combining infrastructures for efficient electric mobility

eCo-FEV final report

Reporting period: Sep 2012 - May 2015

version	1.0
dissemination	CO (Public Version)
due date	22.06.2015
version date	24.06.2015

www.eco-fev.eu

This project is co-funded by the European Union

Grant Agreement number

314411

Project acronym

eCo-FEV

Project title

Efficient Cooperative infrastructure for Fully Electric Vehicle

Funding scheme

GC-ICT-2011.6.8: ICT for fully electric vehicles

Specific Targeted Research Project (STREP)

Date of latest Annex I

May 21, 2013 (version 1.0)

Final report

Period covered

September 01, 2012 – May 31, 2015

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Project funding

7th Framework Programme
GC-ICT-2011.6.8: ICT for fully electric vehicles
Specific Targeted Research Project (STREP)
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Revision and history chart

version	date	comment
0.1	2015-05-05	Template created by EICT GmbH
0.2	2015-06-04	WPLs input integrated
0.3	2015-06-12	List of publications, dissemination activities added
0.4	2015-06-17	Chapter Exploitation added
0.5	2015-06-20	Societal implications added
0.6	2015-06-23	Project coordinator input integrated
1.0	2015-06-24	Coordinator proof-reading

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1. Final publishable summary report

1.1. Executive summary

The eCo-FEV vision is to leverage the mass market introduction of FEVs. Thus, our mission was to achieve a breakthrough in the spread of FEVs by extending and connecting already existing applications and technologies to make them more reliable.

The electric mobility does not only cover the electrification of vehicles (FEV), but also other fields such as the road transport and the energy sectors. An efficient cooperation between FEV, road users and infrastructure is a key factor to implement the electric mobility into road traffic at large by overcoming the challenge of the limited range of FEVs. On the one hand, FEVs present a high potential for environmental protection, resource management and air quality. On the other hand, the electrification of road transport may bring business opportunities for automobile and energy industries.

The eCo-FEV project therefore developed a general architecture for integration of FEVs with infrastructure systems cooperating with each other, thus allowing precise EV telematics services and charging management based on real time information.

FEV users want to rely upon their vehicles. So, all FEV-related information has to be considered by one platform, giving FEV users the possibility and enough time to react. That is why, eCo-FEV´s integrated IT platform architecture focuses on the cooperation of FEV-related infrastructure systems with advanced telematics services.

It was the objective of the eCo-FEV project to propose this open architecture in order to enable the extensibility and flexibility of the eCo-FEV concept in the follow up deployment in different implementation situations.

Overall, eCo-FEV promoted:

- the FEV introduction in mass market,
- the integration of FEV into the existing infrastructures,
- a smart cooperative infrastructure for telematics services,

- an efficient multi-mode innovative FEV charging,
- the urban co-modality mobility, and
- the environmental protection.

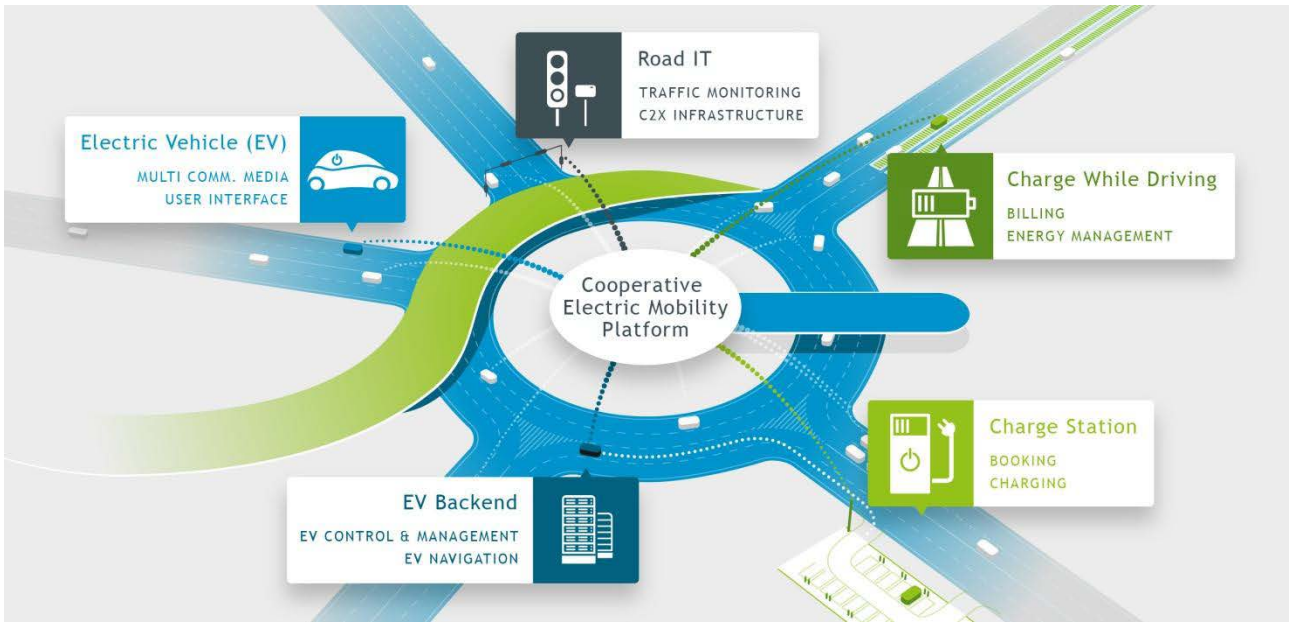

Figure 1-1: General project illustration

Technical challenges to eCo-FEV came from several areas such as charging modes, traffic situation and energy consumption. For mass market introduction of FEVs these challenges have to be accepted and seen as a motivation to push and to combine the advantages of electric mobility, different infrastructures and telematics services.

The most important technical objective was the connection of systems and their sub components like the in-vehicle system, infrastructure system and EV backend system; systems and applications had to be combined in an interactive and reliable network.

eCo-FEVintegrated a reliable communication system for enabling the telematics services at the base FEV users' acceptability. A dynamic selection of the access network will consider predefined criteria such as communication needs and network availability. At the centre of eCo-FEV´s communication approach was the research on mobile AAA-systems that are necessary not only in the case of reservation and actual charge transactions, but also for the acquisition of routing data and V2X-communication.

Attention was also paid to existing specifications from previous projects as well as from standardization activities. To measure the interaction of all related technical sub-systems, applications and interfaces, the proposed eCo-FEV architecture was extensively tested and evaluated, in particular with representative use cases developed over two test sites, in France and in Italy.

1.2. Project overview and objectives

1.2.1. Work performed since the beginning of the project

The European project eCo-FEV developed a next generation E-Mobility cooperative platform mutualizing and exploiting information from EVs and from independent EV-related infrastructures. The backend based platform collects and enables information exchanges of real time data from different independent infrastructure systems and FEVs in order to provide efficient telematics and ITS services to FEV users.

To achieve this ambitious goal, the following objectives were reached that summarize on a high level the work performed:

- Definition of cooperative electric mobility architecture for FEV and users
- Development of advanced telematics services for FEV user during the whole travelling
- Integration and technical validation of the sub systems (FEV, charging infrastructure (inductive and conductive), road IT infrastructure and EV backend system)
- Demonstration of smart infrastructure cooperation and FEV/infrastructure integration based on reliable communication
- Impact assessment
    - Mobility
    - Service quality
    - Charging technology
    - Environment
- Business study and deployment

The project started in September 2012 and ended with a Final Event at MinatecCenter in Grenoble, France in May 2015.

During the first year, eCo-FEV project concentrated its efforts on defining a set of use cases and requirements that served as a base for the development of the functional design and architecture. The overall system specification was designed, thus allowing the development and the integration of the eCo-FEV architecture that begun at the beginning of the second year. In parallel to it, an evaluation methodology and database description was developed in order to support the technical evaluation and impact assessment analysis.

At the final year of the project, the eCo-FE collaborative platform was tested and its impact on mobility, service quality, charging technology and environment assessed. Business models and exploitation plans were elaborated thus facilitating further deployment.

1.2.2. Results achieved

After conclusion of the project, all results achieved are now available and summarised in a number of public deliverables, which may be downloaded from the eCo-FEV website: https://www.eco-fev.eu/deliverables.html. They can be used by research organizations, public bodies and other stakeholders in Europe and elsewhere to support the wider deployment of FEVs.

1.2.3. Final results and their potential impact and use

The main innovations of the eCo-FEV project, tested under real conditions, are clear. eCo-FEV combined existing infrastructures relevant for advanced FEV-related services, established one electric mobility platform, designed a smart concept combining energy management& multimodal urban mobility planning, improved the energy provision via reliable wireless communications, supported different charging modes, and tested its validated platform and use cases at the ITA (Susa) and FR (Grenoble) test sites.

The overall architecture was achieved by developing road-side systems, in-vehicles systems and the backend system, all interacting with external operators related to FEVs.

Furthermore, the eCo-FEV technical evaluation included components' and systems' validation, and their functional/performance evaluation. eCo-FEV provided as well the impact assessment and some potential business models associated to the technologies

developed in the project. Last but not least, eCo-FEV worked on the Exploitation Plan, and provided high quality dissemination (e.g. 4 Journal papers and a common public deliverable with 2 other FP7 projects, Mobility2.0 and Mobincity). And two eCo-FEV Partners are now Associated Partners of the FABRIC project.

1.3. Work performed, results and foregrounds

1.3.1. WP200 Use cases, requirements and specifications

The objective of eCo-FEV project was to specify, to develop end to demonstrate a set of cooperative services allactors of the e-mobility ecosystem: users and operators.

The WP200, the first eCo-FEV project work package, specified a list of use cases targeted by the project and defined interactions between all ecosystem actors. The actor set encompassed the FEV drivers and classic road-infrastructure operators. Additional operators like “back-end platform provider”, telematics service provider, data integrator were also proposed in order to enable new actors to enter the electro-mobility business.

The proposed list of use cases and actors was based on consensus reached within the eCo-FEV consortium. However, the use caseswerenot only limited to the partner specific needs. Other potential business models were considered, in order to keep the flexibility necessary for potential exploitation beyond the eCo-FEV consortium perimeter.

Based on the actors and use case definitions, the WP200 described the architecture from different viewpoints, such as: system, communication, information and technology viewpoints. Once high level functionalities of eCo-FEV system understood, main sub systems have been identified as: On Board Unit (OBU), Road Side Unit (RSU), Charging Infrastructure and eCo-FEV Backend. The interactions between sub systems have been later presented as results of the architecture animation by previously specified use cases. Furthermore, according to the information exchange needs and use cases requirements, the sub systems functional design has been performed.

The final WP200 output wasthe detailed component specifications of all eCo-FEV sub systems in order to provide guidelines for the development work package.

Special attention was paid to the list of the exposed interfaces, necessary to satisfy the communication and operation interoperability. The communication interoperabilitywas required in order to ensure successful exchange of information, whilst the operational interoperabilityenabled the data exchanges among stakeholders who played distinct roles in a potential deployment of the eCo-FEV systems. For these reasons, the standardization of these exposed interfaces was essential to enable the eCo-FEV system exploitation. When possible the existing standards were applied. For others,nonstandard exposed interfaces, the eCo-FEV consortiumwill submitthe proposal to relevant standardization bodies as part of the dissemination activity.

The success of two eCo-FEV “in situ” demonstrations confirmed the correctness of our design principles:

1. eCo-FEV system was defined as a set of services based on the eCo-FEV back end data collect and associated “learning machine”
2. IT solutionswere selected according the their adaptation potential to various business conditions of the eCo-FEV service deployment
3. Interface standardization was considered as an essential factor of the eCo-FEV service deployment acceleration
4. Connectivity reliability was considered as vital for the acceptability of theeCo-FEV services

1.3.2. WP300 Development and integration

This WP300 aimed at the realization of the eCo-FEV architecture as specified in WP200. It also included the integration of the sub systems (i.e. in-vehicle system, charging infrastructure system, road IT infrastructure system and EV backend system) destined for the test done in WP400 and for the impact analysis and demonstration done in WP500.Particular emphasis has been given to the robustness of the system in order to be prepared for being future proof.

The objectives of this work package included:

- Development of all necessary algorithms and software components of eCo-FEV architecture for the vehicle,infrastructure and EV backend sub-systems along with the specifications developed in WP200;
- Integration of the developed components into sub-systems;

- Integration of sub-systems into the test sites;
- Technical validation of sub-system with respect to the overall requirements.

The activities of WP300 run mainly during the second year of the project and allowed to develop, test and validate:

- 2 In-vehicle systems:one focusing on the integration of novel Charge While Driving (CWD) technology within the overall eCo-FEV system. The second, focusing more on the user aspects related to the services provided by the eCo-FEV backend. The system was implemented in a total of 3 vehicles.
- 2 test sites: one, in Italy, to experiment CWD and test the usability of vehicular communication to enable procedures of charging while the car is moving. The second, in France, where static conducting charging as well as traffic and public transportation infrastructure has been integrated within eCo-FEV system.
- 1 backend composed by a set of servers providing a transparent management of charging infrastructure; allowing OEMs to keep control of their user data while implementing Open authentication methods; and enabling symbiotic integration of different stockholders of the green mobility ranging from public transportation operator, to energy provider, to end user of FEV.

The results of development, test and validation have been collected in a final deliverable D300.5 “System design, integration and technical validation” which summarizes and describes the achievements of the work package as well as the complete set of validation tests performed on the eCo-FEV system before being passed to WP400 for evaluation purposes.

1.3.3. WP400 Test and evaluation

Within the WP400 the **main aim** has been ensuring that the envisaged system can properly work(WP410-420-430) and at assessing (WP440) whether it may have a positive impact on the transport system as a whole, from the energy, environmental, motorised mobility viewpoints, including final user perspective.

Particular emphasis has been given to the definition and set up of the “verification and validation plan”, the measurement of the system performances, the verification of the functionality, the assessment of benefits and the comparison with different

technological solutions; some quantification and characterisation of the demand has been obtained.The eCo-FEV system prototypes have been tested and evaluated, on the base of WP300 results within this project.

1.3.3.1. An iterative approach

An **iterative approach** has been followed among WP200, WP300 and WP400 for ensuring systematic as well as thorough testing and evaluation of the eCo-FEV system.

The eCo-FEV components have been developed and validated within WP300 according to the **specifications and use cases**previously identified in WP200. The evaluation and validation methodology have been identified in the first steps of WP400 and further tests and the final evaluation have been performed with the main objectives to ensure that the envisaged system is **properly working** and to assess whether it **may have a positive impact on the transport system**.

1.3.3.2. Evaluation Methodology, Test and Evaluation Plan, Evaluation database description

Defining the testing and evaluation framework for a large-scale project is not a straightforward task. In a European-scale project focusing on the rapidly advancing electro-mobility domain, it should be expected to have changes in the specification of the hardware and software components envisioned in the early system design. Such changes would also naturally affect the verification and validation steps and or the context for the testing.

In the first deliverable realised in the project (**D400.1**, Feb 2014), the general methodology for the testing and evaluation of eCo-FEV system, from the components to the system as a whole, was provided. Even though the components or subsystem specifications may be changed throughout the development phases, the high-level methodology defined based on the V model, within the **Systems engineering approach**, has remained valid (Figure 1).

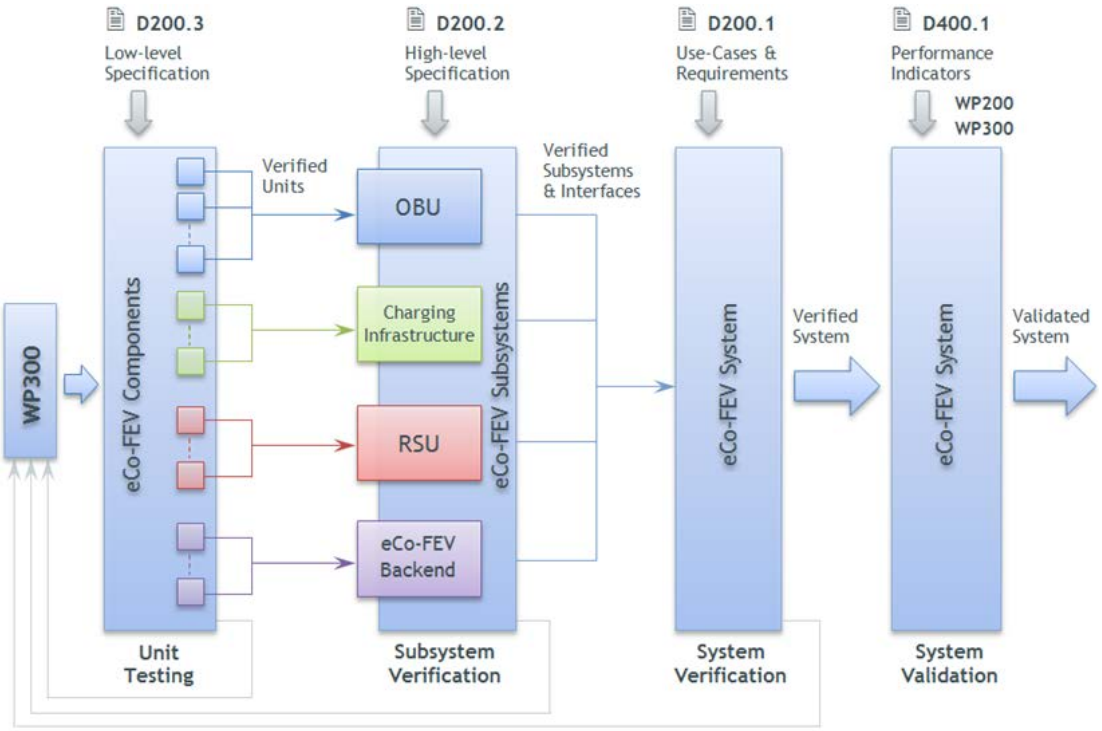

Figure 1.D400.1 Evaluation methodology, test and evaluation plan

General Methodology

An initial set of **key performance indicators** has been identified, used as a basis for the validation of eCo-FEV system in the subsequent phases of WP400.

The deliverable **D400.2** "**Evaluation database description**" was thereafter focused on identifying the dataset to be collected during the tests for the validation and evaluation purpose: this deliverable provided an overview of the dataset to be collected and stored for the evaluation of the mobility assistance services that eCo-FEV provides to FEV users or fleet operators. After a brief overview of the data sources and entities in eCo-FEV, the envisioned evaluation datasets was presented, categorised by the high-level eCo-FEV components of *Backend*, *Charging Infrastructure*, and *On-Board Unit*.

The first two deliverables presented therefore the **general methodology** and the baseline for the testing and evaluation of the eCo-FEV system, which has been

complemented and expanded in the scope of **WP420** (Test preparation and execution), **WP430** (Technical evaluation) and finally **WP440** (Impact assessment).

One relevant issue related to the charging of electric vehicles is the **autonomy**, on one side, and the **recharging possibility**, on the other one, considering the recharging time requested for the vehicle, the autonomy of a car and the **available time for the user,** strictly related to his daily **scheduling**.
Therefore it has been considered that the **electric charging** of a vehicle - given the fact that the majority of the mobility is expressed in urban contexts or anyway in short range daily travels - has to be as much as *flexible,* including:

- **wired,** static;
- **wireless**, with contact, **conductive**, static;
- wireless, contactless, **inductive**, static or in movement, so with charge while driving (CWD);
- by battery substitution, compliant with a person average strength and availability of an installation for this purpose, not consider within eCo-FEV.

The contactless static solution already exists, so we have thought at a charging linear areato be covered or run over while driving for the CWD.

1.3.3.3. **The test sites: Grenoble and Susa-Turin.**

Since March until September 2014, CG38 (since April 2015, renamed as “Le Département de l'Isère”) defined the charging station specifications of eCo-FEV system and equipped the test site in **Grenoble, France,** with the adequate facilities. The charging stations were installed in September 2014, and can supply different levels of power. Consequently different use cases could be experimented. To operate on the public domain, charging stations are equipped with RFID card access system, anti-vandalism mechanism and can be controlled by a supervisory system. Signs enable to keep two park slots for EV charging in a car park ride which is much used on a daily basis. The French test site include charging stations equipped with a communication interface, a road side unit which ensures the connectivity of the vehicle, an internet router which ensures the internet connectivity of the site, an Ethernet LAN to connect together charging stations, router and road side unit. The tests carried out have enabled to validate materials and civil working, energy supply, RFID card access and optional supervision.After the availability of the charging station for eCo-FEV and related

advanced tests, experimentations were thereafter possible for the final demo in Grenoble (May 2015, Figure 2).

Figure 2. Test site in Grenoble

Experimentation on French test site enabled in May 2015 to test successfully advanced ICT eCo-FEV services in real conditions on public domain, while interfacing with different currently operating infrastructures.

As regards the test preparation and execution of the CWD in **Italy**, it has started with February 2014, with duration of approximately 10 months. In the energy/electric **laboratories** (Figure 3, left side) of Politecnico di **Torino**, the test on the inductive power transfer system in CWD have been carried out having several purposes: assessment of the overall efficiency of the IPT CWD system, of the behaviour in misalignment conditions; test on the effectiveness of the adopted power electronic structure and individuation of criticisms; tests on the shielding system for human being EMF protection.

Important results have been achieved during the technical evaluation also on the test site in **Susa** (Figure 3, right side) of the main components developed within eCo-FEV project (D400.3).

Figure 3. Laboratory for the CWD (l.s.) and test side in Susa (r.s.)

1.3.3.4. Tests and evaluation

As well known, as typical of a **system engineering approach**, in a system we may include software and hardware, operated by people –the experts - who are the integrating and intelligent (ITS) part of the system itself: each component of the system and its behaviour are strictly connected to the other components. However, being some parts of this project in a research phase (CWD), their test is intrinsically carried out within the laboratory and occasionally in the test site (Susa), while being some others (static charging) at an applicative level, their tests consist in the starting test and functional operation of the ITS parts (Grenoble); all the components or subsystems, speaking again with the Systems engineering approach, need an functional testing that would require more or less extended operation. A similar example may be taken with complex systems as transportation ones (e.g. a metro), where the functional testing implies not rarely 6-months of operation by staff, before being accessible for public transport.

The evaluation of the eCo-FEV Backend and its functions considered mainly performance aspects to satisfy the application requirements and user needs, and communication aspects to validate the information exchanges between eCo-FEV backend and other eCo-

FEV sub systems, and the impact of communication system on the ICT service provided by the backend. For what concerns the application requirements, the reachability, the risk estimation and the rapidness to react to unexpected situation were evaluated. In general the backend has been designed in a way that it can satisfy the key performance requirement of the main ICT service developed within the project: EV Dynamic Navigation. From communication perspective, the evaluation has shown that it is up most important to consider packet loss and network coverage especially for the communication between backend and FEVs. While for packet loss techniques could be deployed to overcome the issues, for the coverage the network availability needed to be considered once the service will be deployed.

This deliverable D400.3 also revisited the charging infrastructure subsystem, its architecture and components. It described the subsystem verification following the methodology described in D400.1. This includes the verification of each component of the subsystem, the inter-component interfaces, and the interfaces to other subsystems. Based on the verified subsystem, deliverable D400.3 covers the evaluation of the system according to measured performance parameters as described in D400.2, where also target values for the system performance were set (performance indicators). The evaluation showed that the charging infrastructure satisfies the performance indicators targeted for the subsystem. This evaluation serves as an input for the impact assessment (described in D400.4).

The system is capable to detect possible errors or fault conditions and the power electronics is turned to the safe condition either for the devices and the human beings. The laboratory tests have proved the technical feasibility of the charge while driving infrastructure in terms of effectiveness, efficiency, controllability and *safety of human beings*.

In conclusion, despite having obtained in eCo-FEV good preliminary small-scale evaluation results, it is foreseen that to complete the performance evaluation of the system, a piloting project would be necessary.

Furthermore the technical solution adopted for inductive charging seems to be feasible although more research and development activity is needed to test it in realistic scenarios, with more long lasting functional tests as innovative solutions require.

1.3.3.5. Assessment

The ICT deployment

As regards the assessment of the deployment ICT advanced Co-FEV services in public domain at real scale, the eCo-FEV tests showed from a qualitative view point that the deployment of advanced ICT eCo-FEV service may support substantially a sustainable mobility around and inside a modern city, sometimes recognised as smart, both in Susa (Italy, 2014) and Grenoble (France, 2015).

eCo-FEV tests in the French test site showed in particular at the end of the project the possibility to ensure the connectivity:

- of the vehicle both in urban and extra-urban context;
- both with the current media (mobile communication) and future media (G5 communication)
- to interface the eCo-FEV system with public infrastructure including the conductive Electrical charging one and the traffic management centre

The demonstration on a real use case tested the systems in some real conditionsin public domain, yet an assessment from a quantitative view point would require pilot at real and high scale.

The transport system

The general impression, out of the entire assessment document **D400.4**and related results of tests, is that we need to prepare ourselves to the migration towards a more black-oil independent overall transport system. We need at the same time not to abandon it, yet having the possibility to study and avail ourselves of different energy sources for motorised mobility, not losing the WTW (well to wheel) whole energy analysis: this – especially the WTT (well to tank) - varies in the time and the space, i.e. the place where energy is produced and let available at the tank or battery. It seems welcome a Nuclear power supply for electric charging of motor vehicles in France, if this is interesting for the Nation also from the WTT viewpoint. It seems welcome as well the use of under-exploited hydraulic plant installations on the Alps in the North of Italy, if this is also interesting for the Nation or Regions, too; it does not result fine the use of black-oil for producing electricity for electric mobility, since it just extends the energy chain, making the WTT not interesting.

We need to keep in mind that, anyway, the economy of black oil is global, has been consolidating in almost one century and business associated to it is much extended.

The privileged market for electric traction, where the WTW is satisfying, is evidently that associated to short ranges and not so high masses of vehicles; this means typically motor vehicles up to **3.5 or 5 tons of total weight on the ground** (GVW, Figure 4), as it results from two of our studies. Lower masses can be associated to higher distances, as 150 or some more kilometres of autonomy.

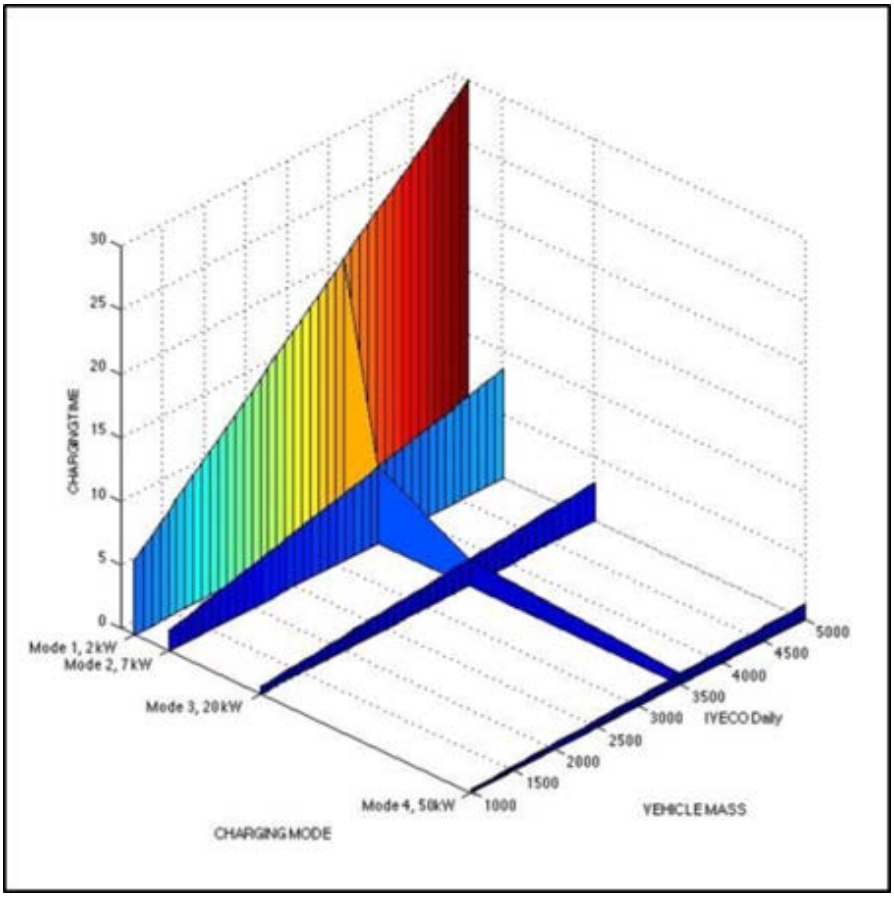

Figure 4. Times (h) for complete battery charging depending on the charging mode and the GVW

However, the **majority of** European **population lives in cities** and there the motorised mobility is mainly and daily expressed, typically on daily ranges of some kilometres up to 20-30 km. The metropolitan context is therefore the most suitable one for electric traction. This does not mean necessarily only FEV, but even HEV where the electric traction is chosen by the driver – a user need for the preferred traction of the vehicles

in a certain moment or place (electric traction in the city centre, ICE in the countryside) - possibly because of some city town's constraints to local emissions.

Since freedom in mobility is an upmost goal, we do not need to condition the **daily scheduling** of people, adding in their agenda the timetable associated to the charging of their vehicles. Therefore the eCo-FEV's services, with the possibilities opened by a remote visibility of occupied parking places, besides their booking, plus the CWD, are certainly technological solutions much helping the use of electric traction, no matter if for FEV or PHEV.

Then, within metropolitan contexts, including only urban ones, the charging points (wired or wireless) and areas (wireless) are important. As far as possible (e.g., 90-95%) charging points (wired or wireless) should be placed and used at home, in the extended areas of companies, universities, public institutions, markets, interchange areas (park and ride, P&R). This can take place even in countryside, yet keeping the attention on

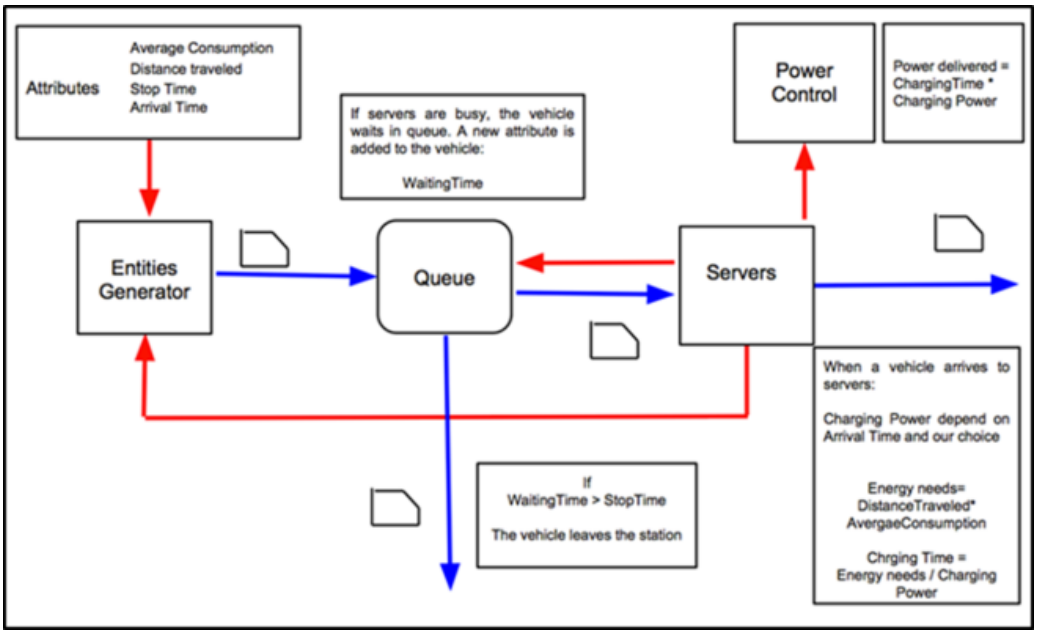

Figure 5. Flow chart of the model for the static charging analysis

WTT and distances; CWD can have much interest in parking spaces (wireless) and in urban or metropolitan public transport dedicated lanes, for example.

A model has been prepared with a Matlab toolbox, which provides blocks to simulate discrete events, queues and servers. The model simulates a charging station with

charging spots during a complete day; in relation with that, technical and economic aspects – including some considerations on cost electricity with respect to fuel/gasoil - are provided.

The most flexible motor vehicle - also for extra urban travels - remains the PHEV, since we cannot at present even think at diffused charging points much outside our cities: gasoline stations have covered the territory in almost twenty years. Whenever a user cannot afford this most flexible kind of vehicles (PHEV), he or she may avail him or herself of the FEV in sharing, in the logic of a shared fleet of FEV; this electric car sharing can be a good vector towards the future, then we shall see.

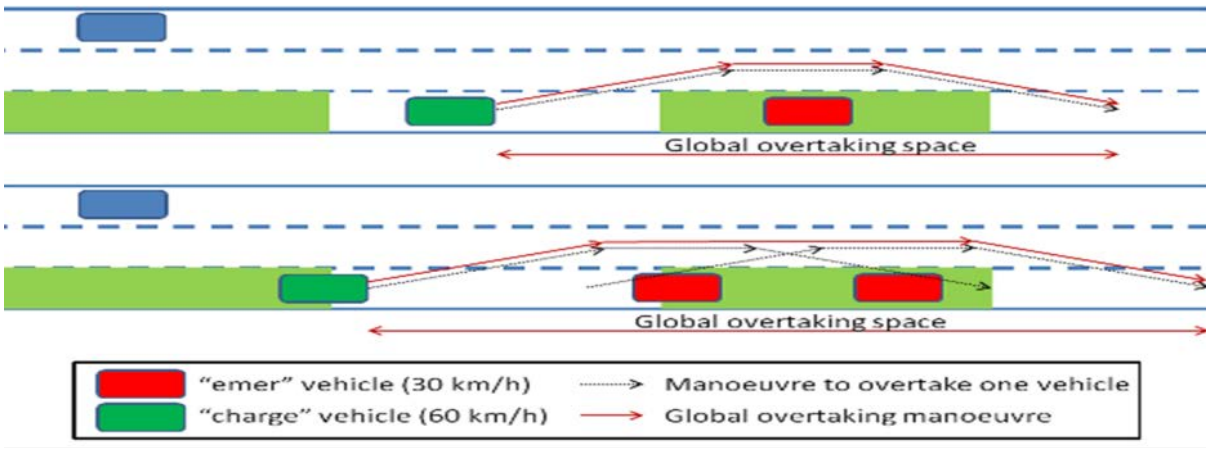

Figure 6. Scenario layout for CWD with three lanes and overtaking manoeuvres

Along motorways and urban contexts, many scenario-layouts for CWD with three lanes and overtaking manoeuvres, with equipped crossroads or single lanes have been prepared and simulated, with an outcome of four scientific papers. The adoption of CWD might result interesting at certain conditions, both of traffic and economical. The usage of CWD can be obtained primarily within the present extended refuelling stations (some tens or a few hundred of meters) or dedicated lanes, but we need to verify that the slow-speed CWD or wireless charging in parking slots can be compliant with the needed SOC by users.

The FEV or the electric traction within PHEV will be rarely used on motorways, at the present autonomy conditions, and their percentage would be too economically risky – besides for the range anxiety - with respect to the needed investments; maybe one day,

not at present. ECO-FEV offers therefore a good possibility for cities' and metropolitan contexts, mainly.

Key findings on the **demand analysis** have been:

1. Customer surveys shows users' familiarity with EV and an interested attitude to electric car purchase;
2. Economic subsidies should be focused on the larger capital costs;
3. Advantages related to operational costs are directly experienced through the use of EV;
4. Sales estimate for inductive charging by 2020 may start to appear, especially in market segments such as public transport;

eCo-FEV specific features with larger **impacts on the demand** are reported hereafter.

A. The services: potential of eCo-FEV services to improve the daily time scheduling more user-friendly technology (no plug-in cables etc.);
B. Less range anxiety with the CWD;
C. Advantages in operational costs more sensible (less cost of electric charging and actual power available at the wheels).

Development of static and CWD pilot applications

Abovementioned pilot applications require:

A. the involvement of real end-users to investigate sociological and operational issues. It requires test sites (CWD) and extended experimentation (static charging), the availability of significant quantity of users as well as equipped vehicles;
B. adequate infrastructures; these have to be currently operational and equipped with interoperable communication interface, ideally interoperable or even more standardised at European level;
C. a collaborative partnership between adequate stakeholders, as technology and advanced vehicle suppliers, local authorities, research centres, energy and mobility operators;
D. a methodology for assessing advanced ICT services, to evaluate in particular:
   - sociological features
   - scalability
   - impact of operational issues in public besides private domain;
   - impact of stakeholder visions.

-

Such an assessment is required to collect and elaborate the required information for political and business decision makers concerning the deployment of advanced ICT services as eCo-FEV services. Such a step would enable to investigate the deployment of such advanced services targeted on multimodality including electro-mobility from a business and society viewpoint. It would enable to investigate how to capitalise the eCo-FEV technical results. Electro-mobility, both full and hybrid, is currently supported by the current charging infrastructures; ICT advanced services could reinforce this deployment while preparing emerging of other charging infrastructure when required.

According to the WHITE PAPER of the European Commission, on the "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" (Brussels, 28.3.2011 - COM(2011) 144 final), with the eCo-FEV project we have been strongly addressing the item "17. The challenge is to break the transport system's dependence on oil without sacrificing its efficiency and compromising mobility", and we may write succeeding in most of this challenge, of course in our limited field of activity within the eCo-FEV domain.

Results in French test site

Experimentations on French test site enabled to test successfully advanced ICT eCo-FEV services in real conditions and on public domain, while interfacing with different currently operating infrastructures.

From a technical point of view, the delivery of advanced ICT eCo-FEV services based on vehicle connectivity and infrastructures' interfacing has been validated:

- The connectivity of the vehicle based on OBU technology has been validated both by using cellular network (3G/4G) and IEEE802.11.p (G5), and on both urban and extra-urban travels.
- Interfaces with currently operating infrastructure has been validated:
    - The interface with conductive FEV charging infrastructure installed in a car park ride was validated, enabling all FEV charging operations included

AAA process and booking operation. This interface was validated in real conditions with advanced pre-commercial installation, and is based on the extension of a standardized interface (OCPP1.5).

- The interface with traffic management centre (using DATEXIIv2 standard), including both road traffic management centre (for FEVs' travel reliability) and public transport management centre (for comodality purposes), which are currently in operation and supply dynamic advanced qualified traffic information in real time.

The demonstration was done on a use case combining urban and extra-urban mobility on the one hand, and combining electro mobility and multimodality on the other hand. EV travel was secured on one of the most critical EV mobility issue : extra-urban travel on a not meshed road network; taking into account traffic events in real time is critical to manage efficiency and comfort of travel, and moreover autonomy of EV battery.

Required technical validation was successfully achieved. Demonstration on a relevant use case was successfully done. So a large scale deployment of ICT eCo-FEV services can be considered to support electro-mobility and further sustainable mobility around and in the smart city.

A large-scale naturalistic pilot project would enable to investigate the sociological and operational issue of the implementation of eCo-FEV ICT services, and enable to investigate the scale effects for a complete business and societal validation.

1.3.4. WP500 Dissemination and exploitation

Work package 500 developed an integrative strategy to communicate and disseminate the project results. A comprehensive project design was created and maintained all over the project assuring a consistent and high quality appearance of the project. For a coherent appearance all partners had templates available, for presentations, posters as well as for all written documents.

The appropriate means and channels of dissemination were identified in the dissemination strategy and set-up afterwards. The website was established as main channel of communication. All together, the website counted 70,867 visits. The project deliverables are available here for download – be it as full version or as an abstract.

Also, all general information material about the project can be downloaded from the website. A list of presentations and publications is available as well.

This main channel website was supplemented by brochures, flyers, posters and give-aways that were developed during the project lifetime. An image brochure, illustrating the eCo-FEV platform was created in the beginning of the project and served as an extended calling card for the project. When testing started, the project had another flyer and a poster available for presenting the eCo-FEV work progress. A last brochure that was produced for the final event complements the set of printed material.

With fivejournal articles and seven more paper publications from conferences in acknowledged proceedings the project was very successful in publishing technical results and thus in shaping the research field. Partners were represented during the major European, international and national industry events such as the ITS World and European Congress, EEVC, events of the French Cluster TENERRDIS, the TRA and the German trade fair CeBIT. eCo-FEV presented to a number of other projects and initiatives. Examples are presentations given to the CIVITAS Summer School, iMobility, Green eMotion, UNPLUGGED and a joint presentation and booth shared with other projects such as FABRIC during the IEEE International Electric Vehicle Conference 2014.Besides presenting during industry events, there also were a number of publications in conference proceedings.

In the main focus of liaison activities was the Clustering with Mobility 2.0 and Mobincity. The projects

- published two releases a joint deliverable,
- held two Clustering Workshops in Brussels, Belgium with about 30 participants each,
- collaborated in the fields of use cases, architecture and requirements,
- exchanged the deliverables D200.1 Use cases and requirements as well as D200.2 Overall architecture and functional design, and
- presented conjunctly during the European Electric Vehicle Congress 2014.

As a major outcome of the joint efforts and the work oriented towards the exploration of exploitation perspectives, eCo-FEV succeeded in setting a new standard ETSI TS 101

556-3. The main result is the D502.3 “Exploitation plan” describing 15 exploitation expectations from the partners and containing a project internal deployment roadmap.

D502.4 “Potential Business Model” contains an extensive business study. It includes a market and economic demand analysis. More than 20 stakeholder interviews were conducted. Based on these information and secondary desk research primary and secondary business cases have been developed and three potential business models have been explored.

1.4. Impact and use of final results

By delivering the validation of technical solutions and by demonstrating advanced eCo-FEV services on a relevant use case, the eCo-FEV project leads to consider more concretely the deployment of ICT services for EV users in territories as the “Departement de l’Isère”.

Electromobility is considered in the Grenoble area, especially thinking at the usual air pollution.Because of a high economic activity and a limited area due to mountains, traffic congestions and mobility difficulties are important in Grenoble. So developing cleaner mobility and combining electromobility with multimodality are major issues for ensuring a sustainable mobility around and inside the Grenoble Metropolis (450000 h).

A high scale deployment of the electric vehicle charging infrastructures is planned between 2015 and 2017 on the territory of Département de l’Isère (around 650 charging points). This operation is managed by the SEDI (Syndicat de l’Energie du Département de l’Isère) with the support of the French state.
At the same time, the “Département de l’Isère” operates its traffic management center“PCItinisère” and is implementing a multimodal mobility advanced platform, “the mobility platform Itinisère”.

So both high scale electric vehicle charging infrastructure and traffic management infrastructures are or are about to be available for contributing to the supply of advanced ICT services. It is a real opportunity for deploying such services at higher scale.

Taking into account this local context and the encouraging and successful technical results of the eCo-FEV project, the deployment of advanced electromobility services as eCo-FEV services have to be considered.

A high scale pilot, with the support of institutions and public-private collaborative partnerships could be a further step.This pilot should have to interface with the existing, public infrastructures in operation and must involve a significant number of real users which will require in particular a large number of equipped vehicles or user systems. Such a pilot may enable to define required conditions for a successful deployment of advanced ICT services as eCo-FEV services. It should also deliver information which is requested by both politics and business decision makers for launching advanced ICT services as eCo-FEV services.

1.5. Exploitation

To prepare the possible exploitation of eCo-FEV results was one of the major eCo-FEV tasks.

1.5.1. Exploitation objectives

The overall goal of the exploitation activities is the comprehensive and consistent exploitation of goals and result to ensure benefit from the eCo-FEV system architecture. The objectives were threefold:

- Identify potential exploitation actions;
- Create liaisons with appropriate standardisation bodies;
- Cooperate with other FP7 projects.

1.5.2. Target groups for exploitation

The target groups for the exploitation are on the one hand the partners, consisting of OEMs, suppliers, research institutions and road authorities. As a second group other FP7 projects were identified. Here, the clustering projects Mobincity and Mobility 2.0 were the closest liaison partners. The second group for the exploitation activities contains the external standardization bodies, namely ETSI.

1.5.3. Consortium specific exploitation plans

The consortium specific exploitation activities include the collection of exploitation plan from consortium partners and analysis based on partners' inputs. In total 15 exploitation plans have been collected. In summary, these outputs can be categorised as follows:

- E-Mobility platform with modular architecture design: such platform highlights the separation of roles that may be played by different stakeholders, and a set of standardised interfaces enabling data exchanges between stakeholder systems and with FEVs end users. The modular architecture is a key technical factor that would stimulate the uptake of cloud based E-Mobility service in the future smart mobility and smart city service domain. The E-mobility platform can be regarded as a big data platform, a service support platform for secondary service providers, or used by operator to create a common market place for E-mobility market introduction and particular B2C services.
- E-Mobility services: by aggregating data from end users and different IT infrastructure systems, advanced E-Mobility services may be developed upon the platform, further adapted to local mobility requirements and to FEV user needs. On the other hand, enhanced Ipv6 protocol improves the FEV connectivity even during mobility and dynamic connectivity conditions. Last but not least, on board HMI and applications are developed to support friendly human machine interactions.
- Innovative charging mode: as one long term research output, eCo-FEV implements and validates the technical feasibility of new charging mode, more suitable for remote area FEV usage.
- New business model: combing contributions and efforts from stakeholders present in the eCo-FEV project, carefully constructed to cover the value chain for E-Mobility services, variable new business model is possible to be established. However, barriers are also present to enable such business mode e.g. cost effectiveness, infrastructure availability and maturity, legal framework etc. Therefore, business related studies are also conducted by eCo-FEV partners as one research challenge.

During the project timeline, no joint exploitation plan has been identified, mainly due to unclear E-mobility market environment in Europe. Nevertheless, it may be observed that the identified project results reflect the stakeholder role in the value chain of an E-Mobility platform. The Exploitation plan of these outputs includes short/mid-term results to long term research outputs.

In addition, the consortium consolidated an E-Mobility roadmap based on the collected partner inputs and provides it as inputs deliverable D502.3 “Potential Business Model”.

1.6. Dissemination

1.6.1. General dissemination activities of eCo-FEV

As outlined in the dissemination plan the eCo-FEV dissemination and liaison activities had three targets.

Ensure project information and visibility. With this task given eCo-FEV created and maintained a coherent communication framework, provided as printed material for physical networking and as digital media in the internet. Therefore a project identity was created, enforcing the visibility and recognition of eCo-FEV.

The website was the key medium and first address that was used by stakeholders, target groups and journalists to be informed continuously about eCo-FEV. Project news were mainly be announced and distributed via this website.It was continuously updated with news from the project. During the project lifetime the website was updated with 20 news articles, several articles on the WP progress and status and all public material as well as a list of presentations, papers and journal publications.

A comprehensive project presentation ensured a coherent representation of the project throughout the life time of the project. The project produced a set of three brochures in total among them being a project image brochure as extended calling card of the project. Also, a roll-up poster was available.

Furthermore, a number of give-aways such as stickers, pens, bags and USB memory sticks were prepared. The material, flyers and the poster were used during the project presentations, e.g. during IEEE IEVC or the Clustering Workshops.

Disseminate technical results of the project. Scientific publications and presentations are the main channels for knowledge exchange among experts and to share results within the expert community. The presentation of technical results is important steps on the way of deployment. Moreover, technical dissemination gave the project reputation within the scientific and stakeholder communities that is needed for the implementation and market introduction. Conferences and congresses are even meeting points and forums for industrial and political stakeholders. Considering the huge amount of opportunities for papers, articles, presentations and special sessions, eCo-FEV focused on themes related to electro mobility, as well as themes about intelligent transport systems (ITS) to promote the eCo-FEV cooperative infrastructure.

Main events among many others were the 20th ITS World Congress, Transport Research Arena 2014, IEEE IEVC, 3rd International Conference on Connected Vehicles and Expo and the EEVC - European Battery, Hybrid and Fuel Cell Electric Vehicle Congress.

eCo-FEV succeeded in publishing five articles in high-ranked scientific journals. Furthermore, seven articles resulting from peer reviewed conference papers have been published. In additions, partners gave a number of presentations, submitted papers that were accepted and presented posters during conferences and events.

All publications, presentations and papers can be found linked here: https://www.eco-fev.eu/conference-presentations.html.

Cooperation and networking in the European context.Working together with other EU projects brings effort and synergies. In the centre of the cooperation for eCo-FEV were the Clustering activities with the European research FP7 projects Mobincity and Mobility2.0. The projects published a joint deliverable and held two Clustering Workshops in Brussels. They collaborated in the fields of use cases, architecture and requirements and eCo-FEV exchanged the deliverables D200.1 Use cases and requirements as well as D200.2 Overall architecture and functional design. All three projects finally presented conjunctly during the European Electric Vehicle Congress (EEVC) 2014.

Besides, eCo-FEV presented to other projects, e.g. the CIVITAS Summer School 2013 and the UNPLUGGED Final Event and exchanged with initiatives in the field, such as Green

eMotion where the project participated in the stakeholder forums. Together with other projects in the field such as FABRIC, UNPLUGGED and ZeEUSthe project shared a booth and presented during the IEEE IEVC 2014.

eCo-FEV also supported EUCAR with contributing to the Sustainable Propulsion ProgramBoard. eCo-FEV contributed intensely to standardization activities and the ETSI standardization body.

2. Use and dissemination of foreground

eCo-FEV contributed to a number of e-mobility standardization activities in conjunction with the Clustering activities. As a result of the WP500 activities this standard was published ETSI TS 101 556-3. A comprehensive list of standards that were published is available on the eCo-FEV website: Besides other activities, the project published an IEEE newsletter article on standards. Furthermore, eCo-FEV contributed to the EUCAR Sustainable Propulsion ProgramBoard.

eCo-FEV also transferred project results within in the Clustering activities by making deliverables D200.1 Use cases and requirements as well as D200.2 Overall architecture and functional design available. In the framework of the clustering common E-Mobility architecture and interfaces design could be set.

eCo-FEV presented findings to the CIVITAS Summer school, within the session at IEEE IEVC of FABRIC, to the UNPLUGGED Final Event.

2.1. Section A (public)

2.1.1. Publications

List of all scientific (peer reviewed) publications relating to the foreground of the project.

NO.	Title	Main author	Title of periodical / series	Number, date or frequency	Publisher	Year of publication	Permanent identifiers (if available)	Is/Will open access provided to this publication?
1	eCo-FEV: efficient Cooperative infrastructure for Fully Electric Vehicles	Lin L. , Kobayashi Y., Lenardi M., Klaudel W. , Inhuelsen H., Bianconi M., Roiu D., Keiser J., El Sayed N., Maisonobe J.-C.	*Proceedings* 2013 20th ITS World Congress		ITS World Congress	2013		NO
2	Modeling and analysis of wireless "charge while driving" operations for Fully Electric Vehicles	Deflorio F., Guglielmi P., Pinna I., Castello L., Marfull S.	Transportation Research *Procedia* SIDT Scientific		Elsevier	2013	DOI:10.1016/j.trpro.2015.01.008	YES

NO.	Title	Main author	Title of periodical / series	Number, date or frequency	Publisher	Year of publication	Permanent identifiers (if available)	Is/Will open access provided to this publication?
			Seminar 2013					
3	Design of wireless power transmission for a charge while driving system	Canova A., Bavastro D., Freschi F., Giaccone L., Repetto M., Guglielmi P., Cirimele V.	IEEE Transactions on Magnetics	Volume 50 , Issue 2, February 2014	IEEE	2014	DOI:10.1109/TMAG.2013.2283339	NO
4	A Review of Network Mobility Protocols for Fully Electrical Vehicles Services	Imadali S., Kaiser A., Sayed N., Sivrikaya F., Klaudel W., Vèque V.	Intelligent Transportation Systems Magazine	Volume 6, Issue 3, July 2014, p. 80 – 95	IEEE	2014	DOI:10.1109/MITS.2014.2325331	NO
5	Traffic Modeling of a Cooperative Charge while Driving System in a Freight transport	Deflorio F., Castello L.,	4th International Symposium of Transport Simulation	Volume 6, 2015, Pages 325–350	Elsevier	2014	doi:10.1016/j.trpro.2015.03.025	YES

NO.	Title	Main author	Title of periodical / series	Number, date or frequency	Publisher	Year of publication	Permanent identifiers (if available)	Is/Will open access provided to this publication?
	Scenario		(ISTS'14) Selected *Proceedings*, Ajaccio, France, 1-4 June 2014					
6	Analyzing Dynamic IPv6 Address Auto-configuration Techniques for Group IP-based Vehicular Communications	Imadali S., Vèque V., Petrescu A.	*Proceedings* of the 8th Workshop On User Mobility and Vehicular Networks, IEEE LCN ON-MOVE 2014	Local Computer Networks Workshops (LCN Workshops), 2014 IEEE 39th Conference on	IEEE	2014	DOI: 10.1109/LCNW. 2014.6927727	NO
7	Competence Area of Electric Vehicles and Relevance of an ITS Support for Transport and Parking Issues	Bottero M., Chiara B., Deflorio F., Filidoro I.	*Proceedings* of the ITS 21st World Congress 2014		ITS World Congress	2014		NO

NO.	Title	Main author	Title of periodical / series	Number, date or frequency	Publisher	Year of publication	Permanent identifiers (if available)	Is/Will open access provided to this publication?
8	An innovative next generation E-mobility infrastructure: The eCo-FEV project	Cirimele, V., Diana, M. ; El Sayed, N. ; Freschi, F.	*Proceedings* Electric Vehicle Conference (IEVC), 2014 IEEE International		IEEE	2014	DOI: 10.1109/IEVC.2014.7056230	NO
9	Wireless power transfer structure design for electric vehicle in charge while driving	Cirimele, V., Freschi, F., Guglielmi P.	*Proceedings* Electrical Machines (ICEM), 2014 International Conference on		IEEE	2014	DOI: 10.1109/ICELMACH.2014.6960532	NO
10	A Review of Network Mobility Protocols for Fully Electrical	Imadali, S.; Kaiser, A. ; Sivrikaya, F. ;	IEEE Intelligent Transportation Systems	Volume:6 , Issue: 3	IEEE	2014	DOI: 10.1109/MITS.2014.232533	NO

NO.	Title	Main author	Title of periodical / series	Number, date or frequency	Publisher	Year of publication	Permanent identifiers (if available)	Is/Will open access provided to this publication?
	Vehicles Services	El Sayed, N.	Magazine				1	
11	"Charge while driving" for electric vehicles: road traffic modeling and energy assessment	Deflorio F., Castello L., Pinna I., Gugliemi P.	Journal of Modern Power Systems and Clean Energy.	Volume 3, Issue 2,March 2015 p. 277-288	Springer	2015	DOI: 10.1007/s40565-015-0109-z	YES
12	Assessing the Performance of a Charge-While-Driving System in Urban Arterial Roads by Traffic Microsimulation	Castello L., Deflorio F.	IET Intelligent Transport Systems	Volume 9, Issue 5, June 2015, p. 505 – 514	The Institution of Engineering and Technology	2015	DOI: 10.1049/iet-its.2014.0147	NO
13	"Charge While Driving" for Fully Electric Vehicles: simulation	Deflorio F., Pinna I., CastelloL.,Cant	SIDT *Proceedings*		SIDT 2015 – National Scientific	ACCEPTED for Sep 15		

NO.	Title	Main author	Title of periodical / series	Number, date or frequency	Publisher	Year of publication	Permanent identifiers (if available)	Is/Will open access provided to this publication?
	for a possible motorway business model	ello V.			Seminar			

2.1.2. List of all dissemination activities

(publications, conferences, workshops, web sites/applications, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters).

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
1.	Paperpresentation , exhibition contribution	POLITO EICT CRF FACIT HIT	Diverse	22-26/10/2012	19th ITS World Congress, Vienna (Austria)	ITS industry, research & policy makers	10.000 visitors	International Conference
2.	Poster presentation	HIT	eCo-FEV: efficient Cooperative infrastructure for Fully Electric Vehicles (FEV)	19/11/2012	European Electric Vehicle Congress, Brussels, Belgium	Academic, government and industry leaders	400 visitors	European countries
3.	Project presentation	HIT	eCo-FEV: efficient Cooperative infrastructure for	5-6/2/2013	5th ETSI Workshop on Intelligent Transport Systems, Vienna,	Decision makers for ITS infrastructure		International workshop

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
			Fully Electric Vehicles (FEV)		Austria	deployments, Traffic and mobility manager, OEMs / suppliers, Service providers, Policy makers		
4.	Poster presentation	HIT		14-15/2/2013	2ndes Assises Nationales des Infrastructures de Charge, Nice France			
5.	Leaflets distribution/ booth	TUB	-	5-9/3/2013	CeBIT, Hannover, Germany	Namely representatives from political, economic and	285.000 visitors	international

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
						university circles		
6.	Project presentation	POLITO		12-14/3/2013	5th Russian International Congress on Intelligent Transport Systems, Moscow, Russia	ITS experts	300 delegates	international
7.	Project presentation	POLITO	Introduction to eCo-FEV concept	27-30/3/2013	EVER´13, Monte-Carlo, Monaco			international
8.	Liaison	EICT	-	8-12/4/2013	MobilTec, Hannover, Germany	Experts from the automotive industry/ electrical engineering / mechanical engineering	35.000 visitors	international

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
						and construction		
9.	Project presentation	POLITO	Introduction to eCo-FEV concept	4-7/6/2013	9th ITS European Congress, Dublin, Ireland	ITS industry, research & policy makers	1,700 delegates	European
10.	Presentation	POLITO	Range of competitiveness of road FEV : mobility of passengers and freight transport analysis, performances and possible solutions	26-27/9/2013	Green Cars Forum 2013, Turin, Italy	ITS experts		European
11.	Technical paper	HIT	eCo-FEV: efficient Cooperative infrastructure for Fully Electric Vehicles	14-18/10/2013	20th ITS World Congress, Tokyo, Japan	ITS industry, research & policy makers	10.000visitors	International
12.	Technical Paper	POLITO	Modeling and analysis	18/10/2013	SIDT, Trieste,			

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
			of wireless "charge while driving" operations for Fully Electric Vehicles		Italy			
13.	Presentation	HIT	Lessons learned for EV C/S POI from eCo-FEV project	23-24/10/2013	ETSI TC ITS WG1 meeting, Sophia-Antipolis, France		20attendants	
14.	Presentation	HIT	eCo-FEV project at the ITS World Congress 2013	6-7/11/2013	Electrical mobility workshop, Grenoble, France		20 attendants	
15.	Dialogue session, presentation, presentation at Conference booth	REN	eCo-FEV: Combining infrastructures for efficient electric mobility	17-20/11/2013	Electric Vehicle Symposium 27, Barcelona, Spain	EV experts & research	4,000 visitors/ 1,300 congress attendees	international
16.	Discussion	REN	-	21/11/2013	7th Green eMotion Stakeholder Forum, Barcelona,	Companies/interested parties	200 companies	European countries

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
					Spain			
17.	Poster, presentation	HIT	eCo-FEV: efficient Cooperative infrastructure for Fully Electric Vehicles	14-17/4/2014	Transport Research Arena 2014, Paris, France	Transportation stakeholders	3000 visitors	international
18.	Workshop session, dissemination activity	EICT	eCo-FEV – Efficient cooperative infrastructure for fully electric vehicles	14-16/5/2014	CIVITAS DYN@MO Summer University, Palma, Spain	students and young professionals, mid-career employees, selected decision makers working on sustainable urban mobility		
19.	Presentation and	POLITO	Traffic Modelling of a Cooperative Charge	1-4/6/2014	4th ISTS - International	world's transportatio		

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
	technical paper		while Driving System in a Freight transport Scenario		Symposium of Transport Simulation International Workshop on Traffic Data Collection and its Standardisation, Ajaccio, Corsica, France	n and traffic academics/people who are interested in gaining a deeper understanding of the transport simulation field		
20.	Liaison, information (brochures distributed)	EICT	-	4-5/6/2014	2nd European Electromobility Stakeholder Forum Meeting, Brussels, Belgium			European countries
21.	Presentation	IERC	The future role of cost-benefit analysis in ITS research	16-19/6/2014	10th ITS European Congress, Helsinki, Finland	Manager, director, Engineer/tec	1,700 delegates	European congress

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
						hnical, Professor/researcher, president/CEO, consultant/expert		
22.	Liaison, Workshop participation	FACIT	-	17/6/2014	Mobincity Workshop, Munich, Germany	eMobility industry and research		European scale
23.	Technical paper	POLITO	Multilane Dynamic Traffic Modeling for a Cooperative Charge While Driving Simulation	17-19/6/2014	5th International Symposium on Dynamic Traffic Assignment, Salerno, Italy			International event
24.	Poster	CEA	VIN6: a VIN-based namespace for Evolutionary Future	27/6-1/7/2014	BMW Summer School, Munich, Germany	Academia, young professionals		International Summer School

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
			Vehicular Internet					
25.	Paper	CEA	Analyzing Dynamic IPv6 Address Auto-configuration Techniques for Group IP-based Vehicular Communications	9/2014	IEEE LCN ON-MOVE 2014, Edmonton, Canada	Industry experts, research		International conference
26.	Technical paper	POLITO	Competence Area of Electric Vehicles and Relevance of an ITS Support for Transport and Parking Issues	7-11/9/2014	21st ITS World Congress, Detroit, USA	CEO's, Chief Engineers, EU Commissioner and EU representatives, Project Developers	10.000visitors	International Conference
27.	Presentation	HIT	eCo-FEV : Efficient Cooperative infrastructure for Fully Electric Vehicles	7-11/9/2014	21st ITS World Congress, Detroit, USA	ITS industry, research & policy makers	10.000visitors	International Conference

LIST OF DISSEMINATION ACTIVITIES

NO.	Type of activities	Main leader	Title	Date/Period	Place	Type of audience	Size of audience	Countries addressed
28.	Presentation	CEA	VIN6: a VIN-based namespace for Evolutionary Future Vehicular Internet	18/9/2014	RA5G Workshop, Palaiseau, France			
29.	Poster	CG38	eCo-FEV efficient Cooperative infrastructure for Fully Electric Vehicles	18/9/2014	Une Journée mobilité durable, Grenoble, France	Industry and research		National, France
30.	Presentation	CG38	Part 1: General presentation of eCo-FEV; Part 2 : Presentation of local test site near Grenoble	6/11/2014	Tenerrdis, Meylan, France	Industry, research, and higher education	150 members	National, France
31.	Technical paper	IERC FACIT	Connecting Intelligent Transport Systems (ITS) and E-Mobility: Analyzing (Socio-)	3-7/11/2014	ICCVE 2014 - 3rd International Conference on Connected	Experts, practitioners and policy makers	2,000	International conference

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
			Economic Synergies		Vehicles and Expo, Vienna, Austria			
32.	Liaison, information	POLITO	-	12-16/11/2014	Smart Mobility World 2014, Turin, Italy	industry professionals, institutions, technologies suppliers, researchers,	3.500 professionals	
33.	Joint presentation with Clustering projectsmobincity and Mobility2.0	HIT	Clustering projects	2-5/12/2014	European Electric Vehicle Congress, Brussels, Belgium	Programs/projects (dealing with e-mobility) supported by the European Authorities		
34.	Presentation	HIT	eCo-FEV achievements	5/12/2014	EU project day,	Programs/pro		European

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
					Brussels, Belgium	jects (dealing with e-mobility) sup ported by the European Authorities		event
35.	Workshop presentation, booth, dissemination material distributed	POLITO	Common presentation with other FP7 projects and initiatives (Green eMotion, FABRIC, UNPLUGGED…)	17-19/12/2014	IEEE International Electric Vehicle Conference, Florence, Italy	Key executives of the private and public sector, academic leaders, standardizati on experts	600 participant s	International conference
36.	Participation, discussion	IERC	-	2/2/2015	SAP - Workshop Sustainable Mobility, Magdorf, Germany	Experts from industry and research		

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
37.	Participation, discussion	IERC	-	25/2/2015	Conference of Sustainable Mobility, Stuttgart, Germany	Experts from industry and research		
38.	Participation , discussion for business studys	FACIT	-	25-26/2/2015	10th Green eMotion Stakeholder Forum, Brussels, Belgium	Companies/interested parties	200 companies	European countries
39.	Booth presentation via partner	TUB	-	16-20/3/2015	CeBIT, Hannover, Germany	Policy/industry/research (non-public trade fair)	285.000 visitors	international
40.	Presentation, distribution of dissemination material	CRF	eCo-FEV project presentation	26/3/2015	FP7 UNPLUGGED Project - Final Event, Zaragoza Spain	European projects related to electric		European countries

LIST OF DISSEMINATION ACTIVITIES								
NO.	**Type of activities**	**Main leader**	**Title**	**Date/Period**	**Place**	**Type of audience**	**Size of audience**	**Countries addressed**
						vehicles		
41.	Technical paper	IERC	Critical Infrastructure: Making it Private or Public – An Institutional Economic Discussion on the Example of Transport Infrastructure	16-19/4/2015	73rd MPSA Annual Conference, Chicago, USA	Social scientists, policy makers, industry	6,000 presenters	International conference
42.	Paper accepted	POLITO, Energrid Spa	"Charge While Driving" for Fully Electric Vehicles: simulation for a possible motorway business model.	1-4/9/2014	SIDT 2015 - NATIONAL SCIENTIFIC SEMINAR, Turin, Italy			

3. Report on societal implications

AGeneral Information (completed automatically when Grant Agreement number is entered.	
Grant Agreement Number:	314411
Title of Project:	eCo-FEV
Name and Title of Coordinator:	Dr. Massimiliano Lenardi, Laboratory Manager, Hitachi EuropeLimited

B Ethics	
1. Did your project undergo an Ethics Review (and/or Screening)? If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports? Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'*	NO
2. Please indicate whether your project involved any of the following issues (tick box) :	
Research on Humans	
Did the project involve children?	NO
Did the project involve patients?	NO
Did the project involve persons not able to give consent?	NO
Did the project involve adult healthy volunteers?	NO
Did the project involve Human genetic material?	NO
Did the project involve Human biological samples?	NO
Did the project involve Human data collection?	NO

Research on Human embryo/foetus	
Did the project involve Human Embryos?	NO
Did the project involve Human Foetal Tissue / Cells?	NO
Did the project involve Human Embryonic Stem Cells (hESCs)?	NO
Did the project on human Embryonic Stem Cells involve cells in culture?	NO
Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	NO
Privacy	
Did the project involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, and political opinion, religious or philosophical conviction)?	NO
Did the project involve tracking the location or observation of people?	NO
Research on Animals	
Did the project involve research on animals?	NO
Were those animals transgenic small laboratory animals?	NO
Were those animals transgenic farm animals?	NO
Were those animals cloned farm animals?	NO
Were those animals non-human primates?	NO
Research Involving Developing Countries	
Did the project involve the use of local resources (genetic, animal, plant etc.)?	NO
Was the project of benefit to local community (capacity building, access to healthcare, education etc.)?	NO
Dual Use	
Research having direct military use	NO
Research having the potential for terrorist abuse	NO

C Workforce Statistics		
3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).		
Type of Position	Number of Women	Number of Men
Scientific Coordinator	1	
Work package leaders	1	4
Experienced researchers (i.e. PhD holders)	8	19
PhD Students	2	9
Other		

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	10
Of which, indicate the number of men:	8

D Gender Aspects		
5. Did you carry out specific Gender Equality Actions under the project?	No	No

6. Which of the following actions did you carry out and how effective were they?

	Not at all effective				Very effective
❑ Design and implement an equal opportunity policy	○	○	○	○	○
❑ Set targets to achieve a gender balance in the workforce	○	○	○	○	○
❑ Organise conferences and workshops on gender	○	○	○	○	○
❑ Actions to improve work-life balance	○	○	○	○	○
○ Other:					

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

○ Yes- please specify

X No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

○ Yes- please specify

X No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

○ Yes- please specify

x No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

x Main discipline[1]: 2.2

x	Associated discipline: 1.1	○	Associated discipline: 5.1

G Engaging with Civil society and policy makers

11a Did your project engage with societal actors beyond the research community? *(if 'No', go to Question 14)*	○	Yes
	x	No

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

○ No

[1] Insert number from list below (Frascati Manual).

- ○ Yes- in determining what research should be performed
- ○ Yes - in implementing the research
- ○ Yes, in communicating /disseminating / using the results of the project

11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?	○ ○	Yes No

12. Did you engage with government / public bodies or policy makers (including international organisations)

- ○ No
- ○ Yes- in framing the research agenda
- ○ Yes - in implementing the research agenda
- ○ Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

- ○ Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
- ○ Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
- ○ No

13b If Yes, in which fields?

Agriculture		Energy		Human rights	
Audiovisual and Media		Enlargement		Information Society	
Budget		Enterprise		Institutional affairs	
Competition		Environment		Internal Market	
Consumers		External		Justice, freedom and security	

Culture Customs DevelopmentEconomic and Monetary Affairs Education, Training, Youth Employment and Social Affairs		Relations External Trade Fisheries and Maritime Affairs Food Safety Foreign and Security Policy Fraud Humanitarian aid		Public Health Regional Policy Research and Innovation Space Taxation	

13c If Yes, at which level?

- ○ Local / regional levels
- ○ National level
- ○ European level
- ○ International level

H Use and dissemination	
14. How many Articles were published/accepted for publication in peer-reviewed journals?	13
To how many of these is open access[2] provided?	3
How many of these are published in open access journals?	None
How many of these are published in open repositories?	None
To how many of these is open access not provided?	10
Please check all applicable reasons for not providing open access:	
x publisher's licensing agreement would not permit	

[2] Open Access is defined as free of charge access for anyone via Internet.

publishing in a repository ❑ no suitable repository available x no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ lack of information on open access ❑other[3]: ……		
15. How many new patent applications (‘priority filings’) have been made?("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).		None
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	None
	Registered design	None
	Other	None
17. How many spin-off companies were created / are planned as a direct result of the project?		None
Indicate the approximate number of additional jobs in these companies:		

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

❑	Increase in employment, or	❑	In small & medium-sized enterprises
❑	Safeguard employment, or	❑	In large companies
❑	Decrease in employment,	❑	None of the above / not relevant to the project
x	Difficult to estimate / not possible to quantify		

[3] For instance: classification for security project.

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs: Difficult to estimate / not possible to quantify	Indicate figure: 16 FTE ☒

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

x Yes ○ No

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

○ Yes x No

22. Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

x	Press Release	x	Coverage in specialist press
x	Media briefing	❑	Coverage in general (non-specialist) press
❑	TV coverage / report	❑	Coverage in national press
❑	Radio coverage / report	❑	Coverage in international press
x	Brochures /posters / flyers	x	Website for the general public / internet
❑	DVD /Film /Multimedia	x	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

❑	Language of the coordinator	x	English
❑	Other language(s)	x	French, Italian, German