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Project acronym

Green Post

Full title of the action

Green Alternative Postal Vehicle Project

Intelligent Energy – Europe (IEE)

WP	TITLE	LEADER	COUNTRY
5	Implementation and knowledge sharing	Comune di Perugia	IT

DELIVERABLE D12

Best practices and lessons learned collection

www.greenpostproject.eu

Starting date of the action: **Jan 2008**

Duration: **30 months**

End date of the action: **June 2010**

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1 Introduction

After initially giving a general summary of the Green Post project, this report we will be presenting and examining the lessons learned during the performance of the project's activities and the best practices that have been individualized.

The main aspects that have been taken into consideration are the following:

- Energy and environment impact
- Economic cost effectiveness
- Safety Guidelines
- Alternative vehicle features and recharging, storage and maintenance issues
- Training on use and maintenance
- Selection of sites and definition of new itineraries
- Communication

This report aims at presenting how the project's partners dealt with each of those key aspects, what methodology they used, what the main findings and difficulties have been, and finally what solutions have been found and which the main results have been. In some cases, studies or guidelines have been elaborated, in order to allow an easier and more effective implementation of the activities and, on a wider point of view, to allow third operators to benefit from the experiences carried out and replicate the model.

The report is based on the activities and the results that have been achieved by all partners in all project's sites: Perugia, Rousse, Szentendre and Bruges.













2 General Summary of the Project

The Green Post Project began in January 2008 and its completion is scheduled for June 2010 and its aims is to increase the actions that are aimed at improving energy efficiency and reduce pollutants in the following countries: Italy, Belgium, Hungary and Bulgaria. The project is based on the substitution of traditional gasoline motorcycles currently used for postal delivery service, with hybrid and electric vehicles to verify the reduction in terms of consumption of fuel and CO2 emissions in the involved cities.

The effects of an efficient fleet, before being widely adopted, must also be carefully evaluated in terms of socio-economic development.

The Green Post Project is designed to be an exchange of best practices and lessons learned between postal operators, using hybrid and electric vehicles. Test results, along with studies and reports that have been produced, demonstrated the validity of the economic investment and environmental benefits. The results of these experiences as lessons learned and know-how that has been produced, was shared and discussed with all the stakeholders of the project in order to stimulate the diffusion of such initiatives. The entire public was involved, through carefully designed communication campaign and dissemination.

The mail delivery is an example of a very "visible" urban mobility, especially in centers of small and medium size. One reason for the success of the project was its popularity of the postal vehicle among the people. Having introduced a new electric vehicle, supported by a targeted information campaign was also a valuable support to the industrial department and to the sustainable mobility.

THE PARTNERS	THE VEHICLE
Poste Italiane S.p.A. (IT) 	THE VEHICLE DUCATI FREE DUCK
Ducati Energia S.p.A. (IT) 	
Comune di Perugia (IT) 	DIMENSIONS AND WEIGHT:
Legambiente Onlus (IT) 	Length: 176 cm; Width: 91 cm; Height: 163 cm;
CIRIAF (IT) 	Weight: 240 Kg;
Posteurop (BE) 	PERFORMANCES:
De Post/ La Poste (BE) 	Max Speed 45 km/h;
Magyar Posta Zrt. (HU) 	Autonomy range in ZEV [Zero Emission Vehicle] mode : 45 km.
University of Rousse (BU) 	APPROVAL: Electric Light Quadricycle (LE6).

3 Energy Impact

Activity's Objectives

The objective of this activity was to calculate the actual energy efficiency of the electric and hybrid vehicles used in the project, in order to verify if such vehicles have a lower energy consumption than the previous fleet, used for the postal delivery, and if the obtained results match with the expected results estimated at the start of the project (performance indicators).

Lessons learned

To be able to perform an energy efficiency assessment of the total or even partial substitution of the original fleet (motorbikes), with the new vehicles (alternative vehicles), one must calculate the average consumptions for both vehicles (litre/km and kWh/km).

It is important to be aware that to calculate the average consumption one must consider a high number of variables, due to the fact that consumption is affected by many factors such as: vehicle's payload, speed, occurrence of accidents, maintenance and others. These factors can be divided in two categories:

1. Vehicle's features: such as average speed and payload.
2. Territory or Background

We have also learned (which later was inserted in the methodology that we used to calculate the energy efficiency) that in order to obtain an assessment of consumptions with sufficient granularity, delivery route vehicle must be partitioned in shorter segments whose traffic features, population's of features and other consumption affecting parameters, can be properly represented by an average value.

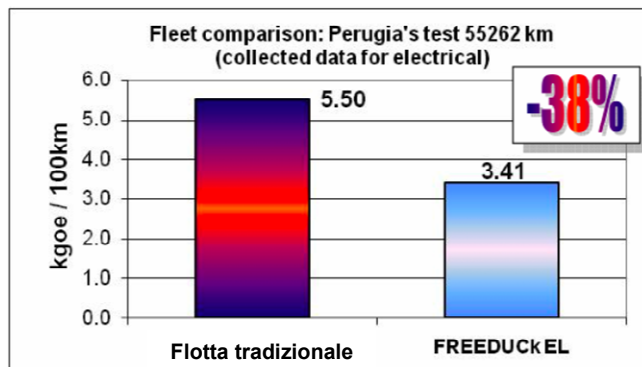
The test's results that were achieved in the various cities, previously mentioned, have showed us clearly that both the alternative vehicles used (hybrid and electric) have natively lower energy consumption, from the previous fleet. However, the data has also showed that the new fleet has a higher consumption than previously expected, but always remaining within a satisfactory level.

Table 1. Energy Efficiency of postal vehicles (expected data)

Vehicle	Vehicle Consumption (kgoe/100km)	Delta %
Original fleet 1	5,50	-
Alternative fleet - electrical	2,50	-55%
Alternative fleet - hybrid	3,07	-44%

The above table shows the theoretical values, which were calculated before the tests results were available.

Comparison of energy efficiency between the two fleets (tests' data)



The above Graph 1, shows the results achieved by the Perugia's tests and it is possible to see that the electric vehicle has a lower energy consumption but not as low as it was previously expected. The difference with theoretical value is 36% and thus the experimented energy saving is 38% with respect of the traditional fleet, which is still a satisfactory value close to project's goal (50%).

4 Environmental Impact

Activity's objective

The objective of this activity was to fully understand the environmental impact of the alternative vehicles, and consequently to understand the effect that a full substitution of the fleet by postal operators could have (more specifically for those vehicles operating in the city centre). As result we calculated the environmental impact of the alternative vehicles and compared it with the traditional fleet's impact.

Lessons learned

To calculate the environmental impact of the alternative vehicles we understood that two main factors must be calculated: i) the greenhouse gas emission of the vehicles, during their usage; ii) the noise emission.

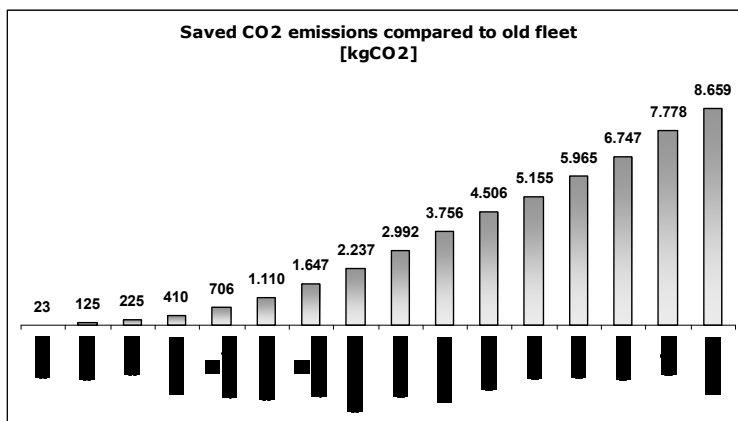
i) Greenhouse gas emission:

To calculate the greenhouse gas emission of an electric or hybrid vehicle, it should be taken into consideration the environmental impact of producing the electricity needed for the vehicles to operate. In this regard, one must always keep in mind the environment in which the vehicle will operate, as result factors such as the quality of the street will have an effect on the amount of energy needed by the vehicle to cover a specific amount of distance and subsequently the greenhouse gas emitted to create that specific amount of electricity.

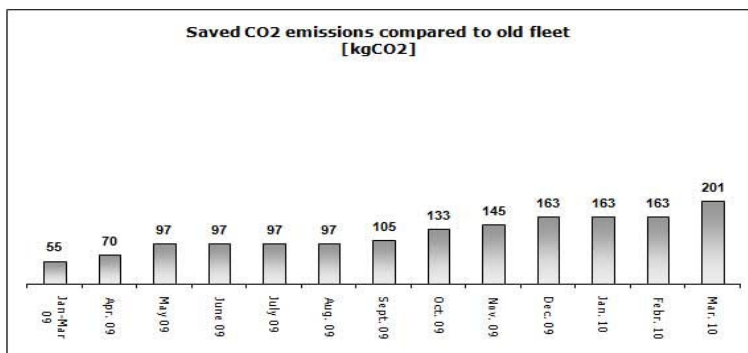
From the study done, on the data from the test results, we have learned that, as expected, the environmental impact coming from an alternative vehicle is much lower than the impact coming from an old fleet's vehicle, while doing the same route.

Particularly, the test in the project's sites, demonstrated a reduction in the greenhouse gas emissions, with the new fleet. In the Perugia's test was used "green certified" in order to obtain a zero emission vehicle, that led to a 100% reduction of greenhouse gas emission.

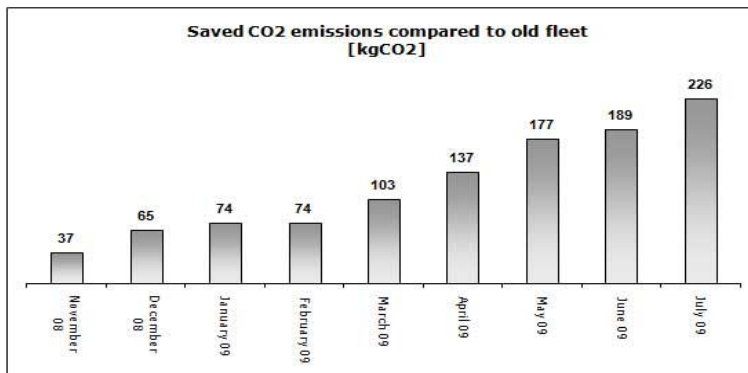
Saved CO2 emissions in the Perugia's test



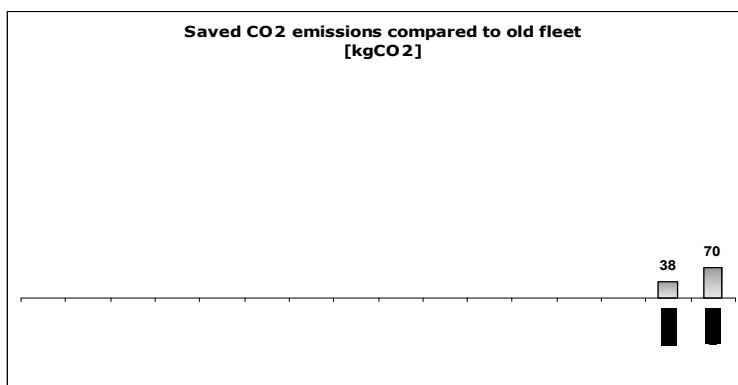
Saved CO2 emissions in the Szentendre's test



Saved CO2 emissions in the Rousse's test



Saved CO2 emissions in the Bruges's test



ii) Noise emission:

To calculate the noise emission of the motorcycles and of the alternative vehicles, both Sound Pressure Level and Single Event Level (SEL), produced by both vehicles were measured, in different conditions, as it is required by regulations. As a reference for measurements, related standards were used, as mentioned in directive 97/24/EC.

Since there are many factors that needed to be calculated, while measuring the noise emission, instruments that were used were: a photometer and ambient sensors and the tests were performed in a suburban area, with low background noise cause by traffic or other disturbing sources under the required limits in order not to affect any measurements.

From the tests that were carried out, we have learned that the new fleet vehicles emit lower noise emission due to two major factors:

- While the old fleet vehicles had an exhausting pipe, the electrical vehicle does not have one. The hybrid vehicle has an exhausting pipe but still emits lower noise.
- While the old fleet vehicles emit noises even if they are not moving, the alternative vehicles does not emit any sounds.

The complete analysis with all the test results can be found in the Annex 1 – D1: Report on Energy/Environment Impact, economic cost effectiveness and Safety guidelines.

5 Economic Cost Effectiveness

Activity's objective

Another major factor behind this project, at part from using a vehicle that was environment friendly, was a vehicle that would be more economic cost effectiveness. The research on the alternative vehicles used showed that such vehicle was cost effective as result one of the project activities was to confirm the research.

Lessons learned

In order to evaluate the cost effectiveness of the new postal fleet, costs were divided in:

- Fixed costs: those are the costs independent from the quantity of vehicles operating in the fleet and in particular from the amount of operations they perform during the year, e.g. infrastructure costs (rent or purchase of parking station, etc.), site set-up, etc.
- Variable costs: those are the costs directly related to single vehicles, proportional to their number and to their use, like vehicle purchase cost, fuel, etc.

Also in order to calculate the investment payback, the costs were successively charged on a yearly basis through depreciation and referred to one single vehicle.

From the analysis made on the fleet of Perugia, the annual average cost per vehicle, calculated on an average of 5 years of use and assuming an equal distance, the same number of personnel and an equal amount of delivered mail, it is less than 495 euros compared to the motorcycles costs, currently in use.

In the case of alternative vehicles, a major component of the total costs is represented by the infrastructure's costs, which are necessary for the recharging stations and for the purchase of the batteries.

Despite these higher costs, the final budget has confirmed the design's assumptions about the reduction of the total cost, which was obtained through:

- The increased loads of the alternative vehicles, at the same time, allowing the use of fewer resources for the same amount of transported mail, from 57 to 44

- vehicles;
- Lower number of injuries suffered by operators;
- The vehicles being more energy efficient.

In conclusion, it was learned that electric vehicles are not only greener, but are also cheaper to maintain, also considering the depreciation costs for the replacement of the fleet.

6 Safety Guidelines

Activity's objective

During the years that the postal services have used the motorcycle to deliver the post, there has been a growing amount of injuries, as result some of the partners were also interested in having a vehicle that was safer without reducing the capability of each postmen.

Lesson Learned

One of the major project's activities was the Evaluation of Risks (EoR) for postmen driving the alternative vehicle and setting up safety guidelines. Such an evaluation has been carried out thanks to a continuous and meticulous dialogue with postal operators.

The major factors that increase the risks that are linked to the provided service, are the following:

- Delivery activity and/or alternative vehicle use: road incidents, which were the result of absent-mindedness and carelessness from other drivers or the postmen, due to a break down of the vehicle or even a failing in observing the road security measures; dogs' bites.
- Manual Handling of Loads (MHL) which indicates load transport or supporting activity performed by one or more employee that can cause dorsal – lumbar lesions, due to their characteristics or as a consequence of an unfavourable ergonomic position;
- Use of Post Boxes (pigeonhole);
- Unpacking activity;
- Presence of dusts for postal material treatment;
- Presence of dusts for postal material in the post pillars.

Best Practises

Following this evaluation that took into consideration all the risks of this working category is subject to, Safeguard Measures (SM) and Safety Operative Procedures have been established and are as follow:

- Training for load moving, which is addressed both to those postmen performing the activity on foot and to the postmen using the alternative vehicle.
- Sanitary Survey, which is addressed to those postmen on foot.
- SPD (Self Protection Device)
- Main checklist for the alternative vehicle that would train a postmen to maintain the vehicle in order, through various checks.

The entire study can be found in Annex 1 – D1: Report on Energy/Environment Impact, economic cost effectiveness and Safety guidelines and Annex 2 – D4: Alternative vehicle driving and maintenance guide.

7 Alternative vehicle features for mail delivery, Recharging and Storage infrastructure, Maintenance

Activity's objective

The objective of this activity was to understand the different features that should be implemented in the alternative vehicle, to facilitate the postman's activities and how to adapt the existing infrastructure to the new requirements of the alternative vehicles, in terms of charging, storage and maintenance.

Lesson Learned

Alternative vehicle for mail delivery

We learnt that to be able to increase, as high as possible, the alternative vehicle efficiency, it is fundamental to receive feedback, from the postal operators, on the usage of the vehicle in question. Such feedback has allowed the vehicle's manufacturer to modify the vehicle for its usage in a specific context, which in this case is the transport of post.

The survey was based on the results obtained from the responses from postal employees using alternative vehicles in their work in the delivery of mail (34 postal employees).

The test allowed, the operators, to obtain useful indications on the vehicle, such as safety issues or functionality of the vehicle compared to the daily postal delivery.

The main results can be retrieved in Deliverable 2.



Recharging and Storage infrastructure

The recharging and storage infrastructure are a crucial part of the Green Post Project. As result the guideline elaborated aims at providing technical tools to identify, set and manage in the safest way possible, the parking sites for the alternative vehicles.

We have identify an universal model that would allow the postal service to identify a parking site adequate for such vehicles.

As result the project identified the following criteria, which each parking site must meet:

- Each vehicle needs an estimated parking area of at least 2.70 square meters per vehicle, allowing for the proper park (1.80 meters x 1.50 meters), keeping an easy enter and exit by half.
- The maximum number of vehicles in the site should be evaluated according to the total surface available, including the internal driving lanes, featured by a minimum width of around 3 meters.
- The site must present a perfectly flat floor, free from cracks or roughness, both for safety reasons, both for paint yellow markings on it.
- As required by national laws, in Italy, all structures should be fire protected for at least 60 minutes.
- Any eligible communication with locals such as offices, shops, and so on, forming part of the building in which the parking area could be set, must be protected with solid metal doors close automatically.

Further:

- Are prohibited communications with places for storage or use of explosives and/or flammable;
- The area of natural ventilation must be not less than 1/30 of the plant surface in the site;
- The height of the site must be not less than 2 meters.

When setting the site one must consider all the items, which must be integrated within the infrastructure, such as: the electrical network, the charging systems, the fire detection systems, hydrants, sprinklers and others.



Maintenance

Management of the site, is entirely based on the safety of the individuals using the vehicle when charging it or using it on the road:

- It is important to program a regular maintenance of the technology installed and cleaning floors.
- Any place will be equipped with emergency kit for oil and fuel spill, to be used in accordance with the existent procedures.

The vehicles must receive maintenance after a specific amount of kilometres or after a specific amount of time has passed. In our research and tests, we have discovered that if maintenance is not kept on schedule, the postal services would not benefit from the alternative vehicles' performances, based on the objective of using a safer vehicle and reducing the injury level of a postmen during the delivery of mail

Best Practises

The products of these studies are as follow:

- The Alternative vehicle driving and maintenance guide (Annex 2), where there are mentioned all the activities that need to be undertaken during the ordinary and extraordinary maintenance.
- The Test report on alternative vehicles for mail delivery (Annex 3).
- The Recharging and storage infrastructure assessment reports (Annex 4).

8 Training on use and maintenance

Activity's objective

The objective of this activity was to ensure the effective use of the alternative vehicles, optimizing their results and to support the sustainability of the action, through best practices in terms of use and maintenance of the vehicles and of the infrastructure.

Lessons Learned

The realization of the project has allowed us to verify that the involvement of all project's partners in the training program, has achieved an excellent result and a constructive confrontation:

1. Postal operators such as end-users of vehicles;
2. Ducati Energia, which is the manufacture, not only of the vehicle but also part of the necessary components for the battery, the charging and the monitoring process;
3. The universities needed to understand in detail the operation of vehicles, the tools for monitoring consumption and to conduct the studies;
4. The City of Perugia, to understand how to support the initiative when Poste Italiane had the need to renovate a garage for parking and refilling the vehicles;
5. Legambiente and Posteurop for communication purposes.

The training involved two fundamental aspects: the use of the vehicle and the activities to recharge the batteries. In both aspects, as well as practical knowledge regarding the use of the vehicles and instruments for recharging batteries, we have placed a particular emphasis on maneuvers that need to be undertaken, to ensure the safety of the workers and in compliance with the legislation on safety in work place.

It should be noted that training was initially made only a small number of people (teacher training), who were designated to transmit the knowledge gained to their colleagues, of their respective departments and this has allowed us to verify and to validate the ongoing training process.

Training has taken a very important role within the project, because for the first time a particular vehicle, an electric quad, for mail distribution.

The involvement of a large number of people with different skills and roles has allowed us to analyze, in detail, various aspects:

- the customization of the vehicles for postal purposes, and in this case not only the changes in driving the vehicle for work purposes, but also the provision of suitable receptacles needed for the service;
- the opportunity to change the paths according to the opportunity of driving / mobility offered by the vehicle
- the need to adopt tools "user friendly" to record and extract data in order to monitor the progress of the results
- the need for tight security measures, to ensure the protection of the operators and to comply with regulations



9 Selection of the sites and new itineraries

Activity's objective

The aim of this activity, was to define the topography's conditions / optimal viability for the replacement of the traditional fleet with the alternative fleet in relation to the postal service and based on the findings, verify the opportunity to adapt the paths of the postal operators.

Lessons learned

The locations that were selected from the start of the project, have confirmed their validity. The identified centers of Perugia, Szentendre, Rouse actually offered a similar scenario in terms of topography, with often a much reduced traffic due to the width of the roadway and the difficulty of maneuvering with Limited Traffic Zones (ZTL) and therefore constrained access and with typical urban runs, thus of short-range and duration. Only in Belgium shortly after the start of the project, there was a realization that it would be more appropriate to implement the activities in centre with smaller dimensions, in line with the strategy followed in other countries, which led to a change of the project's site, from Brussels to Bruges.

In small towns, the supply characteristics of both the electrical and the hybrid vehicles, has adequately met the need for movement by offering a valuable opportunity to replace the existing vehicles.

In terms of the "local" CO2 emissions, this has of course met the criteria of compatibility with the legal limits, even the hybrid vehicle, and in terms of movements, the autonomy of the electric vehicle, has proved to be sufficient to cover the medium distances provided by the delivery routes, even where there is a need for a high number of stop-go, conditions the use of the electric vehicle, the hybrid one has shown to be highly efficient.

Best Practices

It should be stressed, which important aspect for the success of the project and its potential replicability in other contexts, the opportunity to operate changes in the delivery's routes, also thanks to the difference in the amount of load that the alternative vehicle can support, compared to the motorcycles.

In fact, thanks to this peculiarity, at the end of the trial, in Perugia, it was possible to replace the fleet of 57 motorcycles with only 44 alternative vehicles, further improving the already positive indicators of the economic assessment of the project.

10 Communication and Dissemination

Activity's objective

The dissemination and communication campaign, which began as early as the design and conducted throughout the project's duration, should have significantly help to promote environmental reasons behind the initiative, a commitment to energy conservation and, finally, the use of the electric vehicles that are generally regarded, wrongly, expensive and with a low performance. Instead we wanted to demonstrate and communicate that the use of electric vehicles not only has a major impact in reducing the pollutants but as with the delivery service, they do not affect the performance or the economic aspects.

Lessons learned

The provided communication plan, during it application, has received a large amount of positive feedback and suggestions for improvement.

The "expected and normal" communication's activities has seen as key players:

- The students through initiatives in schools and universities;
- The citizens through the participation in trade fairs and conferences, on a local or international level, on the topics of sustainable mobility, environmental protection and energy conservation;
- Other European postal operators likely to know the project thanks to the institutional activities of PostEurop, a partner within the project.

What was not considered and instead has given enormous visibility to the project and generated considerable interest was the communication made through the vehicle. Since the kick off meeting, we realized that the vehicle has brought much attention and for this reason we have pushed hard to use it or to show it, in other contexts. For this reason it has successfully participated: in the Targa Florio, a famous motor racing; the festival Eurochocolate, Aquila's G8 meeting and finally in the four municipalities, especially in Perugia, the vehicle "communicates" the commitment and the investment of a company on environmental issues.

To these actions should of course be added the use of a website.



Regarding the communication between partners, it has been observed a sharp increase in the participation to the project, during the preparation and the participation of the TCU meetings, where the physical presence has certainly contributed, mainly to the improvement of interpersonal relationships.

Instead, what has been a surprise, for the achieved result was the use of a private part, which was created on the website, creating a repository of all the project documentation that was so easily available and by sharing the production of the materials or the ' update of the action plan, it has brought not only a strong participation of all the partners but also to a higher quality of produced materials.

11 Partnership

Lessons learned

Among the successful components of the project, the partnership revealed to be one of the major factor, given that each partner was able to contribute to the project, its experience and knowledge.

In fact, without this strong sharing of expertise, it would not have been possible to meet and exceed the pre-set objectives.

Obviously, the three postal partners have played a key role in all the activities, involving staff from different departments and facilities.

The two universities have been essential to give reliable data, for measuring the impacts of the project and monitoring the results.

The City of Perugia has assured an institutional and a promotion support to the project.

Ducati Energia has contributed decisively by understanding the needs of the operators and in working on customizing the vehicles.

Legambiente and PostEurop gave a strong added value to the communication, through their recognized impartiality.



12 Annexes

Annex 1. D1 Report on Energy/Environment Impact, economic cost effectiveness and Safety guidelines

Annex 2. D4: Alternative vehicle driving and maintenance guide.

Annex 3. D2: Test report on alternative vehicles for mail delivery

Annex 4. D6: Recharging and storage infrastructure assessment reports