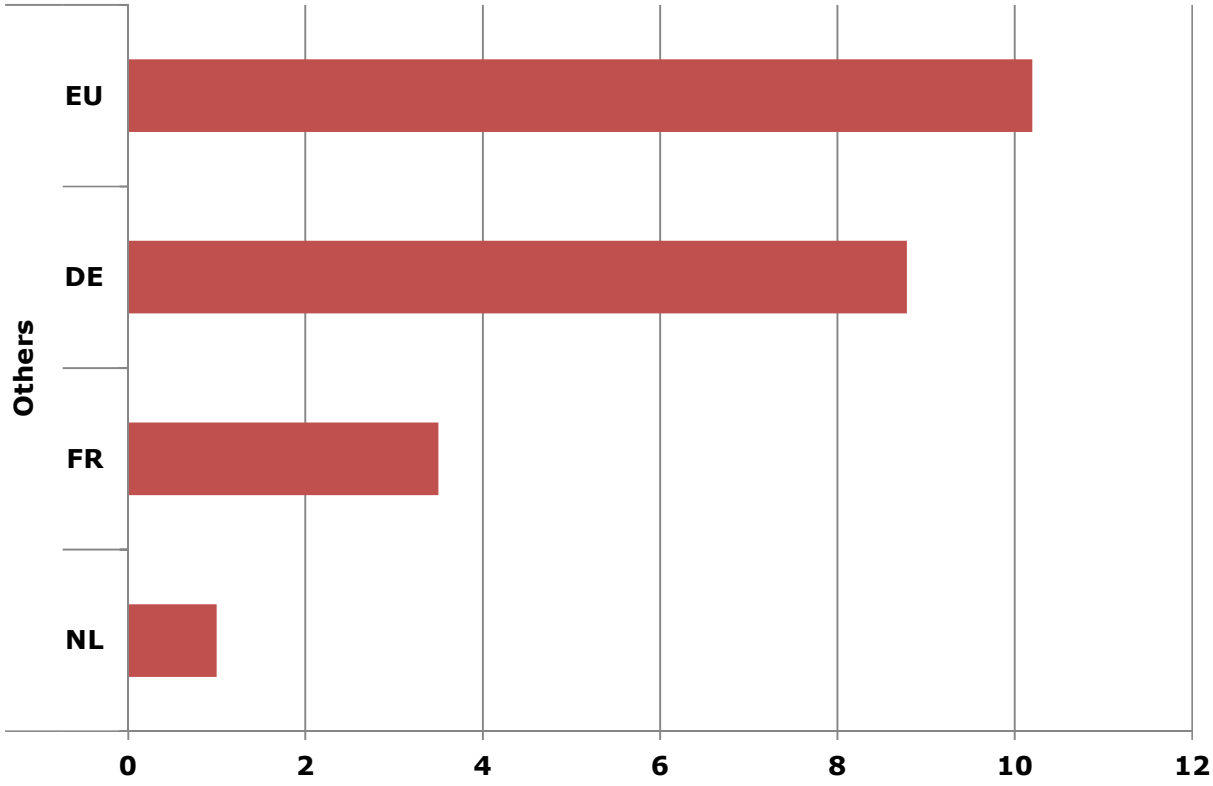


Figure 21 Budget distribution (million Euro) of R&D projects related to other types of R&D EDV thematic per co-funding MS

6. RESULTS: DEMONSTRATION PROJECTS

There is a large amount of demonstration projects already running in Europe. Figure 22 shows information on the number of projects and budget levels of the demonstration activities in each member state. The budgets of the demonstration projects displayed in Figure 22 and Figure 23 add up to a total

of 470 mln Euros. The highest amount of demonstration projects are co-funded by Germany, UK, France and Spain (Figure 22).

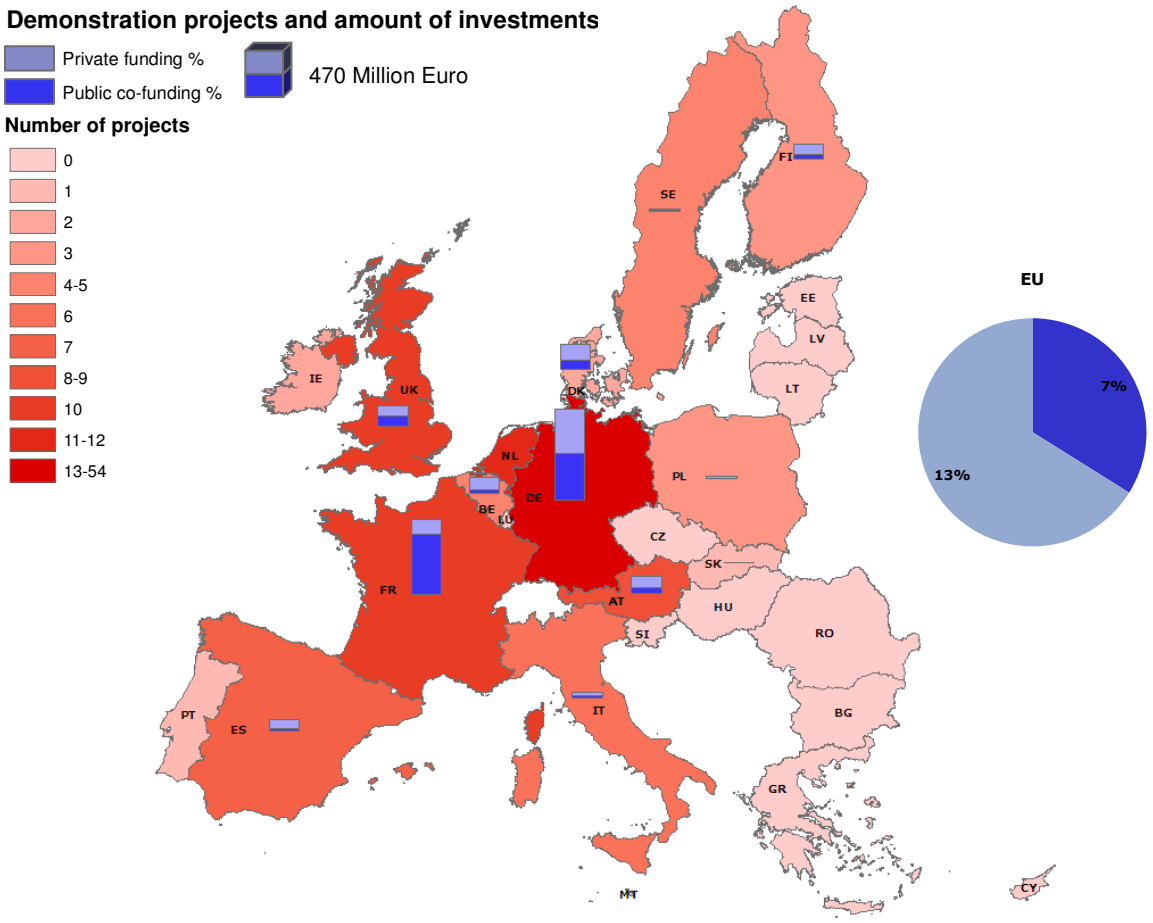


Figure 22 Demonstration projects number and amount of investments

Figure 23 portrays the location and geographical scale (city level, region level or country) of EDV demonstration projects. A high concentration of demonstration projects in Germany are noted around the cities of Berlin, Hamburg, Stuttgart, Munich, Frankfurt and the Ruhr area. In Italy, the projects are sparse across the country with major activities concentrated in Milan, Rome, Bari and Lombardy region. In Spain these projects are located in the coastal areas with foremost concentration in Barcelona and San-Sebastian. The French region Ile-de-France is since long a home to several demonstration projects for EDVs.

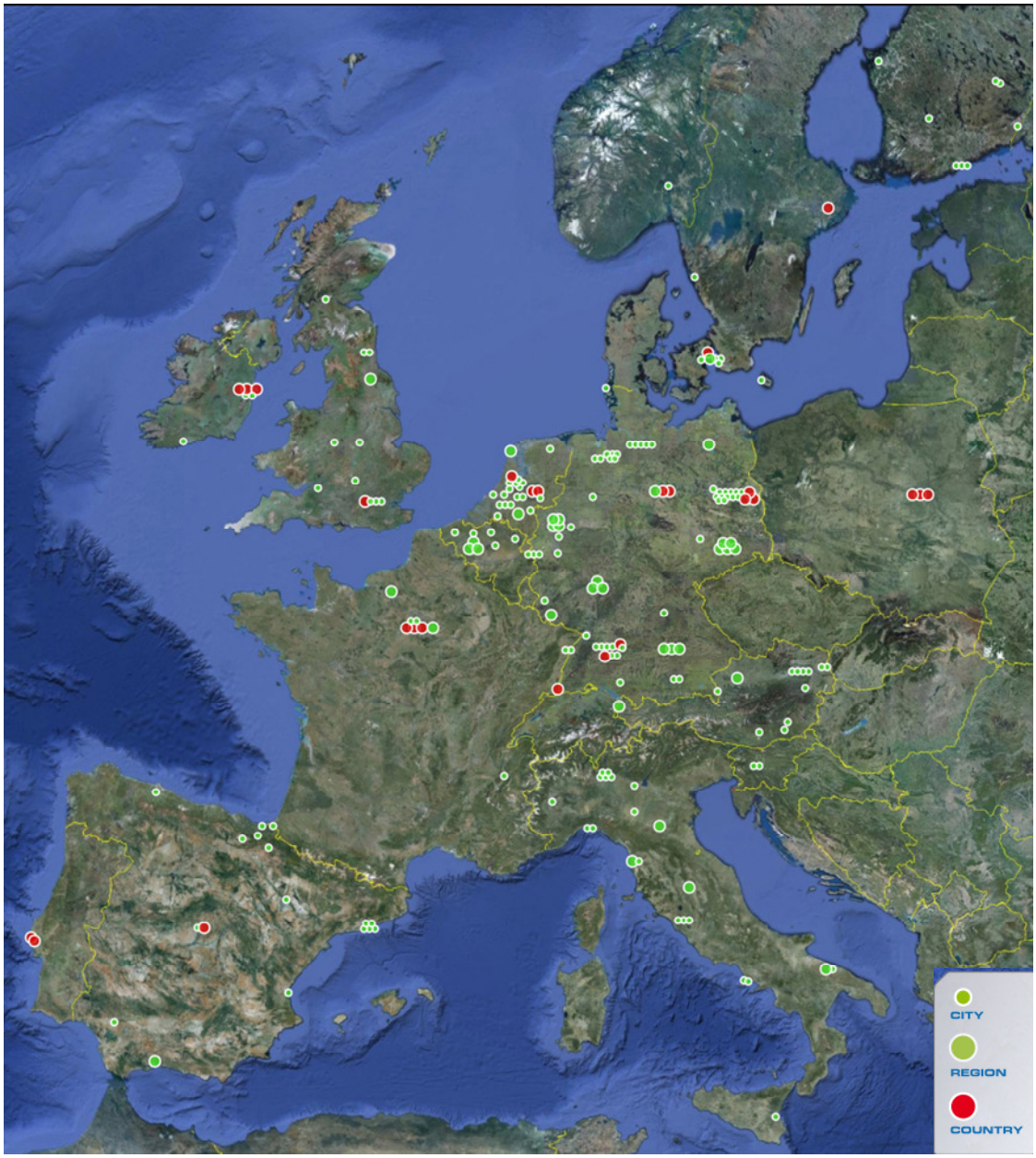


Figure 23 Location and geographical scale of demonstration projects (Source: JRC, EV-Radar 2012)

A number of important projects are running also in the UK (city of London, regions of Greater London, Birmingham, and Coventry) and Ireland. Swedish and Finnish cities and regions host a number of EU and nationally co-funded projects.

Major sources of funding for the demonstration phase of EDVs include:

- the 7th Framework Programme and Competitiveness and Innovation Framework Programme (CIP), cross-border cooperation programmes, European regional development fund, structural funds and Interreg at EU level;
- the German Model Regions of E-mobility funded by the Federal Ministry of Transport, Building and Urban Development and the ICT for e-mobility programme funded by the Ministry of Education and Technology[11];
- the Austrian Federal Ministry of Transport, Innovation, and Technology in model regions for e-mobility[12];
- the Flemish government in the Flemish Living Lab Electric Vehicles[13];
- Finland through EVE – Electric Vehicle Systems programme (footnote 10)
- France through Fonds démonstrateur, Fonds unique interministériel and regional funding of Ile-de-France Region;
- The Italian Ministry of Economic Development - INDUSTRIA 2015 Program and Authority of electrical energy and gas (AEEG);
- The Portuguese government through MOBE.E;
- UK co-funds its demonstration projects through the Ultra-Low Carbon Vehicle Demonstrator Programme within the Low Carbon Vehicles Innovation Platform[14]

Overall, all projects can be classified by their main fields of demonstration. These fields include:

- testing smart grid developments related to electromobility;
- field tests of innovative ICT solutions;

[11] http://www.ikt-em.de/de/1579.php; http://www.bmvbs.de/SharedDocs/DE/Artikel/UI/modellregionen-elektromobilitaet.html
[12] http://e-connected.at/content/modellregionen-0
[13] http://www.livinglab-ev.be/
[14] http://www.innovateuk.org/ourstrategy/innovationplatforms/lowcarbonvehicles.ashx

- demonstration/field tests of different types of EVs by OEMs and other stakeholders (i.e. passenger cars, light commercial vehicles, buses);
- demonstration of different business schemes involving EDVs in different services (postal offices, leasing companies, taxis);
- development of electric vehicle charging infrastructure with EDVs testing;
- testing innovative urban mobility concepts with EDVs;
- promoting public awareness for EDVs.

Among demonstration projects co-funded within FP7 are GREEN E-Motion, MOBI-EUROPE, ICT4EVEU, MOLECULES and SMART-CEM. 3 projects receive a joint EU and Member State co-funding: the Spanish SmartCITY project, the EPV project in the Valencia region and the Swedish Hyper Bus project. Overall most of the EU15 countries co-fund demonstration projects with dominant funding coming from Germany, France and the UK (Figure 22 and Boxes 5-9). The Boxes 5-9 on the following pages list some examples of demonstration projects in various member states.

Box 5. Examples of demonstration projects in various Member states

Austria

Clean Motion Upper Austria
Graz model region (Grossgraum)
Kärnten Model region (E-Log)
Niederösterreich Model Region (E-pendeler)
Rheintal - Vlotte (Vorarlberg) Model region
Salzburg model region (Electrodrive)
Vienna -Bratislava e-mobility
Vienna Model region (e-mobility on demand)
Vienna Model region (E-mobility post)

Belgium

EVA (Elektrische Voertuigen in Actie)
iMOVE (innovatie door elektrische mobiliteit in Vlaanderen)
Linear (Local Intelligent Networks and Energy Active Regions)
OLYMPUS
SPARC (Smart Plug-in Automobile Renewable Charging Services)

Spain

CITIELEC
ELECTROBUS: ENERGY EFFICIENT BUS NETWORK FOR BARCELONA
Live (Logistics for Implementation of Electric Vehicles)
Livingcar project
MOVELE

Finland

EcoUrban Living
EVELINA
Helsinki Demonstration Project

Box 6. Examples of demonstration projects in various Member states

Germany

Linie 103
MeRegioMobil (Electric Mobility in a Future Energy
MINI E Berlin 1.0
MiniE Berlin 2.0 (MINI E Berlin powered by Vatten
MOREMA
MR Bremen-Oldenburg
O(SC)²ar - Open Service Cloud for the Smart Car
PMC (Personal Mobility Center) Module 1
PRIMO2
Primove Road
REX (Batteriefahrzeug mit Range Extender)
SaxHybrid
SaxMobility
SaxMobility II
Smart Wheels (Taxi Drive with E-Power)
Stromschnelle (E-Mobilität im Pendlerverkehr)
Twindrive

France

CROME
DHRT2
ELLISUP
MOV'EO CENTRALE OO
MOV'EO Scolelec)
SAVE (Seine Aval Electric Vehicle)
Strasbourg PHV project
VELECTA
ZEN-EDRIVE

Box 7. Examples of demonstration projects in various Member states

Ireland

EPRI
ESB ecarsw trial

Italy

E-Mobility
Emobility Italy
E-Moving
ENEL Distribuzione - HERA
Green Land Mobility
SEM (Solar Energy Mobility)
ZEC – Zero Emission City –
Piano di mobilità elettrica per la città di Parma, 2011 – 2015".

Netherlands

Amsterdam Electric
CityShopper elektrische stedelijke bezorgservice
Demonstration and R&D
Demonstration of EV's
Diesel Hybrid Bus Province of Gelderland
Diesel Hybrid Bus Rotterdam
Elektrisch bezorgen van levensmiddelen
Elektrische Greenwheelsauto's in de G4
Elektrische vuilnisauto's bij Van Gansewinkel Groep
Elektropool Haaglanden
E-Public Transport
Fijnmazige stadsdistributie/pakketbezorging
Hybrid Mercedes-Benz Trucks
Prestige GreenCab
Rotterdam Test Elektrisch Rijden (voorheen 75-EV-RO)
Texel Gastvrij Elektrisch Vervoer - Opladen op Texel
Volvo Hybride Trucks

Box 9. Examples of demonstration projects in various Member states

Sweden

E-mission in The Øresund Region
E-Mobility
Energimätning på elfordon (Energy Management in Electric Vehicles)
Energy storage system(EES) for heavy duty vehicles (Nilar)
Hyper Bus (Hybrid and Plug-in Extended Range Bus system)
Plug-in City

UK

CABLED (Coventry and Birmingham Low Emmission Demonstrators)
EEMS Accelerate
EVADINE (Electric Vehicle Accelerated Development in the North East)
Ford Focus Battery Electric Vehicle (BEV)
London South East Bid
MINI E
Peugeot Electric Cars
PHV: Paving the way forfull commercialisation
SwitchEV
Ultra Low Carbon Vehicle Demonstrator Programme

Portugal

MOBI.E

Poland

"ECO-Mobility";
Development of electric vehicles market, with infrastructure and charging stations – basis for energetic safety in Poland

7. CONCLUSIONS

A single European market for electric vehicles can only happen based on a coordinated approach and level playing field for all key-players. A number of barriers impeding the large scale market penetration of electrical drive vehicles are tackled amongst others through public-private partnerships. Such cooperation can be seen through investments in various stages of technology development, namely research, development, and demonstration. In our study we looked at the introduction of electric vehicles through a prism of public and private investments into R, D & D projects across Europe. There were several challenges encountered during the collection of information due to in some cases scarce or difficult to find information, which to a best possible extent was dealt with through information validation with the help of national contacts and project coordinators. Not all project coordinators could be reached; therefore information of some projects available in the database needs to be improved.

This report contains information on 320 R, D, and D projects in Europe with a total budget of 1.6 Billion Euro, of which 65% is public funding. The projects listed in this report cover the period from 2007 to 2015. In general, projects in R&D and demonstration that are publicly co-funded are not evenly distributed across Europe. The largest number of projects is co-funded by EU15 countries. Almost 80% of private and public investments cover R&D projects. A large share of R&D projects is co-funded by the European Union through different programs, while the EU has fewer stakes in the co-funding of European EDV demonstration projects. It contributes mostly with large-scale demonstration projects in field tests distributed across Europe. It can be noted that generally bigger cities are targeted by demonstration projects with a high concentration of several projects in large capitals (i.e. Berlin, Rome, Paris, and London). There are two different approaches of Member States chosen for the EDVs introduction: some target

larger urban areas for field testing and infrastructure development, others – through so called "model regions", where different types of EDV models and related business schemes are introduced throughout a country tackling specific issues of a region (tourism increase, presence of corporate fleets, high share of commuting, etc).

Among the R&D projects, the highest amount is dedicated to research in energy storage, controls and the vehicle body and architecture field reflecting the need to address major barriers for large scale EDV diffusion such as "range anxiety" and cost. In Member States, there is uneven distribution of projects related to different components that are subject to research and development. While almost all MS invest in vehicle (body and architecture) projects, fewer of them dedicate funding to components such as energy storage, electric motor, controls, thermal management, and chargers. Due to large investments needed for R&D in these fields, many of the partners participate in EU co-funded projects, forming consortiums together with partners from non-EU countries such as Israel, Macedonia, Norway, Switzerland, Turkey, China, Ukraine and USA. Various stakeholders are involved in the consortiums, the composition of which differs per component that is being researched and the typology of the projects.

It can be concluded that many R, D and D activities in electromobility are currently performed throughout Europe. These activities are important to maintain Europe's leading role in engineering and manufacturing transport equipment and providing transport services. To better leverage the synergies in the various activities across Europe, the authors believe that more information exchange and more coordination between projects would be beneficial. The authors hope that this report along with the EV-Radar tool is a contribution to an improved information exchange. Such exchange and coordination should certainly gain more momentum through the recently

launched European Electro-mobility Observatory and the forthcoming implementation of the Strategic Transport Technology Plan.

8. ABBREVIATIONS AND ACRONYMS

EU	European Union
EDV	Electrical drive vehicle
BEV	Battery electric vehicle
PHEV	Plug-in hybrid electric vehicle
ICE	Internal combustion engine
V2G	Vehicle-to-grid
R&D	Research and development
OEM	Original equipment manufacturer
JU	Joint Undertaking

Country codes	**Countries**
AT	Austria
BE	Belgium
CH	Switzerland
CZ	Czech republic
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GR	Greece
HR	Croatia
IE	Ireland
ISR	Israel
IT	Italy
LU	Luxemburg
MC	Macedonia
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
SE	Sweden
SK	Slovakia
SI	Slovenia
TR	Turkey
UA	Ukraine
UK	United Kingdom
US	United States

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ANNEX I

Project Information Sheet

Project abbreviation: Full Title:	Project budget: € Public co-funding: € Funding Member State: Funding Body and/or Funding Program:
Started: Duration:	Funding type: Private/Public
SHORT PROJECT DESCRIPTION	
PROJECT COORDINATOR	
PROJECT PARTNERS	
OEMs, Academic/Research; Industry/Suppliers; Energy Utility; Services	
participating countries	
PROJECT CATEGORY	
Topic: Classification:	
PROJECT LINK	
PROJECT STATUS	

ANNEX II

R&D project list

Funding country	Vehicle component	Project ID	Name and Abbreviation of a project	Brief project description	Coordinator organization	Link
AT	Controls	P1	Ballade 2 (Next generation e-charging: Neue Anforderungen und Technologien für intelligente Lade- Infrastruktur im eMobilityÖkosystem)	Explores the issues of information flow in the ecosystem "electric vehicle – driver – charging infrastructure and energy supply from renewable energy sources" as a basis for creation of an expert system with the aim of optimizing the ecological and economic efficiency of the overall system and interoperability between operators of infrastructure in different regions and providers	Cirquent GmbH	http://www2.ffg.at/verkehr/projekte.php?id=787&lang=de&browse=program
	Electric motor	P2	E-Drive (Effizienzgesteigerte E-Maschinen für automotive Anwendungen)	Electric machines, as they are in use with forward-looking vehicles are relatively heavy. In the project the combination of the electric machine with a planetary gear is researched. In the ideal case for Miba a completely new business area could be developed	Traktionssysteme Austria	http://www2.ffg.at/verkehr/projekte.php?id=798&lang=en&browse=program
		P3	Innovative weichmagnetische Materialien für Traktionsantriebe	The aim of this project is the investigation of the magnetic, thermal and mechanical properties of the new soft magnetic materials. The obtained measurement should serve as basis for generating time and frequency domain models in finite element models.	AIT Austrian Institute of Technology - Energy&Mobility	http://www2.ffg.at/verkehr/projekte.php?id=788&lang=de&browse=program
		P4	Transmission with new technology for low cost & low weight & high efficient hybrid powertrains (TNT)	This project focuses on the development such a so-called "Transmission with New Technology (TNT)" concept with two particular innovative aspects: Firstly, an e-motor directly integrated into the gear box offering the functionality of electrically driven synchronization, thus, replacing the conventional one. The second innovative aspect is the use of an "automated shift dog-clutch" with 100% efficiency.	AVL LIST GMBH	http://www2.ffg.at/verkehr/projekte.php?id=794&lang=en&browse=program
	Others	P5	On-Board Powerplant: Numerische Optimierung von Verbrennungsmotoren in seriellen Hybrid-Antrieben	The engine process will be described based on thermodynamic and fluid dynamic principles. It will be analyzed together with the electric powertrain and the operation strategy in a single simulation environment.	TU Wien - Institut für Verbrennungskraftmaschinen u. Kraftfahrzeugbau	http://www2.ffg.at/verkehr/projektpdf.php?id=793&lang=en
BE	Charger	P6	CED (Continuous Electric Drive)	Technical feasibility study on inductive charging for buses and passenger cars - Volvo cars C30	Flanders Drive	n/a
	Energy storage	P7	ESTO	Focus on Li-batteries for passenger cars and busses, so more component level research project	VITO	http://www.livinglab-ev.be/platformen
		P8	EV TechLab	Platform in the Flemish Living Lab electric vehicles with the scope of the development of electric powertrains for EV, the development of electric heavy duty vehicles and the introduction of electric bussess with inductive charging in Bruge	PunchPowertrain	http://www.livinglab-ev.be/platformen
DE	Charger	P9	Induktive Energieübertragung - Optimierung von Komponenten der induktiven Energieübertragung und Systemerprobung	Optimization of components of the inductive energy transmission and system testing	Alcatel-Lucent Deutschland AG	n/a
		P10	Induktive Energieübertragung (Optimierung von Komponenten der induktiven Energieübertragung und Systemerprobung)	Optimization of components of the inductive energy transmission and system testing	Industrieanlagen-Betriebsgesellschaft mit beschränkter Haftung Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (FhG)	n/a
		P11	Kabelloses Laden von Elektrofahrzeugen (W-Charge)	Wireless communication between the vehicle and the sides of street and grid.	Audi Electronics Venture GmbH	http://www.w-charge.de/
		P12	SEB: Schnellladesysteme für Elektrobusse im ÖPNV (SEB)	Fast charging systems for electric buses in public transport	Fraunhofer-Institut für Verkehrs- und Infrastruktursysteme IVI	n/a
	Controls	P13	DIANA (Durchgängige DIagnosefähigkeit in Halbleiterbauelementen und übergeordneten Systemen zur ANAlyse von permanenten und sporadischen Elektronikausfällen im samtsystem Automobil)	Comprehensive diagnostic capabilities in semiconductor devices and supervisory systems for the analysis of permanent and sporadic automotive electronics failures in overall system.	AUDI	http://www.iti.uni-stuttgart.de/abteilungen/rechnerarchitektur/projekte/diana.html
		P14	EM4EM (Elektromagnetische Zuverlässigkeit und elektronische Systeme für eMobility-Anwendungen)	Electromagnetic and Electronic Systems Reliability for eMobility applications	AUDI	n/a
		P15	e-mobility (ICT-based integration of electric mobility in the networks for the future)	Project aims to develop an innovative smart-charging and billing infrastructure for electric passenger vehicles that can be integrated into the existing electricity grid. Project research focuses on the development of an open-interface communication system	RWE Efficiency GmbH	http://www.e-ikt.de/
		P16	HELP (Zuverlässige und kostengünstige Hochtemperatur-Elektronik für die Elektromobilität auf Basis von Leiter-Platten aus hochtemperaturbeständigen Harzsystemen)	Reliable and cost-effective high-temperature electronics for electric vehicles based on printed circuit boards from high temperature resistant resin systems	Schweizer Electronic AG	http://www.clusterle.de/uploads/media/Strom_Hochtemperatur_Elektronik.pdf

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DE		P17	HI-LEVEL (Hochstromleiterplatten als Integrationsplattform für Leistungselektronik von Elektrofahrzeugen)	High-current PCB as an integration platform for power electronics of electric vehicles	Conti Temic microelectronic GmbH	http://www.clusterle.de
		P18	iKRAVT (Integrierte Keramik-Metall-Verbunde für robuste Aufbau- und Verbindungs-Technologien leistungselektronischer Module)	Built-in ceramic-metal composites for robust construction and connection technologies for power electronic modules	Robert Bosch GmbH	http://www.clusterle.de
		P19	KAIROS (Keramische Aufbau- und Integrationstechnik für robuste Signal- und Leistungselektronik)	Ceramic design and integration technology for robust signal and power electronics	Siemens AG	http://www.clusterle.de
		P20	MHF4EV (Hoch effizienter Modularer Hochfrequenz Umrichter für einen Antriebsstrang der nächsten Generation von Elektrofahrzeugen)	Modular high-efficiency high-frequency inverter for a drivetrain of the next generation of electric vehicles	INFINEON TECHNOLOGIES AG	http://www.clusterle.de
		P21	NeuLand (Neuartige Leistungs-Bauelemente mit hoher Energieeffizienz und Wirtschaftlichkeit auf Basis von Verbindungshalbleitern mit großer Bandlücke)	New power devices with high energy efficiency and economy on the basis of compound semiconductors with large band gap	INFINEON TECHNOLOGIES AG	http://www.clusterle.de
	Controls	P22	PELIKAn (Power Electronics in Kraftfahrzeug und Aeronautik)	The goal of the project is to initiate innovative developments in the field of direct current converters (DC / DC converter) for motor vehicles and aircraft. These converters are designed for the further electrification of motor vehicles and aircraft	Fraunhofer ISI	http://www.clusterle.de
		P23	PowerGaNplus (Leistungswandler in GaN-Technologie zur Erschließung ungenutzter Energiepotenziale)	Power conversion in GaN technology for unexploited energy potential	Fraunhofer IAF	http://www.clusterle.de
		P24	ProPower: Kompakte Elektronikmodule mit hoher Leistung für Elektromobilität, Antriebs- und Beleuchtungstechnik	Compact electronics module with high performance for electric mobility, and drive-lighting technique development	Siemens AG	http://www.projekt-propower.de/
		P25	RESCAR 2.0 (Robuster Entwurf von neuen Elektronikkomponenten für Anwendungen im Bereich Elektromobilität)	Research goal is to secure a life forecast for bonding connections already in the production and at the same time increase its lifetime of at least 100%. Thus a projects sets new benchmark for the reliability of bonding connections.	INFINEON TECHNOLOGIES AG	http://www.clusterle.de/uploads/media/Strom_Elektronikkomponenten_Elektromobilitaet.pdf
		P26	RoBE (Robustheit für Bonds in E-Fahrzeugen)	The reliability of power electronic modules that are needed for the propulsion of electric vehicles is largely determined by the life of the current-carrying wire connections to the chips, the so-called bonding connections.	Audi AG, Ingolstadt	http://www.clusterle.de/seitennavigation/cluster-service/projekte/aktuell/aktuelles-details/?tx_ttnews%5Btt_news%5D=133&cHash=838a9c318ee0d2b7798002da2eeefb26
		P27	UltiMo 9Ultrakompaktes Leistungs-Modul höchster Zuverlässigkeit)	In the project "Ultimo" a completely new module concept will be developed, which allows much more compact power modules and realize flatter than current ones. In addition to minimizing the number of different materials in the project a new kind of highly effective double-sided cooling of the components is developed.	Conti Temic microelectronic GmbH, Nürnberg	n/a
		P28	UTTERMOST (Ultimate Enablement Research on 32/28 nm CMOS Technologies)	Project is making use of earlier 32 nm research performed in the FP6 PULLNANO project, which provided an initial demonstration of a 32 nm SRAM, and by the IBM International Semiconductor Development Alliance (ISDA). It will continue the 32 nm development effort in Europe up to full production and industrialisation	CEA	n/a
	Electric motor	P29	HyBa: Energieeffizientes Antriebssystem für hybride Baumaschinen mit elektrifiziertem Drehwerk zur Steigerung der Energieeffizienz	Energy-efficient hybrid drive system for construction of electrified rotating mechanism to increase energy efficiency	Liebherr-Elektronik GmbH, Lindau	http://www.clusterle.de/uploads/media/LES_HyBa.pdf
		P30	iFlux (Innovative Antriebe und Leistungselektronik für künftige Elektrofahrzeuge)	The joint project is a new type of electric propulsion iFlux - called a transverse flux machine - examined together with the accompanying power electronics and evaluate its suitability for electric vehicles.	Bayerische Motoren Werke Aktiengesellschaft (BMW AG)	http://www.clusterle.de/seitennavigation/cluster-service/projekte/aktuell/aktuelles-details/?tx_ttnews%5Btt_news%5D=128&cHash=1177256721bff646401bb50fef73aa16&no_cache=1&sword_list%5B0%5D=iflux
		P31	MORE (Recycling von Komponenten und strategischen Metallen aus elekt. Fahrantrieben (Motor Recycling)	Recycling of components and strategic metals from electric traction drives	Siemens AG	http://www.clusterle.de
		P32	PerEMot - Permanenterregter Elektromotor mit verbesserten Eigenschaften hinsichtlich der verwendeten magnetischen Materialien	Permanent-magnet electric motor with improved characteristics of the used magnetic materials	Siemens AG	http://www.clusterle.de/uploads/media/Strom_Permanenterregter_Elektromotor.pdf
		P33	AKUZIL: Entwicklung zyklisierbarer Zinkelektroden mit definierten Strukturen auf Basis verschiedener Prozess- und Formulierungsstrategien	development of zinc electrodes with defined structures based on various process and formulation strategies	TU Clausthal	n/a
	Energy storage	P34	AlkaSuSi - Neue Materialkonzepte für Alkalimetall-Schwefel-Batterien bzw. Akalimetallsulfid-Silizium Batterien	New material concepts for alkali metal-sulfur Batteries or Akalimetallsulfid silicon batteries	Fraunhofer-Institut	http://www.lib2015.de/projekte_detail.php?projekt=24

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DE	Energy storage	P35	BASTA (Batterien für Strom für den Tank und den Antrieb)	Development of electrochemical Li-ion energy storage system	VARTA Microbattery GmbH	http://www.varta-microbattery.com/applications/mb_data/documents/press_releases/PR20111208_VARTA_Microbattery_startet_weitere_Forschungsprojekte_de.pdf
		P36	DE-LION-1 (Entwicklung von Material fur Elektroden und Sparatoren in Lithium-Ionen-Batterien fur mobile und stationare Anwedungen)	Development of materials for electrodes and separators in lithium-ion batteries for mobile and stationary applicationsmobile and stationary applications	Süd-Chemie Aktiengesellschaft	http://www.lib2015.de/projekte.php
		P37	DryLIZ: Trockene Fertigung von Lithium-Ionen-Zellen	This work focuses on the aqueous and dry processing of anodes and cathodes for lithium ion cells and their further processing by cutting and joining.	ULT AG	http://www.produktionsforschung.de/verbundprojekte/vp/index.htm?TF_ID=114&VP_ID=3426
		P38	Energy storage/process technology (Entwicklung von Prozess- und Produktionstechnologie für Energiespeichersysteme in industriellen Anwendungen im Bereich der Elektromobilität)	Development of process and production technologies for energy storage systems	HOPPECKE Advanced Battery Technology GmbH	http://www.e-mobil-sachsen.de/Startseite/Partner-Projekte/BMVBS-Projekte/Projekt-Energiespeicher.html
		P39	eProduction: Produktionsforschung zu Hochvoltspeichersystemen für die Elektromobilität	Production of high-voltage batteries for electric vehicles	AUDI AG, Ingolstadt	http://www.rfh-koeln.de/sites/rfh_koelnDE/myzms/content/e497/e7261/e7269/e7270/13N12027ff_eProduction_Steckbrief_FINAL_ger.pdf
		P40	GLANZ (Wiederaufladbare Lithium - Luft - Zelle mit glasbasiertem Festkörperelektrolyten und geschützter Anode)	Rechargeable lithium-air cells for future use in electric vehicles with significantly extended range	SCHOTT AG	http://www.clusterle.de
		P41	Lessy (Litium-Ionen Energiespeicher System)	LESSY stands for lithium electricity storage system—is testing the first large-scale lithium ceramic storage device. This is the technology that will help power fully electric vehicles in the future	Evonik Industries AG	http://corporate.evonik.com/de/content/product-news/Pages/lessy.aspx
		P42	LHYDIA - Leichtbau-Hydraulik im Automobil	Lightweight hydraulic in automotive applications	Bosch Rexroth AG	n/a
		P43	LIB2015 - LiVe (Lithiumbatterie-Verbundstrukturen)	Nanostructuring of electrode structures for lithium batteries with high performance base materials currently available and the technical mastery of the process-integrated manufacturing precision electrode / electrolyte structures.	University of Munster	http://www.uni-muenster.de/LIB2015/projekte/LiVe/Welcome/index.html
		P44	LiB2015 -Li-Five (Fünf-Volt-Lithium-Ionen-Zellen mit hoher Lebensdauer)	Five-volt lithium-ion cells with long life at high depth of discharge for plug-in hybrid and electric vehicles	TEMIC Automotive Electric Motors GmbH	http://www.lib2015.de/projekte
		P45	Lib2015-BatMan (BatterieManagement für mobile Litium-Ionen-Energiespeicher)	Battery management for mobile lithium-ion energy storage	Robert Bosch GmbH	http://www.lib2015.de/projekte
		P46	LiB2015-Helion (Hochenergie-Lithiumionen-Batterien für die Zukunft)	Advanced Li-batteries with high energy density (> 300 Wh / kg) to develop, which are characterized also by high reliability, long life and good environmental performance.	BASF SE	http://www.lib2015.de/projekte
		P47	LiBRi (Entwicklung eines realisierbaren Recyclingkonzepts für die Hochleistungsbatterien zukünftiger Elektrofahrzeuge)	Development of a viable recycling concept for the high-performance batteries of future electric vehicles	Umicore AG & Co. KG, Hanau	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/batterierecycling/libri
		P48	LI-Mobility - Erforschung der Grundlagen für Batteriemanagementalgorithmen für LiFePO4 Batterien in Elektrofahrzeugen unter Berücksichtigung der Alterung	Exploration of the foundations for battery management algorithms for LiFePO4 batteries in electric vehicles, taking into account the aging	RWTH Aachen, ISEA	http://www.isea.rwth-aachen.de/de/energy_storage_systems_projects_limobility/
		P49	LiSSi (Batteriemodellierung und Entwicklung für Li-S/Si Systeme)	Development of a lithium-sulfur battery consisting of a nanostructured Silicon anode, novel silicon-based electrolyte, a lithium ion-conductive solid electrolyte diffusion barrier layer and sulfur cathode.	Technische Universität Munchen	http://www.lib2015.de/projekte
		P50	LithoRec/LithoRecII (Recycling von Lithium-Ionen-Batterien)	The LithoRec Consortium aims at developing and testing efficient processes and concepts covering several phases of the life cycle for recycling lithium-ion batteries in Germany. The project comprises two approaches: one relating to only one phase of the life cycle, the other relating to several phases.	Technische Universität Braunschweig	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/batterierecycling/lithorec
		P51	PRIMO2 (Entwicklung von modularen, verteilten Energiespeichersystemen und kostenoptimierten Herstellungsverfahren für den Einsatz im Bereich des ÖPNV)	Development of modular, distributed energy storage systems and cost-effective manufacturing processes for use in public transport	HOPPECKE Advanced Battery Technology GmbH	http://www.hoppecke.com/
		P52	ProLIZ: Produktionstechnik für Lithium-Ionen-Zellen	the development and implementation of economic, industry-related production technology for high energy storage cells with the goal of a viable cell at the end of the process chain.	Manz Tübingen GmbH	http://www.produktionsforschung.de/verbundprojekte/vp/index.htm?VP_ID=3427
		P53	ProSysEasy (Innovative Werkstoffe zur Prozess- und Systemvereinfachung der Li-Ionen- Batterie)	Innovative materials for process and system simplification of the Li-ion battery	Robert Bosch GmbH	n/a
		P54	ReLiOn - Lebensdauer und Zuverlässigkeit von Li-Ionen Akkumulatoren - Degradationsmechanismen, beschleunigte Erprobung, treffsichere Lebensdauerprognosen	For selected cells, a general understanding of the interrelationships of cell materials / design and stress profile with measurable performance of waste and material changes will be developed on a microscopic level.	Robert Bosch GmbH	n/a

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DE	Energy storage	P55	STROM ReLion (Lebensdauer und Zuverlässigkeit von Li-Ionen Akkumulatoren - Degradationsmechanismen, beschleunigte Erprobung, treffsichere Lebensdauerprognosen)	Life and reliability of Li-ion accumulators - degradation mechanisms, accelerated testing, accurate life predictions	Robert Bosch GmbH	n/a
		P56	STROM-LULI (Strom aus Luft und Li - Effiziente bifunktionelle Sauerstoffelektroden im nichtwässrigen Elektrolyten)	Flow of air and Li - Efficient bi-functional Oxygen electrodes in the non-aqueous electrolytes	Rheinische Friedrich-Wilhelms-Universität Bonn	n/a
		P57	STROM-STELLA (Strukturierte Elektroden fur Metall-Luft-Akkumulatoren))	Structured electrodes for metal-air batteries	Westfälische Wilhelms-Universität Münster	n/a
	Others	P58	Begleitforschung (Begleitforschung zu Technologien, Perspektiven und Ökobilanzen der Elektromobilität) - Monitoring Research on Electric Mobility	Monitor and forecast the developmnet of EV market	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)	http://www.clusterle.de/uploads/media/Strom_Begleitforschung_Technologien.pdf
		P59	EMOTOR: Energiespeicher-MOniTORing für die Elektromobilität	Roadmapping of EVs	Fraunhofer-Institut für System- und Innovationsforschung ISI	http://www.clusterle.de/uploads/media/Strom_Energiespeicher_Elektromobilitaet.pdf
		P60	Fraunhofer Systemforschung Elektromobilität	Within this project, the goal is to ease the transition to a sustainable "all-electric economy" t. The peculiarity of the Fraunhofer approach is to consider the entire value chain of electric mobility and to explore integrated approach.	Fraunhofer ISI	http://www.elektromobilitaet.fraunhofer.de/
		P61	Hybrides Fügen (Hybrid Joining of multi-material systems for motor vehicles)	Hybrid joining of multi-material systems for motor vehicles	Drahtwerk Elisental W. Erdmann GmbH & Co	http://www.clusterle.de
		P62	HYLIGHT (Entwicklung einer neuartigen Hybridleichtbautechnologie für die Automobilindustrie)	Development of a novel lightweight hybrid technology for the automotive industry	Evonik Industries AG	http://www.clusterle.de
		P63	TU9/CN (Netzwerk TU9/CN Elektromobilität)	Methods and processes for assessment, validation, and optimization of electrical components for electrical drive systems, taking into account the driving operation	Technical University of Berlin	n/a
	Thermal management	P64	EcoTEG (Industrialisierungskonzept für hochtemperaturtaugliche thermoelektrische Generatoren zur Abgaswärmenutzung in Automobilen auf Basis neuartiger Materialien)	The field of potentially suitable materials for thermoelectric generators will be assessed, with a focus on raw material and manufacturing costs, manufacturing technologies, possible degrees of efficiency, integration throughout the entire automobile system	Hochschule Rhein-Waal	http://www.hochschule-rhein-waal.de/forschungszentrum/forschungsprojekte/bmbf-ecoteg.html
		P65	E-Komfort (Innovative Klimatisierungs- und thermische Komfortkonzepte zur Optimierung der Reichweite von Elektrofahrzeugen)	Innovative air-conditioning and thermal comfort concepts for optimizing the range of electric vehicles	Volkswagen	n/a
		P66	HiTEG (Hochtemperaturgeneratoren für die Abwärmenutzung in Fahrzeugen und Industriebrenneranlagen)	High-temperature generators for the waste heat recovery in vehicles and industrial burner equipment	Faurecia Emissions Control Technologies, Germany GmbH	http://www.clusterle.de
		P67	HOTGAMS (Hochtemperatur-Thermogeneratoren mit geschichtetem Aufbau und Metallsilizidanschlüssen)	High-temperature thermal generators with a layered structure	Benteler Automobiltechnik GmbH	http://www.clusterle.de
		P68	HotPowCon (Hot-Power-Connection)	Objective of this project is to obtain the necessary foundations for the development of new power modules are used for peak operating temperatures up to 300 ° C in electric vehicles so as to without cooling measures.	Robert Bosch GmbH	http://www.clusterle.de
	Thermal management; Controls	P69	EFA2014/2: Energieeffizientes Fahren 2014 - 2. Projektphase	Increase in range of EVs through communication; the development of novel components in the field of thermal management, energy and electrical system. These components are tailored to the capabilities of the predictive energy management system	Continental Safety Engineering International GmbH	http://www.fzi.de/index.php/de/forschung/forschungsbereiche/ispe/abteilungen/ids/themen-und-projekte/projekte/7834-efa-2014-energieeffizientes-fahren-efa-2014-phase-ii
	Thermal management; Vehicle	P70	eGeneration: Schlüsseltechnologien für die nächste Generation der Elektrofahrzeuge	Approaches to air condition the car in the center of the research. The reduction of the total weight helps to extend the range, to be investigated further aspects of lightweight construction.	Rheinisch-Westfälische Technische Hochschule Aachen	n/a
	Vehicle	P71	1PeFZ (Umsetzung eines neuartigen Einpersonen-Elektroleichtfahrzeuges im Sinne eines Gesamtsystemansatzes)	Development of an innovative light duty electric vehicle	Innovative Mobility Automobile OHG	http://www.clusterle.de/uploads/media/Strom_Elektroleichtfahrzeug.pdf
		P72	E2V (Electric mobility concept with semi-autonomous vehicles)	The two-wheel electromobile E2V provides mobility in areas not covered by current public transport facilities, such as parks, airports, pedestrian areas. It aims on people without previous training, facing such a vehicle for the first time.	University of Kassel	http://www.clusterle.de/uploads/media/Strom_Elektromobilitaetskonzept.pdf
		P73	E-Boxter Porche	Development, construction and field test of a fully electric sports car	sche Engineering Group GmbH	http://ecars.region-stuttgart.de/
	Vehicle	P74	Elani (Elektrischer Antrieb Niedervolt)	Innovative low-power drive for an electric two-wheeler	BMW Forschung und Technik GmbH	http://www.clusterle.de/seitennavigation/cluster-service/projekte/aktuell/aktuelles-details/?tx_ttnews%5Btt_news%5D=124&cHash=a16b7465f06ea5f153f0ec15fdab2f26

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DE		P75	e-MoSys (Anforderungsgerechtes modulares Antriebs- und Fahrwerksystem für ein Elektrofahrzeug)	Modular drive and suspension system for an electric vehicle	StreetScooter GmbH	http://www.clusterle.de
		P76	ePerformance (Konzeption und Aufbau eines batterie-elektrischen Fahrzeuges)	Aim of the project is to design and construct of battery-electric vehicle.	AUDI AG / Audi Electronics Venture GmbH	http://www.audi.de/eperf/brand/de.html
		P77	ExtraLight - Extremer Leichtbau mit Kunststoff-Metall-Hybriden	Extreme lightweight plastic-metal hybrids	INPRO GmbH	n/a
		P78	Go-Innvelo (Innovatives Fahrzeugkonzept für Ballungszentren)	An innovative vehicle concept for suburban areas	Institut Chemnitzer Maschinen- und Anlagenbau e.V.	http://www.clusterle.de
		P79	InproLight: Integrative Prozesskette zur ressourcenschonenden Serienfertigung von Leichtbauteilen aus thermoplastischen Faserverbundkunststoffen für die Fahrzeugindustrie	Automated handling by making more resistant to bending and displacement of solid preforms. Significantly increased design freedom and functional integration over continuous fiber reinforced thermoplastics.	Fraunhofer-Institut für Lasertechnik ILT	http://www.inprolight.de/
		P80	Light-eBody (Leichte und ressourcensparende Elektrofahrzeugkarosserie in Multimaterialbauweise)	Lightweight and resource-saving electric vehicle body in multi-material construction	VOLKSWAGEN AKTIENGESELLSCHAFT	http://www.lib2015.de/projekte
ES	Vehicle	P81	TECMUSA (Technologies for sustainable and accessible urban mobility)	Development and demonstration of hybrid and electric vehicles, for an efficient, sustainable and accessible urban transport of people and goods.	INSIA UPM	n/a
	Vehicle; Energy Storage; Charger	P82	VERDE (Electric Vehicles: Response to Energy Dependence)	Study of EV technologies, research on batteries and electric traction systems, development of charging equipment, studies to analyze the most convenient locations for installing refuelling infrastructure, the use of intelligent networks and infrastructure	SEAT Techniicall Centre	n/a
	Charger; Controls	P83	FINSENY (Future Internet for Smart Energy)	One of the aims of the project is to identify the requirements of a smart grid ICT system to provide better management of all the charging infrastructure as a whole network. This ICT system consists of the software and protocols involved in a smart grid.	Nokia Siemens Networks GMBH & CO. KG	http://www.fi-ppp-finseny.eu/
EU	Chassis	P84	E-VECTOORC (Electric-VEhicle Control of individual wheel Torque for On- and Off-Road Conditions)	The key objectives of the project are: •Development and demonstration of yaw rate and sideslip angle control algorithms based on the combination of front/rear and left/right torque vectoring to improve overall vehicle dynamic performance.	UNIVERSITY OF SURREY	http://e-vectoorc.eu/
	Controls	P85	EcoGem (Cooperative Advanced Driver Assistance System for Green Cars)	One of the aims of the project is to identify the requirements of a smart grid ICT system to provide better management of all the charging infrastructure as a whole network. This ICT system consists of the software and protocols involved in a smart grid.	TEMSA GLOBAL SANAYI VE TICARET A.S., TR	www.ecogem.eu
		P86	e-DASH (Electricity Demand and Supply Harmonizing for Evs)	"e-DASH" aims at the harmonization of electricity demand in Smart Grids for sustainable integration of electric vehicles. This is addressed by an intelligent charging system supported with near real-time exchange of charge related data between EVs and the grid.	VOLKSWAGEN AG	http://edash.eu/
		P87	ELVIRE (Electric Vehicle Communication to Infrastructure, Road Services and Electricity Supply)	The project's purpose is to develop an effective system which is able to neutralize the driver's "range anxiety", i.e. the fear to break down due to the vehicle's power range limitation. In order to ease and optimize energy management of Electric Vehicles	CONTINENTAL AUTOMOTIVE GMBH	http://www.elvire.eu/
EU	Controls	P88	HI-WI (Materials and drives for High & Wide efficiency electric powertrains)	Addresses the mismatch between the region of HIGH efficiency and the WIDE region of frequent operation with advances in the design and manufacture of motors through:- Holistic design across the combination of magnetic, thermal, mechanical and control electronics with optimisation in line with real-life use rather than a single-point "rating"	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	http://www.hiwi-eu.org/
EU; AT; BE; CZ; DE; ES; FI; IT; NL; NO; UK	Controls	P89	IoE (Internet of Energy for Electric Mobility)	Objectives of this project are to develop hardware, software and middleware for seamles, secure connectivity and interoperability achieved by connecting the Internet with the energy grids.	SINTEF	http://www.artemis-ioe.eu/
EU, DE, AT, ES, CZ, SE, NL, RO, UK	Controls	P90	MOTORBRAIN (Nanoelectronics for electric vehicle intelligent failsafe powertrain)	The intention of the MotorBrain project is to develop sustainable drive train technologies and control concepts/ platforms for inherently safe and highly efficient Electric Vehicle (EV) powertrains of the 3rd Generation.	INFINEON TECHNOLOGIES AG	http://www.motorbrain.eu/
EU, AT; BE; CZ; ES; FR; IT; NL; NO; UK	Controls	P91	POLLUX (Process Oriented eLectronic controL Units for Electric Vehicles Developed on a Multi-System Real-Time Embedded Platform)	The objective is to develop a distributed real time embedded systems platform for next generation electric vehicles, by using a component and programming-based design methodology.	SINTEF	http://www.artemis-pollux.eu/project.htm

Funding country	Vehicle component	Project ID	Name and Abbreviation of a project	Brief project description	Coordinator organization	Link
EU	Controls	P92	SMARTV2G (Smart Vehicle to Grid Interface)	The main objective targeted by the SMARTV2G Project aims at connecting the electric vehicle to the grid by enabling controlled flow of energy and power through safe, secure, energy efficient and convenient transfer of electricity and data.	INSTITUTO TECNOLOGICO DE LA ENERGIA (ITE)	http://www.smartv2g.eu/
	Controls; Chassis	P93	ID4EV (Intelligent Dynamics for fully electric vehicles)	The objective of the ID4EV project is to develop energy efficient and safe brake and chassis systems for the needs of fully electric vehicles and the improvement of active safety and comfort for a faster introduction of fully electric vehicles (FEV).	CONTINENTAL ENGINEERING SERVICES GMBH	http://www.id4ev.eu/
	Controls; Electric motor	P94	EFUTURE (Safe and Efficient Electrical Vehicle)	The key objectives for eFuture are corresponding to the main outputs to achieve with our concept. They are paving the project planning and therefore they have been split within three parts projects: 1) development of the execution layer for electric driving, 2) E/E architecture and corresponding ECUs for fully equipped electric vehicle, 3) docking of the integrating command layer with synchronisation of the decision units.	INTEDIS GMBH & CO KG	http://www.efuture-eu.org/
	Electric motor	P95	CASTOR (Car multi propulsion integrated power train)	The project Castor addresses novel topologies of electrical drives ranging from multi-phase machines to high torque density pseudo-direct-drive machines which will be assessed for performance, efficiency, safety, cost and market volumes effectiveness. The Castor research covers in the domain electrical powertrains for propulsion applications (*1) single and multi-propulsion configurations. In the energy domain CASTOR will also combine high energy density lithium batteries of low cost chemistries with high power density super-capacitors.	INFINEON TECHNOLOGIES AG	http://www.castor-project.eu/
		P96	SMARTOP (Self powered vehicle roof for onboard comfort and energy saving)	The SMARTOP project aims at the development of a modular autonomous smart roof integrating conformable, lightweight and low cost solar panels used to recharge compact Lithium batteries suitable to drive innovative devices for on board well-being and energ	CENTRO RICERCHE FIAT SCPA	http://www.smartop.eu/fe
		P97	WIDE-MOB (Building blocks concepts for efficient and safe multiuse urban electrical vehicles)	The main objective of the project is to develop building block concepts that could be widely applied to most architectures for the manufacturing of efficient and safe EVs.	CENTRO RICERCHE FIAT SCPA	http://eeepro.shef.ac.uk/wide-mob/index.html
	Energy storage	P98	AUTOSUPERCAP (Development of high energy/high power supercapacitors for automotive applications)	The project aims at developing supercapacitors of both high power and high energy density at affordable levels by the automotive industry, and of higher sustainability than many current electrochemical storage devices.	UNIVERSITY OF SURREY	tbd
		P99	AMELIE (Advanced Fluorinated Materials for High Safety, Energy and Calendar Life Lithium Ion Batteries)	AMELIE's objectives are to develop a Higher Specific Energy 10 Ah cell prototype, for EV and PHEV application, combining a high voltage chemistry with a more stable electrolyte, separators and binder system.and following as well an eco-design methodology	SOLVAY SOLEXIS S.P.A., IT	tbd
		P100	APPLES (Advanced, High Performance, Polymer Lithium Batteries for Electrochemical Storage)	This project aims to the development at an initial industrial level of an advanced, lithium ion battery for efficient application in the sustainable vehicle market.	CONSORZIO SAPIENZA INNOVAZIONE	tbd
EU; AT; BE; CZ; DE; ES; FI; FR; IE; IT; NL; NO	Energy storage	P101	E3CAR (Nanoelectronics for an Energy Efficient Electrical Car)	Development of nanoelectronics technologies, devices, circuits architectures and modules for electrical and hybrid vehicles and demonstration of these modules in final systems to achive 35% better efficiency.	Infineon Technologies	http://www.e3car.eu/
EU	Energy storage	P102	EASYBAT (Models and generic interfaces for easy and safe Battery insertion and removal in electric vehicles)	Project will develop modular integration models and mechanisms, as well as define generic interfaces between the vehicle, the battery and the battery switch station for easy and fast integration and removal.	BETTER PLACE LABS ISRAEL LTD.	http://www.easybat-project.eu/
		P103	ELECTROGRAPH (Graphene-based Electrodes for Application in Supercapacitors)	Project follows an integrated, technology driven approach in development of novel materials and components for realization of optimized supercapacitors.In project the progress beyond state of the art will be achieved by development and use of graphene anode	FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V	http://www.electrograph.eu/
		P104	ELIBAMA (European Li-Ion Battery Advanced Manufacturing for electric vehicles)	The global objective of the ELIBAMA project is to enhance and accelerate the creation of a strong European automotive battery industry structured around industrial companies already committed to mass production of Li-ion cells and batteries for EVs.	Renault	http://elibama.eu/
		P105	ESTRELIA (Energy Storage with lowered cost and improved Safety and Reliability for electrical vehicles)	The project will develop battery management system BMS ICs for an integrated flexible BMS to enable simultaneous cell measurement and active cell balancing for ultra capacitors and Li-Ion battery cells.	AUSTRIAMICROSYSTEMS AG	http://www.estrelia.eu/

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EU	Energy storage	P106	EUROLIION (High energy density Li-ion cells for traction)	The outcome will be a newly developed cell, manufactured and tested by end-users. The new cell consists of i) a newly formulated Si-negative electrode, ii) newly designed low cost salts, and iii) modified positive electrodes.	TECHNISCHE UNIVERSITEIT DELFT	http://www.euroliion.eu/home/
		P107	GREENLION (Advanced manufacturing processes for Low Cost Greener Li-Ion batteries)	Development of new active and inactive battery materials viable for water processing (green chemistry); Innovative processes leading to reduced electrode production cost and avoid environmental pollution; Development of new assembly procedures to reduce the time and the cost of cell fabrication	Fundacion Cidetec	http://www.greenlionproject.eu
		P108	HELIOS (High energy lithium-ion storage solutions)	The project Helios will evaluate both electrical performances and their evolution in time – life, and their behaviour under abuse test conditions – safety.	RENAULT S.A.S. REPRESENTED BY GIE REGIENOV	http://www.helios-eu.org/
		P109	LABOHR (Lithium-Air Batteries with split Oxygen Harvesting and Redox processes)	LABOHR aims to develop Ultra High-Energy battery systems for automotive applications making use of lithium or novel alloy anodes, innovative O2 cathode operating in the liquid phase and a novel system for harvesting O2 from air.	WESTFAELISCHE WILHELMS-UNIVERSITAET MUENSTER	http://www.labohr.eu/
		P110	OPERA4FEV (Operating Energy Rack for Full Electric Vehicle)	The project aims to develop thermoplastic battery racks on two functional demonstrators: one for a large scale vehicle from FIAT and one for a "niche" car, the F-City from FAM .To improve deployment of electrical vehicles in Europe, large scale production processes for Rack and electrical components need to be developed	CMEACORP-MECAPLAST Group	http://www.opera4fev.eu/
		P111	OSTLER (Optimised storage integration for the electric car)	It proposes novel concepts for the way in which EV battery storage is integrated into the vehicle; in particular a novel modular concept that permits a storage-centric design approach. It will also investigate the feasibility of removable storage elements	MIRA LTD, UK	http://www.ostlerproject.com
		P112	SMARTBATT (Smart and Safe Integration of Batteries in Electric Vehicles)	Development and proof of the innovative, multifunctional, light and safe concept of an energy storage system which is integrated in the pure electric car's structure	AIT Austrian Institute of Technology GmbH, Vienna, Austria	http://www.smartbatt.eu/
		P113	SOMABAT (Development of novel SOlid MAterials for high power Li polymer BATteries.Recyclability of components)	Project aims to develop high power Li polymer battery by the development of novel breakthrough solid recyclable materials to be used as anode, cathode and solid polymer electrolyte new alternatives to recycle the different components of the battery and life cycle analysis	ogem	http://somabat1.ite.es/
	Energy storage; Controls	P114	SuperLIB (Smart Battery Control System based on a Charge-equalization Circuit for an advanced Dual-Cell Battery for Electric Vehicles)	SuperLIB focuses on smart control system solutions for batteries. To enhance the overall performance, the battery consists of both High-Power (HP) and High-Energy (HE) cells.	AVL LIST GMBH	http://www.superlib.eu/
		P115	SMART-LIC (Smart and Compact Battery Management System Module for Integration into Lithium-Ion Cell for Fully Electric Vehicles)	The objectives of the project are connected to the realization of the BMS module as a system-in-package (SiP) directly integrated into the lithium-ion cell for fully electric vehicles by using advanced packaging technologies.	STMICROELECTRONICS S.A.	www.smart-lic.com
	Energy storage; Controls; Chassis; Others	P116	P-MOB (Integrated Enabling Technologies for Efficient Electrical Personal Mobility)	A novel concept of fully-electric personal mobility addressing the needs of urban mobility whilst also encompassing characteristics suitable for extra urban mobility; •reduced system complexity (a common car can have more than 50 processors, actuators)	THE UNIVERISTY OF SHEFFIELD	http://eeepro.shef.ac.uk/p-mob/index.html
	Others	P117	CAPIRE (Coordination Action on PPP Implementation for Road-Transport Electrification)	CAPIRE will prepare and support the realization of a Public Private Partnership (PPP) sustaining and putting into practice the European Green Cars Initiative.	RENAULT S.A.S. REPRESENTED BY GIE REGIENOV	http://www.capire.eu/
		P118	EVADER (Electric Vehicle Alert for Detection and Emergency Response)	Project will investigate the interior and exterior sound scape of electric vehicle for safe operation, considering drivers feedback, feasible pedestrian reactions, driver and pedestrian warning systems and pedestrian safety.	IDIADA AUTOMOTIVE TECHNOLOGY SA	tbd
		P119	G4V (Grid for Vehicles - Analysis of the impact and possibilities of a mass introduction of electric and plug-in hybrid vehicles on the electricity networks in Europe)	Analysis of the impact and possibilities of a mass introduction of electric and plug-in hybrid vehicles on the electricity networks in Europe	RWE DEUTSCHLAND AG	http://www.g4v.eu/
	Others	P120	ICT4FEV (Information and Communication Technologies for the Full Electric Vehicle)	ICT4FEV is aiming at building a R&D community, creating a European roadmap and recommending standards, regulations, business cases and R&D priorities for the FEV.	VDI/VDE INNOVATION + TECHNIK GMBH	http://www.ict4fev.eu/public/
	Thermal management	P121	ICE (MagnetoCaloric Refrigeration for Efficient Electric Air Conditioning)	Project is focused on the development of an efficient air-conditioning and heating system based on a Magneto Caloric heat pump and a new system architecture to fulfill the thermal comfort and energy requirements of Fully Electric Vehicles (FEVs).	CENTRO RICERCHE FIAT SCPA	http://www.ice-project.webs.upv.es/
		P122	TIFFE (Thermal systems integration for fuel economy)	The TIFFE-Project is devoted to the development of an innovative integrated vehicle thermal system to improve the on board thermal management and the energy efficiency of the vehicle.	CENTRO RICERCHE FIAT SCPA	http://www.tiffe.eu/

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EU		P123	DELIVER (Design of Electric Light Vans for Environment-Impact Reduction)	Project aims to explore urban light commercial vehicle (LCV) concepts intended for larger scale production by executing a broad scope conceptual design study which will start by establishing initial design specifications and continue to a detailed prototype	RWTH Aachen University	www.deliver-project.org
		P124	ECOSHELL (Development of new light high-performance environmentally benign composites made of bio-materials and bio-resins for electric car application)	ECOSHELL is concerned with the development of optimal structural solutions for superlight electric vehicles (category L6 and L7e), decreasing its environmental footprint and using an innovative bio-composite material for the vehicle body	CONCEPTION ETUDES REALISATION ET GESTION INFORMATIQUE SAS, FR	http://www.ecoshell.eu/
	Vehicle	P125	E-LIGHT (Advanced Structural Light-Weight Architectures for Electric Vehicles)	The main objective of E-Light project is to develop an innovative multi-material modular architecture specifically designed for electric vehicles, achieving optimal light weight and crashworthy performances while ensuring ergonomic on board.	FUNDACION CIDAUT, Valladolid, Spain	http://www.elight-project.eu/
		P126	ELVA (Advanced Electric Vehicle Architectures)	To fully exploit new freedoms in design for fully electric urban vehicles is the aim of the ELVA project. Thus the project partners go far beyond what is known as vehicle architecture, mainly being taken over from conventional cars, i.e. driven by a combustion engine. At first, a better understanding of the customer requirements for electric vehicles and a detailed overview of technologies for electric vehicle drives available until 2020 were investigated. On this basis, main concepts for battery-driven city cars were developed in a creative phase. Three of these concepts have now been chosen, are currently designed in detail and afterwards analysed and evaluated with regard to key requirements.	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN	http://www.elva-project.eu/
		P127	FUEREX (Multifuel Range Extender with High Efficiency and Ultra-Low Emissions)	The targeted final result of the FUEREX project is to prove the feasibility of the range extender technology for the markets for sub-compact passenger cars up to light duty commercial vehicles.	Uniresearch B.V. – UNR	http://www.fuerex.eu/
		P128	FURBOT (Freight Urban RoBOTic vehicle)	The project proposes novel concept architectures of light-duty, full-electrical vehicles for efficient sustainable urban freight transport and will develop a FURBOT vehicle prototype. The payload is considered packaged in freights boxes or ISO pallets.	UNIVERSITA DEGLI STUDI DI GENOVA	www.furbot.eu
		P129	HIVOCOMP (Advanced materials enabling high-volume road transport applications of lightweight structural composite parts)	The project focuses on developing and demonstrating the viability of two novel material systems that show unique promise for cost-effective production of high performance carbon fibre reinforced plastic (CFRP) parts.	Katolieke Universiteit Leuven	www.hivocomp.eu
		P130	MAENAD (Model-based Analysis & Engineering of Novel Architectures for Dependable Electric Vehicles)	Provision of support for the automotive safety standard ISO 26262; Provision of capabilities for prediction of dependability & performance; Provision of capabilities for design optimization; Demonstration of project results in a practical electrical vehicle design in the context of EAST-ADL and Fully Electrical Vehicles	VOLVO TECHNOLOGY AB	http://www.maenad.eu/
		P131	OPTIBODY (Optimized Structural components and add-ons to improve passive safety in new Electric Light Trucks and Vans)	Focuses on the development of a new concept of modular structural architecture for electric light trucks or vans (ELTVs) that will focus on the improvement of passive safety in order to help to reduce the number of fatalities and severe injuries.	UNIVERSIDAD DE ZARAGOZA, ES	http://optibody.unizar.es/
		P132	V-FEATHER (InnoVative Flexible Electric Transport)	The V-FEATHER project presents a complete electric vehicle architecture vision on how urban light duty vehicles will be designed, built and run in the near future. This project is led by industrial partners with emphasis on energy efficiency, commercial viability, life cycle design and development of new technologies for LDVs steered by leading research institutes.	Ayton Willow	tbd
	Vehicle; Controls	P133	OpEnEr (Optimal Energy Consumption and Recovery based on system network)	The objective is a new energy manager coordinating control strategies to maximise real world energy saving, and hence electric driving range to alleviate so called 'range anxiety'. The system provides advanced driver support based on a networked architecture	ROBERT BOSCH GMBH	http://www.fp7-opener.eu/
FI	Controls	P134	Mobile Power Connections (MPC)	Project aims to develop a service concept, which enables electricity consumers to secure the amount of used electricity power independent from the point of delivery. The goal of the project is to create intelligent metering system.	Aidon	n/a

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FI	Energy storage	P135	High Power LFP Cathodes for Large-Format Lithium-ion Batteries	The target of the project is to improve the power density of lithium-iron phosphate large format cell by improving the LFP-based cathode characteristics. The cathode-anode system has direct effect to the cell performance.	European Batteries Oy	n/a
	Vehicle	P136	Eco Urban Living II	Project creates a comprehensive test environment for EVs	VTT	http://www.eco-urbanliving.com/index.php/about-us/6-about-us.html
		P137	L7e Van	L7 Auto Ltd`s aim is to design a suitable electric L7e class delivery vehicle which will use innovative battery- and powertrain technology.	L7 Auto	n/a
FR	Controls	P138	MOV'EO CO-Drive (Co-Pilot for an intelligent road and vehicular communication system)	This project aims to validate a pre-industrialisation approach towards a cooperative driving system between User, Vehicle and Infrastructure to suggest an intelligent, secure and calm route, for sustainable mobility.	Valeo	http://www.pole-moveo.org/EN/index.php
		P139	MOV'EO E-CEM (Electromagnetic compatibility of power systems)	This project is a continuation of SP4 program O2M and continues the developmnet of tools to take into account electromagnetic compartibility of power systems in static energy converters. Main objective is to get the possibility of EMS modelling and optimization	Valeo	http://www.pole-moveo.org/EN/index.php
		P140	AREMA (Amélioration du REndement Moteur Alternateur)	Research on electric motor optimization	Valeo	http://www.utc.fr/lec/Projets/Fiches/FicheProjetAREMA.pdf
		P141	Mov'eo-DEGE (Satory pour l'intégration système mécatronique dédiée au Véhicule Électrique et Hybride)	Research and industriallization of Evs	Renault	http://www.pole-moveo.org/EN/index.php
	Electric motor	P142	ID4CAR-ICARES	Improvement of the negative electrode of the battery through a better understanding of reactions at the interface between the electrode and electrolyte.	INSTITUT CHARLES GERHARDT	http://www.id4car.org/fr/410.aspx
		P143	ID4CAR-SLIM	Facing the development of electric vehicles, the SLIM project meets the system requirements of energy storage safer by developing new technology for all-solid lithium battery with high security, used industrially on batteries currently produced.	INSTITUT CHARLES GERHARDT	http://www.id4car.org/fr/410.aspx
	Energy storage	P144	MOV'EO CINELI (Interoperable inductive electrical load)	The CINELI project aims at developing knowledge and methods to make it possible for carmakers to control: - The magnetic radiation generated by the transfer of electrical power through induction, by addressing the problem in a scientific and practical way	Renault	http://www.pole-moveo.org/EN/index.php
		P145	MOV'EO SIMCAL (Calendar life study and modelling of NiMH and Li-Ion batteries for road Vehicles)	Principal objective aims: -To study the calendar ageing mechanisms of different new battery technologies for which these mechanisms still unclear (especially for new generation of Li-ion batteries);To model the calendar aging of batteries.	CEA	http://www.utc.fr/lec/Projets/Fiches/FicheProjetSIMCAL.pdf
		P146	MOV'EO SUPERCAL (Interaction des modes de vieillissement calendaire des supercondensateurs pour applications automobiles)	The aim of the SUPERCAL project is to develop the electrical energy storage industry, and particularly to help create a French sector capable of mass-producing supercapacitors for soft hybridization systems and electric vehicles.	IMS	http://www.pole-moveo.org/EN/index.php
		P147	SIMSTOCK (Modelling of the Behaviour of Energy Storage Devices in Road Vehicles Applications)	Model supercapacitors and batteries behaviour taking into account ageing deduced from accelerated power cycling tests	Renault	http://www.ims-bordeaux.fr/IMS/ressources/fichiers/NGJhYjI4Nig2YTVkZO==/SIMSTOCK.pdf
	Others	P148	M2EI (Development of new electric HEVs)	Design and evaluation of innovative concepts of integrated electromechanical systems for hybridization of combustion vehicles in an industrial environment	Valeo	http://www.utc.fr/lec/Projets/projet.htm
	Others	P149	COMPACITE (Compact low consumption electrically driven compressor for air conditioning in hybrid and electric cars)	Development of mechatronic compressor with integrated electronics which will drive both the motor and the mechanics for optimal operating in terms of performance and consumption.	Valeo	http://www.pole-moveo.org/EN/index.php
		P150	ID4CAR - ISO4CAR	The project develops a new solution ISO4CAR electric vehicle isotherm utility with innovative technologies (new refrigeration system) and an overall control of energy (isothermal body low-energy, better insulation)	GRUAU	http://www.id4car.org/fr/410.aspx
		P151	MOV'EO Memoire (MEchatronic for power MOdule Including cooling foR Electrical and hybrid vehicles)	The project purpose is a new switch current module for mechatronic on IML technologies, including IGBT and passive components (middle and high power) ones.	Valeo	http://www.pole-moveo.org/EN/index.php
	Thermal management	P152	VEGA/THOP (Véhicule Electrique à Grande Autonomie/Système de Gestion Thermique Optimisé du Confort Habitacle et de la Chaine de Traction)	Project Framework: Review / Build technology "tool box" to enhance EV cruising range, Specific focus on Thermal Management Architecture; Battery Thermal Management also of concern, Demonstrate solutions : at bench / on EV demonstrator;	VALEO and RENAULT	http://www.developpement-durable.gouv.fr/spip.php?page=article&id_article=5918
		P153	VELROUE (ZE Concept)	Optimization of thermal management on the basis of Renault Kangoo	Renault	http://www2.ademe.fr/servlet/doc?id=82284&view=standard
	Vehicle	P154	FOREWHEEL	Demonstrator vehicles with ActiveWheel technology	Michelin	http://www2.ademe.fr/servlet/doc?id=82272&view=standard

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FR	Vehicle	P155	MELODYS (MEdium duty & LOw emission for DYStribution)	3 demonstrators for different uses: dry goods delivery, refrigerated transport, directed transportation with bucket. The hybrid powertrain (diesel / electric) will be provided by electric battery-powered and / or supercapacitors rechargeable motor.	Renault Trucks	http://www2.ademe.fr/servlet/doc?id=82307&view=standard
		P156	MOV'EO SOFRACI (High efficiency inverter with integrated charge function)	The purpose of this project is: -To define a new power structure allowing traction function and quick and slow recharging of electrical vehicle without contactor;- To confirm this system functions efficiently and establish its characteristic performances	Valeo	http://www.pole-moveo.org/EN/index.php
		P157	MOV'EO TILTER (A new urban mobility concept: Electric, Safe, low Width)	The aim and ambition of the Tilter project is to come up with a radically different solution in terms of the definition, characteristics, performance, use and operational profile for what is commonly referred to as the urban vehicle.	SynergEthic	http://www.pole-moveo.org/EN/index.php
NL	Chassis	P158	Lightweight suspension with wheel hub motor:	integrated design of a full (electric) wheel module.	Teamwork Technology	http://www.htas.nl/index.php?pid=276
	Controls	P159	360EVT	battery monitoring & control system.	Sycada.Green	http://www.htas.nl/index.php?pid=275
	Energy storage; Controls	P160	Databox	heavy vehicles.	Mr Green Holding	http://www.htas.nl/index.php?pid=274
	Others	P161	CVTruck	Innovative (Continuous Variable) transmission for optimum power transfer electric motor	Gear Chain Industrial	http://www.htas.nl/index.php?pid=273
		P162	SafeBat	Drafting design guidelines for battery safety and End-of-Life management structure; and creation of a validation platform for the Dutch EV industry	Kema	http://www.htas.nl/index.php?pid=316
	Vehicle	P163	Commercial drivetrain technology	Development of an integrated electric drive train	InnoSys Delft	http://www.htas.nl/index.php?pid=318
		P164	E-refuse	Development of future citytruck demonstrator of a full hybrid garbage truck.	Benteler Engineering Services	http://www.htas.nl/index.php?pid=277
		P165	Evident	development of modular platform as a base for vehicle applications (medium-) heavy class, demonstrator in collaboration with major truck manufacturer Gemco E trucks	TomTom	http://www.htas.nl/index.php?pid=271
		P166	HYREF	n/a	Gemco E-trucks	http://www.htas.nl/index.php?pid=258
		P167	Range Extender Innovations	3 parallel projects with different solutions for extending the range.	Peec Power	http://www.htas.nl/files/Range%20extender%20leaflet.pdf
		P168	Zero Emission Low Floor Minibus	Realise the electrifi cation of a low floor minibus and a fuel generator at a price acceptable to the market	B-style & BUSiness	http://www.htas.nl/index.php?pid=317
PT	Controls	P169	MOBILES	To create ICT-based solutions to support electric mobility, in particular mobile-based applications with navigation	NDrive	n/a
	Vehicle	P170	MOBI.CAR	Flagship project within the competitiveness pole for the mobility industries, which aims to fully engineer and design a light electric vehicle that embodies the green car revolution	CEIIA	http://www.pofc.qren.pt/ResourcesUser/2011_Documentos/Noticias/IDT/13844_MobiCar_Ficha_Resumo_de_projecto.pdf
	Vehicle; Controls	P171	TICE.MOBILIDADE	Increasing acceptance and adopting new solutions and technologies for urban transportation	PNIas - Laboratory of Automatic and Systems of Instituto Pedro Nunes (IPN)	http://tice-mobilidade.clusters.ipn.pt/
	Charger	P172	Slide In Technique for continuous transfer of energy to electrical vehicles (Slide In-teknik för kontinuerlig överföring av energi till elektriska fordon)	Project will investigate the technical possibilities of inductive and conductive electrical transmission. It will enable completely emission-free road with cars, trucks and buses.	Volvo powertrain	n/a
	Chassis	P173	Electrical driven axle for hybrid vehicles and electrical driven vehicles (Eldriven axel för hybridfordon och eldrivna fordon)	Development of electric drive axle for hybrid vehicles and electric vehicles	Haldex Traction	n/a
SE	Controls	P174	HVDC-network and HVDC-components for hybrid vehicles – weight/performance optimiced OBC & DC/DC	n/a	Kongsberg automotive	n/a
	Energy storage	P175	State of function for Energy storage for electric vehicles	n/a	Volvo powertrain	n/a
	Vehicle	P176	Innovatum	The project develops: -10 test vehicles. These vehicles will be used as an integration vehicle for the development of the subsystems as well as the development of new components (motors, batteries, battery management, etc.) and the existing vehicle components	SAAB	http://www.innovatum.se/pages/default.asp?ArticleID=8919
	Vehicle	P177	Research, development and industrialisation study of electrical vehicles for urban traffic with high market potential (Forskning, utveckling och industrialiseringsstudie av elbil för stadstrafik med hög marknadspotential)	The project aims to develop and demonstrate a fleet of electric vehicles.	Volvo Car Corporation	n/a
UK	Chassis	P178	YAMOT - YASA Motor redesign to enable the motor to be produced at a cost and in the volumes the automotive industry requires over the next decades	Development of new direct drive Yokeless And Segmented Armature (YASA™) chassis and wheel motor packages that will be ready for volume production	YASA Motors	http://www.yamot.co.uk/
	Energy storage; Controls	P179	IHEPU (Intelligent Hybrid Electric Power Unit)	The project will produce the scalable range of versatile hybrid and electric drive systems: 25kW,50kW and 150kW electric drive systems	Ashwoods Automotive	n/a

Funding country	Vehicle component	Project ID	Name and Abbreviation of a project	Brief project description	Coordinator organization	Link
UK	Thermal management	P180	The Total Thermal Management of a Hybrid Diesel-Electric Bus	The three-year "TERS" (Thermal Energy Recovery Systems) project will utilise market-leading technology to research, design and integrate pioneering thermal managing concepts into hybrid diesel-electric buses. The project aims to reduce vehicle CO2 emissions	Wrightbus Limited	http://www.lowcvp.org.uk/lceb/monitoring/details.asp?id=35
	Vehicle	P181	E Van (Integrated 'E' Van System)	Integrated 'E' Van System Development	Smith Electric Vehicles (UK)	n/a
		P182	Hybrid Integrated Urban Commercial Vehicle	The Hybrid Integrated Urban Commercial Vehicle (HIUCV) is a lightweight Heavy Goods Vehicle designed for refuse collection in an urban environment.	Dennis Eagle Ltd	n/a
		P183	REEVolution (Evolution of REEV technologies Building a UK Supply Base)	Development of advanced electric powertrains and a greater understanding of the commercial requirements needed for high performance electric and range extended electric vehicles	Jaguar Land Rover	tbd
	Vehicle; Energy Storage, Thermal Management; Controls; Chassis; Electric Motor; Others	P184	Low Carbon Vehicle Technology Project	LCVTP has been separated into fifteen different research streams, each lead by a different project partner and each covering a specific area of low carbon research.	Jaguar Land Rover, TATA Motors European Technical Centre, Ricardo, MIRA LTD, Zytek, WMG and Coventry University	http://www2.warwick.ac.uk/fac/sci/wmg/research/lcvtp/

ANNEX III

Demonstration projects

Country of funding	Name and Abbreviation of a project	Project ID	Area of field tests	Brief Project Description	Coordinator Organization	Link
AT	(VIBRATE) Vienna -Bratislava e-mobility	PD1	Vienna	Objectives: • Display of e-mobility as an alternative to gasoline; • Constructing standardized, compatible charging stations in the region. Activities: • Commuters of the region will be chosen as pilot users and thus make e-mobility visible on the streets	VERBUND AG	http://www.emobility-vibrate.eu/
	Clean Motion Upper Austria	PD2	Upper Austria	Development and testing of new electric vehicle	Automotive Cluster Upper Austria	http://www.automobil-cluster.at/index_ENG_HTML.php
	Graz model region (Grossgraum)	PD3	Graz	Leasing models for electric vehicles as pedelecs, e-scooters, car sharing, testing facilities for electric vehicles, rental of electric vehicles, various "Mobility" models with travel card for public transport and the use of electric vehicles for private	Holding Graz	http://www.emobility-graz.at/
	Kärnten Model region (E-Log)	PD4	Klagenfurt	Establishment of a decentralized logistics center and a workshop-hall on the outskirts of Klagenfurt for fleet management services for 200 duty vehicles. The electric vehicles will be leased to logistics and service companies in Klagenfurt and the surroundings	IPAK International Project Management Agency Klagenfurt on Lake Wörthersee GmbH	http://e-connected.at/content/e-log-klagenfurt-0
	Niederösterreich Model Region (E-pendeler)	PD5	Vienna and Wr Neustadt	New mobility package, the consulting, implementation and accounting for all components including the entry into electric mobility: car - charger - eco power - mobility, all from one source 4 defined multiplier models for municipalities and companies.	ecoplus, Niederösterreichs Wirtschaftsagentur GmbH	http://www.e-connected.at/content/e-pendler-nieder%C3%B6sterreich
	Rheintal - Vlotte (Vorarlberg) Model region	PD6	Rheintal-Vlotte (Vorarlberg)	• Introduce e-Mobility to public by including various stakeholders; • Setup of Service and e-Charging infrastructure; • Extension of renewable energy sources; Test of business models	Illwerke vkw	http://www.vlotte.at/
	Salzburg model region (Electrodrive)	PD7	Salzburg	The three-year target for this region is 2,000 electric vehicles that will include 1,000 passenger cars. The vehicles are leased under a subscription and returned after a certain period of time. These charging stations are exclusively supplied with renewable energy sources	ElectroDrive Salzburg GmbH	http://www.electrodrive-salzburg.at/
	Vienna Model region (e-mobility on demand)	PD8	Vienna	The e-BMG will coordinate all the offers of the Vienna model region (vehicle procurement, charging infrastructure, additional services). In addition, it is the coordinator for e-car-sharing operators in terms of vehicle placement, parking and charging infrastructure	Beteiligungsmanagement E-Mobilität GmbH (BMG-e)	http://www.e-connected.at/
	Vienna Model region (E-mobility post))	PD9	Vienna	Austrian Post AG will acquire from 2012 to 2015 309 E-cars, 300 motorcycles and 548 e-e-bikes to test the practical application delivery traffic in the entire federal territory and explore. The focus is on the Vienna metropolitan area including commuter behaviour	Österreichische Post AG	http://www.e-connected.at/content/e-mobility-post
BE	EVA (Elektrische Voertuigen in Actie)	PD10	Flanders	Largest testing round of electric cars in Flanders	Eandis	http://www.elektrischevoertuigeninactie.be/

Country of funding	Name and Abbreviation of a project	Project ID	Area of field tests	Brief Project Description	Coordinator Organization	Link
BE	iMOVE (innovatie door elektrische mobiliteit in Vlaanderen)	PD11	Flanders	This project will test electric vehicles for a large group of employees and individuals: 175 electric cars and 300 charging points, across Flanders for three years of daily use. The innovation focus on three themes that play a crucial role: renewable ener	UMICORE	http://www.imovelivinglab.eu/
	Linear (Local Intelligent Networks and Energy Active Regions)	PD12	Flanders	Fieldtest with minimum 200 up to 1000 houses where "demand side management" will be demonstrated on a residential and district level, the flexibility of electric vehicles is also of high interest in this project	VITO	http://www.linear-smartgrid.be/?q=en
	OLYMPUS	PD13	Antwerp, Ghent, Hasselt, and Leuven	Platform in the Flemish Living Lab electric vehicles with the focus on multimoal and shared electric transport by train, car and bikes. Implements charging equipment at 34 Belgian train stations and innovative charging equipment for bikes in cities. Develops a B to B ICT platform, which is an open platform that can be used by service providers that what to offer mobility services to the market	SNCB-Holding	http://www.proeftuin-olympus.be/en/home-1.htm
	SPARC (Smart Plug-in Automobile Renewable Charging Services)	PD14	Bruge	The aim of the SPARC project is to collaborate with plug-in electrical vehicle operators (e.g. car and battery leasing companies) and car parking providers (e.g. private parking companies) to jointly address novel services that should allow to bring the EV to the market	Ghent University - IBBT	http://www.ibbt.be/nl/projecten/overzichtprojecten/p/detail/sparc
DE	metropol-E - Elektromobilität Rhein-Ruhr	PD15	Dortmund	Urban E-fleet concept	RWE Effizienz GmbH	http://www.rwe.com/web/cms/de/37110/rwe/presse-news/pressemitteilungen/pressemitteilungen/?pmid=4007463
	4S (Netz-Flotten-Management: Energieeffizienz- und Betriebskostenoptimierung für Elektrofahrzeuge)	PD16	Erlangen and München	Test of company electric vehicles and charging infrastructure	Siemens AG, München	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche
	B-AGV (Forschung und Entwicklung sowie Bau batteriebetriebener Schwerlastfahrzeuge (Batterie-AGV) und deren Erprobung in einem Feldversuch im Container-Terminal Altenwerder in Hamburg)	PD17	Hamburg	Research and development and construction of battery-powered heavy duty vehicles (AGV battery) and their testing in a field trial in the container terminal in Hamburg Altenwerder	Gottwald Port Technology GmbH	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/wirtschaftsverkehr-feldversuche/emil
	BeMobility (BerlinElektroMobil)	PD18	Berlin	The project aims at integration of an electric passenger car and e-bike fleet in the public transport on offer	InnoZ – Centre for Innovation in Mobility and Societal Change	http://www.e-mobil-bb.de/
	BMW activeE	PD19	Bavaria	Research and testing of new vehicle concepts for electric vehicles	Bayerische Motoren Werke AG, München	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche
	CognE-mobil	PD20	Cologne	Projects aims at development and industrialisation of electric vehicles with a focus on small vans and passenger cars	Ford-Werke GmbH	http://www.elektromobilitaet.nrw.de/page.asp?TopCatID=12323&CatID=13024&RubrikID=13024
	Dieselhybridbusse	PD21	Hamburg	10 Diesel hybrid buses of Daimler subsidiary Evobus in the project are tested in a regular service of the Hamburg Hochbahn. The low-emission buses are the first in Germany with a serial drive, which can provide a fully electric driving alone	HOCHBAHN	http://www.elektromobilitaethamburg.de/

Country of funding	Name and Abbreviation of a project	Project ID	Area of field tests	Brief Project Description	Coordinator Organization	Link
DE	Drive eCharged (Erhebung von Nutzerpräferenzen im Feldversuch, Entwicklung eines Schnellladesystems, MaSS nahmen zur Netzqualität)	PD22	Munich	The project will examine user-related and technical aspects of electric vehicles for private and commercial environment. The goal is to develop practical and comprehensive strategies, systems and components holistically.	Bayerische Motoren Werke AG	http://www.swm.de/privatkunden/unternehmen/innovation/elektromobilitaet/modellregion-muenchen.html
	E-Aix Aachen (Machbarkeitsanalyse »Elektromobiles Oberzentrum und ländliche Regionen«: Nachhaltige Mobilitätskonzepte auf Basis von Elektromobilität und Stadtwerkeinfrastrukturen)	PD23	Rhein-Ruhr	Group of three subprojects address sustainable mobility concepts based on electromobility and public utility infrastructure	Stadtwerke Aachen AG	http://www.elektromobilitaet.nrw.de/page.asp?TopCatID=12323&CatID=13024&RubrikID=13024
	E-City-Logistik	PD24	Berlin	The project envisages to develop electrical commercial vehicles and logistics concepts for the supply of retail and private households	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (FhG)	http://www.e-mobil-bb.de/
	econnect Germany - Integration der Elektromobilität in die Infrastrukturen von Stadtwerken	PD25	Aachen, Allgäu, Duisburg, Leipzig, Osnabrück, Sylt, and Trier	Intelligent electro-mobile traffic applications (Smart Traffic) and the integration of electric vehicles in the Smart Grid of the Future (Smart Grid) using information and communication technologies are researched, developed and tested.	Aachener smartlab GmbH	http://www.econnect-germany.de/
	E-Golf (blue-e-motion 07 Erfahrungsflotte)	PD26	Wolfsburg	Volkswagen has launched the campaign "Think Blue "and "BlueMotion" a variety of different models on the market, which are characterized by low fuel consumption	Volkswagen	n/a
	Electromobile city	PD27	Stuttgart	The cities of Bäblingen and Sindelfingen have joined forces to create an entirely new district, Flugfeld, featuring both commercial and residential property. This development project will also examine the relationship between e-mobility and the urban infrastructure	Zweckverband Flugfeld Boeblingen.Sindelfingen	http://ecars.region-stuttgart.de/2010/06/elektromobile-stadt/
	EleNa (E-mobility retrofitting for diesel engine delivery vans)	PD28	Stuttgart	The EleNa project aims to find a retrofit e-mobility solution for diesel delivery vehicles. This would enable drivers to comply with restrictions on particulate emissions on local trips in built-up areas.	Fraunhofer IPA	http://ecars.region-stuttgart.de/2010/06/elena-%e2%80%93-elektroantriebs-nachrustsatze-fur-diesel-lieferwagen/; http://www.mechatronik-ev.de/00000233.html
	ELMO - Elektromobile Urbane Wirtschaftsverkehre	PD29	Rhein-Ruhr	Urban electric vehicles commercial transport	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (FhG)	http://www.iml.fraunhofer.de/de/themengebiete/verkehrslogistik/themen_transportverkehrlogistik/Elmo.html
	EMIL (Erprobung nutzfahrzeugspezifischer E-Mobilität) - E-mobility Test for Commercial Vehicles	PD30	Wolfsburg	Field tests of VW Caddy rebuilt with e traction	Volkswagen AG,	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/wirtschaftsverkehr-feldversuche/emil
	EMKEP (Elektrifizierung von Mercedes-Benz Kleintransportern in Entwicklung und Produktion)	PD31	Berlin	The project aims to explore the use of battery-powered vans in regard to their suitability for everyday use. These are Mercedes-Benz Vito vans of the future E-CELL	Daimler AG	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/wirtschaftsverkehr-feldversuche/emil
	E-Mobil Saar (Elektromobilität als öffentlicher Verkehr: Das Beispiel Saarland)	PD32	Saarland	Target use of electric vehicles in public transport	VGS Verkehrsmanagement Gesellschaft Saar	http://www.dassaarlandhandelt.de/e-mobil-saar
	e-mobility Berlin/Hamburg	PD33	Berlin; Hamburg	The project envisages to test electric Smart vehicles and related infrastructure in Berlin	Daimler AG	http://www.e-mobil-bb.de/

Country of funding	Name and Abbreviation of a project	Project ID	Area of field tests	Brief Project Description	Coordinator Organization	Link
DE	E-tour Allgau (Blaizing trails with electric power)	PD34	Bavaria	The eE-Tour Allgäu project aims to use electric mobility to help solve the region's needs for full mobility as well as the highest possible level of environmental protection. This will be done by creating a fleet of electric vehicles that can be rented	Allgäuer Überlandwerk GmbH	http://www.ee-tour.de/
	EWE Flottenversuch Elektromobilitat	PD35	Berlin	Analysis and development of a needs-based charging infrastructure; - Procurement of electric vehicles as a test fleet - Testing of electric vehicles for everyday use; - Investigation of business development for future electric vehicles	EWE AG	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche
	Fleet tests (EWE Flottenversuch Elektromobilität)	PD36	Bremen/Oldenburg	The aim is to develop a needs-based charging infrastructure for economic, technical and user related aspects, to safeguard and promote e-mobility.	EWE AG	http://www.personal-mobility-center.de/de/projekte-und-aktivitaeten/unsere-projekte-und-aktivitaeten.html
	Fleet tests (Flottenversuche) - PMC Modul 3	PD37	Bremen/Oldenburg	Fleet testing with electric vehicles in the region for demonstration and scientific analysis and evaluation	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (FhG)	http://www.personal-mobility-center.de/de/projekte-und-aktivitaeten/unsere-projekte-und-aktivitaeten.html
	Forschungsbegleitung für den Einsatz von Hybridlinienbussen im Verkehrsverbund Rhein-Ruhr	PD38	Rhein-Ruhr	Hybrid buses in local public transport: testing of a prototype and two parallel hybrid buses	Rheinisch-Westfälische Technische Hochschule Aachen	http://www.elektromobilitaet.nrw.de/page.asp?TopCatID=12323&CatID=13024&RubrikID=13024
	Future Fleet (Green energy for company cars)	PD39	Baden-Wuerttemberg	Five-hundred SAP employees, out of over 1,400 applicants, were given the chance to get behind the wheel of 27 electric cars for their daily driving needs. The cars were charged exclusively with renewable energy provided ba MVV Energie at 36 stations at SAP	SAP AG (SA Research)	www.futurefleet.de
	Gesteuertes Laden V2.0 (Increase the effectiveness and efficiency of wind-to-vehicle applications (W2V) and vehicle-to-Grid (V2G) including charging infrastructure)	PD40	Berlin	The aim of the current project "Controlled Charging V2.0" is to evaluate on the basis of scientific analysis and taking account of the automotive and energy industry needs adequate information to represent an optimum process for the use of renewable energy	Vattenfall Europe	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche
	Green Move (Hybridbusse in Darmstadt)	PD41	Rhein-Main	Deployment of 3 hybrid busses	HEAG mobilo GmbH	http://www.offenbach.de/stadtwerke-offenbach-holding/holding/leitstelle-elektromobilitaet-der-modellregion-rhein-main/projekte-3/
	GridSurfer (Taking electric mobility in a country side)	PD42	Oldenburg	Project will develop and field-test key components of electric mobility systems and their interfaces, including storage and charging stations; metering and control systems; ICT-based storage management, billing, and marketing processes	EWE AG	www.ewe.de/ewe-macht-zukunft/ grid_surfer.php
	Hamburg PURE	PD43	Hamburg	15 battery-powered Renault Kangoo Ze are deployed. These light commercial vehicles are used at Hamburg businesses in trade, crafts and logistics	hySOLUTIONS	http://www.elektromobilitaethamburg.de/
	Harz.EE-mobility (Harnessing the wind and the sun to make people mobile)	PD44	Saxony	An intelligent ICT-based system is used to calibrate the energy supply in accordance with the existing power grid and individual mobility needs. Harz.EE-mobility demonstrates how drivers of electric cars can fuel up on carbon-neutral electricity without restrictions	Otto-von-Guericke-Universität Magdeburg Institut für Elektrische Energiesysteme	https://www.harzee-mobility.de/index.php

Country of funding	Name and Abbreviation of a project	Project ID	Area of field tests	Brief Project Description	Coordinator Organization	Link
DE	hh=more	PD45	Hamburg	The project envisages the deployment of 50 battery-powered Smart electric drive vehicles and the establishment of a public charging infrastructure.	hySOLUTIONS	http://www.elektromobilitaethamburg.de/
	hh=wise	PD46	Hamburg	The project envisages the deployment of 20 battery-powered Fiat Fiorino electric drive vehicles and the establishment of a public charging infrastructure.	hySOLUTIONS	http://www.elektromobilitaethamburg.de/
	IKONE (Intergrated concept for sustainable e-mobility	PD47	Stuttgart	A project led by Daimler, trials 50 battery-driven Mercedes-Benz vans in the Stuttgart region. The aim is to assess the vansâ□□ efficiency in terms of consumption and range, and test their suitability for delivery runs in urban environments.	Daimler AG	http://ecars.region-stuttgart.de/projekte/
	INMOD (Intermodaler öffentlicher Nahverkehr im ländlichen Raum auf Basis von Elektromobilitätskomponenten)	PD48	Mecklenburg-Vorpommern	inter-modal public transport in rural areas based on electric mobility components	Zentrum für ländliche Mobilität der Hochschule Wismar	www.ikem-online.de
	IRENE (Simulation und Erforschung der künftigen Netzbelastungen durch Elektromobilität und Erneuerbare Energien in einem Alltagsszenario 2020. Das FuE-Projekt soll am Beispiel des Allgäus neue Erkenntnisse für die künftige Auslegung und –planung von Verte	PD49	Bavaria	The pilot project for the "Integration of renewable energies and e-mobility" (IRENE) aims to identify technical and business solutions to enable distribution network operators to feed power from fluctuating decentralized renewable energy sources into the	Siemens AG	http://www.projekt-irene.de/index.html
	iZEUS - intelligent Zero Emission Urban System	PD50	DE	As a follow-up project of the project MeRegioMobil iZEUS, aims to promote research, development and practical demonstration in the areas of energy, and vehicle traffic with a focus on Smart Traffic and Smart Grid.	EnBW Energie Baden-Württemberg AG (	http://www.izeus.kit.edu/
	Kontaktloses Laden von batterieelektrischen Fahrzeugen (IndiOn)	PD51	Berlin	In the joint project "Indion" the emphasis is on achieving the highest possible efficiency in energy transfer between road and vehicle side by the intelligent control of the charging device.	Siemens AG	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche/w-charge
	Kontaktloses Laden von Elektrofahrzeugen (Conductix)	PD52	Weil am Rhein	Wireless charging for Range Extender	Conductix-Wampfler AG	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche/w-charge
	Linie 103	PD53	Rhein-Main	Test operation of electric busses including conception and construction of intrastructure as well as e-bike sharing	Offenbacher Verkehrs-Betriebe GmbH	http://www.offenbach.de/stadtwerke-offenbach-holding/holding/leitstelle-elektromobilitaet-der-modellregion-rhein-main/projekte-3/
	MeRegioMobil (Electric Mobility in a Future Energy System)	PD54	Baden-Wuerttemberg	MeRegioMobil aims at developing and building up the infrastructure for a large number of electric vehicle users in Baden-Wuerttemberg in 2010 and putting it to a regional field test by the end of 2011. Also within the framework of the project, excess ener	EnBW AG	http://meregiomobil.forschung.kit.edu
	MINI E Berlin 1.0	PD55	Berlin	Demonstration of electric MINI fleet with related infrastructure	Bayerische Motoren Werke AG	n/a
	MiniE Berlin 2.0 (MINI E Berlin powered by Vattenfall V2.0)	PD56	Berlin	Additional 20 vehicles are used for tests	Vattenfall Europe Innovation GmbH	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche
	MOREMA	PD57	Rhein-Main	Contruction and operation of an electric vehicle fleet including the testing of the compatibility and user-friendliness of charging stations and electricity parking spaces	juwi R & D Research & Development GmbH & Co. KG	http://www.offenbach.de/stadtwerke-offenbach-holding/holding/leitstelle-elektromobilitaet-der-modellregion-rhein-main/projekte-3/

Country of funding	Name and Abbreviation of a project	Project ID	Area of field tests	Brief Project Description	Coordinator Organization	Link
DE	MR Bremen-Oldenburg - Neue Mobilität im ländlichen Raum: Angewandte Elektromobilität - Technologiekonzepte - Mobilitätseffekte	PD58	Bremen, Oldenburg	The aim of the project is the development of electric vehicles in the region.	Fraunhofer-Institut für Fertigungstechnik und Angewandte Materialforschung IFAM, Bremen	http://www.modellregion-bremen-oldenburg.de/de/projekte-und-aktivitaeten/aktuelle-projekte.html
	O(SC)²ar - Open Service Cloud for the Smart Car	PD59	Aachen	O(SC)²ar aims at transfering the Aachen modular system for electric vehicles ("Concept Zeitgeist") to ICT, as well as electrical and electronics (ICTEE) architecture.	FEV Motorentechnik GmbH	http://www.fir.rwth-aachen.de/en/research/research-projects/osc-ar-01-me12035
	PMC (Personal Mobility Center) Module 1	PD60	Bremen/Oldenburg	Establishment of a Personal Mobility Center as a central contact point and competence center for electromobility in the region	Deutsches Forschungszentrum für Künstliche Intelligenz GmbH	http://www.personal-mobility-center.de/de/projekte-und-aktivitaeten/unsere-projekte-und-aktivitaeten.html
	Primove Road - Entwicklung der weltweit ersten multimodalen Teststrecke für induktiv geladene Fahrzeuge	PD61	Ausburg	Development of the world's first multi-modal test circuit for inductively charged vehicles and all-electric bus prototypes	Bombardier Transportation GmbH	n/a
	REX (Batteriefahrzeug mit Range Extender)	PD62	Stuttgart	The main objective of the project is to develop and demonstrate a sustainable vehicle and drive concept to reduce pollutant and noise emissions. (Range-Extender vehicle)	Daimler AG	http://www.pt-elektromobilitaet.de/projekte/foerderprojekte-aus-dem-konjunkturpaket-ii-2009-2011/pkw-feldversuche
	SaxHybrid (Serielle Hybridbusse mit partiell rein elektrischem Fahrbetrieb)	PD63	Saxony	Deployment of serial hybrid busses, some with full electrical drives (10 vehicles each for Dresden and Leipzig)	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (FhG)	http://www.e-mobil-sachsen.de/Startseite/Partner-Projekte/BMVBS-Projekte/Projekt-SaxHybrid.html
	SaxMobility (Serielle Hybridbusse mit partiell rein elektrischem Fahrbetrieb)	PD64	Saxony	Fleet operation with electric vehicles and fleet management (deployment of 39 electric vehicles) as well as the expansion of charging infrastructure in Dresden and Leipzig	KEMA – IEV Ingenieurunternehmen für Energieversorgung GmbH	http://www.e-mobil-sachsen.de/Startseite/Partner-Projekte/BMVBS-Projekte/Projekt-SaxMobility.html
	SaxMobility II - Mobile Endgeräte als Zugangs- und Abrechnungssystem für Ladeinfrastruktur sowie zur Verknüpfung mit dem ÖPNV	PD65	Saxony	Mobile devices for access and billing system for charging infrastructure, and to link with public transport	KEMA - IEV Ingenieurunternehmen für Energieversorgung GmbH	http://sax-mobility.de/
	Smart Wheels (Taxi Drive with E-Power)	PD66	Aachen	One of the project's main priorities is to develop a concept that encompasses various vehicle types (electric buses, cars and scooters) to take optimal account of the issue of limited vehicle range. Within this concept, electric scooters are to be used to	FEV Engine Technology	www.smartwheels.de
	Stromschnelle (E-Mobilität im Pendlerverkehr)	PD67	Rhein-Ruhr	Project examines the "electric commuter traffic between the Rhine and Ruhr" in practice. The vehicle fleet consists of 40 electric vehicles from Renault, and converted from 110 electric cars provided by RWE as lease vehicles.	RWE Effizienz GmbH	http://www.elektromobilitaet.nrw.de/page.asp?TopCatID=12323&CatID=13024&RubrikID=13024
	Twindrive - Ermittlung des Nutzenpotenzials von Plug-In_Hybrid-Fahrzeugen	PD68	Berlin/Potsdam	Determination of the potential benefits of plug-in Hybrid vehicles	Volkswagen	http://www.e-mobil-bb.de/Weitere_regionale_Projekte_1.html
DK	ChoosEV (TestEnElbil)	PD69	DK	Development of EV infrastructure and vehicle testing: 300 electric cars in 30 municipalities of Denmark	Clever	http://testenelbil.clever.dk/english/
	EDISON	PD70	Island of Bornholm	Development of optimal system solutions for EV system integration, including network issues, market solutions, and optimal interaction between different energy technologies.	Dansk Energi	http://www.edison-net.dk/

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ES	CITIELEC	PD71	San Sebastian, Zaragoza	Research on electric powertrain systems and the dedicated infrastructure; demonstrate the impact of the research with a field test in two Spanish cities	ROBOTIKER	http://www.cityelec.es/es/elproyecto/elproyecto.php
	ELECTROBUS: ENERGY EFFICIENT BUS NETWORK FOR BARCELONA	PD72	Barcelona	Retrofit existing diesel and GNC buses into hybrids, with: • Technological studies on electric and hybrid buses (including retrofitting) • Support in the definition of tailored financial instruments to finance the bus fleet renewal • Studies for a new Bus	Transports de Barcelona, S.A (TB)	(blank)
	Live (Logistics for Implementation of Electric Vehicles)	PD73	Barcelona	Live promotes electric mobility in the Metropolitan Area of Barcelona	(blank)	http://w41.bcn.cat/web/guest
	Livingcar project	PD74	Astiurias	A living lab for studying the effect of using electrical vehicles and their related infrastructure in a real life environment. The main objective of this initiative is to run a living lab based on the utilization of electrical vehicles in a real city	Prodintec	www.prodintec.com
	MOVELE	PD75	Madrid, Barcelona, Seville	Aimed at demonstrating the technical and economical feasibility of EVs and promoting public and private collaboration in this field and the deployment of the associated infrastructure.	n/a	http://www.movele.es/
EU	GREEN E-Motion	PD76	Dublin, Cork, Copenhagen, Bornholm, Malmo, Belin, Karlsruhe, Stuttgart, Budapest, Rome, Pisa, Kozani, Barcelona, Madrid, Malaga, Giuipuzcoa,	Green eMotion will connect ongoing regional and national electromobility initiatives leveraging on the results and comparing the different technology approaches to ensure the best solutions prevail for the European market.	SIEMENS	http://www.greenemotion-project.eu/
	ICT 4 EVEU (ICT services for Electric Vehicle Enhancing the User Experience)	PD77	Vittoria, Pamplona, Bristol, Ljubljana, Maribor	The aim is to deploy an innovative set of ICT services for electric vehicles (EV) in different and complementary pilots across Europe. The scope of the ICT services is the integration of different management systems operating on the existing EV infrastructure	COMUNIDAD FORAL DE NAVARRA - GOBIERNO DE NAVARRA, SPAIN	www.ict4eveu.eu
	MERGE (Mobile Energy Resources in Grids of Electricity)	PD78	Berlin, Oslo, Dublin	The project will examine the impact of ecars on electricity grid infrastructure and on existing power generation and grid infrastructure planning.	PUBLIC POWER CORPORATION S.A.	http://www.ev-merge.eu/
	MOBI.Europe (Integrated and Interoperable ICT Applications for Electro-Mobility in Europe)	PD79	Lisbon, Dublin, Amsterdam, Vigo	MOBI.Europe aims to make users more comfortable with the use of EVs beyond the limits of “range anxiety” by providing them with universal access to an interoperable charging infrastructure, independently from their energy utility and region.	INTELI - INTELIGENCIA EM INOVACAO,CENTRO DE INOVACAO ASSOCIACAO PRIVADA SEM FINS LUCRATIVOS, PORTUGAL	http://www.mobieurope.eu/

Country of funding	Name and Abbreviation of a project	Project ID	Area of field tests	Brief Project Description	Coordinator Organization	Link
EU	MOLECULES (Mobility based on eLectric Connected vehicles in Urban and interurban smart, cLean, EnvironmentS)	PD80	Berlin, Barcelona, Paris	The aim is to contribute to a pre-deployment and wider uptake of smart connected electromobility as a radical departure from today's transport system towards lower carbon emissions. with three large scale pilots in Barcelona, Berlin and Grand Paris aiming to use ICT services to help achieve a consistent, integrated uptake of Smart Connected Electromobility (SCE) in the overall framework of an integrated, environmentally friendly, sustainable mobility system.	ETRA Investigacion Y Desarrollo SA	n/a
	smartCEM (Smart Connected Electro Mobility)	PD81	Barcelona, Gipuzkoa-San Sebastian, Newcastle and Turin	The smartCEM project aims to minimize the current EV limitations, by applying advanced mobility services (EV-navigation, EV-efficient driving, EV-trip management, EV-charging station management) to existing multimodal electro-mobility transport modes.	ASOCIACION CLUSTER DE MOVILIDAD Y LOGISTICA DE EUSKADI, SPAIN	www.smartcem-project.eu
EU; ES	SmartCITY project	PD82	Malaga	Among other electric vehicles and their associated infrastructure (e.g. charging systems, roaming, etc.) will be promoted in the form of fleets and dedicated local supplies, including the design and installation of a MV substation supporting up to 200 EVs	Endesa	http://www.smartcitymalaga.es/
	Valencia region: EPV Project	PD83	Valencia	Developing and installation of a recharging station prototype for electric vehicles; identification of usage patterns for the vehicle to be launched, study new business models and pursue standard charging solutions	IBERDROLA	n/a
FI	EcoUrban Living	PD84	Espoo	National test environment for electric vehicles –project EVELINA refers to a comprehensive test environment for electric vehicles nationwide. The vehicles will be tested in various cities in Finland: at the beginning at least in Tampere, Varkaus, Lappeen	Synocus	http://www.eco-urbanliving.com/index.php/about-us.html
	EVELINA	PD85	Tampere, Varkaus, Lappeenranta, Kuopio, Vaasa, Helsinki	In addition to the monitoring of the vehicles test environment focuses on traffic and energy systems as well as on the development of maintenance and service infrastructure for electric vehicles.	Hermia Ltd	http://www.evelina.fi/
	Helsinki Demonstration Project	PD86	Helsinki	The aim is to form a test fleet of 500 electric vehicles to Helsinki Metropolitan area during 2011-2012.	Nokia Siemens Networks Venture	n/a
FR	CROME (border Mobility for Electric vehicles - deutsch-französicher Modellversuch zu grenzüberschreitender Nutzung von Elektromobilität)	PD87	Alsace/ Baden-Wurttemberg	the demonstration of cross-border traffic with electric vehicles, the design and testing of compatible cross-border charging infrastructures (charging plugs, charging cables, charging communication, access systems, services, etc.), the testing of novel evs	Deutsch-Französisches Institut für Umweltforschung	http://crome.forschung.kit.edu/
	DHRT2 (Démonstrateur Hybride Rechargeable Toyota II)	PD88	Strasbourg	A large-scale demonstration EDF-Toyota of experimental fleet of PHEVs in conjunction with infrastructure in an urban area. Thus, one hundred vehicles like Toyota Prius 3 equipped with Li-ion batteries instead of the current commercial version (such as n	Toyota	n/a

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FR	ELLISUP (Autobus ELectrique à batteries au LIthium et SUPercapacités)	PD89	Paris	ElLiSup is a project that aims to demonstrate electric bus and a hybrid electric bus, both fast charging.	IRISBUS IVECO	http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=24712
	MOV'EO CENTRALE OO (Innovative Information and Communication Platform facilitating and optimizing the management of zero emission urban mobility)	PD90	Paris	The project will focus on specific issues related to full electric mobility. It includes modeling and development of successive optimized versions as well as testing and calibration of these models in real conditions thanks to a dedicated EV micro ecosyst	Laboratoire de l'Ecole des Ponts	http://www.pole-moveo.org/pdf-projets-das/CentraleOO-A.pdf
	MOV'EO Scolelec (An ecological and innovative solution for school transport)	PD91	Seine-et-Marne	The aim of the Scol'Elec is to produce an electric school bus demonstrator vehicle. This vehicle will be equipped with a 100% electric powertrain and will carry roughly 100 KWh of Lithium-ion batteries on board. The aim of this first vehicle is to prove t	PVI SAS	n/a
	SAVE (Seine Aval Electric Vehicle)	PD92	Seine Aval Region	Project objectives: To test the business models of electric vehicles and the battery-charging infrastructures. To obtain information about driver usage and find out how drivers appreciate the vehicles and the recharging systems.	Renault	http://www.renault.com/en/capeco2/pages/experimentation-seine-aval-vehicules-electriques.aspx
	Strasbourg PHV project	PD93	Strasbourg	large-scale experimentation of Plug-in Hybrid Vehicles (PHVs) (100 plug-in hybrid electric vehicles); -experimentation of PHV using Li-Ion batteries; -vehicle-recharging unit combination.	EDF	http://innovation.edf.com/vhr-strasbourg/uk/index.html
	VELECTA	PD94	Paris	Velecta aims to demonstrate electric vehicles in the field of light and heavy QUADRICYCLES on an electric vehicle already on the market: the MEGA e-City.	AIXAM-MEGA	http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=24712
	ZEN-EDRIVE	PD95	Bourget-du-Lac; Grenoble; Paris	Realization of a demonstration platform for the development of an integrated vehicle / infrastructure with optimal management of energy	Courb	http://zen-e-drive.com/
IE	EPRI	PD96	Dublin	The aim of the project is to assess the impact of electric vehicle charging on the electricity network. ESB ecars is conducting public trials, providing customers with electric vehicles, smart meters and other sensors to closely monitor the impact of char	EPRI	http://www.esb.ie/electric-cars/electric-car-charging/electric-car-research-trials.jsp
	ESB ecarsw trial	PD97	Dublin	15 Mitsubishi i-MiEVs and 2 Nissan LEAFs are being trialled by residential and high profile corporate participants such as Conor Faughnan, AA Ireland, and Alan Gallagher, Croke Park Stadium, throughout Ireland. Each electric car is fitted with a data loggers	ESB	http://www.esb.ie/electric-cars/electric-car-charging/electric-car-research-trials.jsp
IT	Emobility Italy	PD98	Pisa, Rome, Milan	enables the diffusion and the use of electric vehicles, with state of the art recharging technologies, thanks to adhoc development of recharging infrastructure, offering intelligent and secure services and respecting the environment. Smart® Electric vehicles will be tested	ENEL	http://www.e-mobilityitaly.it/

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	E-Moving	PD99	Milan, Brescia	The E-Moving project sees the collaboration between A2A, an electric utility based in Lombardy Region, and Renault, supplying EVs. A2A plans to build 270 charging points in two Italian cities (Brescia and Milan), and Renault will supply 60 EVs of various models	Renault-Nissan Alliance	n/a
IT	ENEL Distribuzione - HERA	PD100	Pisa, Bari, Genova, Perugia, Milano, Emiglia-Romania region	Electric vehicle infrastructure implementation	ENEL	http://www.autorita.energia.it/it/docs/11/096-11arg.htm
	Green Land Mobility	PD101	Milan, Rome, Bari,Genova, Catania, Naples, Bologna, Monza-Brianza	Electric vehicle infrastructure implementation	Class Onlus	http://www.greenlandmobility.it/
	SEM (Solar Energy Mobility)	PD102	Rome	Electric cars for Fiera di Roma	Investimenti SPA	n/a
	ZEC – Zero Emission City – Piano di mobilità elettrica per la città di Parma, 2011 – 2015".	PD103	Parma	Development of electric vehicle infrastructure and business model	Municipality of Parma	http://www.comune.parma.it/
	Amsterdam Electric	PD104	Amsterdam	Integrated scheme for electric vehicle and infrastrucature development	Gemeente Amsterdam	www.amsterdamelektrisch.nl
	CityShopper elektrische stedelijke bezorgservice	PD105	Nijmegen	7 electric vans for supermarket chain are tested	Cornelissen	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
	Elektrisch bezorgen van levensmiddelen	PD106	Amsterdam	Electric vans for supermarkets	Peter Appel Transport	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
	Elektrische Greenwheelsauto's in de G4	PD107	Amsterdam, Rotterdam, Den Haag and Utrecht.	There are 25 Greenwheels electric cars with corresponding charging points placed to use in the car sharing concept testing.	Peugeot	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
NL	Elektrische vuilnisauto's bij Van Gansewinkel Groep	PD108	Amsterdam, Rotterdam, Den Haag, Schiphol, Groningen, Zutphen en Breda/Tilburg	With the aid of electric waste collection vehicle commercial waste is collected in urban areas and industrial sites in different regions.	Van Gansewinkel Groep	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
	Elektropool Haaglanden	PD109	den Haag	11 cars for pooling and 1 courier vehicle are tested	Ontwikkelingsmaatschappij Den Haag	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
	E-Public Transport	PD110	Noord Brabant	n/a	n/a	n/a
	Fijnmazige stadsdistributie/pakketbezorging	PD111	Amsterdam	6 electric trucks for UPS deliveries	UPS	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
	Hybrid Mercedes-Benz Trucks	PD112	NL	n/a	Daimler	n/a
	Prestige GreenCab	PD113	Utrecht	Prestige GreenCab invests in 18 electrical passenger cars and their charging stations. The vehicles are deployed in pupil and patient transport, airport and hotel transportation, beltaxi transport, shuttle transport and business travel.	Stedin	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
NL	Rotterdam Test Elektrisch Rijden (voorheen 75-EV-RO)	PD114	Rotterdam	Joint project with 75 electric and plug-in hybrid cars of different makes and models. The acquisition of 30 of these electric vehicles and monitoring be funded from the pilot. The cars are used as pool cars for employees and company cars	Stedin	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
	Texel Gastvrij Elektrisch Vervoer - Opladen op Texel	PD115	Texel	In the project, 28 electric cars are purchased and the required charging infrastructure is constructed. The goal is the population Texel and tourists with electric cars to become acquainted.	Stichting Urgenda	http://www.agentschapnl.nl/content/resultaten-proeftuin-hybride-en-elektrisch-rijden
	Volvo Hybride Trucks	PD116	NL	n/a	Volvo	n/a
PL	"ECO-Mobility"	PD117	PL	n/a	n/a	n/a
	Development of electric vehicles market, with infrastructure and charging stations – basis for energetic safety in Poland	PD118	Warsaw	Electric vehicle testing and inftrastructure development	Agency for Regional Development MARR S.A.	http://www.en.marr.pl
	First Europe, Polish electric bus from Solaris Bus & Coach"	PD119	PL	n/a	Solarisbus	http://www.solarisbus.pl/en/about_us.html

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PL	MOBI.E	PD120	PT	MOBI.E was set as the first fully interoperable electric mobility system, where users can, through the IT system, access any charging point operated by any company with one single authentication and payment method, choosing from different electricity suppliers, ensuring the integration with parking and other services. Within the scope of the “Pilot Phase”, the target is to set a nationwide infrastructure of 1 350 charging points (normal and quick charging) by 2013, covering 25 cities, and to develop and test advanced mobility services.	Mobi.E: Management Entity	http://www.mobie.pt/en/mobilidade-electrica
SE	E-mission in The Øresund Region	PD121	Oresund	Information campaigns, an electric vehicle rally and a summit for mayors from the Ørresund Region. Work towards the establishment of an infrastructure for electric vehicles that makes it possible for commuters to charge their electric vehicles on both sid	Københavns Kommune	http://www.interreg-oks.eu/en/Menu/Projects/Project+List+%C3%96resund/E-mission+in+The+%C3%98resund+Region
	E-Mobility	PD122	Malmo	Test household: 20 private families have opportunity to use electric vehicle for three months period. The experience the families gain during the test period is spread through press articles, social media and public events.	EON	http://www.eon.se/om-eon/Om-energi/Sustainable-mobility/E-mobility/FAQ/#faq73956
	Energimåtning på elfordon (Energy Management in Electric Vehicles)	PD123	Stockholm	(blank)	(blank)	n/a
	Plug-in City	PD124	Malmo	70 PEVs, 60 twowheelers, 250 charging points	EON	n/a
SE; EU	Hyper Bus (Hybrid and Plug-in Extended Range Bus system)	PD125	Gothenburg	Demonstration of a pilot fleet of innovative public transport vehicles (buses) that combine outstanding performance with low-energy consumption. This will be achieved by introducing hybrid buses with a newly developed plug-in technology	Business Region Goteborg (BRG) AB	http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=3977&docType=pdf
SK	(VIBRATE) Vienna -Bratislava e-mobility	PD126	Vienna	Objectives: • Display of e-mobility as an alternative to gasoline; • Constructing standardized, compatible charging stations in the region. Activities: • Commuters of the region will be chosen as pilot users and thus make e-mobility visible on the streets	VERBUND AG	http://www.emobility-vibrate.eu/
UK	CABLED (Coventry and Birmingham Low Emmission Demonstrators)	PD127	Birmingham	Project is supported by a consortium of 12 companies. It aims at "real world testing" of EVs and infrastructure to support the product development activities of 6 vehicle manufacturers, the majority of them UK-based. The 1st year project report describes	ARUP, UK	http://cabled.org.uk/the-project
		PD128	Coventry	Project is supported by a consortium of 12 companies. It aims at "real world testing" of EVs and infrastructure to support the product development activities of 6 vehicle manufacturers, the majority of them UK-based.	ARUP, UK	http://cabled.org.uk/the-project

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	EEMS Accelerate	PD129	UK	Project aims to help realise the potential of electric performance vehicles. With support from the Government, the project brings together cutting edge, British designed and engineered, electric vehicles and puts them at the hands of driving enthusiasts	AEA Technology	http://eemsaccelerate.co.uk/about/
	EVADINE (Electric Vehicle Accelerated Development in the North East)	PD130	Newcastle	Over the course of the project the vehicles will be placed with a cross section of society to capture representative information reflecting how the vehicles perform and how they impact on the behaviour of the users. Running in parallel, ONE North East, th	Future Transport Systems	http://www.futuretransportsystems.co.uk/projects/electric-vehicle-accelerated-development-in-the-north-east.aspx
UK	Ford Focus Battery Electric Vehicle (BEV)	PD131	London	Project developed zero-emission prototype vehicles to test the technology's suitability for potential future application in Ford's European passenger car range.	Ford, UK	http://www.ford.co.uk/AboutFord/News/CompanyNews/2010/GoLive
	London South East Bid	PD132	Westminster, London	Additional cars will be brought to the UK when Smart carries out an important trial with the support of the Technology Strategy Board. Individuals can apply to participate in these research trials across the London South East and Westminster	Mercedes-Benz	n/a
	MINI E	PD133	Oxford	A number of MINIs were deployed for day to-day usage within a rest area of South East of the UK, Project aimed at the introduction of emission-free driving and the required infrastructure.	BMW Group, UK	http://www.mini.co.uk/model-range/making-the-right-choice/minimalism/product/mini-e/
	Peugeot Electric Cars	PD134	Glasgow	The trial vehicles, that have a battery range of between 80 and 100 miles, will be integrated into the council's existing fleet and that of other partner organisations to gather reliable information and feedback on the viability of including these vehicle	Allied Electric vehicles	http://www.alliedelectric.co.uk/
	PHV: Paving the way forfull commercialisation	PD135	London	Toyota together with EDF Energy to trial the UK's first Plug-in Hybrid Vehicle (PHV). The PHV's batteries can be recharged using a standard electrical plug or a public charging post - EDF has helped install the first of 40 posts in the UK	Toyota	http://www.toyota.co.uk/cgi-bin/toyota/bv/frame_start.jsp?id=plugin_hybrid
UK	SwitchEV	PD136	North East England	Switch EV is a North East regional project, with project partners from within the area. All of the vehicles will be on the roads within the North East, with an initial focus on Newcastle and Gateshead	Nissan	http://vehicletrial.switchev.co.uk/

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Abstract
The electrification of road transport or electro-mobility is seen by many as a potential game-changing technology that could have a significant influence on the future cost and environmental performance of personal individual mobility as well as short distance goods transport. While there is currently a great momentum vis-à-vis electro-mobility, it is yet unclear, if its deployment is economically viable in the medium to long term. Electro-mobility, in its early phase of deployment, still faces significant hurdles that need to be overcome in order to reach a greater market presence. Further progress is needed to overcome some of these hurdles. The importance of regulatory and financial support to emerging environmentally friendly transport technologies has been stressed in multiple occasions. The aim of our study was to collect the information on all on-going or recently concluded research, development and demonstration projects on electric and plug-in hybrid electric vehicles, which received EU and national public funding with the budget >1mln Euro, in order to assess which of the EDV challenges are addressed by projects and to identify potential gaps in the R, D & D landscape in Europe. The data on research, development and demonstration projects on electric and plug-in vehicles, which receive public funding, has been collected by means of (i) on-line research, (ii) validation of an inventory of projects at member state level through national contact points and (iii) validation of specific project information through distribution of project information templates among project coordinators. The validation process permitted the identification of additional projects which were not accounted for in the original online search. Statistical elaboration of the collected data was conducted. More than 200 R&D and 160 demonstration projects funded by EU and 14 Member states are listed and analyzed. Collected data allowed also the development of an e-mobility visualization interactive tool, called EV-Radar, which portrays in an innovative way R&D and demonstration efforts for EDVs in Europe. It can be accessed under http://iet.jrc.ec.europa.eu/energy-systems-evaluation/ev-radar

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