PRO-E-BIKE

Promoting electric bikes and scooters for delivery of goods and passenger transport in urban areas

Current situation analysis
WP 2; D.2.1.

Authors:
Ronald Jorna, Mark Mallens
Mobycon BV

November, 2013
The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.
**Introduction to PRO-E-BIKE**

The PRO-E-BIKE project promotes clean and energy efficient vehicles, electric bicycles and electric scooters (common name ‘E-bikes’), for delivery of goods and passenger-transport among private and public bodies such as delivery companies, public administration and citizens in European urban areas as an alternative to ‘conventionally fossil fuelled’ vehicles.

The project actions are directed towards an E-bike market uptake and promotion of policies that stimulate the usage of E-bikes for urban transport. Pilot projects amongst target groups (delivery companies and companies with their own delivery personnel, public administration, local authorities and citizens in selected urban areas) will not only help us to achieve these objectives, but also enable the demonstration of measurable effects in terms of CO2 emission reduction and energy savings in urban transport.

The project partners, ten in total, will create favourable conditions for market development by:

- collaborating between various actors
- setting up a platform for manufacturers, distributors and potential E-bike users

**Expected outputs and results**

The aim of these actions is to build understanding and raise confidence in E-bike technology amongst target groups, allowing them to test and analyse E-bike technology. The final effect the project aims for is to change the behaviour of target groups manifested in their decision to replace their conventionally fuelled vehicles with E-bikes.

Overall, the actions defined in this project are needed in order to reduce congestion, save energy, reduce traffic noise and pollution in urban areas and to create new market opportunities for the local economy. This is achieved by transforming urban delivery in favour of E-bikes.

**Content and aim of the report**

This report focuses on work package 2 of the PRO-E-BIKE project, wherein the goal is to identify and analyse E-bike experiences and E-bike trends for the delivery of goods, passengers and providing services in urban areas. More concrete this is done by doing desk research and by conducting interviews with suppliers of e-(cargo)bikes, users and governments. With the use of a predefined template for interviews all partners were instructed to approach a specific group of stakeholders. The results of those interviews are described in this deliverable.

---

*The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.*
Contents

Introduction to PRO-E-BIKE

1. Introduction to E-bikes
   1.1 Definition of E-bikes
   1.2 Bike usage in Europe
   1.3 Different usage of E-bikes
      1.3.1 E-bikes for passenger transport
      1.3.2 E-bikes in freight transport
      1.3.3 E-bikes for provision of services

2. E-bike initiatives
   2.1 Method of research
   2.2 Overview of E-bike initiatives
      2.2.1 E-bikes for passenger transport
      2.2.2 E-bikes for freight transport
      2.2.3 E-bikes for providing services
   2.4 General conclusions

3. E-bike trends and policies
   3.1 Technology overview
      3.1.1 Sensor Systems
      3.1.2 Battery, Battery Safety, Battery Recycling, Charger / Charging Costs
      3.1.3 Controller, Display (E-Bike Computer), Software
      3.1.4 Motor / Drive Systems, Cruising Range
      3.1.5 E-Bike Classification
      3.1.6 E-Bike History, E-Bike Trends / Future Developments
   3.2 Economic sustainability
      3.2.1 Financial economic sustainability
      3.2.2 Socio-economic sustainability
      3.2.3 Product Life cycle
      3.2.4 Trends / developments
   3.3 Service Management
      3.3.1 Service management of delivering goods
      3.3.2 Service management of passenger transport
      3.3.3 Service management in the provision of services
      3.3.4 Summary of service management
   3.4 Favourable conditions
      3.4.1 Policies
      3.4.2 Built environment & Orography
      3.4.3 Promotion schemes for E-bikes

4. Summary and conclusions
PRO-E-BIKE

Annex I  Extended templates for cases ................................................................. 72
Annex II  References .......................................................................................... 114
1. Introduction to E-bikes

In this chapter we will introduce E-bikes, describing the position E-bikes claim in the total modal split in Europe and the general pro’s and con’s against motorised transport. Also information is given on the various motives for which E-bikes can be used, i.e. transport of passengers, freight or for the provision of services.

1.1 Definition of e-bikes

In this chapter we describe the various types of e-bikes/pedelecs, and what is included and excluded in the PRO-E-BIKE project. Electric bicycle or LEV (Light Electric Vehicle) is a term that covers two different concepts of vehicles with an auxiliary electric motor:

1. Bicycles equipped with an auxiliary motor that cannot be exclusively propelled by that motor. Only when the cyclist pedals, does the motor assist. These vehicles are generally called pedelecs;
2. Bicycles equipped with an auxiliary motor that can be exclusively propelled by that motor. The cyclist is not necessarily required to pedal. These vehicles are generally called e-bikes.

More details on the various types of E-bikes can be found in section 3.1.5. Pedelecs and E-bikes are not always two-wheeled. There are also vehicles with three or four wheels. Legal definitions have the term ‘cycles’ in order to cover all vehicles, irrespective of their number of wheels.

In summary, this project describes bikes that have pedal support, and thus require the need for the cyclist to pedal. Electric scooters are also included, because they replace the very pollutant mopeds. In fact it means that we concentrate on:

- pedelecs, i.e. bicycle with electric pedal support
- e-cargobikes, i.e. cargo-bike with electric pedal support
- e-scooters, i.e. full electric scooter.

For reasons of simplicity we will group these three types under the general heading ‘E-bike’ (with capital E), unless explicitly mentioned otherwise.

1.2 Bike usage in Europe

Bikes have been around for two centuries, but only a few countries in Europe are known to have significant use of them. Traditionally The Netherlands, Denmark, Hungary, Sweden and Belgium are amongst those countries. There are several factors that influence bicycle usage, which can be divided into physical and personal factors:

- personal motivation and health status (learning to ride a bike at a young age helps)
- quality, quantity and safety level of available infrastructure
- geographical layout (flat versus hilly)
- characteristics of destination infrastructure
- prices of car parking.

---

1 Vehicle categorization and related legislation (GoPedelec project), http://www.gopedelec.eu/cms/index.php?option=com_content&view=article&id=125&Itemid=70
There is a significant difference between European countries in the share of transport modes. The share of non-motorized transport in the total number of kilometers travelled varies from around 3% to 10% in those countries. This difference is related with factors such as physical conditions, weather, penetration of car ownership (income), supply of infrastructure for non-motorised transport modes and attractiveness of competing modes, among other things (Rietveld & Daniel, 2004).

E-bikes are becoming more and more widespread throughout Europe. Although usage grows fastest in countries that have a history of high bike usage (e.g. Denmark, Hungary, Sweden), other countries also see an increase in E-bike usage over the years. The popularity of E-bikes is influenced by several factors:

- speed compared to normal bikes (in cities E-bikes can be even faster than cars)
- comfort of E-bikes (less influence from hilly terrain, wind)
- environmental friendliness, calculated CO$_2$ emission over lifespan is only 10% of that of cars
- use of pedelecs and e-cargobikes is more healthy than cars
- much lower impact on congestion in cities.

Tradtitionally vans and trucks are the mode of transport for long distance freight hauling, but these modes are also used in high numbers for city distribution. In the BESTUFFS report from 2006, a share (of urban goods trips as part of all trips) of 9-15% was reported for urban areas in France. Studies in other European countries showed similar numbers. When taking into account that only 20% of all cargo trips are related to heavy vehicles (>3,5t) and that 12% of all urban trips are related to small goods, this means that in urban transport there’s room for bikes to take over part of the goods flow. Furthermore: studies conducted in the CycleLogistics project showed that bicycles could do 51% of all commercial deliveries in cities.

### 1.3 Different usage of E-bikes

In this section we describe three different types of professional use of E-bikes, i.e.

- E-bikes for passenger transport
- E-bikes for freight transport
- E-bikes for the provision of services.

Each of these forms of transport will be described in more detail in the next subsections. In this analysis only the use of E-(cargo)bikes by companies/organisations is considered. It should be noted that the private use of E-bikes (e.g. commuting, shopping, bringing children to school) is excluded from this analysis.

#### 1.3.1 E-bikes for passenger transport

With respect to passenger transport E-bikes can be used in various forms:

- as a taxi (rickshaw, e-scooter taxi)
- as a cargo-bike for transporting children at childcare centres
- as a special service for elderly/disabled people

---

4 http://www.cyclelogistics.eu/docs/111/CycleLogistics_Baseline_Study_external.pdf
5 http://www.cyclelogistics.eu/
PRO-E-BIKE

Taxi
A phenomenon that is increasingly seen in European cities nowadays is the bicycle taxi. They transport people within city centres from and to places of interest, usually for a rate per kilometre, like in car-taxis. Typically, these ‘rickshaws’ can carry two passengers, who are seated in front or behind the driver, in most cases shielded from rain. They are an important addition to the cities public transport. The use of these vehicles originated in several countries in Asia and has since then spread out globally. Terms as Riksja and Becak are common names.

Alternatively, in some cities it is also possible to use the e-scooter as a taxi. The passenger sits at the passenger seat behind the e-scooter driver. E-scooter taxis are available among others in Paris (City Bird) and Amsterdam (Hopper).

E-Cargobike for transporting children
A lot of families have two working parents for several days in the week. After the legal maternity leave has ended for the mother (12 weeks after birth in the Netherlands), their children will go to either a day-care centre or a babysitter during working hours. Some day-care centres offer a service to pick up the children in the morning and return them in the afternoon with a special e-cargobike or to pick up the children at school and bring them to the childcare centre. Usually these e-cargobikes can carry up to eight children, either sitting behind each other or across from each other. The cargobike has electric pedal support. This type of service is something that is not seen in many countries outside of The Netherlands.

Special service for elderly/disabled
One bicycle producer in The Netherlands has created another type of vehicle to ease the carrying of wheelchairs on a bike. This way disabled people get the chance to travel greater distances outside under the guidance of another person. The so-called “VeloPlus” wheelchair bike has a small ramp up front for the wheelchair, which can carry wheelchairs up to 74cm wide. The bike is standard equipped with eight gears, hydraulic disc brakes, and all safety measures in place for securing the wheelchair. The electric pedal support can be added as an option, which makes riding it even easier. The VeloPlus is (among others) used for bringing people in their wheelchair to and from the railway station.
1.3.2 E-bikes in freight transport

In freight transport E-bikes can be used for:

- Parcel delivery
- Last mile logistics
- Home delivery (pizza’s, meals, fresh vegetables)
- Internal transport in factories (people/parts)

Parcels
Several European-based parcel companies (DHL, UPS and FedEx) are slowly reshaping their logistical structures, wherein more and more e-cargobikes are being used. DHL invented ‘parcyles’, which means a delivery round for parcels using cargobikes and increasingly also e-cargobikes. The logistical process is different than that for cars, since the e-cargobikes cannot carry as much cargo as cars, and their maximum trip length is shorter. For smaller rounds however, they have proven to be more money efficient, cost less to purchase and maintain and outperform cars in densely built areas. Similarly, in some countries postal deliveries is increasingly done by pedelecs.

Last mile logistics
Cars, vans and trucks still usually do distribution in city centres. But E-bikes bring many advantages:

- purchase costs are much lower
- maintenance costs are much lower
- no fuel costs
- insurance is cheaper
- no contribution to emissions
- minimal impact on congestion
- no noise pollution
- average speed within cities is comparable to that of cars
- no parking restrictions and access to bike paths and pedestrian areas, so real door to door delivery

There are also some downsides to using E-bikes for last mile delivery:

- limited range (40-60 kilometres)
- reliant on physical fitness of bicyclist
- goods insurance is difficult (will improve over time)
- weather conditions have a bigger influence on delivery times

Home delivery
Nowadays there are a lot of options for delivering groceries, packages and even complete meals to your home. Where cars mostly did this in the past, E-bikes are being used more and more. One reason for companies to start using E-bikes is that it suits their goals and mission for a better environment. Next to that, especially in city centres, E-bikes are faster than cars in most cases and customers appreciate delivery by E-bike more than delivery by cars, since this is better for the (local) environment (noise, emissions).
Internal transport in factories
For large production facilities, it was a common sight to see bikes being used to travel from one end of the terrain to another. With the development of E-bikes that became even easier, and it helps reducing total travelling time, and thus increase productivity (be it slightly). A compelling example is BASF, who are replacing 1500 motorized scooters with 1000 pedelecs on their Ludwigshafen site, after a successful test in 2011.

1.3.3 E-bikes for provision of services
In this case the main purpose of the E-bike is to transport the bike-rider, but with the additional possibility to carry some goods. Examples are:

- Home care
  In The Netherlands, older people that still live at their home, but need some help with cleaning or buying groceries for instance, can get assistance for a few hours per day from a nurse. This nurse has no need to carry a lot of equipment, but has to travel to several locations per day. A pedelec is then a perfect option.

- Gardening
  For smaller gardening companies who do not have to carry large amounts of supplies to their destination, an e-cargobike is a good solution for traveling. The e-cargobike also appeals to this specific line of work.

- Craftsmen (painters, plumbers, etc.)
  Same as above, in case not too great distances need to be travelled to the destination. It can help to get a more positive overall view on the service provided.

Figure 7 Treade tree care
2. E-bike initiatives
This section describes the E-bike initiatives that have been found through desk research and interviews by the project partners. First the data collection methodology will be presented (section 2.1), followed by a listing of the initiatives on a country-by-country basis (section 2.2).

2.1 Method of research
In order to describe a proper set of initiatives a strict working method was put into place for all project partners. This is shown in the following diagram.

![Diagram of the research method](image)

The start was to make a comprehensive overview of all initiatives per country. Each project partner was instructed to gather initiatives from a given set of countries (for instance, ITENE collected initiatives from Spain and France, while Energikontoret Ost collected initiatives from the Scandinavian countries). In this process, whenever possible, the native language was taken into account to ease the process of finding relevant initiatives. A template has been created to make sure all partners would report back in the same manner.

In addition to the above-mentioned E-bike initiatives an inventory was made of relevant EU projects, which have some relationship with E-bikes. These initiatives are described separately in D2.2, and therefore not included in this Deliverable.

After the initial gathering of initiatives all partners that contributed were asked to make a short description of their cases. That way we made sure there would not be too much overlap in key elements (e.g. too many cases describing pizza delivery companies). In the process we made sure all target groups (suppliers, users and governments) were as much as possible equally represented.

After the initial search and definition of the cases, we picked the most relevant cases and instructed
the partners to focus on these. Those are the cases that have been worked out in extended templates (which can all be found in annex 1) in which the case is described in detail. After that, either by phone or face-to-face, interviews were conducted with contacts for the described cases.

For the interviews another template was created (example in annex 2). All partners that conducted interviews were asked to follow that template to ensure all information would be returned in the same order. In the template we defined four focus areas:

- Technology
- Economic sustainability
- Service Management
- Favorable conditions

Besides that, some general questions were asked concerning the background of the case and detailed technology questions, with which we continued in the line of the extended templates. The description of all cases and the information from the interviews is the input for chapter 3.

### 2.2 Overview of E-bike initiatives

This paragraph provides an overview of the gathered initiatives. This section is split in three subsections (passenger, freight, providing services) and per subsection the cases are grouped per country (alphabetically). The focus is on the countries where the PRO-E-BIKE partners are located, i.e. Belgium, Croatia, Italy, Netherlands, Portugal, Slovenia, Spain and Sweden. Sometimes also other examples are mentioned, e.g. from Germany and France. First a tabular overview is given in the table below. Then each case is briefly described in the following subsections. Annex 1 holds detailed information on the most interesting cases mentioned below.

<table>
<thead>
<tr>
<th>Pedelec</th>
<th>Transport of cargo</th>
<th>Transport of passengers</th>
<th>Providing services</th>
</tr>
</thead>
<tbody>
<tr>
<td>bPost (Belgium)</td>
<td>wheelchair bike, Duo-bike (The Netherlands)</td>
<td>City of León (Spain)</td>
<td>Police in city of Lisbon (Portugal)</td>
</tr>
<tr>
<td>Pizzeria Broadway (Croatia)</td>
<td>City of Valencia (Spain)</td>
<td>Home Care service for elderly in the municipality of Nynashamn (Sweden)</td>
<td></td>
</tr>
<tr>
<td>Deutsche Post (Germany)</td>
<td>City of Burgos (Spain)</td>
<td>City of San Sebastián (Spain)</td>
<td></td>
</tr>
<tr>
<td>Domino’s Pizza (The Netherlands)</td>
<td>Posta Slovenia (Slovenia)</td>
<td>PostNord (Sweden)</td>
<td></td>
</tr>
<tr>
<td>New York Pizza (The Netherlands)</td>
<td>Internal transport at BASF (Switzerland)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posta Slovenia (Slovenia)</td>
<td></td>
<td>E-cargobike</td>
<td></td>
</tr>
<tr>
<td>TNT Express, Brussels (Belgium)</td>
<td>BSO De Bieënkar, Wijhe (The Netherlands)</td>
<td>City cleaning (Croatia)</td>
<td></td>
</tr>
<tr>
<td>La Petite Reine, Bordeaux,</td>
<td>BSO De Notedop, Houten (The Handyman service (France)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 2.2.1 E-bikes for passenger transport

This section gives an overview of the current practices on the use of E-bikes for the transport of passengers in a number of European countries. Typically it covers services such as a taxi (rickshaw, e-scooter-taxi), transport of children at childcare centers and special services for elderly/disabled people.
Belgium
No cases are known in Belgium where the E-bike is used for the transport of passengers.

Croatia
No cases are known in Croatia where the E-bike is used for the transport of passengers.

France
In France one example could be found on passenger transport by E-bike, more in particular by e-scooter as a taxi service.

City Bird (Paris and Marseille)
From 2003 onwards, people looking for transport in the cities of Paris and Marseille can order an electric scooter or motorbike. In Paris it’s mainly focused on routes between the city centre and airport Orly. Since the start in 2003 they have done a total of 175,000 trips. The driver waits at the requested point after an online booking or booking by phone. All the necessary equipment is taken care of: helmet, protective suit, gloves and some extra protection for the legs. A suitcase of up to ten kilos combined with a small briefcase can be transported as well. Prices for using the scooter vary from € 65 for an hour up to € 350 for eight hours on weekdays. In the weekends it’s € 85 for an hour up to € 510 for eight hours.

Note: in Amsterdam ‘Hopper’ started in 2012 with e-scooters as a taxi service. In 2013 the initiative stopped its operation due to financial problems.

Italy
No cases are known in Italy where the E-bike is used for the transport of passengers.

Netherlands
In the Netherlands there are quite a number of examples of E-bike use for passenger transport, particularly for childcare centres and for transport of elderly and disabled persons.

Childcare centre De Bieënkorf (The Netherlands)
‘De Bieënkorf’ is a childcare centre located in Wijhe, a village of 7,000 people in The Netherlands. They provide childcare services for children from age 0 to approximately 12 years old. In February 2012 they bought a e-cargobike called ‘Go Cab’ from producer Van Raam. This is a dedicated e-cargobike for transportation of children, specifically to be used by childcare centres. Total costs were € 11,600 (including maintenance contract, overprint, extra battery, rear view mirror, VAT).
The Go Cab is used for short distance trip (four km roundtrip) with up to eight children to/from school, for shopping (around four km), for fun trips (up to 20 km roundtrip), etc. The Go Cab is still in use (august 2013) and the employees of the childcare centre are very enthusiastic about it.

Childcare centre De Notedop (The Netherlands)
PRO-E-BIKE

Childcare centre De Notedop, which is located in Houten (NL) is an after-school care centre for children. They use an e-cargobike since the beginning of 2012 to transport children from school to their location. It complements their sportive image and is a safe, fun and cheaper way of transporting children. They have one so-called ‘GoCab’ e-cargobike in use, which is produced by Van Raam.

Childcare centre ‘Struin’ (The Netherlands)

Located in the Dutch city Nijmegen, childcare centre Struin has it’s own approach to providing an after-school place for children. They are focussed on the outdoors and have a green, environmental friendly business model. That is why they only use bicycles to transport children from school in a sustainable and environmental friendly manner. Currently they have nine group-bikes (for up to 11 kids) and three e-cargobikes like the one in the picture for up to eight kids. All of their bikes have electric pedal support, mainly because the Nijmegen region is quite hilly. They have the bikes in use for six years now.

E-bikes for elderly and disabled people (Netherlands)

In the Netherlands a number of care-homes for elderly and/or disabled people make use of so-called ‘special bikes’, produced by Van Raam, located in Varsseveld, The Netherlands. The company specializes in producing bicycles for people with special needs. In their product range they have uniquely ‘special needs bicycles’, tricycles, wheelchair bikes, tandem bikes, double rider bikes, and low step trough bikes (also known as comfort bikes). Each model is also available as an electric bike (Pedelec). Examples of special E-bikes for care-homes for elderly or disabled people:

- Two day-care centres for elderly people ‘Passantenhuis’ in Dendermonde (Belgium) and day-care centre ‘Huize Sonnevanck’ in Hengelo (The Netherlands), started using an electric powered ‘Duo-bike’ this year. The bike allows an elder person to be accompanied by one of the caretakers. That way they can still enjoy a day in the open air;
- Other examples of this ‘duo-bike’ being used in The Netherlands are day-care centre ‘De Plantage’ in Brielle and elderly homes ‘De Beekwal’ in Eerbeek and ‘De Regenboog’ in Dronten. In all cases, occupants of the centres can use the bikes for free. Most bikes are bought with the help of private funds;
- A bike rental service in Appelscha (The Netherlands) purchased a wheelchair-bike with electric pedal support from Van Raam, even though the purchase price of this bike is around € 7000. They wanted to make it easier for disabled people in a wheelchair to enjoy the outdoors. Together with the local government, who paid a substantial part of the bike, they have made this bike available for inhabitants and visitors of the town.

Portugal

No cases are known in Portugal where the E-bike is used for the transport of passengers.
PRO-E-BIKE

**Slovenia**
No cases are known in Slovenia where the E-bike is used for the transport of passengers.

**Spain**
In Spain there are some examples of passenger transport by E-bike, especially in the field of transportation of tourists.

**E-bikes for tourists (mainly) in Burgos**
The Burgos City Council started a project in 2011 to supply users with an electric bike for a day if they leave their car in the underground car park of the Museum of Evolution in Burgos, as an additional service. In total 12 pedelecs are in use, supplied by Bicicletas de Castilla y León from Juárez. Mostly tourists use this service from the city. The initiative was supported by the SUMOBIS project, part of the INTERREG IV B SUDOE programme. Project partners include: Toulouse city, Lisbon city, Ponferrada city, Oviedo city and Huelva city.

**Passenger tricycles by TXITA in San Sebastián**
TXITA started in 2006 as a last mile transport service for transport companies, an urban courier and a passenger and tourists taxi (with e-bicycles). Next to that they do a lot on tricycles marketing and advertising.

This project is organised by TXITA TXIRRINDAK S.L.U. They have six electric supported cargo tricycles called "Lovelock", five passenger tricycles called "Veloform", one small cargo tricycle called "Jonny-crazy" and one electric supported tricycle called "Garbycicle". They will add an e-Scooter and en e-Van in the coming months. TXITA also is a product dealer for cargo tricycles ("Lovelock" and "Garbycicle").

TXITA is not part of any greater project, but the city of San Sebastián participated in a CIVITAS project and Txita started the last mile service at that time ("TXITRANS" Measure No 65 of Donostia-San Sebastian in CIVITAS 2009).

**Rickshaws in the City of León**
The Léon city council helped start the SOLTRA (Soluciones Integrales) company in 2001, whose main objective was to create jobs for people with disabilities, allowing them to participate in the efforts of companies and institutions. Within SOLTRA the EVOLO project started in which three rickshaws, with electric pedal support, and two e-cargobikes were bought.

The rickshaws are used for promoting tourism in order to know the city from an environmental perspective and promoting sustainable mobility among citizens. This initiative has been given the name 'Ciclotour León'. The units allow the transport of persons with reduced mobility.

The e-cargobikes are not implemented yet, but it will allow to run the streets of the city in an agile, fast and efficient way, making parcel distribution including mail, materials for activities, and so on.

**Sweden**
No cases are known in Sweden where the E-bike is used for the transport of passengers.
2.2.2 E-bikes for freight transport

This section gives an overview of the current practices on the use of E-bikes for the transport of freight in a number of European countries. Typically is covers services such parcel delivery, last mile delivery, home delivery of meals and internal transport in factories.

Worth mentioning is the Cycle Logistics Federation, which has been established (as a spin-off from the CYCLELOGISTICS project) to develop and help implement a strategy, for transferring as much as possible of the freight/goods being moved within the urban environment in Europe, from motorized vehicles to bicycles/trikes/quads/HPV’s and/or electrically-assisted (pedelec) cycles/trikes. In addition it will support any business or social enterprise, which uses or intends to use a bicycle to deliver its operations or services. More information: http://federation.cyclelogistics.eu/

Belgium

In Belgium two cases have been found of E-bike use for freight transport, one in parcel and one in postal delivery.

Parcel delivery by TNT in Brussels

In 2010, TNT Express Benelux launched a project with electric cargo bikes for the delivery of parcels in the centre of Brussels. Therefore, a cooperation agreement was signed with the Brussels sustainable Ecopostale courier and delivery company. The e-cargobikes of TNT Express Benelux consume no fuel and emit no carbon dioxide. The project will be implemented in five phases. They started with a bicycle for deliveries in the city. In the second phase, two to three electric bicycles used for freight deliveries were added within the small ring of Brussels. That area will be expanded in the third stage to the neighbourhoods around the Avenue Louise, after which a total of five e-cargobikes is in operation. The fourth phase is planned as a mobile storage warehouse and sorting between TNT Brucargo hub and the centre of Brussels. In a final stage, the concept of a mobile registration in other European cities is set up.

bPost

bPost (formerly De Post), is a mail and parcel delivery company in Belgium. Mail delivery used to be done by cars (54%), scooters (14%) and normal bikes (10%). E-cargo bikes (now at 14%) are replacing scooters and normal bikes in the delivery rounds. Reason is that more accidents (mainly scooters) can be prevented and that there was a need to lower carbon emissions. Besides that, the fact that bikes proved to be equally successful or even better in delivering mail in cities than cars was a great advantage. They now use a total of 2500 pedelecs throughout Belgium. Next to that they also have e-Vans and e-scooters.

Croatia

There are three cases in Croatia where E-bikes are used in goods transport. In general, E-bikes are a not very widespread phenomenon in the country. Postal companies are starting to think about using pedelecs for letter deliveries.

Pizzeria Mona Lisa

The company started three years ago with modifying their normal delivery bike to an electric one. In meantime they have had to replace a few battery packs and a motor, but in general they are satisfied with the technology and cost.
Pizzeria Broadway
Starting in 2012, they used electric bicycles, but in October 2013 they switched to electric scooters because they were not satisfied with the performance of the bikes. That mainly had to do with range and loading capacity.

Garbage collection in city of Čakovac, Velik Gorica, Poreč and Rovinj
In this city local authorities use electric powered tricycles for garbage collection. The city has a total of four of them in use. Three other cities (Velik gorica, Poreč and Rovinj) also use these kinds of vehicles, but they only have two per city.

Denmark
Although cargo-bikes are very popular in Denmark, e-(cargo)-bikes for freight are not (yet) very popular. Just one case could be found in Denmark.

Danish Post
Since 2011, Danish Post uses electric tricycles to deliver containers of packages and parcels to companies. It is part of a larger plan to replace old and pollutant cars and mopeds with e-vans, pedelecs and e-scooters. Doing so, the company aims to reduce their CO2 emissions by 40% in 2020. The bike is a special design from the Nihola company from Copenhagen. They now have a total of 1440 pedelecs in use throughout Denmark. By replacing traditional bikes with electric types, routes can be longer and the need to store packages and parcels lowers substantially. Source: http://ing.dk/artikel/post-danmark-skifter-til-elcykler-121971

France
In France we have found two examples of E-bikes being used in freight transport.

La Petite Reine (France)
The company was founded in 2001, and delivers one million packages throughout France each year. They were the first company in Europe to deliver goods by electric powered bicycles and have grown significantly since the start. They now have five hubs in four cities (Paris, Bordeaux, Toulouse and Lyon) and a total of 80 CargoCycles®, all with pedal support. Loading capacity is about 180 kilograms. They offer the possibility to show commercial pictures on the cargohold, which is appealing to a lot of shipping companies. They can load any type of material, as long as it fits in the cargohold. Vans and cars all weigh significantly more than bikes, they usually deliver loads up to 100 kilograms, packages usually travel 15 kilometres from distribution centre to destination and cars and vans are pollutant. Bikes do not pollute, can carry up to 180 kilograms of goods and round trips are much shorter.

Parcel delivery with Vert chez Vous
Since early 2011, Vert chez Vous uses an unusual solution to delivering cargo in Paris. Using a combination of a ship (ms Vokoli) and E-cargobikes (tricycles) they deliver up to 2500 packages each
day in Paris. The ship acts as a floating warehouse that cruises on the river Seine, with 5 pre-set stops per day. After a trip, the E-cargobikes can go back to the ship to load additional cargo. Each E-cargobike has a 2m$^3$ cargohold, while the ship holds 120m$^3$. So a total of 60 full bike loads can be delivered each day. Especially the addition of a moving warehouse adds value, because more stops can be made per day compared to a warehouse that is located at one location. This provides them with a clear advantage over other forms of transport. Toulouse and Lyon are the next cities that the company wants to expand to.

**Parcel delivery with e-cargobike by FedEx**
In May 2010, FedEx partnered with UrbanCab, a company that moves passengers around the city with ‘rickshaws’. UrbanCab wanted to test an environmentally friendly parcel delivery service for which they needed FedEx. They now have 12 e-cargobikes in use, used for mail and parcel delivery in Paris. The cargo holds on the bikes are removable and can thus be pre-loaded with parcels before being put on the e-cargobike (with a forklift). That saves time with reloading, when several trips must be made from the depot.

The use of these specific e-cargobikes provides an advantage in terms of visibility and client communication, and in terms of finance and productivity. Moreover partnering with existing passenger transport companies and a removable cargo hold helps too. The result is that the productivity per parcel is 20 to 50% higher compared to ‘classic’ vehicles (e.g. cars).

**Germany**
In Germany a number of examples of E-bikes for freight transport could be found.

**BASF**
BASF is replacing their fleet of fuel-powered mopeds and scooters with pedelecs to let employees travel the Ludwigshafen site in a more environment friendly manner. Each time a scooter needs a large repair, a pedelec is bought instead, thus replacing the fleet of scooters slowly over time. Employees were very positive on the change. With this initiative, BASF supports innovative mobility concepts. Next to that pedelecs are more efficient in usage and maintenance, and it helps improve the employees’ health.

![E-bike at Ludwigshafen site (source: BASF)](image)

**Ich ersetze ein Auto**
The project “Ich ersetze ein Auto” (i.e. “I replace a car”) - funded by the German Federal Ministry for the Environment as part of the **Climate Initiative** - investigates user needs as well as user and stakeholder acceptance of electric cargo bikes for city logistics. Within this project (summer 2012 - summer 2014) 40 of these vehicles are implemented into the daily routine of courier and express logistics providers in nine major German cities.
In total 40 e-cargobikes are being used, from the brands iBullet (via Urban-e) and CargoCruiser, mainly for last mile delivery and postal services.

**Ich far Lastenrad**
Under the flag of VCD, a German non-profit organization for transport and environment, a project was started in 2013 to encourage companies and city officials to use cargo bikes in commercial activities. The project is aimed primarily at guides and employees of companies and institutions that participate in the urban economy and transport cover short to medium routes mainly by car or van. These include crafts, the courier, express and parcel service, social service providers and delivery services of restaurants, retail and furniture stores. Even for companies and institutions with large grounds complexes and organizers of major events are load wheels an option. The project has two main ways: firstly, relevant actors (cargo-bike repairshops, potential users, relevant industry representatives, scientists and interested journalists) networking and information exchange among themselves be intensified. They have set up a Steering Committee, a project newsletter and thematic events. Secondly, a central information portal for businesses and communities about effective uses of modern economic cargo bikes in traffic will be set up: [http://www.vcd.org/lastenrad.html](http://www.vcd.org/lastenrad.html). The following examples come from this website:

**Pedelecs for the Deutsche Post**
Since 1896 the Deutsche Post has used bicycles for postal services. Currently they have 23,600 bicycles, of which 6,400 pedelecs. Until the end of 2013 this will grow to 7,300 pedelecs.

**Joey’s Pizza delivered by e-cargobike in Germany**
Already 10 year Joey’s Pizza delivers pizza with bicycles in stead of with cars or mopeds. At present also pedelecs are used as well as e-cargobikes. The e-cargobike is provided by Gobax, with whom Joey’s Pizza closely cooperates.

**Rotrunner tests e-cargobike**
In Dusseldorf Rotrunner is a bike courier company with now tests 4 e-cargobikes through the “Ich ersetze ein auto” programme. The e-cargobike makes it possible to have larger cargo as well as also delivering outside the innercity. It is likely that the company will buy at least 2 e-cargobikes after the testing period.

**Italy**
In Italy, three cases on cargo delivery with E-bikes were found:
**Courier service BiciLogistica in Brescia**

BICILOGISTICA® is a courier that deals with daily shipment of small packages, letters, and documents. The company links itself to the sustainable character of the city of Brescia where they are located. The city has a program called CityLogistic specifically for sustainable logistics. The company delivers to both companies and private addresses. An insurance company covers all shipments for loss. The company uses two types of bikes: a pedelec for the smallest packages (up to 6 kilograms), and Bullit e-cargobikes for deliveries up to 80 kilograms. Deliveries are made in the entire Brescia locality. They have three types of delivery times:
- Eco, with deliveries in one day
- Lean: deliveries in two hours
- Flash: deliveries in one hour

The company can also deliver meals and other food products with a special insulated e-cargobike. The bike complies to the strict HACCP (quality standard for food delivery) norms for these kind of deliveries. They deliver to supermarkets, restaurants and butchers for instance.

**Urban delivery by Quick Coop**

In response to a recent policy regulating access for urban deliveries, two young entrepreneurs founded Quick Coop, a small society offering urban deliveries with e-tricycles. They started up with a small depot close to Florence downtown and three e-tricycles and a subcontracting contract by Bartolini, a big Italian delivery company. Their core business is supplying restaurants and shops; additional services include home delivery of clothes from dry cleaner's shops and transport for disabled and elderly people.

**Goods and parcel delivery by TRICLO**

Triclò is a private company, founded in Padova in 2011, that delivers goods and parcels. After an initial testing period, the initiative has a big success and expanded in Milan in 2013; soon after DHL signed a subcontracting with Triclò for deliveries of parcels and goods within AREA C, the congestion charge area. The company offers several services with different prices: single delivery ticket, a set of tickets, storage and distribution or even the possibility to rent vehicles.

**The Netherlands**

In the Netherlands many cases have been found with respect to E-bikes for freight transport. In particular last-mile delivery, parcel services and delivery of meals to homes are the areas where e-(cargo)bikes are becoming increasingly popular.

**E-cargobike in Maastricht by DHL**

DHL is one of the largest global players in logistics. In the Netherlands they have introduced e-cargobikes into their daily delivery schedules. Mainly focused on last mile distribution in city centres they have proved that bikes can be better than car in many ways. Bikes are faster in dense city areas, they do not pollute, have no delays from traffic jams and cost less to purchase and maintain. At the moment, they have so called ‘parcicles’ running in several Dutch cities (including Amsterdam, Rotterdam, Breda and Nijmegen). In the city of Maastricht DHL uses an electric ‘parcycle’, since here they have to deal more with slopes.
FietsXpress in The Hague
Currently FietsXpress uses 3 electric bikes and 2 ‘normal’ cargo-bikes. The company believes that bike couriers have the future. Cargo-bikes will only work when there is sufficient load capacity.

E-scooter for Domino’s Pizza in Utrecht
Since the beginning of February 2013 all delivery scooters from the shop in Utrecht are electric. Even since 2004 Domino’s Pizza has been researching possibilities to only use e-scooters. This fits perfectly in their sustainable policy. Domino’s wants to be using solely e-scooters for all deliveries in two years. E-scooters are non-pollutant and less noisy than fossil fuel powered scooters. The latter is also a disadvantage, as the vehicles cannot be heard very well. They have found a solution in adding a speaker that emits sound waves when approaching people.
For the shop in the city of Utrecht, which is the first city in the Netherlands to start using e-scooters, this was made possible partly from a subsidy from the local government. For them it is a great opportunity to have younger people get to know e-vehicles.

E-cargobike Binnenstad Service Nijmegen
The inner cities in the Netherlands should be cleaner, more liveable and more accessible. That in turn is good for the retailer, its customers and its suppliers. With that in mind the company Binnenstadservice was founded 5 years ago.
An environmentally friendly transportation service for retailers. They use both an e-cargobike (picture) and small electric powered vans. Binnenstadservice supplies shipments from different vendors in one time at the store.
Result: the retailer has to act only one time instead of multiple times during the day. That way the retailer has more time for customers, and freight traffic in the shopping streets decreases. Binnenstadservice also immediately takes plastic and cardboard for return shipments. And that means more space for waste disposal. With their vehicles on natural gas or electricity, they also help create a cleaner city.

Meal delivery at home by De Bezorgbeer
In September 2011 the Bezorgbeer, a restaurant chain in the Dutch city of Spijkenisse, started using their first electric scooter to deliver meals at home. One year later they already had seven. A very noticeable advantage is the fuel cost: in the old days it cost about € 75 to fill up the scooters with gasoline, nowadays it’s only € 20 in electricity.
Their employees are enthusiastic about it, they even compete in being early to be certain to get an electric scooter. The electric types accelerate faster and are much less noisy.
All electric scooters in their possession use two batteries to increase range, which is now up to 120 kilometers. The company also acknowledges the importance of a good battery pack, which contributes to the success.

Last mile delivery in the City of Breda
The city of Breda wants to encourage and promote using green, non pollutant city distribution in the near future as part of their goal to reach a CO₂ neutral city in 2040. The city centre is a perfect place
to conduct a pilot project as it is a relatively small area, has good connections and has a lot of different types of shops. They want to start using a distribution centre near the city centre for last mile distribution. Normal trucks will do deliveries to the Distribution Centre, but from there, electric vehicles, both e-cars and e-cargobikes, will conduct distribution to shops. They are started the pilot in September 2013, which will then run for one year. Evaluation will be done in September 2014.

The main goal of the project is to improve air-quality in the city. A secondary effect will be that CO$_2$ emissions will be reduced. But also traffic noise, safety and traffic flow will be positively influenced by the project. Those parameters are however harder to quantify. And although CO$_2$ reduction on the entire supply chain will be minimal, it will have a measurable effect for the city of Breda.

**E-bikes for NY Pizza in Heerhugowaard**

The local NY Pizza (from here on: NYP) shop in Heerhugowaard uses five electric bikes (fitted with a small cargo-hold) to deliver pizzas in a one kilometre radius from the site. They were the first of all shops of NYP in The Netherlands to use this form of transport. In a deal with Batavus (a Dutch producer of (electric) bikes) they developed a sturdy and safe bike, painted in the NYP colour with a special cargo-crate up front. The holding of NYP now has a new deal with Sparta (another producer) for 300 bikes to be used around the Netherlands.

The main reason to start using pedelecs was the positive response of the general public towards employees who chose to ride bikes instead of scooters. Next to that, pedelecs do not pollute and make no noise. Delivery times are almost as fast as with scooters. Maintenance and running costs are much lower than those of scooters, an estimated €1,000 difference per year per vehicle.

**E-cargobikes for Marleen Kookt in Amsterdam**

Marleen Kookt is an online shop that started 1.5 years ago at which you can order meals. They will be delivered between 4 and 8 pm each day and just need to be heated before consuming.

The reason for Marleen Kookt to start using e-cargobikes is to connect to their products (which are all eco-friendly of nature). Next to that, after looking at manoeuvrability, bikes are clearly better than cars for them. Also, bikes can carry more than (e-)scooters. They now use seven e-cargobikes, all from the same supplier with which they developed the bikes (the bikes have been modified specifically to carry food).

**E-cargobike for home delivery from drugstore ‘Piet’ in Purmerend**

This drugstore is the first in The Netherlands to provide home-delivery. They do so in a sustainable way by using an e-cargobike (as in the picture). When clients order before 15.00uh (through the webshop), delivery is done the same day before 19.00h. There’s no additional cost for the delivery within the city of Purmerend, they do not deliver outside the city.

Payment can only be done with a credit card or bankcard.
**Portugal**

Postal service with e-cargobikes and e-scooters

CTT is the nations postal service. They started using E-cargobikes and E-scooters in 2011. Nowadays they have approximately 150 e-cargobikes and 15 e-scooters in their fleet. For the company it was clearly a means of saving money on energy consumption, as deliveries used to be done by cars mostly. As they say themselves, CTT is transforming its longstanding values of social responsibility into a competitive advantage for the company, while benefiting the society. This helps reduce pollutants and noise emissions, it’s much better in countering traffic congestion, they get increased efficiency in cities and they also gain some security to the postmen.

**Slovenia**

In Slovenia there is one case of freight delivery by E-bikes.

E-bikes and e-scooters for Posta Slovenije

Posta Slovenia, the national mail delivery service, decided to introduce electric vehicles in their operations in 2010, which are more environmentally friendly than the cars and vans they used up to that point. In 2009, Posta Slovenije started with testing of electric vehicles. The results of testing showed that electric vehicles for delivery in the city centre of Ljubljana, Koper and Celje could partly replace the polluting vehicles used before. Posta Slovenije’s vehicle fleet in 2010 consisted of 37 pedelecs (ACCEL PRO) and three electric delivery cars (PIAGGIO PORTER). Posta Slovenije now has five electric cars, 60 cars running on liquid gas, 41 pedelecs and 20 e-scooters.

The main purpose of the initiative is to:

- Reduce noise and emissions
- Carry out the parcel much more easier
- Promote the ease of use of E-bike and E-scooters

**Spain**

Four cases could be found in Spain, where e-cargobikes are used for the delivery of freight.

Last mile delivery and courier service by TXITA in San Sebastián

TXITA started in 2006 as a last mile transport service for transport companies, an urban courier and a passenger and tourists taxi (with e-bicycles). See also section 2.2.1.

This project is organised by TXITA TXIRRINDAK S.L.U. They have six electric supported cargo tricycles called "Lovelock", one small cargo tricycle called "Jonny-crazy" and one electric supported tricycle called "Garbycicle".

Delivery of goods by VANAPEDAL in Barcelona

The discovery of an e-cargobike of almost 200 kg load capacity, allowed VANAPEDAL to see that it was possible to transform the oversized structure and unsustainable current distribution in the last mile. The use of conventional vehicles for the distribution of goods was becoming out-dated (since there’s a lot more focus on green, sustainable forms of transport) and it caused environmental pollution (air, noise, space and road safety) in addition to fines, poor service delivery due to lack of access to certain areas and insecurity against theft.

The objectives are: improving citizen’s quality of life through the use of vehicles and logistics solutions that respect the environment and people, and compatible with the uses of public space.
The project now has five e-cargobikes in use (brands: Lovelo and Babboe) for the delivery and
collection of parcels and transportation of general goods (furniture, clothing, catering, ice cream,
newspapers, etc.) B2C and B2B in Barcelona City, both in last mile and first mile routes. It started in
2010 and is still operational.

**Home delivery of supermarket sales (EROSKI)**
Eroski is a Spanish supermarket chain from the place Elorrio in the Basque Country. Started as food
shops, now also clothes and white goods are being sold, and also the company has perfumeries, gas
stations and many other types of stores. 10% of the profits from Eroski go back into the society
through the Fundación Eroski, a foundation that deals with all kinds of social goals.
In their continuing concern for the environment and sustainability, they aim to be leaders in
innovation of distribution through "clean" vehicles. In three Bask cities and Pamplona they employ a
total of 8 e-cargobikes for delivery of groceries to homes. One of the project goals, with a link to the
TXITA project, is to increase hours of service to our customers and reduce emissions in transport
activities. It is consistent with their commitment to the environment, but an important success factor
will be whether or not the project is profitable.

**SDLOGISTICA**
SDLOGISTICA is a transport company from Derio in Spain. They deliver all kinds of goods with electric
vans and e-cargobikes. On a day-to-day basis they use a 4 e-cargobikes, which is increased in busy
periods. The idea behind introducing bikes into the logistical flow is about addressing two issues at
once. Firstly to align with customers in a more sustainable way, and secondly to satisfy customer
demand. The latter has to do with restrictions for vans for deliveries in cities that do not apply to
bikes, so they have a longer timeframe in which they can deliver to customers. The e-cargobikes also
help in reducing emissions.

**Sweden**
Two examples have been found in Sweden with respect to E-bikes for freight transport.

**MoveByBike in Malmö**
MoveByBike is a privately owned company based in Malmö, Sweden, operating in Malmö, Lund,
Helsingborg, Gothenburg and Stockholm. They use E-bikes (and regular bikes) for last mile delivery of
newspapers and also for transporting furniture for people moving from one apartment to another in
the city center. They use a total of 15-20 bikes, whereof six are pedelecs (Bullit e-bikes). To transport
the goods they use a wagon attached to the e-bike. The operation started as a private initiative in
the beginning of 2012 and is still running. They use pedelecs and e-cargobikes for the delivery of
goods/parcels and services.

**Pedelecs and e-scooters for PostNord**
The company that is owned partly by the Danish government and partly by the Swedish government,
operates in Sweden, Denmark, Norway and Finland. They have a total of 4200 pedelecs and e-
scooters for delivering parcels and letters. The benefits lie in reduced CO₂ emissions and more
positive effects on the employees using the pedelecs. The ultimate goal is to greatly reduce impact
on the environment (40% reduction in CO₂ by 2020 for instance).
**United Kingdom**
In England (London) we have found one example of e-cargobikes.

**Gnewt Cargo**
The company conducts deliveries in London with electric tricycles and electric vans. They have about 15-20 e-cargobikes in use at the moment, which are actually the same model (and produced by) as La Petite Reine. They use the bikes for last mile delivery in the city from a central hub at the city border. Local authorities are giving positive support to the initiative, which helped the successful implementation. Since the start, they have gained an increased logistical efficiency, improved image from clients, and greatly reduced emissions (noise and greenhouse gases).

2.2.3 E-bikes for providing services
This section gives an overview of the current practices on the use of E-bikes for providing services in a number of European countries. Under ‘providing of services’ we understand the use of E-bikes where the main purpose is to get to a place, but at the same time offering the opportunity to carry stuff, such as materials needed for a job, a nurse in home-care bringing some of her materials, repair services, etc.

**Belgium**
No cases for providing services were found in Belgium.

**Croatia**
No cases for providing services were found in Croatia.

**France**
**Handymen with e-cargobike**
In a number of French cities the company Le Jules is operating e-cargobikes. Les Jules offers handymen to both individuals and to companies. For the transport of their materials/equipment the e-cargobike is used.

**Germany**
**Homecare on pedelec**
In Bremen home-care workers started to use pedelecs in May 2010. On average 10-20 km were driven per day. In general the experiences were very positive: it was often quicker than by car, cycling is more fun than driving a car, and it was experienced as ‘easy to ride’. Important for the success of the pedelec is the equipment of the bike (enough capacity to carry goods), suitable (rain) cloths, and the possibility to use the pedelec also for private purposes. Around 60% of the nurses however said that the bicycle is not comfortable enough (cold, wet) and 44% indicated that the distance is too far to use the bicycle. It was also concluded that pedelecs replace cars; they don’t replace ‘normal’ bikes, since people already riding a normal bike often do this to stay healthy.

**The Netherlands**
Treade: Tree care with e-cargobike
Treade is a company that is active in tree care. Where possible Thomas Rijniers (owner) makes use of an e-cargobike for the transport of his materials (ropes, climbing material, chain saw, etc.). If the distance is too far, or he has to carry too many materials, Thomas drives a biogas van. Also his chain saw and leaf-blower are electric, thus reducing noise and CO₂ emissions.

Portugal

E-bikes for police in the city of Lisbon
Lisbon started using electric powered tricycles and quadricycles for the local police. This was part of a greater plan in reducing the cities use of fossil fuel powered vehicles. Besides starting to use eBikes, they also implemented various e-vans for city maintenance. Concerning the police: they can react quicker to emergencies and can more easily travel greater distances, which greatly improves the efficiency. The city has a total of 14 E-bikes in use at the moment.

Slovenia
No cases for providing services by E-bike were found in Slovenia.

Spain

Lighting maintenance in the City of Valencia
Valencia has implemented the use of e-scooters for lighting maintenance service of the city. With these sustainable vehicles (less noise and emissions) they can contribute to the cities’ goals on sustainability and emissions reduction Greenhouse Gas (GHG). From the start in 2009, they have a total of four e-scooters driving around for the lighting maintenance.

Sweden

Home care by pedelecs in Nynashamm
The home care department of Nynashamm in Sweden uses three pedelecs to carry personnel and small goods (such as cleaning materials) to clients. They started using the pedelecs in 2011, which is not supported by any local government or subsidy program. The entire municipality tries to be sustainable, energy efficient and support the wellbeing of the employees. Goals are to save energy and reduce emissions.

2.4 General conclusions

If we look at the current professional use of E-bikes, it can be concluded that the E-bike (e-bike, e-cargobike, e-scooter) is mostly used for freight transport, and much less for passenger transport.

In freight transport E-bikes are mainly used for last mile delivery, parcel services and delivery of meals. For last mile delivery and parcel services e-cargobikes are most popular, whereas for delivery of meals pedelecs and e-scooters are mostly used.
In passenger transport E-bikes are mainly used for child-care centres and elderly/disabled (Netherlands) or for transporting tourists (Spain).

The use of E-bikes for the delivery of services is very limited, and only few examples could be found across Europe, ranging from police to handyman service.

From the analysis it becomes clear that most of the examples on professional use of E-bikes can be found in the Netherlands, followed by quite a few examples in Spain and Germany. In the other countries also some examples can be found, but it is clear that there is still a long way to go. Even in some countries where there is definitely a cycling culture (Denmark, Belgium), only few examples could be found.
3. E-bike trends and policies

This section describes the E-bike trends and policies as identified in the desk research and interviews carried out by the partners. This chapter consists of 4 sections, i.e.

- Technology overview;
- Economic sustainability;
- Service Management;
- Favourable conditions.

3.1 Technology overview

3.1.1 Sensor Systems

Today’s E-Bike technology is based on the following three sensor technologies:

1. RPM sensor

   The RPM Sensor is a “Hall-Sensor” which is mounted together with a magnet disc behind the chain wheel(s) of the crank set. This sensor is measuring the rotation of the crank set. As soon as the sensor is recognizing the movement of the crank set, a signal will be send to the controller which consequently activates the support of the motor.

[Figure 17 RPM speed sensor]

Figure 17 RPM speed sensor

[Figure 18 Disc with 6 magnets]

Figure 18 Disc with 6 magnets

2. Torque Sensor – The Torque Sensor is measuring the torque, i.e. the pressure that is applied to the pedal – the amount of force the rider applies to the pedal. The Torque sensor allows an intuitive riding experience, as the power provided by the motor depends on the strength that is applied on the pedal.

   - Mechanical Torque Sensor - The mechanical Torque Sensor is a low cost sensor type for E-Bikes. Coil Springs inside the crank set are working as a transducer, which converts the torsional mechanical input into an electrical output signal. The output signal will be send to the controller

[Figure 19 Mechanical torque sensor]
• **Drop Out Torque Sensor** - This sensor is mounted on the right dropout side of the bike. It measures the deflection of the dropout that is caused by the chain force. The Drop Out Sensor measures the pedal torque of the cyclist. The chain force causes a small deflection in the sensor. This deflection of approximately 0.1 mm is sensed by a small “Hall” element. The result is an electrical output signal, which will be send to the controller.

![Drop out torque sensor](image)

Figure 20 Drop out torque sensor

• **Bottom Bracket Torque Sensor** - The bottom bracket torque sensor is the latest technology available for pedelecs. This sensor type responds to the tension placed on the chain by the pedalling effort of the rider. Usually this system incorporates force, rotation and crank arm position sensors for the ultimate in torque sensor accuracy.

![Bottom bracket torque sensor](image)

Figure 21 Bottom bracket torque sensor

3. **Speed Sensor** - The speed sensor is a “Hall” Sensor, which is used to detect the speed of the E-Bike. The electronic output signal will be send to the controller. This type of sensor is a basic sensor of all E-Bike systems. The sensor is either mounted outside of the motor or inside the motor.

![Speed sensor](image)

Figure 22 Speed sensor
All E-Bike systems of today are using either the **RPM sensor** in combination with the **Speed Sensor** (entry level E-bike system) or in addition a **Torque Sensor**, which is the more sophisticated and professional solution for E-Bikes.

### 3.1.2 Battery, Battery Safety, Battery Recycling, Charger / Charging Costs

#### Battery
The quality, capacity and the safety of the battery are the crucial elements of the E-Bike system. Modern systems are using Lithium-Ion batteries in combination with battery management software (BMS). The Lithium-Ion battery currently offers one of the best energy densities without memory effect. Quality batteries are offering up to 500 full load cycles without losing battery capacity.

There are also Lithium-Ion-Mangan, Lithium-Ion Polymer, as well as Lead–Acid batteries. The most useful batteries in terms of weight, capacity (cruising range), product safety and non-memory effect, are based on the Lithium-Ion technology.

The capacity of E-Bike batteries is rated in Wh (Watt hours). There are mostly 24 Volt, 26 Volt and 36 Volt batteries on the market. The amount of charged energy starts from 7 Ah batteries up to 25 Ah batteries. The capacity of the battery is the amount of the energy charge (Ah) multiplied by the voltage of the battery cells (V) – for example:

- 7 Ah x 36 Volt = 252 Wh
- 25Ah x 26 Volt = 650 Wh

#### Battery Safety
The battery cell management offers protection for unbalanced battery cells, overheating, overcharging, short-circuiting and enables a PC aided battery diagnosis. The PC aided diagnosis is in general a feature of top-level E-bike systems.

Lithium Ion batteries can be dangerous under some conditions. The battery can pose a safety hazard as it contains a flammable electrolyte that is under pressure. Due to this, the quality and safety standards of these kinds of batteries are very high. According the International Air Transport Association (IATA), Lithium Ion batteries are classified as “Miscellaneous Dangerous Goods” - Class 9 / UN 3480.
Battery Recycling
Lithium-Ion batteries must be treated as hazardous waste. There is a need to build up the infrastructure for the recycling process from the points of acceptance to the recycling facilities. There are estimates that the increase of electrical vehicles could lead to a significant supply crunch. For this reason, recycling is expected to be an important factor for consideration in effective material supply for the battery production.

Charger / Charging Costs
The charging time of the Lithium Ion battery can take up to 2.5 hours (fast charging mode is available at top level E-bike systems) or up to nine hours at standard and entry level E-bike systems. Depending on the local conditions, as well as depending on the charger and the battery capacity, the costs to recharge the battery is between five to ten eurocents.

3.1.3 Controller, Display (E-Bike Computer), Software

Controller
The controller is the interface between the sensor system, battery, motor and display. It is the key element of the E-Bike. The controller provides assistance as a function of the sensor inputs, as well as the vehicle speed and the required force. In general, the controller provides, in combination with the display, potentiometer-adjustable motor speed, closed-loop speed control for precise speed regulation, protection logic for over-voltage, over-current and thermal protection. The controller uses pulse-width modulation in order to regulate the power to the motor.
Display
The display is the tool to switch the system On/Off, to choose the required assistance level and to provide information about the battery charge condition.

1. **LED Displays** are very often used for entry-level E-bikes. This type of display offers basic operating functions.
2. **LCD Displays** in combination with a separate control unit are a feature of top-level E-bike systems. The LCD Display provides basic operating functions plus bike computer functions such as speed information, day trip and time.
3. **Future LCD Display** will provide in addition, bike navigation, individual rider applications (Apps), as well as smart phone connectivity.
4. Display with **Walk Assistance**. Some systems are also offering a walk assistance button, which activates the motor in case that the bike needs to be pushed uphill.

![Figure 27 LED display](image)

![Figure 28 LCD display with remote unit](image)

![Figure 29 LCD display / Bike computer with apps](image)

**Software**
Top level E-bikes systems are using a software communication protocol to enable on-board diagnostics, as well as to facilitate functions such as after-sale service, warranty management and software updates. The display provides an interface that can be used to update the software of the E-bike system or for diagnostic purposes.

The benefit of a new software release can be an improved cruising range and a better motor performance for a harmonious, agile and safe ride experience.
3.1.4 Motor / Drive Systems, Cruising Range

There are three different types of motor, i.e. drive systems on the market.

1. **Front Hub Motor** – The motor is assembled in the front wheel. This system works with a RPM Sensor and additional in more sophisticated systems with a Torque Sensor. The front motor allows the use of different drive train concepts such as chain shifting or hub shifting in combination with a back pedal brake.

![Figure 30 Front hub motor](image)

2. **Bottom Bracket Motor / Mid Drive Motor** – Mid drive systems are offering an optimal weight distribution and motor efficiency. The RPM Sensor and the Torque Sensor are usually integrated. The integrated sensor solution offers a reliable and efficient system up to a torque of 55 Nm (depending on the type of motor and manufacturer).

![Figure 31 Mid drive motor](image)

3. **Rear Hub Motor** – The motor is assembled in the rear hub. It is in general the solution for sportive bikes that are using a down tube battery in order to achieve an optimal weight distribution. The torque sensor is integrated in the motor. The rear hub motor is a low noise solution that offers a good traction for sportive bikes.

![Figure 32 Rear hub motor](image)
**Cruising Range** - The cruising range of the E-bike depends on the performance and the quality of the sensor system, the motor and the controller software efficiency, as well as of the drivers’ weight. Due to the chemical process inside the battery, the ideal outside temperature for the Lithium-Ion battery is between 5 degrees and 25 degrees Celsius. Depending on the system, the cruising range can vary between 50 km and 180 km.

### 3.1.5 E-Bike Classification

1. **Pedelec (Pedal Electric Cycle)** is the common expression for bikes with e-motor assistance. The motor of these kinds of E-bikes provides a performance of up to 250 Watt and a maximum speed assistance of up to 25 km/h plus 10%. Pedelecs require no registration within the EU, and thus no license plate.

2. **Cargo Pedelec (e-cargobike)** is a cargo-bike with e-motor assistance. The purpose of such a bike is the transport of goods, the supply of services and most important it could be the substitution for a car. The e-cargobike can be manufactured in combination with a trailer or without one. Individual e-cargobike constructions with two or three wheels, as well as with different load capacities are available from specialized manufacturers. Depending on the size and construction of the e-cargobike, it can be used as a multipurpose bike. There are already constructions for small business activities available, which have the demand for an on board cooling or heating system or who have the demand for a water protected cargo space.

3. **S-Pedelec (Speed-Pedal Electric Cycle)** is the common expression for bikes with an e-motor assistance of up to 45 km/h. The motor provides a performance of 350 Watt. There are systems on the market with 500 Watt and even 1000-Watt motors. Within the EU, S-Pedelecs require a homologation and a license plate in order to use them on public roads. S-Pedelecs are not allowed to pull a bike trailer. Changing the regulation of traffic law for the S-Pedelecs is an on going process. Some regulations are adapted from motorbikes and not really practical for a bicycle. All in all, the maximum S-Pedelec motor performance allowed for use on public roads within the EU is 350 Watt. S-Pedelecs with more than 350 Watt are for Sports purposes only and not allowed for use on public roads.

Due to the fact that S-Pedelecs are treated as a motorbike in the traffic law, they are not allowed for use on the bike lane as well as on roads, which are forbidden for motor bikes.

4. **E-Scooter / E-Moped** – Bikes with an e-motor system instead of a compression-ignition engine. These bikes are available with a throttle. The use is similar to a standard motorbike. Depending on the battery capacity, the cruising range is 30 to 60km with one full charge. E-Scooter and E-Mopeds require a license plate for the use on public roads. Riders are also required to wear a helmet.
3.1.6 E-Bike History, E-Bike Trends / Future Developments

History
The first pedelecs (Pedal Electric Cycle) were introduced to European markets at the middle of the 90’s. However without success in sales, since the consumers did not accept the weight of the battery and the resulting cruising range.
As a result, pedelecs used to be until the years 2007/2008 a niche product in Europe. The available simple technology was used to produce individual bikes for handicapped people. Non waterproof cable plugs, heavy Lead–Acid batteries, unreliable Lithium-Ion batteries and system controllers, as well as broken front motors and broken fork drop outs caused substantial problems at the early stadium of the E-Bike development.
The turning point used to be the first mid motor system of Panasonic, which allowed bike manufacturers to produce pedelecs that were safe and easy to use. These bikes had a 26 Volt battery / 7 Ah which enabled a cruising range of up to 40 kilometres.

Trends / Future Developments
Especially in the Middle and North of Europe, E-Bikes have a broad acceptance, especially by older consumers, who are using pedelecs to expand their mobility in a healthy and sportive way or as a substitution for a car. More and more young people are getting used to pedelecs nowadays as well. The trends are towards sportive and weight optimized lifestyle pedelecs, which are equipped with a “Smart Phone” like display.
Future developments will be focused on the battery technology in order to increase the cruising range, to reduce the charging time, as well as to achieve a maximum battery safety. Further developments will also be based on the weight reduction of the bike and on the improvement of the sensor system and controller software in order to enable a natural way of riding the bike.
Additional developments will be towards display applications as bike navigation and applications that will support the usability of E-Bikes and e-cargobikes for business purposes.

3.2 Economic sustainability
There is an increasing awareness among managers of organisations, being it large companies or SME’s, profit or not-for-profit organisations, that mobility patterns should change. Key drivers are cost consciousness, environmental concern, health of employees and image of the organisation. This section will analyse to what extent ideological and economic considerations can go together, meaning that more sustainable transport not necessarily means higher costs. In contrast: sustainable transport and economic sustainability can go hand in hand. Not under all circumstances, but certainly for specific cases where E-bikes can replace cars and vans.

Within this subtask an analysis of the economic sustainability of the use of electric bicycles for delivering goods and passengers is presented. Three paths will be worked out in detail:
- financial-economic sustainability: business point of view
- socio-economic sustainability: society point of view
- product life cycle and environment.
3.2.1 Financial economic sustainability

The financial-economic analysis shows the costs and the benefits of E-bikes from the perspective of the company/organisation. Of course it will not be possible to do this for each type of business, since there are big differences between logistics companies and childcare centres, and between pizza home delivery services and rickshaw services. Therefore in this section we will give a general overview of costs and benefits of E-bikes.

Costs

Purchase costs:
In this part we focus on the financial characteristics of E-bikes. A lot of companies that replace cars or scooters with E-bikes look at the purchase cost to begin with.

Three types can be distinguished:
- pedelecs
- e-cargobikes
- e-scooters

Pedelecs are in the price range of € 1.500 to € 2.000 (less for larger volumes), and thus pedelecs are a lot cheaper to buy then cars or (e-)scooters.

For e-cargobikes prices are a lot higher and they have a bigger price-variation than pedelecs. Two of the most used brands, Babboe and Bullit (used by two companies described in the cases), have a product range that consists of both normal cargobikes and e-cargobikes; all of the ‘normal’ cargobikes also have an electric equivalent. The Babboe electric bikes (ten different types) max out at € 1.700. If a standard Babboe cargobike needs to be upgraded afterwards (to include pedal support), that costs € 999. An extra battery pack costs € 299. All Babboe models have a square cargo hold in front of the driver. The Bullit e-cargobikes, of which 13 different types are available, all are made on the same basic frame. Prices for the non-electric bikes vary greatly from € 1.950 (Bullit Classic) to € 2.800 (Bullit TNT). On top of that a conversion kit is needed to give the bike pedal support, which costs around € 1.500. Total price for an electric powered Bullit would then be between € 3.450 and € 4.300.

In The Netherlands there are also other e-cargobikes that are used solely for transporting children to and from an after-school care centre. These e-cargobikes have a capacity to carry up to eight children. It costs between € 10.000 and € 12.000. This is more or less equal to a second-hand mini-van. Another example is the bike that TXITA uses in Spain, the cost for their ‘Lovelo’ bike is around € 7.500.

E-scooters also have a larger price-variation than pedelecs, prices start at around € 2.500 and go as high as € 6.000 for models that have a cargo-hold fitted to them. There are a lot more dealers for e-scooters than there are for e-cargobikes however, so getting a cheaper model should be easier. GOVECS, the leading German manufacturer has won several prices for their models, including ‘European e-scooter of the year 2012’. Other well known manufacturers include Peugeot, Vectrix and Vmoto/E-max.
It should be noted that in some countries the actual costs of e-(cargo)bikes and e-scooters can be lower if subsidies and tax-reductions are taken into account. For example, in the Netherlands a tax-reduction is possible for clean vehicles (MIA/Vamil tax reduction) and some cities have a subsidy-scheme for e-scooters (aimed at reducing the number of very polluting mopeds).

Maintenance costs:
Maintaining pedelecs and e-cargobikes is comparable. From the cases described in this deliverable the most common parts that need repairs are tires, gearboxes and chains. Chains are suffering from the extra strain put on them when using pedal support. Battery packs are generally performing as expected and do not need repairs or replacement during normal life span. Total maintenance costs per year are therefore limited. An educated guess on maintenance costs is about 200 euros per e-(cargo)bike, of which a normal service check accounts for € 75 and replacing parts accounts for € 125 (replacement of tires, chains, etcetera).

Insurance costs:
Traditionally, insurance for bikes depends on the region a person lives. Denser areas usually have a higher risk of theft and thus result in a higher insurance price. Next to that there’s a choice to have the bike insured for damage, accidents, legal assistance and for what countries (national versus international). Another choice is the number of years for insurance coverage (e.g. one, three or five years).
In the case of pedelecs, insurance tends to be cheaper or equal compared to the insurance for normal bikes. The main reason is that insurance companies estimate lower losses from theft and damages regarding pedelecs.
Calculating with a value of € 2.500, insurance costs for a five year policy are approximately € 300, which means € 55 annually (based on quotes from Dutch insurance companies). On the other hand, in the UK insurance costs are much higher (up to five times), which might be explained by the fact that bikes in general are much less common.

Compared to a normal bike, things that are different for pedelecs include the electric components (motor, battery), tougher brakes and heavier frame. In insurance policies there is not yet a clear distinction between normal bikes and pedelecs. Theft of parts, including the battery, is never insured at this moment in standard policies. This will be less of a problem for e-(cargo)bikes and e-scooters used in companies as they usually do not travel or park the vehicle in high-crime areas.

Benefits
In this section the benefits of pedelecs, e-cargobikes and e-scooters will be compared to cars and vans, since the objective of PRO-E-BIKE is to demonstrate and promote the replacement of cars/vans with E-bikes.

Cost savings:
Comparing E-bikes with cars and vans, the following cost savings can be realised:

- **lower purchase cost:**
The purchase costs of pedelecs, e-cargobikes and e-scooters are varying from € 1.000 – € 6.000 (with some exceptions going up to € 12.000). The lowest price of a small passenger
car starts around € 8.000 and for a (mini-)van around € 12.000. On average, the investment is € 6.000 lower. Since the E-bikes are used on relatively short distances, we assume that the car/van looses 50% of its new value over ten years and the E-bike looses 100% of its value over ten years. Based on this, annual depreciation costs of the E-bike are € 300 less than for the car/van.

• lower maintenance cost:
  Maintenance costs are assumed to be € 200/year for an E-bike and € 500/year for a car/van. Total annual saving on maintenance: € 300.

• no road taxes:
  Road taxes vary depending on type, weight, etc. For a small private car taxes are 100 euro/year, for a delivery van € 200/year. Thus on average € 150 can be saved on road taxes.

• lower insurance costs:
  Insurance for E-bikes is about € 55 annually. For an average sized car (calculated for Toyota Auris, 1.6 litre) this is a minimum of € 300. Annual saving is € 245.

• no fuel costs:
  Fuel costs are related to the distance travelled. E-bikes are an alternative on relatively short distances, let’s assume between 10 and 40 kms per day. Assuming 200 productive days per year, this amounts to 2.000 – 8.000 kms per year. Assuming € 1,80/litre petrol and an efficiency of 15 km per litre, the costs of 2.000 – 8.000 kms amounts to € 240 – € 960 per year. For simplicity we take the average saving of € 600/year. An example on e-scooters from Croatia shows that fuel costs (electricity versus petrol) can be up to 1/3 compared the fuel costs for petrol-powered scooters, based on an average consumption of electricity of € 0,60/100 km (more info on http://msmarine-emax.com). Another example: for pedelecs the monthly fuel costs can be reduced (compared to car) from around € 40 to around € 1 (source: Bund für Umwelt und Naturschutz Deutschland (BUND) Landesverband Bremen e.V., adapted by PRO-E-BIKE for lower expected mileage per pedelec).

As a result it can be concluded that total cost savings are € 1.595 per year, consisting of € 300 reduced depreciation costs, € 300 savings on maintenance costs, € 245 saving on insurance costs, € 150 savings on road taxes and € 600 savings on fuel costs. Of course it should be noticed that these are averages, including many assumptions. The real savings in a specific situation can only be calculated on a case-by-case basis.

Quicker than cars in cities and dense industrial areas:
In many urban areas, especially in the old urban city centres, E-bikes are quicker than cars. This means that fewer employees are needed to do the same work (or the same employees are needed for a shorter time period). This results in a higher productivity and lower costs per unit. Exact productivity gains can not be given, since these are very specific per case. As the DHL and FedEx examples show, E-bikes do already outperform cars. Prerequisites are that distances are not too long and volumes are high. Which fits perfectly in city centres such as Paris and Amsterdam and dense industrial areas such as the port of Rotterdam.

No problems with time windows for urban delivery
An increasing number of cities apply time windows for urban delivery, meaning that trucks and vans can only enter the cities during specific time windows (mostly in the morning hours). When using an
PRO-E-BIKE

E-bike, those restrictions don’t apply, and deliveries can be made when and where you want. This leads to a higher flexibility and thus a better use of transport means. In addition this could lead to higher customer satisfaction, which might result in higher turnover.

Healthier employees:
By using pedelecs and e-cargobikes instead of cars or mopeds, employees will get more physical exercise, which ultimately will result in more healthy employees. And more healthy employees will lead to a reduction of sick leave, which could be a significant saving. Of course this might also have a disadvantage: not all current employees might find it pleasant to have to change from a passive to a more active mode of transport. This change in working method might thus also have consequences when hiring new employees.

No driving license needed:
For some organisations it is a benefit that no longer personnel needs a driving license to perform certain activities. This means that the organisation will have more flexibility to assign staff to distribution work. Examples can be found in organisations that work with (mentally) disabled employees, for which it is difficult or impossible to get a driving license.

Better image of the company/organisation
The use of E-bikes improves the image of the company compared to the use of fossil fuelled vehicles. It is less polluting and makes less noise, all of which is appreciated by many customers. As some of the examples showed (Marleen Kookt, NY Pizza), the perception of clients when they see their goods, in this case meals delivered by e-cargobike or pedelec, is much better compared to deliveries by cars (e.g. pizza couriers). This is also true for DHL in The Netherlands whose drivers get much more positive response from the clients they deliver goods to. This better image of the organisation could ultimately lead to more clients and more turnover.

3.2.2 Socio-economic sustainability
If we look at the impact that different modes of transport have on the environment, cyclists have clear advantages compared to cars and trucks:

- Bicycles contribute less to congestion;
- Bicycles do not pollute;
- Bicycles need less space for infrastructure;
- Bicycles make little to no noise.

Less congestion
Congestion is one of the major problems in urban areas, mainly caused by cars, vans and trucks. On the one hand the large number of vehicles, but on the other hand this traffic also causes congestion through loading/unloading and while finding parking places. If shifting to E-bikes can reduce the number of cars, vans and trucks, this will help to relieve the pressure on the urban road network. In addition parking E-bikes and (un)loading E-bikes will have much less impact on blocking roads compared to vans and trucks, thus also contributing to reducing congestion.

Less pollution
PRO-E-BIKE

Pollution, in the form of fine particles, CO$_2$ and also noise pollution, is something that is mostly reserved for motorized vehicles. Apart from production, normal bicycles do not cause any pollution. This is however different for E-bikes since they have a battery that needs to be charged. The environmental impact of this charging depends on the fact how the electricity is generated: by coal, gas, nuclear power, wind, solar or hydro-electricity.

In addition a battery has a limited lifetime. There are options to revise the battery after the normal life span, which costs about € 300 in The Netherlands. That however is only possible if the battery is a Nickel Cadmium (Ni-Cd) or Nickel Metal hydride (Ni-Mh) battery. If the battery cannot be revised, a recycling company will process it. The metals from the battery can be used for roof gutters, Nickel and Cadmium can be reused in new batteries. The parts that cannot be reused are either burned at high temperatures (so toxics cannot get into the environment) or stored in a secure location. So this does effect the environment, although through continuously improving recycling techniques, waste is reduced to a minimum. As such it can be concluded that E-bikes are more environment friendly than cars, but all depends on the way the electricity is produced and how society is able to deal with recycling batteries.

Less space needed for infrastructure
The size of bicycles compared to cars gives some distinct advantages because of their better space/user ratio. Although cars generally have room for four or five people, in most cars only one person drives in the morning and evening rush hours. Normal sized bicycles have the length and width of just one person. The space/user ratio is comparable to buses operation at high load factors. For bicycles, the relative impact on congestion is much lower. They are less bound to lanes than cars, which makes overtaking and queuing for traffic lights more efficient. A standard European driver lane for cars is about 7,5 meters (two lanes for two directions, this is both in the UK and in The Netherlands). A two-way bike path is, dependent on the rush-hour intensity, 3,5 - 4 meters wide, so about half of a car lane.

Less noise
Another aspect of bicycles is that they cause no noise-pollution. Where the impact of cars on noise levels is very high, bicycles do not have that disadvantage. The total tire-surface on the ground is much less than with cars (e.g. 2 x 3,5 cm of rubber compared to 4 x 19,5 cm), so rolling resistance and the resulting noise is much lower. Also, bicycles have no motor and turning parts to power it, which further lowers the noise emissions.

Examples
In order to make the socio-economic benefits more concrete, in the following three concrete cases are presented of using the E-bike instead of a fossil-fuelled vehicle.

Case 1: child-care centre:
A child-care centre in Wijhe (The Netherlands) has bought a e-‘cargo’-bike, which provides place for 8 small children (or six larger children). Total costs were € 11.600 (including maintenance contract, advertisement, extra battery, rear view mirror, VAT).
The Go Cab is used for short distance trip with up to eight children to/from school, for shopping, for fun trips, etc.
The child-care centre is located 1,5 km from the village centre. If we assume that the e-cargobike is used two times a day on average, the total distance per day is six km. Assuming 250 working days (day-care centre is also open during holiday periods), the e-cargobike replaces 1500 car kilometres per year.

The alternative for the e-bike is a second-hand minibus (ten persons), which uses one liter of gasoline per ten km. This means 150 litres of gasoline per year. Therefore replacing approx. 500 round-trips by car per year by 500 round-trips per e-‘cargo’-bike results in:

- a reduction of 0,129 toe (based on 0,86 toe/1000l gasoline (source: EUROSTAT))
- a reduction of 0,347 ton CO$_2$e (based on 2,3117 t CO$_2$e/1000l gasoline (source: Carbon Trust));
- a reduction of 150 litres of gasoline (fossil fuel);
- a reduction of local noise emissions.

Case 2: New York Pizza
New York Pizza in The Netherlands has bought pedelecs in order to replace nearly 800.000 trips made by approximately 300 pizza delivery mopeds. Currently these trips are maximum one km in length, so if we assume that the average is around 0,75 kms, in total around 600.000 kms are saved by mopeds. On average a moped uses one litre of fuel per 25 kms, thus it saves 24.000 litres of moped fuel. Assuming an average CO$_2$ emission of 40-50 gr CO2 per km, this equals around 27 t CO$_2$ for 600.000 kms.

In summary, replacing 300 mopeds by 300 pedelecs for pizza deliveries results in:

- a reduction of 10 toe
- a reduction of approx. 27 ton CO$_2$e;
- a reduction of 24.000 litres of petrol (fossil fuel);
- a reduction of local noise emissions.

Case 3: Parcel delivery in Brussels (TNT)
As in most European cities, traffic is hindered by congestion. This makes it expensive for TNT Express to keep their inner-city deliveries (and pick-ups) reliable and fast. Traffic congestion also makes distribution traffic extra polluting in times when there is a lot of environmental attention. With the support of the European project STRAIGHTSOL, TNT started a new concept for urban distribution in Brussels in 2012. This was done on the corridor between the TNT hub at Brussels airport to the city centre.

What was needed was to implement a cost efficient and emission free operation. A possible solution lies in the use of electric vehicles (green) or tricycles (green and not hindered by congestion). There are some downsides, as the electric vehicles are expensive to buy, and the tricycles need some additional infrastructure for loading and unloading at the hub. TNT wanted to make the deliveries cost efficient and pollution free, so they chose the tricycles to carry out the deliveries.

Once a day a truck takes the parcels destined for the area to the cycle courier depot. From there, deliveries are carried out making use of e-cargobikes. One of the downsides was that the capacity of the e-cargobike was too low to also do pick-ups, so that still has to be handled by cars or vans. Also, because of the extra courier depot, goods need to be handled a second time before shipping them to the destination.
From the STRAIGHTSOL project a solution was engineered for this problem: using a mobile depot. Parcels are loaded into the mobile depot at the TNT airport hub (already according to their final destination), after that the mobile depot drives directly from the TNT hub to the city centre with all parcels for that day. From there, deliveries are carried out making use of electric tricycles.

The expected socio-economic benefits:

- Decreased truck-kilometres
- Reduced CO₂-emissions
- Reduced fuel consumption
- Reduced noise level.

3.2.3 Product Life cycle

In order to understand what the actual impact of E-bikes is on the environment, we need to understand how the product life cycle works for these types of vehicles and what other relevant factors play a role in using the vehicles compares to other modes of transport⁶.

Production

The divergent parts on E-bikes compared to normal bikes are the battery and the motor. Batteries used nowadays mostly consist of Lithium-ion (Li-ion) or sometimes Nickel Metal Hydride (NiMH). Both have advantages to other types, such as the older Lead (Pb) or Nickel-Cadmium (NiCad) batteries, in terms of total energy stored.

The total energy cost to produce Li-ion batteries is comparable to older Pb batteries, although slightly higher, but much better than NiMH batteries for instance.

Transport

Because of the energy density of Li-ion and NiMH batteries, transporting these is much more efficient than Pb or NiCad batteries. Li-ion is the most efficient with a 1:4,7 ratio compared to Pb batteries. Also, for Li-ion and NiMH batteries transportation energy is comparable to the total manufacturing energy, while for Pb batteries that is almost seven times higher.

Refurbishment / recycling⁷

A normal E-bike battery lasts for about 3-5 years, which equals roughly 500-700 full charges, after that period it needs to be replaced or revised. All battery types contain metals that can be reused to a great extent. The Li-ion batteries of E-bikes however are less interesting for battery recycling than the Li-ion batteries of e.g. smart phones, since the E-bike batteries contain less valuable metals.

Increasingly, recycling of batteries is done on a commercial basis. The downside of this is that these companies are not interested in Li-ion batteries (due to lack of valuable metals) and only collect batteries with valuable metals (cherry-picking). Thus there is a risk that the Li-ion batteries will be more difficult to recycle.

For recycling lead batteries, they start by filtering the acid and then separate the water and metals. Lead and other metals are separated from plastics, which is then recycled. Lead is separated from

---

other metals by heating it, and then making new lead bars from it. They can be melted into new battery parts. For other battery types, by heating at various temperatures, the different metals can be taken out of the battery. The components (nickel-cadmium, nickel-metal-hydride and lithium-ion) are placed in separated containers to be reused in new batteries later on. Refurbishing batteries is also possible, which costs much less than replacing the battery (which can cost up to 400 euro a piece). When revising a battery, the actual cells that contain the acid and metals are replaced, which is now mostly done for Ni-Cd and Ni-Mh batteries. Revising li-ion batteries is possible, but not yet widely spread due to strict regulations for working with lithium.

**Environmental impact**

It is undoubted that the use of non-carbon emission vehicles in substitution of light-duty vehicles, responsible for around the 15% of the EU’s emissions of CO\(_2\), would determine great savings in terms of CO\(_2\) and GHG. This is wholly true for “human-powered” bikes or cargobike while the matter complicates in case of electrically assisted or powered bikes. A number of studies though, and this project as well, aims at calculating savings to investigate where and how using e-vehicles may represent a reasonable opportunity.

At first an example from London: In 2009, a major supplier of stationery and other office supplies to businesses in the UK made the decision to trial a new urban delivery system in the City of London in order to reduce the environmental impacts of their delivery operation, as part of the company’s corporate social responsibility strategies\(^8\). The eight months lasting trial (from December 2009 to July 2010) introduced two great novelties:

1. The use of a consolidation centre in the delivery area from which electrically assisted tricycles and electric. This centre, located in the City of London delivery area, was used as a transhipment facility for the transfer of parcels from the suburban depot onto the electric vans and tricycles for final delivery.
2. The substitution of seven diesel vans with six electric tricycles, three full electric vans and one diesel truck. The electric assisted tricycle could carry a load of up to 180 kg and has a load space of 1.5 cubic meters, with a typical speed of approximately 15 kilometres per hour in free-flow conditions; it required a four-hour recharging overnight.

The results show that by May 2010 the use of the micro-consolidation centre together with the complete replacement of the diesel van fleet by electrically-assisted tricycles and electric vans led to a reduction of 20% in the total distance driven by all vehicles per parcel delivered between the suburban depot and the customer delivery locations. The total carbon dioxide equivalent (CO\(_2\)e) emissions\(^10\) were calculated for the delivery system before the trial. The total CO\(_2\)e emissions per parcel delivered was 54% lower in May 2010 than in October 2009 before the trial. This was due to the reduction in the total distance travelled per parcel and the use of electric vehicles using fuel generated from renewable, carbon-free sources in the City of London. The distance travelled between the suburban depot and the City of London per parcel delivered fell by 82% due to the use

---


\(^10\) CO\(_2\)e includes carbon dioxide, nitrous oxides and methane emissions.
of a single truck to transport goods between the suburban depot and the micro-consolidation center in the City of London.

However, within the City of London the total distance travelled per parcel delivered increased by 349% by May 2010. This is due to the lower carrying capacity of the electric vans and tricycles compared to the diesel vans together with the guaranteed delivery times that have to be met, thereby resulting in the need for more delivery activity per day. In terms of CO₂ emissions, these fell by 49% per parcel delivered between the suburban depot and the City of London, and by 83% per parcel delivered within the City of London compared with the situation before the trial. As a result, the company officially launched the scheme in 2010. The trial put in light the trade-off between total distance travelled and greenhouse gas emissions associated with the use of clean electric vehicles in place of diesel vehicles that have greater size and volume payloads.

In France, the Petite Reine service, already described in section 2.2.2, by 2007 was operating in four cities (Paris, Bordeaux, Dijon and Rouen), with 50 employees, 53 bikes and a turnover of € 1.3 million. According to their own calculations, they transported 700,000 packages, a total of 210,000 km. In the process they displaced nearly 600,000 ton-kilometers of van transport in Paris alone, largely accounted for by the difference in the weight of the vehicles used, and saved 204 ton of CO₂ emissions.

According to research reported in 11, a bike courier in the Netherlands yearly cycles 10,000 to 12,000 kilometers and is for 90% active in dense urban areas. Delivered goods are mostly parcels, but fast moving consumer goods gain importance. The weight per parcel - in the Netherlands - is on average 20 to 30 kg. A calculation of total energy use by Dutch vans, later on compared with bikes, was made. In the year 2000, the total use of fuel by vans amounted to 17.000 million liters. A total of 20 billion kilometers was driven 12. When calculating with a 10% mode share for bike couriers, the study calculated a shift of one million kilometers per year would be achievable. Calculating with average fuel consumptions, a yearly saving of 85.000 liters would be possible. Less fuel consumption leads to less CO₂ emissions 13. The next table summarizes the results.

<table>
<thead>
<tr>
<th></th>
<th>Fuel saved (liters)</th>
<th>CO₂ reduction (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nijmegen (at present)</td>
<td>3.100</td>
<td>7.8</td>
</tr>
<tr>
<td>Nijmegen optimal*</td>
<td>85.000</td>
<td>213</td>
</tr>
<tr>
<td>The Netherlands optimal*</td>
<td>8.500.000</td>
<td>21.000</td>
</tr>
</tbody>
</table>

* Calculated with a 10% modal share. Source: Fietsdiensten.nl, 2009

It has to be remembered, though, that the effects of electric-powered bikes, cargobikes, tricycles or similar on polluting emissions depends upon how electricity has been produced: in the traditional

13 In this study, a liter of petrol was estimated to emit 2.4 kg of CO₂ per liter and 2.6 kg CO₂ per liter for diesel fuel. LPG was estimated to emit 1.6 kg CO₂ per liter.
PRO-E-BIKE

thermal way, although it is true that a centralized generation of electricity can be more easily controlled and filtered, the only zero-emission generation model is the usage of renewables.

In conclusion, what was often underlined by many interviews and reports is that the ecological benefits brought by the usage of cycles for delivery are insufficiently played and encouraged: individuals who have a less polluting car purchases get tax reductions and benefits while bicycle couriers receive no financial support. At the same time, though, national has funded many trials or supra national agencies, as the PRO-E-BIKE project itself in order to reduce GHG emission and to increase energy efficiency. In general, supporting or guiding city policies can help to change the present logistic model, like regulation of access in the city centres or the development of urban consolidation centres, depots or storage facilities.

3.2.4 Trends / developments
In general, on a socio-economic level, people are getting more aware of available sustainable solutions. This holds opportunities for increasing the use of E-bikes. Because cities are closing their centres for polluting vehicles (or like in the example of London asking a congestion charge), bikes get more room to outperform cars in cargo deliveries in urban areas. Not having restrictions on delivery times (as vans usually do) or restrictions in forbidden zones such as pedestrian areas are a further positive influence on the professional use of pedelecs, e-cargobikes and e-scooters. All in all it seems that the usage is growing and that the markets are ready to implement E-bikes on a larger scale. DHL for example estimates that a total of 20% of deliveries can be done by bike in the near future.

3.3 Service Management
This section of the report describes how E-bikes (pedelecs, e-cargobikes, e-scooters) can be used to deliver various types of services, how the use of E-bikes impacts the way these services are delivered, and how it fits into the operational processes of delivering goods (section 3.3.1), passengers (section 3.3.2) and/or providing services (section 3.3.3).

3.3.1 Service management of delivering goods
Environmentally speaking, the general goal as regards to urban logistics is to reduce the impact of freight-vehicles movements on city living conditions in terms of congestion, emissions and pollution, keeping in mind, though, that last-mile delivery is an entrepreneurial activity and, thus, revenues are expected.

In this context, this section describes service management for the logistics with electric vehicles, concerning the three typologies of vehicles objects of the project, with a particular focus on the “electric” aspects that is the main novelty the project aspires to address, since it has a direct impact on carbon reduction.

The objectives that can be pursued are many, all aiming at increasing efficiency, effectiveness and at reducing carbon emissions:

- to reduce and to control the number and the dimensions of freight vehicles operating within the city;
- to improve the efficiency of freight movements;
PRO-E-BIKE

- to reduce the number of empty vehicle;
- to reduce km travelled.

The fundamental idea that underlies most initiatives collected under the topic urban logistics is to stop considering each shipment, firm and vehicle individually: rather, one should consider them as components of an integrated logistics system. We will see, looking at the initiatives collected within the interviews and desk research, that this kind of integrated system is not actually really pervasive: bike delivery experiences still are not completely integrated into the city logistics and it is rather common that they represent, as part of a more complex logistic chain, starting experiences and pilot initiatives (as they already play a role as independent delivering services) waiting for a common framework.

The present chapter will elaborate the information collected by desk analysis and interviews which has been done in an earlier stage, and differentiating, where needed, between three categories of freight operations:
- Logistics operators
- Bike couriers
- Home delivery.

Secondly, this section will focus on the implications of the adoption of electric engines for bike deliveries concerning the service management. To assess that, it is necessary to clarify some operational variables featuring the services, as follows.

3.3.1.1 The framework

The logistic sector is particularly fluid: it demonstrated its flexibility throughout its history with a continuous adaptation to rapid changes in goods demand and in the market of goods shipping. A brilliant example of this is the rise of logistic integrators in the seventies, namely the biggest logistic operators nowadays still active on the market, in response to customers’ need of having delivered at home an item purchased remotely, rapidly and safely: national distributors lacked in organization and in integration across modes and private companies soon took advantage of it. Even nowadays, logistics is still highly dependent on demand and customers’ demand (B2C) has been gaining terrain upon firms’ supply demand (B2B). The EU parcel market was estimated to be worth € 42.4 billion in 2008 with the B2C segment representing 15% of this market.

Four drivers can be recognized and their description is useful to understand the feature of a market niche suitable for bikes and E-bikes usage.

The rise of e-commerce

A report from Politecnico di Milano indicates an overall 19% growth in e-commerce trades between 2011 and 2012. According to the international research agency Nielsen, the categories of products sold in the world on the Internet in 2012, in terms of sales volume, are clothing, shoes and jewellery (1st), books, magazines (2nd) and tourism products like flights and holidays (3rd). At the fourth place, consumer electronics, computers, video games and mobile phones. Among the sectors that registered the largest increase, leaving out “inmaterial” products, such as tickets for travel and leisure (cinema, theatre, etc.) are food and cosmetics. A common and evident characteristic of these

---

items is the limited volumes and weights. As a consequence of e-purchasing, the B2C segment of parcel and packet markets has grown rapidly: current estimations indicate that B2C segment represents between 20% and 40% of total volumes in more mature e-commerce markets (e.g. in the UK). As a response to this change in the demand, the traditional distinction between mail and parcels is less evident, players that used to operate mainly in B2B are now adapting to cover also the B2C segment.

Demographics and urbanization

In terms of size, world population has more than doubled since 1950 and for 2050 the forecast is to reach more than 9.3 billion people. Of this population, more than 50% live in urban areas now: today the population of the city is about 3.3 billion, and the trend is likely to increase: according to the latest estimates, the population living in cities will almost double by 2050 or two or three out of ten will live in cities. As a consequence, a larger volume of parcels will be delivered in cities. Moreover, population in developed countries is aging. Elder people can, for instance, order grocery online and see items delivered for free, at home. Also the structure of families is changing, from the “traditional” one (parents and children) to single-parent, single working mothers, etc. These phenomena affect consumer patterns and are contributing to an increase in online purchasing and home deliveries.

A demanding demand

Another driver deals (again) with the convergence of B2B and B2C in terms of needs: both consumers and firms require speed, convenience and reliability in delivery. While some years ago delivery companies used to offer specialized services according to the customer (i.e. express and guaranteed delivery for businesses as opposed to ordinary and slow delivery for the individual consumer), nowadays consumers are as demanding as firms. Moreover, an express provider has to deal with a growing number of individual consumer deliveries (B2C) because its traditional B2B clients/shipper – firms, suppliers and so on – use to provide online purchasing in addition to the traditional business and delivering to final consumer is more complex than business delivering. In this sense, the promise of a one-day delivery of an item purchased online does represent a big threat for traditional shopping, especially for small shops operating in retail.

Urban policies

Urban goods distribution is on average responsible of 20-40% of CO2 urban emissions, the trips generated for goods delivery represent the 8-30% of the overall urban trips; shipments time-windows generally overlap with private transport rush hours in the morning; final delivering operations reduce on average by 30% the road capacity. The consequence of these feature or city

---

15 In the Postal Directive (Directive 97/67/EC, as amended by Directives 2002/39/EC and 2008/6/EC), items of correspondence or documents up to 2 kg are considered as letter, goods up to 20 kg are considered to be parcels
19 DG MOVE EC, Study on Urban Freight Transport, 2012
logistics is pollution, congestion and noise. In response to this, urban policies for limiting or organizing access to the city are spreading throughout Europe and worldwide: logistic operators are trying to adapt infrastructures, operations and fleets towards more sustainable models.

3.3.1.2 Modelling bike delivery
There is a clear segmentation in the various last mile markets depending on the items delivered, as displayed in the following figure.

![Figure 33 Market segmentation for delivery companies (source: Fietsdiensten.nl, 2009)](image)

The lowest and widest part of the pyramid represents the mass market where companies in nearly monopoly conditions deliver letters and small packages: postal services. Volumes are large, recurrent, with low priority and with a low willingness to pay. As long as the pyramid gets smaller, priority increases as does the variety of goods volume; reliability and traceability are required with consequences of increasing price level. The top of the pyramid is the high-end market: high standard in timing, increased expectations in terms of reliability and safety, very high willingness to pay by side of customers. Summing up and giving as assumed the “mission”, that is delivering, it can be stated that volumes and weight are limiting factors, making bike delivery not properly suitable for every kind of goods: moving big parcels is actually possible but knocks down many of the advantages described so far unless adopting different types of vehicles.

Bike couriers and small delivery company can play a role, though, as long as new logistic model are adopted and put into practices through public policies: bike couriers can become part of a new urban logistic system. Alternatively, E-bikes can be adopted for fast home delivery. On these basis and taking into consideration the several analysis and reports about bike logistics\(^{21}\), it is possible to draw a preliminary distinction, as regards the adoption of E-bikes for goods transport in urban areas, into three major working models, as follows.

- **Home delivery model.** This group embodies all the activities operated by shops and commercial activities, making use of vehicles to deliver goods purchased by customers.

\(^{21}\) [http://www.flanderslogistics.be/](http://www.flanderslogistics.be/)
Purchasing generally occurs online or via phone and products have to be delivered as soon as possible. A first implication is that vehicles have to be quick and easy to ride into traffic; secondly, they generally do not need high loading volumes. According to these preliminary and superficial assumption, bikes and E-bikes can play an interesting role in the model.

- **Bike messenger model.** This pool includes young companies, grown during the last ten years, that have been occupying a significant market niche, most of whom are bike-courier companies. They have generally followed a similar development path, starting from a very small (even one-man) company, to enlarge year by year, symptom of a sustainable business model and of a good market penetration.

- **Big delivery company model.** In these cases, the problem at study regards the full integration of the last-mile operations, made by bike into the whole supply chain.

### 3.3.1.2 Characteristics of operators

This paragraph means to illustrate the characteristics of the companies included in the three categories mentioned before: logistic operators, bike couriers and home-delivery shops.

#### Logistic operators

This category includes the major logistic players that can be further distinguished in postal service companies, express operators and third parties. For each of them it is highlighted the potential role for E-bikes within logistic operations. These players showed different attitudes and changes regarding the openness to the increase in B2C market. Pushed by the recent economic crisis and by a strong competition, they have been forced to reorganize their parcel network, to diversify their offer, using different strategies: renewal of services thanks to innovation in ICT, new organization of the supply chain in cities, adoption of different vehicle to have a more flexible fleet. Subcontracting and partnerships have also been used to benefit from new player innovations and to keep an eye on them. In this scenario, the usage of bikes and E-bikes is recently playing a very important role: TNT Benelux is one of the first big companies to sign a cooperation agreement with Ecopostale. Once a day a truck takes the parcels destined for the area to the cycle courier depot and there, deliveries are carried out making use of electric tricycles. As a result, two-thirds of Ecopostale total transported volume is now linked to TNT. Apart from TNT, many other express couriers like DHL (that in 2005 subcontracted La Petite Reine in Bordeaux for delivery with e-tricycles) or FedEx have been testing the integration into the last mile operations of bike delivery, with different models and vehicles. There is a mutual benefit from this cooperation: logistic operators can easily enter a market segment (B2C urban delivery) lowering investments to densify their network and outsourcing risks, delivery failure and flow seasonality to subcontractors that can count on larger and steadier volumes of parcels. Lastly, the adoption of e-vehicles (pedelecs, e-cargobikes and e-scooters) often represents, for companies, a sort of green marketing, in coherence with their main business and clients’ expectations. Lastly, especially for big/public services (i.e. Posts, Municipalities, etc.) the support and incentives of Public Administration for the trial of a pilot and/or the implementation of a pervasive service often occurs.

---


Bike messengers (bike couriers)

Bike couriers phenomenon can actually be considered as a rediscovery of something that used to happen in the past. Almost immediately after the development of the pedal-driven velocipede, in the second half of nineteenth century, people began to use the bicycle for delivery purposes. In contrast to the current situation, the focus was on speed whilst sustainability was less an issue at that time. Nowadays, within the urban logistics sector, bike couriers are among the emerging new players. The key of their success is the design of specific solutions for fast and reliable delivering in congested urban areas.

Many bike couriers started as an ethical and environmentalist response to the present polluting model, like an extension of the critical mass movement, as a one or more persons’ initiative in response to unemployment, personal work dissatisfaction, unexpressed passion for bikes, opportunity to make business or to a mixture of them. With the exception of some private initiatives, many started up thanks to the support of European, National or Regional funding schemes as actions to reduce carbon emissions.

The bicycle couriers can transport a variety of goods, as long as they are light, with limited volume and have relatively high value per volume. Although there are some exceptions, the current bike messengers (e.g. Ecopostale in Belgium, Outspokendelivery\textsuperscript{24} in UK, B-linepdx\textsuperscript{25}) mainly belong to the highest segment: they offer speed and reliability but still improvements are expected as regards, for instance, traceability and integration in extra-urban shipments. Definitely, bike couriers have large margins to professionalize although it is really needed with quite large volumes (and, on the other hand, sufficient volumes can be reached with professionalization). For some of them the solution may consist in being part as subcontractors of a major logistics player (the case of TNT Express in Belgium that subcontracted Ecopostale). In some cases, though, big companies develop bike delivery schemes independently. Others bike couriers prefer to remain independent and try to improve, with a generally good success, their business and service models, although in absence of sufficient volume the costs remain high and business is hard to take-off. The availability of a storage depot is a pursuable strategy to increase competitiveness: Outspokendelivery in Cambridge UK and B-linepdx, in Portland, for instance, have proper depots to collect parcels and to re-arrange them for the final delivery. The number of cyclists of a bike courier company is limited by the volume of shipments: many companies began with few employees to reach an average number of 10 to 15. As it is easy to recruit a rider, it is less easy to keep him/her at work because of strongly fluctuating volumes. Stable volumes can be afforded by partnering with a major delivery company or by offering in exchange special conditions for delivering. The couriers have a physically demanding job\textsuperscript{26} that can be strongly relieved by the adoption of electric assisted vehicles. Training for couriers is also both offered and demanded.

Bicycle messengers companies, picking up and delivering items by bicycle, are most often found in the central business districts of metropolitan areas. Very likely, they work on a small scale, collecting

\textsuperscript{24} \url{http://www.outspokendelivery.co.uk/about-us/vision}
\textsuperscript{25} \url{http://b-linepdx.com/}
\textsuperscript{26} Bike messenger annual distance covered averages between 10.000 to 12.000 kilometers, 90\% made in densely populated urban areas.
packages and distribute them quickly throughout the city, because bikes do suffer less from road congestion problems: it can be stated that the more urban areas face congestion, the more these have an advantage. Delivery times have to be short. Reliability can be offered since bike couriers, compared to the conventional transport, have a more stable period of time to do a certain trajectory which is regardless weather conditions, traffic jams, peak or off-peak times, strikes in public transport similar all year round.

Nowadays bike couriers are observed as regular transport companies delivering packages, letters, contracts, etc. Their clients are among others advertising agencies, law firms, administrations, etc., which create a time pressure to deliver fast. However, other products are transported by bike too: the distribution of lunches is becoming a common practice. Bike vehicles also offer advertising services, in terms of delivery itself and by allowing stickers and posters to be displayed on own vehicles.

At the moment, there is an international federation of bike messengers (IFBMA, International Federation of Bike Messengers Association) although a lot still is lacking in terms of representing couriers’ interests at stake.

**Home delivery**

Home delivery is a characteristic of the whole B2C sector, therefore it is not different from the previously listed operators (logistic operators and bike couriers). Here, though, we especially refer to the variety of physical shops using vehicles to deliver, on their own, goods: along with the growth of e-commerce, in fact, the number shops offering the possibility to order on-line increased and delivering followed. Moreover, as we are concerned in finding out the most suitable market segments enabling E-bike delivery, we will consider especially all the commercial activities who offer products that have to be delivered quickly, as soon as possible (no or little collection of items into an unique order) and that are ready to consume: groceries, pizza shops, kebab shops, florists, pharmacies, etc. The most common vehicle adopted, in this case, is the traditional ICE scooter, if necessary equipped to keep items in properly conditions. A focus on items delivered is in the next paragraph.

### 3.3.1.3 Goods delivered

The market of delivering by bike is quite various. From law firms, advertising agencies and administrations that need to send documents, under time pressure to door-to-door delivery service that includes products that can be purchased at the shop or home-delivered, like food/meals, flowers, photocopies.

Since the common denominator of the product categories listed below are the limited volumes: this factor, together with the increasing need for both e-shops and traditional shops to deliver sold items, makes bike-delivery a very suitable option. Scooters still have the major part but e-vehicles, e-bikes and e-cargobikes are rapidly becoming profitable alternatives.

Using cycles for the last-mile deliveries is particularly attractive as they offer much greater efficiency and flexibility than motorized transport, saving time and money. Other points in favour of using bicycles are the contribution they make to the reduction of CO₂-emissions and pollution, which helps to create more liveable cities. At present, in many cities, deliveries are done in small vans and some
of these deliveries could potentially be transferred to cycles. In some cases, it tend to be smaller companies that are using cycles for deliveries or it is the shop or commercial activity itself that makes the delivery with its own means. The CycleLogistics project estimates that the potential for an increased use of cycles in urban environments is high for both B2B and for B2C markets. Several examples already exist of cycles (i.e. freight bikes or ordinary bikes) being used to deliver items, grouped into categories below.

<table>
<thead>
<tr>
<th>Items/products</th>
<th>Papers</th>
<th>Food</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing services</td>
<td>Sandwiches and lunches</td>
<td>Shopping items</td>
<td></td>
</tr>
<tr>
<td>Promotional materials</td>
<td>Pizza/kebab</td>
<td>Flowers</td>
<td></td>
</tr>
<tr>
<td>Newspapers</td>
<td></td>
<td>Medicaments (supplies for pharmacies)</td>
<td></td>
</tr>
<tr>
<td>Mail and parcels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidential documents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office equipment (e.g. copy machine equipment; office supplies)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.3.1.4 Supply chain and operations

The company organizational aspects of delivering goods vary across three main categories (listed in the first paragraph: home delivery, bike messenger, big delivery company). It is in fact possible to identify three main models for the delivery management, mostly adopted by the interviewees and consolidated in literature on this topic\(^{27}\).

The first one is **Home delivery model**: the product is brought from the origin of production, the factory, to the destination directly by the employees of the factory. It’s the typical model for restaurant and pizza place with home delivery.

The second one is the **Bike messenger model**: the factory has not its own system for delivering the product and it leans on dedicated Bike messenger service for bringing the product from the factory to the client place. It’s the typical model for small factories and e-shop stores.

The third model is the **Big delivery company model**: in this case the bike delivery is used as a link of the supply chain. Typically a traditional van brings the parcels to a warehouse and from there they are loaded on cargo bikes in order to be brought to the clients.

---

\(^{27}\) From research done by Poliedra for the PRO-E-BIKE project, 2013
1. **Home delivery model**: this model is the typical model of restaurant, pizza places or, more in general, of those producers that have to deliver their product, often of limited size, in the fastest way possible.

The delivery model is quite simple. A delivery request is processed via a switchboard and the product is prepared and loaded on the bike or, if already prepared, just packed and loaded. The delivery can be both B2B and B2C.

If the request is not to be satisfied in real time, the producer/provider can try to arrange more deliveries in order to optimize the route. Typical products delivered in this way are, for example, printed products, advertisements, newspapers, documents, dresses and shoes, other non-perishable products, food, etc.

If the request is a real time one, typically the lunch orders, it’s possible to make one or two deliveries for each trip. Typical products delivered in this way are, for example, lunches and take-away foods.

2. **Bike messenger model**:

A preliminary definition: bicycle couriers, internationally known as Bicycle Messengers, get parcels and deliver them to the final destination, completely by bike. They mostly operate in densely populated urban areas where they can quickly move and cover middle-range distances. A sufficient density of pick-up and delivery locations features the ideal situation, compared to traditional systems.

Since they have a limited maximum speed, they are not as suitable as vans or light duty vehicles for delivering outside the city but they take advantage from congestion on city roads, city policies limiting traffic (e.g. congestion charge schemes, environmental zones, time limiting access, etc.). These conditions make some delivery time slot more profitable than others: busy morning and evening time in peak traffic. Bike delivery takes advantage also from weather conditions: bike couriers are less constrained by bad weather and seasonality, resulting in a high reliability of the service.
As concerns organization activities, requests use to be collected both in advance (generally the day before) and in real-time, organizing tasks on the bike. In fact most of the contacts with the customers go by telephone. Furthermore seeking new clients happens on a bike (or by flyers). The administrative part of the business usually takes place in the evenings, unless dedicated personnel are available: parcels are prepared and ordered for final delivery. The amount of deliveries varies widely depending on the company mission and size: small companies (up to five bikers) deliver an average of twenty parcels per day, except “big orders”. Delivery occurs all along the week, at any daytime till closure time (depending on country). Food delivery is generally available also on Saturday.

3. **Big delivery company model**: the “traditional” logistic model consists in extra urban hubs where goods are stored, sorted, labelled and loaded on trucks or vans and delivered to the final destination. Vans generally perform round trips, serving several delivery points before returning to the base, as displayed in the following figure, upper left.

Parcels, either nationally or internationally, are delivered to a central depot during the day, then injected in the network to the destination depots during the evening/night and delivered to final destinations within the following 1-3 days, depending on the delivery zone the destination depot belongs to.

The collection of on-drive orders (i.e. orders for the driver to go somewhere to collect a parcel to be shipped) are received in real time and carried out by the driver during the day. Remaining parcels are brought to the origin depot in the evening then injected in the network and to reach the destination point in the predefined service capabilities in the following days. For standard deliveries, vehicles generally leave the depot in the morning and return in the evening. To provide express delivery service vehicles normally perform multiple trips, one to delivery express parcels and others to load all the remaining standard parcels and go back to their delivery area. This model can be modified in presence of an inner urban storage and load area, generally called *Urban Consolidation Centre* (UCC). UCC is a logistics facility situated in relatively close proximity to the urban area that it serves, i.e. the city centre, an entire town or a specific site such as a shopping centre, airport, hospital or major construction site. Goods destined for these locations are dropped off at the UCC. The UCC operator sorts and consolidates these loads dropped off by logistics companies and makes delivers to the final destinations, as displayed in the following figure, upper right.
The "traditional" logistic model

The introduction of an urban depot into logistic chain

Figure 35: old and new urban logistic concept and applications

From the point of view of service management, the introduction of an additional layer (UCC) into the traditional logistic model implies further optimization and procedures. Considering the new physical distribution of UCCs, also called satellites platforms, the system operates according to the new sequences, in order to grant coordination between two layers (UCCs and logistic HUB outside the urban area):

1. Assignment of trucks to satellites and, eventually, implementation of holding strategies for trucks at their points of origin (at the entrance of the city).
2. Transfer and consolidation of freight at satellites.
4. Dynamic control and adjustment of these routes.

Such a change in the logistic model has consequences also on structure cost and time delivery. The new "fixed" costs are composed by the acquisition cost of the additional fleet and its subsequent maintenance. This includes, when required, the construction or installation of depots and fuelling stations for the city-freighters.

Other options, though, are possible: city-freighters, in our case bike couriers, can be subcontracted. Maintenance operations are required in case of property of vehicles, otherwise, in case of renting, maintenance may remain on charge of the renting company. Some costs may also be incurred due to
the installation and the equipment (esp. ITS to control and manage fleet) of urban satellites. In addition, the personnel cost: apart from drivers, console operators, mechanics, are needed. For transportation costs, they include those associated to the truck movements, transfers at satellites, and the city-freighter routes. In section 3.2 the various costs elements have been described in detail.

Other major modifications concern timing, with the addition of transfer times at satellites, the eventual holding time of trucks and the reduction of travel time for trucks and their impacts on congestion. On the other hand, travel times associated with city-freighter routes will have to be considered. Yet, due to co-ordination and a higher loading factor, their number is expected to be less than the actual volume of trucks. And, of course, their detrimental environmental impact would be significantly less compared to the current situation. Time is also needed for further load and unload operations: in this sense, some cargo-bikes are designed with a removable cargo-hold in order to ease and speed up load and unload operations while the bike is on service outside the depot.

The major advantage, indeed, obtained by the adoption of a UCC is the enabling of smaller and quicker vehicles into highly congested areas as the city centre, generally electrically powered. They can generally enter restricted zones, they are more reliable, noise and pollution decreases, and pedestrian safety increases. At the same time, though, load factor per vehicle diminishes, so that more trips are needed and further optimizations are required.

In addition to consolidation and final delivery, a range of other value-added logistics and retail services can also be provided at the UCC including off-site stockholding, consignment unpacking, preparation of products for display and price labelling. These can benefit receivers by reducing their on-site space requirements, saving time by reducing the tasks that have to be performed onsite, and enhancing productivity and sales in core activities.

Examples of such model are growing fast. *Outspoken Delivery* company, in Cambridge (UK) is using their office/workshop as a hub: companies drop off their deliveries (up to 25kg) for the inner city centre early in the morning. Throughout the day, Outspoken Delivery can deliver the last mile using their range of freight bicycles. This proves ideal in a city like Cambridge where delivery vans are not allowed in the city from 10am to 4pm. The eventual vision is to have these hubs strategically located throughout the city with delivery by van or lorry to hubs on the major roads surrounding the city, such as Park & Ride sites. From there, a range of bicycles and electric vehicles will deliver the 'last mile’. The bigger freight bicycles can also act as mobile hubs, allowing the smaller freight bikes to carry out deliveries in specified areas.

There is also another approach adopted by *Urban Cab*, a company based in Paris, France. Suppliers have all their goods pre-sorted at logistic centres and then packed into containers, which fit onto specially designed bicycles. These containers are transported to the edge of the city, scanned and loaded onto the back of bicycles for the quickest, most efficient routing, effectively avoiding any resorting of goods. Urban Cab is also developing a system allowing customers to choose a fixed location at various points across the city to pick up their goods. The bicycles simply park (for free) in a fixed location, saving customers the hassle of having to be at home when their goods are delivered. The cargoholds are removable and can thus be pre-loaded with parcels before being put on the e-cargobike (with a forklift). That saves time with reloading, when several trips must be made from the depot.
Several improvements and modifications to the UCC model are objects of study, at present. A quite futuristic proposal, for instance, comes from *TNT-express in Belgium*. The EU project STRAIGHTSOL has been experimenting a mobile depot: parcels are loaded into the mobile depot (a on purpose designed truck) at the TNT airport hub (already according to their final destination), the MD drives directly from the TNT hub to the city centre with all parcels for that day and from there deliveries are carried out making use of electric tricycles, carried inside the truck.

In conclusion, it can stated that the presence of a UCC represents a possible *trait-d’union* between the major logistic operators and bike couriers who can, in this way, be incorporated within the whole supply chain for last-mile deliveries.

### 3.3.1.5 Trip model
It is possible to identify two main trip models for the delivery, mostly adopted by the interviewees and consolidated in literature on this topic.

1. **Round trip model**: it is adopted by the vast majority of bike couriers and consists in a number of pick-up and deliveries in a series. The courier exits the depot and proceeds towards the first pick-up point to load and prosecutes to the first delivery point; then he checks his schedule and goes on to the next pick-up point, till the last delivery of the day. In presence of a depot, goods are loaded once at the depot and then delivered one by one along the scheduled path.

   ![Round trip model diagram](image)

   *Figure 36: round trip model, generally adopted by couriers: a series of pick-up and delivery points (source: Poliedra)*

2. **Take-away model**: it is defined as all goods delivered to customers homes (or another location selected by the customer – such as a workplace) regardless of the ordering system. The so called AB shipments have a great time pressure and a ride is almost fully implemented for a customer. This usually involves only limited volumes per trip, such as a package or envelope.
The market expects the rounds rates cheaper especially with the take-away model. The willingness to pay is primarily to bring the time pressure has a shipment. It is for the courier to combine the two. Both the two models, though, have to be fitted in case of adoption of e-vehicles.

### 3.3.1.6 E-vehicles

As regards the use of the e-vehicles object of the PRO-E-BIKE project, that is e-scooters, pedelecs and e-cargobikes, it can be stated that nearly all the major delivery companies have been experimenting the introduction or have already introduced e-vehicles into the traditional fleet.

Last-mile delivery activities in operation with a major logistic player often need electrically assisted vehicles in response to the increase of volumes transported; the choice generally goes to tricycles or e-cargobikes. In the other cases, bike couriers generally include one or more e-vehicle in their fleet to carry heavy loads whilst home delivery generally adopt e-vehicles for other reasons like, for instance, to communicate a green image of the company. As regards the major companies, the challenging aspects concern the integration of these kinds of vehicles into the traditional supply chain management, bound to variables like autonomy range, battery recharge cycles and the optimization of loads. Most of little delivery company or home delivery services generally adopt scooter or bikes, not necessarily electrically assisted, although E-bikes become often part of the fleet to assure flexibility.

**Figure 37 Take away model (source: Poliedra)**

| Distance for each trip | 1-2 km |
| Number of deliveries for each trip | 1-2 |
| Number of trips per day | 10-12 |
It can generally be stated that the adoption of pedelecs, e-scooter, e-van and e-cargobike does not affect the efficiency of the system. The constraints introduced by the adoption of e-vehicles can be summarized as follows:

- A full recharge cycle of an E-bike is between four and eight hours, implying that it usually performed in the night time;
- The range is variable, from approximately 30 to 90 km. The range can be extended by substituting the discharged battery with an extra-battery stored at the depot;
- Load capacity and payload decreases in cases of substitution of a van or diesel light duty vehicle with a e-cargobike or a e-tricycle.

The importance of the choice of the right means of transport is illustrated in that summarizes the main performances of pedelecs, e-cargo bikes and e-scooters. In general is possible to say that scooters have the best performances concerning capacity (150-180 l), speed (maximum speed is over 100 km/h, in urban context it can travel, congestion permitting, at 35-40 km/h) and autonomy (160-180 km) while their cost is almost 2-3 times the costs of pedelecs and double the costs of e-cargobikes. E-cargobikes have similar performance in terms of capacity of an e-scooter (160 l), they can travel at the same speed of a pedelec (25 km/h) with the same autonomy (around 70 km). Pedelecs have the best performance in terms of costs but are disadvantaged for the capacity, considerably less of e-cargobikes and scooters.

![Figure 38 Comparison on various modes of transport (source: Poliedra)](image-url)

### 3.3.2 Service management of passenger transport

#### 3.3.2.1 The framework

Cycles electrically assisted do play a role in passenger transport as well. The curious fact is that western countries are (re)-discovering this activity whilst eastern countries like Japan, India, China have been performing this activity for centuries although nowadays human pulled rickshaws have mostly disappeared mainly due to concern for the welfare of rickshaw workers and only (e-)cycled or
motorized rickshaws persist. The focus of the present chapter is twofold: on cycle-rickshaw, also known by a variety of other names such as bike taxi, velotaxi, pedicab, bikecab, cyclo, trishaw and many others, and on cargobikes or bikes used to perform passenger transport; the geographical scope is especially European countries.

Figure 39: the Velotaxi service, operating in Berlin since 1997 [source: http://s289.photobucket.com]

3.3.2.2 Company characteristics
Regarding rickshaws, companies generally include riders and some desk personnel (who are often riders as well). Many companies have been spreading widely, disseminating branches in franchising regime, as for Main Street Pedicab, a US company operating all around the States and in Europe as well.

As regards to the use of cargobikes for passenger transport, this focuses mainly on tourists. However, especially in the Netherlands, e-cargobikes are used to transport children to/from child-care centres. Rather than an entrepreneurial activity, transporting children on a cargobike is generally a cultural habit or, in few cases, a service offered by child-care centres. In this case transporting children is not a core-activity, but merely a side-activity, which is both cost effective and environmentally sound.

3.3.2.3 Type of passengers
The common target for rickshaws is tourists or other visitors and for this reason the service is usually available in city the centre, where motorized traffic is restricted, parking is a scarce commodity and people are willing to pay. They are conceived and promoted as part of “the tourist experience”, as an amazing and green way for city sightseeing. Alternatively, rickshaws are available on hire, as a quite fashionable and trendy option for companies to entertain their guests or for groups of people as a funny option to reach a desired location, for instance in night times.

A second group of ‘passengers’ are the children at day-care centres. They might be collected at school to be transported by e-cargobike to the child-care centre, or the e-cargobike can be used to make short trips with the children, e.g. to a shop or to a play ground. As regards to the use of e-cargobikes, both staff and children seem to like it.

Another reason to hire a rickshaw is for special occasions, like wedding or what imagination can suggest. There has also been cases where the same company offered both goods and passengers transport, as for Urban Cab, in Paris.

Lastly, properly equipped cargobikes can serve disabled people, even directly loading the wheelchair.

### 3.3.2.5 E-vehicles
Rickshaws have very peculiar shapes, as displayed in the picture below. The most traditional ones are made of a small cabin, capable of transporting a couple of passengers and small bags; the most futuristic ones have an egg-like aerodynamic frame and transmission is hidden within the frame. They can be both human-powered or electrically assisted. As regards the latter, an important aspect to be considered regards legislation: there have been cases, like in New York in 2008, where electrically assisted pedicabs were banned (along with all other forms of electric vehicles), basically because of unfair competition regarding taxi drivers. In Bangkok, instead, traditional rickshaws have been banned in the 60’s as they have been judged not to fit the modern image of the city.

![Figure 40: a traditional rickshaw in the UK, on the left [source: http://www.standard.co.uk] and a futuristic rickshaw, in Paris, on the right [source: http://green.autoblog.com].](image)

### 3.3.3 Service management in the provision of services
The use of bikes and E-bikes in the provision of services cover such a variety of application that only curiosity can wholly intercept. A rough distinction can be drawn splitting services into the following categories.

**Professionals**

Bikes, and especially cargo bikes, it is known, are versatile vehicles. Before the advent of car and the full motorization, bikes were not only largely used as a mean of transport but also as real moving shop. With a bike, the craftsman could offer his skills anywhere, providing services or handworks in a simple way.
Policies and rules, then, contrasted this kind of activities, in favour of more conventional (and expensive) configurations. Recently, though, this usage has been rediscovered, also because of the crisis, and some cities are giving importance and worth to it. In Utrecht (NL), for instance, the city council has plans to promote the use of e-cargobikes for small mobile vendor shops on the street.

Radiobici (www.radiobici.it) is the first Italian multimedia broadcasting by (cargo)bike. A journalist is making interviews riding a cargobike and carrying interviewed on it. Traveling across the Italian peninsula in search of stories and witnesses of a sustainable way of living, Radiobici means to broadcasts sensitive stories to Italy that moves. The bicycle, in this case, is a tool to break down barriers within the territories described during the trip and, at the same time, the bike is the first answer: to move in a sustainable manner is the first step to change the road. In 2012, the first edition of Radiobici gathered on the street 160 guests, among them the mayors of all the major Italian cities. The video interviews have been published by the major national newspaper and tv news.

Other professionals on bike include photographers, painters and decorators, plumbers, electricians, locksmiths and even chimney sweepers and butchers.

Services

The provision of services by bike also includes an interesting variety of experiences, although not very consolidated. Among the most common, is waste collection. In the Italian city of Alessandria,
AMIU, the local waste collection and treatment agency, in collaboration with a local cooperative, supports the project SPAZZAcity. The initiative, launched in 2011, involves the use of tricycles for the cleaning of the centre in the evening hours, from 18:00 to 22:00, Wednesday to Monday, including midweek holidays, in the streets, squares and green areas identified among the most popular.

Another interesting application concerns children and schools. Pedibus is a rather common initiative in Italy: the term is a contraction of "Piedi", that is feet, and Bus. The purpose of pedibus is to avoid parents to carry children at school by car pushing them to go on foot. It basically consists in organizing stops along a predefined path to gather children "on board" of an imaginary bus, made by children themselves. Volunteer parents, playing the part of bus-drivers, guide them to school. A cargobike (cargo tricycle) is used in some cases to carry children’s rucksacks.

In a number of French cities the company Le Jules is operating e-cargobikes. Les Jules offers handymen to both individuals and to companies. For the transport of their materials/equipment the e-cargobike is used.
Other interesting usages of bikes range from standard municipal maintenance operations (e.g. hand fire extinguishers, illumination, ...), mobile bicycle repair to even non-profit groups using trailers to distribute food to the needy. Lastly, one of the most common service is advertising, basically consisting in offering space on vehicles for marketing: the generally extravagant frame of vehicles is expected to capture masses’ attention in order to effectively communicate a message.

**Street vendors**

The last category providing services by bike, historically one of the oldest, is street vendors. Also in this case it is only imagination limiting the use of bikes. Products like ice creams, coffees, soup, pancakes, cocktails, sushi, waffles, hot-dogs, etc. can be properly stored and sold thanks to customized bikes, like the one displayed in the following picture.
3.3.4 Summary of service management

In order to successfully integrate E-bikes into a logistical system first the characteristics of the supply chain have been identified. As an overview, three different markets can be identified on which cargo is delivered. Firstly there are the high volumes and low prices seen in letter and small parcel deliveries on the mass market. A common example is a postal company. Going up to the medium and high-end markets, priority increases, as do variations in goods dimensions and product values. (Cargo)pedelecs can play a role on all three markets, as long as new logistical concepts are thought out. Three delivery models can be derived from it: the home-delivery model (business to consumer directly), the bike messenger model (producers do not have their own delivery mode but hire companies to do that) and the big delivery company model (the bike is an integral part of the supply chain).

Then there is also a distinction in the type of trip that is made: a round trip model (one trip with a length of for instance 30 kilometres and 15 stops) or a take-away model (trips are much shorter and fewer stops per trip are made, but there are more trips per day).

Transporting passengers mainly happens in larger cities, where rickshaw-type vehicles bring people from site A to B, or make site-seeing trips. These are common nowadays in a number of big cities around the world. Having electric pedal support greatly increases operating range for the drivers, giving them a larger potential of customers they can provide service to. A specific market for e-cargobikes can be found among the child-care centres, for which E-bike producers have now developed e-cargobikes that offer seats for up to 8 children.

Last but not least the e-cargobike can also be used to deliver services, such as ice-cream selling, waste collection, handymen, gardening, etc. Here, the primary service is not the deliver goods or passengers, but to deliver a specific service, where the e-cargobike is used for carrying the tools needed to deliver this service.
3.4 Favourable conditions

3.4.1 Policies
The European Union has officially recognized the importance of cycling as an alternative mode of urban transport, generating environmental, economic, and health benefits (ECMT, 2004). Connected to this, the use of bicycles as a means of transporting parcels or/and passengers is gaining even more meaning. The emergence of European projects such as CycleLogistics which main objective is to broadcast the benefits of cargo bikes in cities, encouraging EU citizens to consider the cargo bike as transport and for logistics is the proof of that.

The authorities should create the necessary incentives and promote joint initiatives in order to create economy scales to reduce the costs associated with the vehicles to speed up the adoption of e-cargobikes.

There are two crucial ways of encouraging bicycle use. One is reducing the generalized costs of this mode to improve their attractiveness and the second one is to make the competing modes more expensive. This combination of push and pull policies was found in general transportation research and it is also endorsed by Rietveld & Daniel (2004) to be applied in cycling. In Northern Europe, the land use planning is regionally coordinated and commonly restricts low-density and car-oriented sprawl (Shmidt and Buehler, 2007). Land use policies can generate shorter trip distances that are more willingly done by bicycle. Restrictions on car use also affect positively bicycle use. Limited car parking, car-free zones, comprehensive traffic calming and lower speed limits, which reduce the overall convenience and attractiveness of car use along with higher cost of car ownership and use, encourage bicycling (Pucher and Buehler, 2008). This not only applies to private individuals, but also to companies.

Furthermore, a complete system of bicycling infrastructure such as lanes, paths, cycletracks, bike boxes, traffic signals, parking and so on, may have far more impact than the sum of its individual effect. In addition, a coordinated package of complementary infrastructure measures, programs and policies may enhance the impact of any intervention within this package (Pucher et al, 2010).

Pusher et al (2010) show that policies make an important difference. Not only obviously pro-bicycle policies but also transport policies in general such as housing and land use policies, car pricing and restraint policies. The appropriate set of policies should be designed for each particular situation, taking into account the context of the city, which requires careful planning and on going citizen inputs.

The government played an important role by setting rules for lowering carbon emissions countrywide in the countries where are the most bicycle-friendly cities in Europe, such as Netherlands, Denmark, Germany and Belgium. In the Netherlands and Denmark, the bicycle is one of the principal means of travel in cities, due to their national governments’ strong, long-term, support for cycling.

Pro-bike groups have also an important role since they have actual political influence. In The Netherlands, for instance, there are some very large lobby groups, such as Dutch Cyclists’ Union (Fietsersbond). In addition, the European Cyclists’ Federation (ECF) seeks to change attitudes; policies and budget allocations at the European level stimulating and organizing the exchange of
information and expertise on bicycle related transport policies and strategies as well as the work of the cyclists’ movement.

As cycling is a means of local and short-distance transport, the measures encouraging the use of bicycle are most-efficiently designed, overseen and implemented by local authorities. Still, the commitment of the national level has a significant impact on implementation. As a consequence, if there is not a well-integrated policy framework at a national level, implementation at a local level could be difficult (ECMT, 2004).

The success of cycling policies in northern European countries is due to the coordinated implementation of the multi-faceted, self-reinforcing set of policies such as extensive systems of separate cycling facilities, intersection modifications and priority bicycle traffic signals, safe and convenient bike parking, traffic education and training for both cyclists and motorists, and traffic laws that favour non-motorized modes (Pucher & Buehler, 2007).

Even in countries where the culture of bicycle is not well established yet, E-bike projects supported by the governments are appearing in increasing numbers and diversity. Another example is the CESLA project which is support by the government and their dissemination was very successful among users in Slovenia and Austria or Povezovalni project, support by the government which was financed by European agricultural fund for rural development of Slovenia.

Almost all countries have a national policy or plan for cycling. Certain countries have a separate or specific plan for cycling promotion at a national level, such as Finland, Germany, Latvia and UK, while others have cycling policies as components of larger transport, environment or health plans, like in Norway and the Slovak Republic. Several countries, amongst them Poland and Spain, indicated particularly limited commitment to cycling at a national level, however with cycling policy mostly at regional and local authorities (ECMT, 2004).

Reduced emission zones
In Portugal for example, the Municipality of Lisbon has been particularly committed to electromobility in the last five years. In fact, Lisbon is part of the ambitious National Program for Electric Mobility in Portugal (MOBI.E) that intends to set-up a nation-wide intelligent charging network, and under which almost 500 charging points were installed in the city until the end of 2011. Also, since 2010 that CML, together with the Municipal Public Parking Company for Lisbon - EMEL - has been developing the Local Action Plan for Electric Mobility, a participatory process involving relevant stakeholders for the city that intends to enable electric vehicles to become the preferred mode of choice in urban areas.

Moreover, the municipality has been developing a comprehensive strategy to improve air quality in the city centre: in 2010 a Reduced Emission Zone (“Zona de Emissões Reduzidas”) - ZER - was enforced in the major avenues of the city and has been gradually extended. Herein, traffic is banned to pre-1992 vehicles (except those that have been fitted with a catalytic converter, public transport vehicles, emergency vehicles, among other specific cases). Still, as part of its leading by example approach, Lisbon City Council has signed an agreement that at least 20% of all new vehicles bought should be electric. Hence, the municipality has been progressively investing in the acquisition of EVs for their own fleet, substituting older vehicles. By 2011 the municipality had already 36 EVs in its fleet (of a total of 880 vehicles): 5 light passenger cars for generic transport activities, 17 light duty
vehicles to support municipal urban cleaning operations and 14 quadricycle (Segways and Gems) used by the Municipal Police.

There are many other cities that impose limitations based on environmental characteristics. Certain polluting vehicles are banned from streets, zones or entire cities. Mostly, limitations are based on the Euro type (1 to 6, 1 being the most pollutant) of the vehicle. For electric, hybrid and other low emission vehicles, exceptions are made.

In terms of environmental impacts, the bike couriers and deliveries by e-cargobikes are for sure an advantage. The municipality defined the Reduced Emission Zones in some areas in the city and these vehicles easily fulfil the necessary requirements. Also, an urban logistic study was made for a pilot area in the downtown Lisbon and one of the intervention proposals was also to use non-pollutant vehicles using the bus corridors, like the electric ones.

There are other cities with this similar concept, such as Amsterdam (Netherlands), Nuremburg (Germany) and Zermatt (Switzerland) which use ‘eco-zoning’ where only low-emission vehicles can enter in certain areas. In addition to that, certain cities such as Milan (Italy), London (UK) and Stockholm (Sweden) have implemented congestion charges whereby motorized vehicles must pay to access city centres. The European Commission has appealed to ban all conventionally fuelled vehicles from city centres by 2050 (ECF, 2012).

Fiscal incentives and subsidies

European countries are increasingly supporting the purchase of bicycles with tax breaks or subsidies. In 1997, the Belgian government introduced a law, which allowed employers to pay their staff a tax-free sum for kilometres-cycled. This measure led to an increase of more than 50% in the number of cyclists in the companies, which made use of this tax break. In addition, in the case of motoring/bicycle expenses, where the employee uses their private car, motorcycle or bicycle for business purposes, re-imbursement of allowable motoring/bicycling expenses can be made to employees for instance in some companies of Ireland and Netherlands.

In many European countries there are already this kind of laws incentivizing schemes such as in Germany the “Mit dem Rad zur Arbeit” or “Bike to Work” which was initiated through a health insurance company that rewards cyclists who cycle at least 20 days to work in a given period of time.

Germany subsidizes every new bicycle by 50 Euros and Italy’s Ministry for the Environment subsidizes between 180 Euros and 1,300 Euros for every new bike purchased, depending if it is a pedelec or a standard pedal bicycle.

In The Netherlands, employers can give bikes to their employees through a certain tax measure, which results in 32-50% tax benefit on the price of a bike. With respect to the investment in E-bikes, employers can receive a tax-reduction (so-called MIA/Vamil subsidy) on their investment in e-cargobikes, but only when this e-cargobike has a ‘roof’ for the cyclist. Furthermore there is a tax-reduction on investments in e-scooters and in charging stations for electric vehicles (including E-bikes).

In France, Paris has launched a program for granting up to 25% of the purchase price of a pedelec up to a maximum of €400.
The 1999 Finance Act in England introduced an annual tax exemption to promote healthier journeys to work and to reduce environmental pollution, allowing employers to loan cycles to employees as a tax-free benefit. The exemption was one of a series of measures introduced under the government’s Green Transport Plan.

Finally, a more recent example was the Irish government who introduced a benefit-in-kind tax break in 2009, supporting employers in providing employees with bicycles to cycle to work. The tax break offered savings of up to 50% on a bike supplied to the employee through the employer (Urbanczyk, 2010).

The most interviewed companies think that authorities could create the necessary incentives and promote joint initiatives in order to create economy scales to reduce the costs associated with the vehicles to speed up adoption of E-bikes.

In the Netherlands various cities have subsidies for investments in E-bikes for companies. For example, Region Haaglanden gives a subsidy of € 250,- per e-scooter. The cities of Arnhem and Nijmegen provide a subsidy of 30% of the investment costs, with a maximum of € 750,- per e-scooter and maximum five e-scooters per company. The subsidy is only given when the new e-scooter replaces an old (polluting) moped. The Region Groningen-Assen provides a subsidy of € 800,- when companies buy an e-cargobike. In exchange for the subsidy the companies have to co-operate in an evaluation scheme. The city of Utrecht also has a subsidy scheme for entrepreneurs that want to invest in e-scooters. In addition charging stations are subsidized, both in public places and at private grounds.

In Gent (Belgium) companies can apply for a subsidy on pedelecs (€ 250) and e-cargobikes (€ 400) for work-related trips. Maximum is 20 e-(cargo)-bikes per company.

In Austria, for instance, the acquisition of the vehicle fleet of an electric vehicle rental system in Velden by a local tourist association (Veldener Touismus GesmbH), received subsidies of the klima:aktiv” program (national subsidy program). “klima:aktiv” is the climate change program of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. The aim of “klima:aktiv” is to reduce CO2 emissions as well as reinforcing renewable energy in Austria. The funding represented 50 % of the costs. Another incentive in Austria is an initiative of the Carinthian Government, which supported Carinthian companies with a 20% funding by “Lebensland Kärnten”, if they buy an electric charging station29 (Edgger et al, 2012).

3.4.2 Built environment & Orography
In the Netherlands, Denmark and Germany, local government have been planning, constructing, and funding bicycling facilities for many decades since the 1970s but much earlier in some cities. States, counties, and regional governments (intermediate level) provided additional support such as policy guidance, coordination, and funding, as well as some direct planning and construction of cycling facilities, which serve rural areas or link different municipalities.

29 http://lebensland.com/en/incentives
A decade later, the central government was involved in cycling by providing overall goals, design guidelines, research support, model projects, coordination, and funding. The Netherlands, Denmark, and Germany all have official National Bicycling Master Plans. As a consequence, the bikeway network in Germany almost tripled in length, from 12,911km in 1976 to 31,236km in 1996 while in the Netherlands the bikeway network doubled in length, from 9,282km in 1978 to 18,948km (Pucher & Dijkstra, 2003).

In the Netherlands, local authorities conducted a wide-ranging bicycle policy, firmly anchored in overall transport and traffic policies. In addition, urban planning has for decades focused with perseverance and vision on a compact town, providing the citizens with many activities well within cycling distances. In brief, this was the success of vision, political choices and official effort (Fietsberaad, 2009).

The land use and urban design policies in Dutch, Danish, and German cities generally provide more government controls on low-density sprawl and the long trip distances that usually generates. Furthermore, mixed-use zoning and transit-oriented developments have a long history in Europe. They facilitate the proximity of residential areas to commercial establishments, schools and a range of services. For the most part, these complementary taxation, parking, and land use policies are not specifically intended to promote cycling.

Separate facilities are important to promote the use of bicycles, but it is not enough. Dutch, Danish, and German cities reinforce the safety, convenience, and attractiveness of excellent cycling rights of way with extensive bike parking, integration with public transport, comprehensive traffic education and training of both cyclists and motorists, and a wide range of promotional events intended to generate enthusiasm and wide public support for cycling.

At the same time, car use is made expensive, less convenient, and less necessary through a host of taxes and restrictions on car ownership, use, and parking. And land use policies foster relatively compact, mixed-use developments that generate more bikeable, shorter trips. According to Pucher and Buehler (2007), a significantly higher percentage of all trips in European cities are shorter than 2.5km. The figures are 44% in the Netherlands, 37% in Denmark, and 41% in Germany.

Nowadays, almost every city in Europe has an extensive car-free zone in their centres, usually intended for pedestrians but also permitting cycling during the off-peak hours. In addition, in some cities these car-free zones include cycling facilities such as bike lanes and parking (Pucher & Buehler, 2007).

An interesting example is La Petite Reine, in Paris. The city authorities provided strong political support, including high profile launch events, which received good press and TV coverage highlighting the endorsement of top political figures. Through partnerships similar to the London Sustainable Distribution Partnership, the managers of LPR were able to get round the table with the likes of TNT, FedEx and UPS to work out large-scale contracts. Moreover, the city provided and still does provide, a 600 m² underground storage facility which is part of a parking structure in the centre of Paris close to the Louvre at a minimal rent (TfL, 2009).

Different strategies can be identified to create favourable conditions for pedelecs, e-cargobikes and e-scooters. In Belgian cities, an overall policy goal is limiting the free circulation of private motorized vehicles in the centres of cities and creating an extensive car-free zone during the off-peak hours.
transport, which is in line with the European white paper sets. By 2050 no diesel or petrol powered vehicles will be allowed in city centers (EC, 2011). Although this is affecting passenger flows, the focus in most cases lies on freight vehicles. Dablanc (2007) indicates the awareness of local governments on freight circulation policies but states that most of them don’t know how to implement these. In general, policies on this theme are not commonly known and/or out of date.

Many cities are limiting vehicle access for certain streets or zones in several ways. For instance, by introducing time windows where vehicles are allowed to enter in defined areas or streets with limitations based on weight. This is in turn a positive thing for bike couriers since they are not influenced by this measure. The bikers are not only gaining delivery speed, but also they can pick up and deliver all day long.

Finally, another measure widely taken is limiting the traffic by a toll system, such as the city of London with the congestion charge. If a charge would be levied, the fossil-powered vehicles will be affected, increasing the competitiveness of bike couriers (Maes and Vaneelslander, 2012).

To conclude, at the local level cities/municipalities can undertake specific action to facilitate the professional use of pedelecs, e-cargobike and e-scooters. Specifically one can think of the following:

- make sure that there are sufficient parking places for e-cargobikes. This is not obvious, but authorities should realize that e-cargobikes do not fit in regular bicycle-parkings
- charging stations for E-bikes at strategic locations, e.g. near to the working places of the employees riding the E-bikes.
- check whether the bicycle lanes are wide enough for e-cargobikes, paying specific attention to poles on cycle lanes which block the way for wide e-cargobikes.
- layout of cycle lanes which take into account the higher speeds of (speed) pedelecs.

### 3.4.3 Promotion schemes for E-bikes

The use of E-bikes can be promoted through proper promotion schemes. This can be fiscal incentives or subsidies (see above), but also campaigns can help to promote the use of E-bikes. In The Netherlands in the region of The Hague, companies can use an e-scooter for two weeks, after which they have to pass it on to the next user. This so-called Scootafette also describes the experiences of the users on the Internet. Similarly, in the Region Groningen-Assen companies can use the e-cargobike for two weeks and they have to twitter on their experiences with the e-cargobike. In this way a lot of (hopefully positive) attention is created for E-bikes. Heerhugowaard has organized an information day for the companies, showing all kinds of ‘green transport’, including information on pedelecs and e-cargobikes.

In Bremen the local authorities offer companies the possibility to test pedelecs for 10 days, and e-cargobikes for four weeks. This is free of charge. 34 Pedelecs and 4 e-cargobikes are available for testing. The total costs of these bikes are € 100,000.

In Italy, the Ministry of Environment has promoted a call for bike-sharing projects with pedelecs combined with energy efficiency and renewables (innovative systems, installation of charging stations, renewable energy use). In order to promote the sustainable mobility with zero emissions, 14 million euro from State funds were allocated to co-finance these projects.
PRO-E-BIKE

Municipalities and regional managers of national parks were beneficiaries of funding for achievement of cycling lanes; construction of parking for bicycles in public area; pedelec rental system with innovative devices, installation of charging columns, renewables to support bikesharing services, computer systems and network to monitor and distant management of bicycles and communication and dissemination of sustainable mobility and renewables (Edegger et al, 2012).

Another example of a promotion scheme is the project “Ich ersetze ein Auto” (i.e. “I replace a car”) - funded by the German Federal Ministry for the Environment as part of the Climate Initiative which investigates user needs as well as user and stakeholder acceptance of electric cargo bikes for city logistics. Within this project, between 2012 and 2014, forty of these vehicles will be implemented into the daily routine of courier and express logistics providers in nine mayor German cities. The idea behind this campaign is to make companies aware of the possibilities of transporting freight by e-cargobike instead of by car. Companies can test e-cargobikes and then decide to buy one for personal use.
4. Summary and conclusions

Bikes have been around for a long time, for transporting both passengers and cargo. Traditionally, transporting cargo was done with normal bikes, on which for instance a crate was added. In The Netherlands, the so-called ‘bakfietsen’ were and are very popular. These bikes have a large cargohold at the front of the bike. In the past few years, a large range of different types of cargobikes was developed. The introduction of electric pedal power meant a shift in thinking. E-bikes can travel greater distances and carry more load then normal bikes, at an equal energy level. This has been a breakthrough in using bikes for cargo transport. Other factors that play a role are the focus on more sustainable forms of transport to reduce pollution (noise, CO2, fine particles), the fact that bikes can outperform cars in dense urban areas (city centres) and the fact that bikes are not restrained by delivery-windows (timeframes) that are often in place for vans and trucks.

In the search for initiatives in Europe that are focussed on either transport of cargo, passengers or providing services, the majority of cases that are found are about cargo transport. Passenger transport is a much smaller group, as is using E-bikes for providing services.

Looking at the modes used, pedelecs and E-cargobikes are very popular, while E-scooters are much less used. Cost of purchase plays an important role, as do the maintenance costs.

In general, it seems that mainly Germany and The Netherlands have a much more supporting government and positive mind-set towards pedelecs then other European countries. In the other countries initiatives are started more by single companies or persons. Although also here cities and larger corporations can be found that stimulate or incorporate E-bikes more and more in their logistical systems and daily routines.

Apart from all the E-bike initiatives, in this deliverable four main topics were described: Technical overview, economic sustainability, service management and favourable conditions.

There are not too many different systems used on pedelecs concerning the electrical parts. Lithium-ion batteries are used most, as they are generally the best performing types. A disadvantage of these batteries however is that refurbishing is not yet widespread. (Re)charging batteries can normally be done between 2,5 and 9 hours. Regarding speed there’s a distinction between normal pedelecs and Speed-pedelecs. The first supports speeds up to 25kph, the latter up to 45kph. For the Speed-pedelecs there is not yet proper legislation in most countries, as it is in fact a moped. In the near future that will most likely be changed, which might restrict the use of those types. Developments in technology are focussed on lowering recharging times, extending capacity for increased range and general weight reduction of parts. New developments can also be found in IT-extensions, such as adding standard navigation, charging mobile phones, etc.

Economic sustainability can be divided in three parts: financial-economic, socio-economic and the product life cycle. Pedelecs are cheaper than cars and mopeds on a lot of different areas. Purchase cost, maintenance and insurance are all cheaper, and in addition E-bikes neither cost extra road taxes nor use expensive fuel. Logistically speaking, bikes are faster than cars in dense (urban) areas, they do not suffer from delivery restrictions in the form of time windows, are easier in use because no drivers license is needed and have a better image than cars or mopeds. Less congestion, less
pollution, less noise and a lower impact on the use of space all contribute to a lower impact on the environment. All in all pedelecs, e-cargobikes and e-scooters seem to be a much more sustainable form of transport.

In order to successfully integrate E-bikes into a logistical system first the characteristics of the supply chain have been identified. As an overview, three different markets can be identified on which cargo is delivered. Firstly there is the high volumes and low prices seen in letter and small parcel deliveries on the mass market. A common example is a postal company. Going up to the medium and high-end markets, priority increases, as do variations in goods dimensions and product values. (Cargo)pedelecs can play a role on all three markets, as long as new logistical concepts are thought out. Three delivery models can be derived from it: the home-delivery model (business to consumer directly), the bike messenger model (producers do not have their own delivery mode but hire companies to do that) and the big delivery company model (the bike is an integral part of the supply chain).

Then there is also a distinction in the type of trip that is made: a round trip model (one trip with a length of for instance 30 kilometres and 15 stops) or a take-away model (trips are much shorter and fewer stops per trip are made, but there are more trips per day).

Transporting passengers mainly happens in larger cities, where rickshaw-type vehicles bring people from site A to B, or make site-seeing trips. These are common nowadays in a number of big cities around the world. Having electric pedal support greatly increases operating range for the drivers, giving them a larger potential of customers they can provide service to. A specific market for e-cargobikes can be found among the child-care centres, for which E-bike producers have now developed e-cargobikes that offer seats for up to 8 children.

In order to benefit from the clear advantages bikes can have for the environment over vans and trucks, governments can play a role in making policies and regulations to create favourable conditions for the use of pedelecs, e-cargobikes and e-scooters. One way to do so is lower the cost of ownership and usage for bikes and at the same time to raise these costs for the other competing modes of transport. Examples are the introduction of low-emission zones or introducing a congestion charge for polluting vehicles. Also, specific subsidies for bike-friendly programs are a great addition to creating favourable conditions. Lastly there’s the focus on the built environment, where specific bike infrastructure makes the use of E-bikes in dense (urban) areas much easier.
PRO-E-BIKE
Annex I  Extended templates for cases

In this Annex you will find several (not all) of the cases described in this document. In these extended templates more detailed information is mentioned on each case.
<table>
<thead>
<tr>
<th><strong>Name of the case</strong></th>
<th>Bpost, using e-cargo bikes for mail delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Keywords</strong></td>
<td>• e-cargo bikes</td>
</tr>
<tr>
<td></td>
<td>• delivery of goods/parcels</td>
</tr>
<tr>
<td></td>
<td>• Belgium</td>
</tr>
<tr>
<td><strong>Case logo or picture</strong></td>
<td><img src="image" alt="Bpost Logo" /></td>
</tr>
<tr>
<td><strong>Case description</strong></td>
<td><em>Describe the case mentioning at least the following items:</em></td>
</tr>
<tr>
<td></td>
<td>• <strong>Type and name of organisation/user</strong></td>
</tr>
<tr>
<td></td>
<td>Bpost (formerly De Post), mail and parcel delivery company in Belgium</td>
</tr>
<tr>
<td></td>
<td>• <strong>Number of e-(cargo)-bikes/scooters</strong></td>
</tr>
<tr>
<td></td>
<td>2500 pedelecs in Belgium, next to that also electric scooters and electric vans</td>
</tr>
<tr>
<td></td>
<td>• <strong>Brand of e-(cargo)-bikes/e-scooters used</strong></td>
</tr>
<tr>
<td></td>
<td>unknown</td>
</tr>
<tr>
<td></td>
<td>• <strong>Type of operation for which it is used</strong></td>
</tr>
<tr>
<td></td>
<td>(last mile delivery, postal service, transport of children, carrying materials for plumber, etc.)</td>
</tr>
<tr>
<td></td>
<td>Postal service</td>
</tr>
<tr>
<td></td>
<td>• <strong>Start date/still running?</strong></td>
</tr>
<tr>
<td></td>
<td>Still running</td>
</tr>
<tr>
<td></td>
<td>• <strong>If part of subsidy programme: name of programme</strong></td>
</tr>
<tr>
<td></td>
<td>Part of the companies program to reduce carbon emissions</td>
</tr>
<tr>
<td><strong>General benefits</strong></td>
<td>Less energy consumption, less pollution, get into the top 5 of postal services worldwide (competitive advantage)</td>
</tr>
<tr>
<td><strong>Success factors</strong></td>
<td>Introduced company wide, so no exceptions were made between regions. Willing employees, partly because they also get training in eco-driving for instance (car related). Lastly the government played an important role by setting rules for lowering carbon emissions country wide.</td>
</tr>
<tr>
<td><strong>Starting point / objectives / motivation</strong></td>
<td><em>What was the main problem, idea or motivation that led to the introduction of this initiative?</em></td>
</tr>
<tr>
<td></td>
<td>Need to lower carbon emissions and the fact that bikes proved to be equally successful or even better in delivering mail in cities than cars.</td>
</tr>
<tr>
<td></td>
<td><em>What was the common practice before this initiative?</em></td>
</tr>
<tr>
<td></td>
<td>Most mail delivery was (and is) done by cars (54%), scooter (14%) and normal bikes (10%). E-cargo bikes (now at 14%) are replacing scooters and normal bikes in the delivery rounds. Reason is that more accidents (mainly scooters) can be prevented.</td>
</tr>
<tr>
<td></td>
<td><em>What is the purpose of the initiative?</em></td>
</tr>
<tr>
<td></td>
<td>Lower carbon-dioxide emissions, reduce accidents.</td>
</tr>
</tbody>
</table>
| Supported strategic targets | Which strategic targets are supported or addressed by the case? *(e.g. reduced emissions, increased efficiency or productivity in the logistics process)*  
Reduced emissions and increased efficiency in city delivery (bikes are faster than cars in cities) |
| Lessons learnt | Are there any lessons that can be learnt from this initiative? Any recommendations?  
None that are known of |
| Other relevant information | Maximum range for batteries is 40km |
| Website/more information | E.g. website of initiative, link to article, e-mail address contact person  
<p>| Name and contact details of person who has completed this template | - |</p>
<table>
<thead>
<tr>
<th>Name of the case</th>
<th>Gnewt Cargo use of battery-electric tricycles and vans for retail distribution in London.</th>
</tr>
</thead>
</table>
| Keywords         | • E-bike/e-cargobike  
                   • Delivery of goods/parcels  
                   • United Kingdom |
| Case logo or picture | ![Gnewt Cargo Logo](image)  
                         [Love the last mile](image) |
| Case description | • The name of the organisation is Gnewt Cargo based in London, UK.  
                   • About 15-20 bikes and cargo bikes are in use.  
                   • The e-(cargo)-bikes used are manufactured in France by La Petite Reine and Aixam  
                     Mega electrical vans are also used.  
                   • The electrical vehicles are used for last mile delivery. Mainly parcels deliveries  
                     from a small urban consolidation centre to customers in the central of London.  
                   • The initiative started in 2009 and is still running. |
| General benefits | The impact evaluation in May 2010 demonstrates that the use of the consolidation  
                   centre together with the replacement of the diesel van fleet by electric vans and  
                   tricycles led to a reduction of 20 % in the total distance driven by all vehicles per  
                   parcel delivered to customers. The total CO2 equivalent (CO\textsubscript{2}{e}) emissions per parcel  
                   delivered was 54 % lower in May 2010 than in October 2009 before the trial. The start-up  
                   business was profitable after 3 months. |
| Success factors | • Creation of the new company Gnewt Cargo was supported by the large UK retailer  
                  Office Depot  
                   • Positive support from the local authorities  
                   • Successful consolidation of the start-up phase and entering the stage of financial  
                     profitability early  
                   • Successful acquisition of new customers enabling growth |
| Starting point / objectives / motivation | Main problems of urban goods distribution are externalities such as noise, congestion  
                                               and lack of available parking and road space, accidents, air pollution and climate  
                                               change emissions. Following graphs illustrates the changes in the delivery system  
                                               before and after the introduction of the electric vehicle and consolidation centre:  
                                               Before the cargo cycle project start:  
                                               ![Before the start diagram](image)  
                                               After the start:  
                                               ![After the start diagram](image) |
The main action to reduce total travel distance and emission per parcel was to eliminate the longer distance trips made previously by many diesel vans between suburban depot and central London, and have them replaced by large truck delivering at night all goods to the consolidation centre.

| Supported strategic targets | - Increased efficiency – productivity of logistics processes  
|                            | - Improved image  
|                            | - Reduced pollutants emissions  
|                            | - Reduced greenhouse gas emissions  
|                            | - Others: Social entrepreneurship, creation of a new company with job creation and employment effects. |

| Lessons learnt | - |

| Other relevant information | - |

| Website/more information | http://gnewtcargo.co.uk |

| Name and contact details of person who has completed this template | Jacques Leonardi, j.leonardi@westminster.ac.uk |
## Name of the case
CTT – E-bike project

## Keywords
- pedelec/e-cargobike/e-scooter
- delivery of parcels
- Portugal

## Case logo or picture
![CTT E-bike](image)

## Case description
Describe the case mentioning at least the following items:
- CTT – Correios de Portugal, Postal service
- 150 e-(cargo)-bikes/5 e-scooters
- Brand of e-(cargo)-bikes: Órbita S-Post Electric CTT 2011
- Type of operation for which it is used: postal service
- Start date/still running? 2012 (not sure)
- If part of subsidy programme: name of programme (Don’t Know)
- Other information

## General benefits
- The direct energy bill of CTT is approaching 13.5 million/year of which about 7 million is for fuel and tends to grow as fossil fuels become scarcer. Any measure of consumption rationalization translates into obvious economic benefits.
- When electrically assisted bicycle replaces turning pedestrian, CTT envisage the reduction of postman’s turnaround time and an increased amount of carried mail by eliminating supplies along the way.

## Success factors
Describe why it is a successful initiative (e.g. support from government, large user group, ....)
| **Starting point / objectives / motivation** | What was the main problem, idea or motivation that led to the introduction of this initiative?  
What was the common practice before this initiative?  
The common practice before was using cars and vans.  
What is the purpose of the initiative?  
CTT is transforming its longstanding values of social responsibility into a competitive advantage for the company, while benefiting the society. |
|---|---|
| **Supported strategic targets** | Which strategic targets are supported or addressed by the case? (e.g. reduced emissions, increased efficiency or productivity in the logistics process)  
Reduce pollutant and noise emissions, better to traffic congestion, increase efficiency and security to postman. |
| **Lessons learnt** | Are there any lessons that can be learnt from this initiative? Any recommendations? |
| **Other relevant information** | You can write any other information here that is relevant, but didn't fit in any of the previous fields. |
| **Website/more information** | E.g. website of initiative, link to article, e-mail address contact person |
| **Name and contact details of person who has completed this template** | Joana Ribeiro  
joana.m.ribeiro@ist.utl.pt |
<table>
<thead>
<tr>
<th><strong>Name of the case</strong></th>
<th>DHL Parcycle</th>
</tr>
</thead>
</table>
| **Keywords**        | • E-cargobike  
                    | • Delivery of goods/parcels  
                    | • Netherlands            |
| **Case logo or picture** | ![DHL Logo](image) |

**Case description**
Cleaner city distribution is part of DHL's GoGreen program in which they strive to less CO2 pollution from their activities. Aside normal bikes they use cargobikes to deliver parcels. DHL started using cargobikes in 2011 to meet the company's own goals to produce less CO2. These cargobikes are now being used in 10 cities in The Netherlands.

Apart from being cleaner than cars, cargobikes are also more efficient in delivery times, maintenance is cheaper and their deliveries cause less congestion in cities than vans.

The phrase ‘parcycle’ is a combination of ‘parcel’ and ‘cycle’. DHL has 15 ‘normal’ parcyles and 3 e-parcyles, i.e. in Amsterdam, Maastricht, and Rotterdam. The e-parcyles are used in cases where it is hilly or where the distances become too big for a ‘normal’ parcycle. Funding is completely done by DHL. They also have e-parcyles nowadays in Athens (Greece).

DHL uses the Bullit cargobike, which is produced in Denmark: [http://www.larryvsharry.com/](http://www.larryvsharry.com/)

**General benefits**
Cost reduction on last mile distribution, lesser CO2 and small particles pollution and more efficient delivery in dense inner cities.

**Success factors**
The fact that DHL already has a vast network of transport relations between hubs and clients makes it easier to fit in the parcyles. Next to that, the large volumes and the specific choice for city centres and other dense areas has helped in making this a success.

**Starting point / objectives / motivation**
*What was the main problem, idea or motivation that led to the introduction of this initiative?*

The need for cleaner city distribution as part of the global CO2 reduction program. Besides electric - and natural gas-powered cars they decided to also introduce (e-)cargobikes in the supply chain. In addition the (e-)cargobike is more efficient in some cases where cars were used before.

*What was the common practice before this initiative?*

City distribution was done by small cargo-vans.

*What is the purpose of the initiative?*

Gaining efficiency in deliveries (logistics) and saving money. Side effects are less CO2 pollution and less impact on city congestion (because bikes can go where cars cannot).
**Supported strategic targets**

*Which strategic targets are supported or addressed by the case? (e.g. reduced emissions, increased efficiency or productivity in the logistics process)*

Reduced emissions, increased efficiency in deliveries (benefits for the supply chain as a whole actually).

---

**Lessons learnt**

*Are there any lessons that can be learnt from this initiative? Any recommendations?*

For incorporating the e-cargobikes in the planning process it is very important to make a good estimate of all the delivery rounds, the volumes and the distances.

---

**Other relevant information**

*You can write any other information here that is relevant, but didn’t fit in any of the previous fields.*

---

**Website/more information**

*E.g. website of initiative, link to article, e-mail address contact person*


---

**Name and contact details of person who has completed this template**

*Name and e-mail address*

Mark Mallens – Mobycon

m.mallens@mobycon.nl
**Case description**

Describe the case mentioning at least the following items:

- FedEx, local branche initiative
- 12 e-cargo bikes
- no specified brand of bikes
- used for parcel and mail delivery within Paris
- started in may 2010, still running

FedEx partnered with UrbanCab, a company that moves passengers around the city with ‘rickshaws’. UrbanCab wanted to test an environmentally friendly parcel delivery service for which they needed FedEx. The cargoholds are removable and can thus be pre-loaded with parcels before being put on the e-cargobike (with a pallettruck). That saves time with reloading, when several trips must be made from the depot.

**General benefits**

Less CO2 pollution and able to enter areas that vans and cars cannot so actual door-to-door delivery is possible. Next to that, traffic jams do not influence delivery schedules because bikes can avoid them. Also, in the city centre, bikes are faster than cars or vans.

**Success factors**

It’s an advantage in terms of visibility and client communication, and in terms of finance and productivity. Next to that partnering with existing passenger transport company and a removable cargohold help too. The result is that the productivity per parcel is 20 to 50% higher compared to ‘classic’ vehicles. The city of Paris, under the guidance of its mayor Bertrand Delanoe, had made special effort to widen sidewalks and replace car lanes with bike and bus corridors. The city wants to develop over 400 miles of bike lanes by 2014. This helps greatly in supporting (cargo)bikes to get around the city.

**Starting point / objectives / motivation**

**What was the main problem, idea or motivation that led to the introduction of this initiative?**

Congestion is a major issue in dense cities such as Paris. Bikes do not contribute to the congestion and can move more freely when traffic is at its peak. After a testing period, bikes proved to be efficient both logistically and financially

**What was the common practice before this initiative?**

As in most European countries, vans and trucks were used to deliver goods and parcels

**What is the purpose of the initiative?**

FedEx aims at developing the more car-less areas of Paris. That way they can expand their business faster.

---

**Name of the case** | FedEx
---|---
**Keywords** | - e-cargo bike (tricycle)
| - Select from the following: delivery of goods/parcels
| - Paris (France)

**Case logo or picture** | ![FedEx Logo](image)

**General benefits**

Less CO2 pollution and able to enter areas that vans and cars cannot so actual door-to-door delivery is possible. Next to that, traffic jams do not influence delivery schedules because bikes can avoid them. Also, in the city centre, bikes are faster than cars or vans.

**Success factors**

It’s an advantage in terms of visibility and client communication, and in terms of finance and productivity. Next to that partnering with existing passenger transport company and a removable cargohold help too. The result is that the productivity per parcel is 20 to 50% higher compared to ‘classic’ vehicles. The city of Paris, under the guidance of its mayor Bertrand Delanoe, had made special effort to widen sidewalks and replace car lanes with bike and bus corridors. The city wants to develop over 400 miles of bike lanes by 2014. This helps greatly in supporting (cargo)bikes to get around the city.

**Starting point / objectives / motivation**

**What was the main problem, idea or motivation that led to the introduction of this initiative?**

Congestion is a major issue in dense cities such as Paris. Bikes do not contribute to the congestion and can move more freely when traffic is at its peak. After a testing period, bikes proved to be efficient both logistically and financially

**What was the common practice before this initiative?**

As in most European countries, vans and trucks were used to deliver goods and parcels

**What is the purpose of the initiative?**

FedEx aims at developing the more car-less areas of Paris. That way they can expand their business faster.
**Supported strategic targets**

*Which strategic targets are supported or addressed by the case? (e.g. reduced emissions, increased efficiency or productivity in the logistics process)*

The deployment of an electric fleet (including cars and vans) that is CO2 emission free, which fits in the companies plans to lower emissions.

**Lessons learnt**

- 

**Other relevant information**

Battery is 250W electric motor, max speed is around 20 km/h. The bikes may enter pedestrian only areas, which gives them a huge advantage over cars/vans. The bikes are serving 3 Paris districts now, they plan to add 2 more in the near future. With the 3 bikes they have lowered total CO2 emissions by 10 tonnes per year and they expect to reach a reduction of 20 tonnes CO2 per year. Customer reaction is very positive, and it helps gaining a competitive advantage.

**Website/more information**

- [http://www.youtube.com/watch?v=YvOwBqN7b7U&feature=player_embedded](http://www.youtube.com/watch?v=YvOwBqN7b7U&feature=player_embedded)
- [http://mediacenter.van.fedex.com/node/482](http://mediacenter.van.fedex.com/node/482)
- [http://ortre.blogspot.nl/2012/01/paris-fed-ex-tricycle.html](http://ortre.blogspot.nl/2012/01/paris-fed-ex-tricycle.html)

**Name and contact details of person who has completed this template**

*Name and e-mail address*
<table>
<thead>
<tr>
<th>Name of the case</th>
<th>Ich ersetze ein Auto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keywords</td>
<td>• E-cargobike</td>
</tr>
<tr>
<td></td>
<td>• delivery of goods/parcels,</td>
</tr>
<tr>
<td></td>
<td>• Project runs in Germany only</td>
</tr>
<tr>
<td>Case logo or picture</td>
<td><img src="image" alt="Ich ersetze ein Auto" /></td>
</tr>
<tr>
<td>Case description</td>
<td>Describe the case mentioning at least the following items:</td>
</tr>
<tr>
<td></td>
<td>• 40 e-cargobikes used</td>
</tr>
<tr>
<td></td>
<td>• Brands used are iBullet (via Urban-e) and CargoCruiser</td>
</tr>
<tr>
<td></td>
<td>• Used for last mile delivery, postal service</td>
</tr>
<tr>
<td></td>
<td>• Still running</td>
</tr>
<tr>
<td></td>
<td>• Part of subsidy programme Climate Initiative</td>
</tr>
<tr>
<td>General benefits</td>
<td></td>
</tr>
<tr>
<td>Success factors</td>
<td>Describe why it is a successful initiative (e.g. support from government, large user group, ...).</td>
</tr>
<tr>
<td>Starting point / objectives / motivation</td>
<td>What was the main problem, idea or motivation that led to the introduction of this initiative?</td>
</tr>
<tr>
<td></td>
<td>What was the common practice before this initiative?</td>
</tr>
<tr>
<td></td>
<td>What is the purpose of the initiative?</td>
</tr>
<tr>
<td>Supported strategic targets</td>
<td>Which strategic targets are supported or addressed by the case? (e.g. reduced emissions, increased efficiency or productivity in the logistics process)</td>
</tr>
<tr>
<td>Lessons learnt</td>
<td>Are there any lessons that can be learnt from this initiative? Any recommendations?</td>
</tr>
<tr>
<td>Other relevant information</td>
<td></td>
</tr>
<tr>
<td>Website/more information</td>
<td>Name and contact details of person who has completed this template</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Name and e-mail address</td>
</tr>
</tbody>
</table>
**General**

<table>
<thead>
<tr>
<th>Project name:</th>
<th>Ich far Lastenrad</th>
</tr>
</thead>
</table>

**General description**

Particulate matter and NOx, noise and congestion - many inner cities and their residents groan under the burden of motorized transport. The share of commercial traffic in some places is more than 50% of total traffic. Here the VCD wants to show through the project "I'm going 'cargo bike" to companies and municipalities that the e-cargobike is a realistic alternatives.

**Benefits of cargo bikes**

The increased use of modern economic cargo bikes in urban traffic is useful not only for ecological reasons - with the proper logistics, it can also be economically viable in many shorter routes with a payload of less than 350 kg. As is shown by the decades of experience of the post with over 20,000 bikes.

Ultimately modern cargo-bikes' purchase and running costs are much cheaper than cars or vans. You are on inner-city routes also often faster and more reliable, because they can better avoid traffic jams and are less subject to access restrictions. Cargo-bikes also require less space, can be driven by people with no drivers license and are flashy advertising. In addition they carry an ecologically-sustainable image.

**Target groups**

The project is aimed primarily at managers and employees of companies and institutions that participate in the urban economy and transport, cover short to medium routes mainly by car or van. These include crafts, the courier, express and parcel service, social service providers and delivery services of restaurants, retail and furniture stores. Even for companies and institutions with large grounds complexes and organizers of major events cargo bikes are an option.

Important transport policy frameworks that promote or inhibit the use of cargo-bikes are, for example, parking as well as spatial and temporal restrictions for motorized delivery vehicles. Here, the local authorities have an important control function. Therefore, the project also aimed at local politics.

**Sponsors**

The project is funded by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and the Federal Environmental Agency (UBA). The programma runs from 1 April 2013 to 31 December 2014.
What does the project do?

The project has two main ways: firstly, relevant actors (cargo-bike repair shops, potential users, relevant industry representatives, scientists and interested journalists) networking and information exchange among themselves be intensified. A Steering Committee has been set up, the project newsletter and thematic events. Secondly, a central information portal for businesses and communities about effective uses of modern economic cargo bikes in traffic will occur.

The use of cargo-bikes in economic transactions should be strengthened in the public perception.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is/was the goal of the project?</td>
<td>To encourage companies and city officials to use cargo bikes in commercial activities</td>
</tr>
<tr>
<td>Who are the partners (and what is their field of operation / specialty)?</td>
<td>No partners. The funders are the German Ministry for the Environment and the Federal Environment Agency</td>
</tr>
<tr>
<td>What is the status of the project?</td>
<td>Running</td>
</tr>
<tr>
<td>In what timeframe is/will be the project executed?</td>
<td>From April 2013 – End 2014</td>
</tr>
<tr>
<td>What languages were used and are reports published in?</td>
<td>Mainly German. There is a project description in English on the web site.</td>
</tr>
<tr>
<td>Is it focussed on cargo-bikes or passenger bikes (collective) or a mix of those?</td>
<td>Cargo only</td>
</tr>
</tbody>
</table>
| What is the target group (users: e.g. transport companies, SME’s, carpenters, etc.)? | Companies  
City officials  
Identified business sectors that will emerge from the study as high potential user sectors |
<p>| Do you have reports, documents, pictures?                               | Too early for this                                                                                                                     |
| Is there a website?                                                     | This is in development, currently there is a web page on the VCD web                                                                  |</p>
<table>
<thead>
<tr>
<th><strong>PRO-E-BIKE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>site.</td>
</tr>
<tr>
<td><strong>Background</strong></td>
</tr>
<tr>
<td>What was the trigger to start the project or to cooperate in it?</td>
</tr>
<tr>
<td>Is the project working on itself or part of a larger project?</td>
</tr>
<tr>
<td>Do you feel it helps your organization to reach goals in terms of corporate social responsibility / sustainability?</td>
</tr>
<tr>
<td><strong>Conclusions</strong></td>
</tr>
<tr>
<td>Was the project evaluated / monitored for results? And if so, in what way?</td>
</tr>
<tr>
<td>What are the results when monitored?</td>
</tr>
<tr>
<td>What are the most important lessons that have been learned?</td>
</tr>
<tr>
<td>What are the Key Performance Indicators (KPI’s)?</td>
</tr>
<tr>
<td>Will/has this project been continued in some way (e.g. as part of another project or in another form)?</td>
</tr>
</tbody>
</table>
These include

Relevant other Cargo Bike projects in Germany you should talk to:

www.velotransport.net (Leopold Broetzmann)

www.ich-ersetze-ein-auto.de (Johannes Gruber)

http://www.kirchentag.de/das-ist-kirchentag/klimaschutz/lastenrad-projekt.html (Christof Hertel)

http://www.senatspressestelle.bremen.de/detail.php?gsid=bremen146.c.62383.de (Tobias Leuze)
## Name of the case
MoveByBike

## Keywords
- pedelec and e-cargobike
- delivery of goods/parcels, delivery of services.
- Sweden

## Case description
MoveByBike is a privately owned company based in Malmö, Sweden, operating in Malmö, Lund, Helsingborg, Gothenburg and Stockholm. They use e-bikes (and regular bikes) for last mile delivery of newspapers and also for transporting furniture for people moving from one apartment to another in the city centre. They use a total of 15-20 bikes, whereof six are e-bikes (Bullit e-bikes). To transport the goods they use a waggon attached to the e-bike. The operation started as a private initiative in the beginning of 2012 and is still running.

## General benefits
Fast, flexible and environmental friendly transport alternative.

## Success factors
The owners have not identified any success factors yet but they mention that whomever they talk to about their operation is positive to the idea.

For companies using MoveByBike it is also an opportunity to strengthen their environmental profile.

One success factor is that the operation is fast, flexible and environmental friendly.

## Starting point / objectives / motivation
The initiative started partly as a fun thing and partly due to a personal need to move smaller gods in an environmental friendly way. So they started to use bikes with waggons to do so. They discovered quickly that the interest for the initiative was bigger than they thought from the beginning and

The common practice before the initiative was and to a large extent still is to use fossil fuelled vehicles to deliver gods in city centres.

The purpose of the initiative is to offer an alternative way for last mile deliveries in city centres.

## Supported strategic targets
The following strategic targets are supported by the case:
- Reduced emissions
- Increased efficiency and productivity in the logistics process
- Reduced traffic in city centres

## Lessons learnt
- Make sure that you have high quality gear in terms of E-bikes and waggons that can carry the weight you are planning.
- Make sure that you, as E-bike operator, participate in logistic networks together with local authorities, freight transport companies and so on to illustrate the environmental friendly alternatives.

## Other relevant
<table>
<thead>
<tr>
<th>information</th>
<th></th>
</tr>
</thead>
</table>
| **Website/more information** | [www.facebook.com/MoveByBike](http://www.facebook.com/MoveByBike)  
(Their website is under construction) |
| **Name and contact details of person who has completed this template** | Johan Wedin, johan.wedin@movebybike.se |
### Name of the case
EROSKI

### Keywords
- e-cargobike
- delivery of goods
- Spain

### Case description
- Eroski
- 4 e-cargobikes
- Txita and E-Volo
- Food delivery in final customer
- Start in 2.010. Still running.
- No part of any grant
- No consortium project.

### General benefits
Access to areas with limited hours the other vehicles, zero emissions, visibility

### Success factors
We still do not consider it a success because today is not profitable.

### Starting point / objectives / motivation
Eroski, in our continuing concern for the environment and sustainability, we aim to be leaders in innovation of distribution through "clean" vehicles.

- Distribution with conventional motor vans.
- To be consistent with our commitment to the environment and that the project is profitable.

### Supported strategic targets
Increase hours of service to our customers, reducing emissions in transport activities.

### Lessons learnt
Pioneering has given us a broad understanding of this resource, and has allowed us to work with our suppliers in the evolution of a vehicle adapted to these distribution operations.

### Results
We have e-cargobikes in the Basque Country and Navarra, the results of cases have been very different, in three provinces the assessment is very positive and one has not had the same positive results. The high cost of vehicle today does not guarantee profitability of the case. The main KPI's are: number of services on time (capacity), % stop time breakdowns.

### Expression of Interest
We are interested in receiving PRO-E-BIKE project information. And of course we are interested in participating in the pilot phase of the PRO-E-BIKE
Note that the person doing the work of distribution must have specific qualifications and be interested in driving bikes.

Website/more information

http://www.eroski.es/eroski-y-tu/medio-ambiente/logistica

Name and contact details of person who has completed this template

Maite Ibarguchi
miren_maite_ibarguchi@eroski.es
<table>
<thead>
<tr>
<th>Name of the case</th>
<th>Vanapedal (Solucions Última Milla, S.L.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keywords</td>
<td>• e-cargobike</td>
</tr>
<tr>
<td></td>
<td>• Delivery of goods / parcels</td>
</tr>
<tr>
<td></td>
<td>• Spain</td>
</tr>
<tr>
<td>Case logo or picture</td>
<td><img src="image" alt="Vanapedal" /></td>
</tr>
<tr>
<td>Case description</td>
<td>• Solucions Última Milla, S.L.</td>
</tr>
<tr>
<td></td>
<td>• 5 e-cargobikes</td>
</tr>
<tr>
<td></td>
<td>• Lovelo, Babboe</td>
</tr>
<tr>
<td></td>
<td>• Delivery / collection last / first mile of parcel and transportation of general goods (furniture, clothing, catering, ice cream, newspapers, etc..) B2C and B2B.</td>
</tr>
<tr>
<td></td>
<td>• Started in 2010, still running.</td>
</tr>
<tr>
<td></td>
<td>• Barcelona Activa programme (without grant support).</td>
</tr>
<tr>
<td></td>
<td>• Ecoemprendedores XXI (award finalists), winners of IV Eneragen 2012 award.</td>
</tr>
<tr>
<td>General benefits</td>
<td>• Lower maintenance costs and lower purchase price compared to similar motor vehicles</td>
</tr>
<tr>
<td></td>
<td>• Long life-time with good maintenance</td>
</tr>
<tr>
<td></td>
<td>• Quick-payback</td>
</tr>
<tr>
<td></td>
<td>• These electric- human hybrid vehicles are the only ones that promote active mobility in delivery of goods</td>
</tr>
<tr>
<td></td>
<td>• These tricycles consume few energy and produce individual and collective health</td>
</tr>
<tr>
<td>Success factors</td>
<td>Support of the mobility department of Barcelona City; flexibility to adapt to customer needs and the knowledge and participation of our staff on sustainable mobility culture and social welfare.</td>
</tr>
<tr>
<td>Starting point / objectives / motivation</td>
<td>The discovery of an e-cargobike of almost 200 kg load capacity, allowed us to see that it was possible to transform the oversized structure and unsustainable current distribution in the last mile.</td>
</tr>
<tr>
<td></td>
<td>The use of conventional vehicles for the distribution of goods was oversized and caused environmental pollution (air, noise, space and road safety) in addition to fines, poor service delivery due to lack of access to certain areas and insecurity against theft.</td>
</tr>
<tr>
<td></td>
<td>Our objectives are: Improving citizen’s quality of life through the use of vehicles and logistics solutions that respect the environment and people, and compatible with the uses of public space.</td>
</tr>
<tr>
<td>Supported strategic targets</td>
<td>Reducing emissions in the urban transport sector and increased efficiency and effectiveness in the distribution.</td>
</tr>
<tr>
<td>Lessons learnt</td>
<td>The added value of sustainability is not enough for our customers if not accompanied by other improvements such as security, efficiency or cost reduction. You need to</td>
</tr>
</tbody>
</table>
internalize the social costs are reduced with this activity, for example, in public health.

<table>
<thead>
<tr>
<th>Results</th>
<th>We have not evaluated the results of the project. We keep track of the kilos, packages and expeditions carried and also mileage and emissions saved.</th>
</tr>
</thead>
</table>
| Expression of Interest | • We are interested in receiving PRO-E-BIKE project information.  
• We are interested in participating in the pilot phase of the PRO-E-BIKE project. |
| Other relevant information | We are collaborating on a pilot for Barcelona City micro-distribution within project Smile activities.  
We have submitted a proposal to the European Commission for the development of urban distribution flexibility together with 14 European cities.  
We are starting a project to build our own cargo tricycle. |
| Website/more information | www.vanapedal.es |
| Name and contact details of person who has completed this template | Jordi Galí. [Jordi@vanapedal.es](mailto:Jordi@vanapedal.es)  
Ronald Ugas. [ron@vanapedal.es](mailto:ron@vanapedal.es) |
<table>
<thead>
<tr>
<th>Name of the case</th>
<th>TXITA</th>
</tr>
</thead>
</table>
| **Keywords**     | • pedelec, e-cargobike, e-scooter and e-van.  
                  | • Delivery of goods / parcels, advertising services, passenger transport, 
                  | distribution of tricycles, advice for replication of the project.  
                  | • San Sebastian. (Basque Country, Spain) |
| **Case description** | • TXITA TXIRRINDAK S.L.U.  
                          | • 6 cargo tricycles "Lovelock"  
                          | • 5 passenger tricycles "Veloform"  
                          | • 1 small cargo tricycle "Jonny-crazy"  
                          | • 1 tricycle "Garbycicle" (surely the future cargo tricycles)  
                          | • In three months: 1 e-scooter and 1 e-van (pending acquisition)  
                          | • Last mile transport for transport companies, urban courier, passenger and 
                          | tourists (bicycle taxi), tricycles marketing as advertising. Dealers of cargo 
                          | tricycles ("Lovelock" and "Garbycicle").  
                          | • No part of any grant, but San Sebastián city participated in a CIVITAS project 
                          | and Txita started last mile service ("TXITRANS" Measure No 65 of Donostia- 
                          | San Sebastian in CIVITAS 2009)  
                          | • In a very close surely can be part of a consortium, formed by Txita and special 
                          | employment centre dedicated to the occupation of disabled staff. |
| **General benefits** | Countless, and also in many aspects! |
| **Success factors** | In my opinion our key to success has been to be pioneer, transparent and nothing 
                        | ambitious in terms of profit. I would say that we have learned to be patient and 
                        | generous when required to.  
                        | With local authorities, we have mutual trust with them, Txita as a civic initiative that 
                        | goes hand in hand with the objectives in terms of mobility and sustainability concerns. 
                        | They support us whenever they can.  
                        | In addition, in 2012 Txita was selected by Momentum Project, as one of 10 social 
                        | enterprises with more social impact and growth potential.  
                        | In terms of number of customers and users, is increasing, as there are enabling trends: 
                        | smart cities, fuel price increase, social awareness, ... |
| **Starting point / objectives / motivation** | The start of the company, in June 2006, was motivated because among 3 friends had 
                                                   prepared a business plan to "bring" to San Sebastian the "rickshaw" service, 
                                                   referencing the services had been operating in Edinburgh and London (UK), San Diego 
                                                   (USA), among other cities. The business plan was finished in February 2006, and it was 
                                                   not clear if we would go ahead: lack of funding and a bit of stage fright. In May of the 
                                                   same year, one of the partners had a serious motorcycle accident, and fell into a coma. 
                                                   The illusion that at the time of "awakening" to see that the project was a reality, gave 
                                                   us the push we needed. (The third partner came out of the coma, but in the 
                                                   aftermath, has not joined the project). |
In 2009 we had a dilemma: to grow or disappear. We focus on first. We had been watching while they were delivering the goods in the historic and pedestrian areas of our city, which to us seemed illogical: using vehicles that have restrictions in pedestrian streets, low utilization of bicycle lanes that in our city are great ... so we decided to introduce a way to improve service and we realized what we could do better: urban freight distribution sustainably!

Our purpose is to consolidate in San Sebastian, and to help arising many companies like ours, so in this way, you would get an energy saving and reduction of pollution in most cities, at once, this will "wake up the market", increase social awareness and to be also economically sustainable, as it will facilitate customer growth in the cities.

Before introducing our initiative, there was no bicycle taxis service, and 5 vans were circulating for the urban area of San Sebastian. With our tricycles, we make the distributions of these five vans, and got citizens and visitors to visit our city in a 100% sustainable way.

**Supported strategic targets**

Our strategic objective is the application of what we understand as logical, for example:
- If you are changing the cities, it is logical to change vehicles and delivery forms. (Less restrictions, less expenses)
- As for us it is logical that if we know that our grandchildren’s grandchildren just cannot live on a planet as nice as the one we are living now, we try to remedy, (eg reducing pollution).

**Lessons learnt**

We're learning every day since 2006.
We have experience in the areas we consider essential to our business: transport, logistics, advertising and tourism. We also have training and experience in mechanical and maintenance of tricycles.
Being the pioneers and being "well regarded" by the manufacturers, they offer us the ability to distribute their tricycles, which together with the consulting service for replication of similar business models, allows us to learn and keep learning every day.

**Results**

Basque Institute of Logistics IVL followed up the CIVITAS project and made an assessment of the measure: energy savings during 2010 and 2012 was 14 tons of CO2.

**Expression of Interest**

- We are interest in receiving PRO-E-BIKE project information, and of course will be a pleasure to contribute our bit in what you believe appropriate.
- And of course we are interested in participating in the pilot phase of the PRO-E-BIKE project.

**Other relevant information**

**Website/more information**

- [www.txita.com](http://www.txita.com)
- [http://www.youtube.com/watch?v=hY1m82vEmOY](http://www.youtube.com/watch?v=hY1m82vEmOY)

**Name and contact details of person who has completed this template**

Daniel Ruiz Ribas
dani@txita.com
Mobile phone: 662 182 737
<table>
<thead>
<tr>
<th><strong>Name of the case</strong></th>
<th>SD Logistica</th>
</tr>
</thead>
</table>
| **Keywords**        |  - e-cargobike  
                        - delivery of goods  
                        - Spain |
| **Case logo or picture** | ![SD Logistica](image) |
| **Case description** |  - SD Logistica. Focused in last mile delivery.  
                            - 4 e-cargobikes (and some more for support in peak period)  
                            - Txita  
                            - Last mile delivery  
                            - No part of any grant  
                            - No consortium project.  
                            - Delivery is made with own vehicles and own staff. |
| **General benefits** | Allows a friendly face of the activity from the environmental point of view, as well as from the practical point of view access to old town at any time of day, extending the time for the customer’s home service in those areas. |
| **Success factors** | The degree of integration with the motor vehicle, allows operating units, where they can combine traditional motor vehicles, and these vehicles, in areas which by its geography and type of orders permits. |
| **Starting point / objectives / motivation** | The idea of addressing two issues at once. Align with customers and institutions in a more sustainable urban distribution and, to satisfy customer demand due to their addresses in city centers with limited hours of delivery.  
Before this solution, distributions in these environments were limited to authorized hours, which severely limited their availability.  
The aim is to combine the traditional vehicle with this type of vehicle, minimizing environmental impact and giving potential service to these customers on equal time to other areas of the city. |
| **Supported strategic targets** | To help with this plan to reduce emissions of pollutants. From the operational point of view to identify the type of orders that can be distributed with this method, depending on the topography of the area of distribution, and the types of orders. |
| **Lessons learnt** | The ergonomics of the vehicle is critical. The driver must have the highest security and, stores, orders, hours and schedules must be designed according to the daily distribution combined in motor vehicle and electric bike. |
| **Results** |  - Pilot tests were evaluated from the point of view of customer satisfaction, and productivity criteria also.  
    - Based on the post-analysis, improvements were introduced.  
    - Constantly responds to the suggestions of the various partners to keep improving the system. |
<p>| <strong>Expression of</strong> | We are interested in any project that will help us improve the hitherto implemented, |</p>
<table>
<thead>
<tr>
<th><strong>Interest</strong></th>
<th>being willing to drive some experience of this kind.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other relevant information</strong></td>
<td>We have discussed this possibility with our client Consum Cooperative, based in Valencia region, which would be willing to have this experience in some of its stores in Valencia city.</td>
</tr>
<tr>
<td><strong>Website/more information</strong></td>
<td><a href="http://www.sdlogistica.es">www.sdlogistica.es</a></td>
</tr>
<tr>
<td><strong>Name and contact details of person who has completed this template</strong></td>
<td>Federico Andres <a href="mailto:f.andres@sdlogistica.es">f.andres@sdlogistica.es</a></td>
</tr>
<tr>
<td><strong>Name of the case</strong></td>
<td>Child care centre ‘De Bieïenkorf’, Wijhe, NL</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------</td>
</tr>
</tbody>
</table>
| **Keywords**        | • e-cargobike  
                      | • delivery of passengers  
                      | • The Netherlands |
| **Case description**| ‘De Bieïenkorf’ is a childcare centre located in Wijhe, a village of 7,000 people in The Netherlands. They provide childcare services for children from age 0 to approx. 12 years old.  
In February 2012 they bought a e-cargobike called ‘Go Cab’ of Van Raam. This is a dedicated e-cargobike for transportation of children, specifically to be used by childcare centres. Total costs were € 11,600 (including maintenance contract, advertisement, extra battery, rear view mirror, VAT).  
The Go Cab is used for short distance trip with up to 8 children to/from school, for shopping, for fun trips, etc. The Go Cab is still in use (July 2013) and the employees of the childcare centre are very enthusiastic about it. |
| **General benefits**| • Reduction of operational costs (no gasoline, no insurance)  
                      | • Better image (compared to car)  
                      | • It is much easier to put 8 children into the Go Cab than into 8 child seats in the car  
                      | • For the children the Go Cab gives a much better ‘experience’ (touch and feel of being outdoor) than being transported by a van  
                      | • Transportation until the door  
                      | • Extremely easy cycling (even lighter than a normal bike)  
                      | • Very easy to manoeuvre |
| **Success factors** | • Easy to use, with little hassle (compared to car with 8 child seats)  
                      | • Very easy cycling (even lighter than a normal bike)  
                      | • The feeling of being outdoor  
                      | • Full repair and maintenance service of provider. |
| **Starting point / objectives / motivation** | **What was the main problem, idea or motivation that led to the introduction of this initiative?**  
• The childcare centre moved from the village centre to a more peripheral location. Walking to the village centre was no longer an option. The e-cargobike provides them with the freedom to do all kinds of small trips without too much hassle.  
**What was the common practice before this initiative?**  
• The common practice was to walk, but this was no longer feasible due to the fact that the childcare centre moved to a peripheral location. The alternative would be to buy another van (they already have two vans).  
**What is the purpose of the initiative?**  
• To have a reliable and economical transport service for the children attending the childcare centre. |
<table>
<thead>
<tr>
<th>Supported strategic targets</th>
<th><strong>Which strategic targets are supported or addressed by the case? (e.g. reduced emissions, increased efficiency or productivity in the logistics process)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Extension of mobility options for staff and children in an economical and environment friendly way.</td>
<td></td>
</tr>
<tr>
<td>• Improved ‘experience’ of children compared to van.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lessons learnt</th>
<th><strong>Are there any lessons that can be learnt from this initiative? Any recommendations?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very positive experience of management, employees and children in using the e-cargobike.</td>
<td></td>
</tr>
<tr>
<td>• Full repair and maintenance service of provider is highly appreciated.</td>
<td></td>
</tr>
<tr>
<td>• Very positive reactions from the general public leads to positive image for childcare centre.</td>
<td></td>
</tr>
<tr>
<td>• Before buying the Van Raam e-cargobike various other e-cargobikes were tested, with very big differences in ‘ease of riding’.</td>
<td></td>
</tr>
<tr>
<td>• Although the Van Raam Go Cab has a cover against rain (and wind), in the winter it might be too cold for very young children.</td>
<td></td>
</tr>
<tr>
<td>• Rear view mirror is very good to get a clear overview on what happens behind the e-cargobike rider.</td>
<td></td>
</tr>
<tr>
<td>• It is important to make good rules about charging the battery after use. The childcare centre has an extra battery, which can be easily swapped. The Go Cab has one small extra battery on board (in case of ‘emergency’).</td>
<td></td>
</tr>
<tr>
<td>• Minor comment: the seat-belts for the young children should not just go around the waist, but also around the shoulders for more stability.</td>
<td></td>
</tr>
<tr>
<td>• The current battery allows for 25 km electric support. For current activities this is sufficient, but a longer range would be easier.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other relevant information</th>
<th><strong>You can write any other information here that is relevant, but didn’t fit in any of the previous fields.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>If the local authorities want to facilitate the use of e-cargobikes, they should take actions in the following areas:</td>
<td></td>
</tr>
<tr>
<td>• Make sure that poles on bicycle lanes do not block the way for e-cargobikes (opening between poles should be sufficiently wide).</td>
<td></td>
</tr>
<tr>
<td>• When e-cargobikes become popular, there should be sufficient parking places for e-cargobikes.</td>
<td></td>
</tr>
<tr>
<td>• Financial support from local authorities could speed up the adoption of e-cargobikes. An investment of nearly 12.000 euro is significant. For the same costs (or even lower) a second-hand van can be bought.</td>
<td></td>
</tr>
</tbody>
</table>

|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|

<p>| Name and contact details of person who has completed this template | <strong>Ronald Jorna (Mobycon)</strong> <a href="mailto:r.jorna@mobycon.nl">r.jorna@mobycon.nl</a> phone: +31-6-33305652 |</p>
<table>
<thead>
<tr>
<th>Name of the case</th>
<th>BSO De Notedop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keywords</td>
<td>• e-cargobike</td>
</tr>
<tr>
<td></td>
<td>• Delivery of passengers (children)</td>
</tr>
<tr>
<td></td>
<td>• Netherlands</td>
</tr>
<tr>
<td>Case logo or picture</td>
<td><img src="image" alt="BSO De Notedop Logo" /></td>
</tr>
<tr>
<td>Case description</td>
<td>BSO De Notedop from Houten (NL) (an after-school care center for children) is using a e-cargobike since the beginning of 2012. They use it to transport children from school to the BSO. It complements their sportive image and is a safe, fun and cheaper way of transporting children. They now use 1 GoCab e-cargobike from producer Van Raam.</td>
</tr>
<tr>
<td>General benefits</td>
<td>Supports the sporty image of the BSO and is cheaper than using a car or van.</td>
</tr>
<tr>
<td>Success factors</td>
<td>Cheaper than using a car or bike and complements their sporty image.</td>
</tr>
<tr>
<td>Starting point / objectives / motivation</td>
<td><strong>What was the main problem, idea or motivation that led to the introduction of this initiative?</strong></td>
</tr>
<tr>
<td></td>
<td><strong>What was the common practice before this initiative?</strong> Using cars or vans to transport the children</td>
</tr>
<tr>
<td></td>
<td><strong>What is the purpose of the initiative?</strong> Complementing the sporty image and cost reduction</td>
</tr>
<tr>
<td>Supported strategic targets</td>
<td>Which strategic targets are supported or addressed by the case? (e.g. reduced emissions, increased efficiency or productivity in the logistics process)</td>
</tr>
<tr>
<td>Lessons learnt</td>
<td>Are there any lessons that can be learnt from this initiative? Any recommendations?</td>
</tr>
<tr>
<td>Other relevant information</td>
<td>You can write any other information here that is relevant, but didn’t fit in any of the previous fields.</td>
</tr>
<tr>
<td>Website/more information</td>
<td>E.g. website of initiative, link to article, e-mail address contact person <a href="http://denotedop.eu/2012/01/19/nieuwsbrief-januari-2012/#more-826">http://denotedop.eu/2012/01/19/nieuwsbrief-januari-2012/#more-826</a></td>
</tr>
<tr>
<td>Name and contact details of person who has completed this template</td>
<td>Name and e-mail address Mark Mallens - Mobycon</td>
</tr>
<tr>
<td><strong>Name of the case</strong></td>
<td>IMPLEMENTATION OF A DELIVERY SYSTEM OF GOODS AND PASSENGERS BY USING ELECTRICAL TRICICLOS IN LEON CITY</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Keywords**         | • pedelec, rickshaw, taxi-bike, e-cargobike.  
|                      | • delivery of goods/parcels, delivery of passengers  
|                      | • Leon, Spain |
| **Case logo or picture** | ![Ciclotour logo (delivery of passengers)](image1)  
|                       | ![E-bike, rickshaw or taxi-bike (delivery of passengers)](image2)  
|                       | ![Rickshaws and e-cargobike. Parking signposted.](image3) |
**Case description**

- Local administration. Leon city council.
- 3 rickshaws and 2 e-cargobike.
- EVOLO.
- **Rickshaws**: Promoting tourism in order to know the city from an environmental perspective and promoting sustainable mobility among citizens. This initiative has been given the name 'Ciclotour Leon'. The units allow the transport of persons with reduced mobility.
- **e-cargobikes**: Not implemented yet, but it will allow to run the streets of the city in an agile, fast and efficient way, making parcel distribution including, mailshot, materials for activities, ...
- No grant programme.
- ‘SOLTRA, Soluciones Integrales’ company was created in Leon city in 2001. Whose main objective is to create jobs for people with disabilities, allowing them to participate in the efforts of companies and institutions to generate wealth.

**General benefits**

- Leon city council has supported this initiative because of its innovative, sustainable character and support groups with social integration difficulties.
- E-bikes have access to historical center of the city (restricted to motor vehicles following the local regulation ‘Ordenanza de regulación del tráfico en el Casco Histórico’).
- Establishment of accessible tourist routes.
- Allow delivery of passengers with reduced mobility.
- Fast, safe and effective transport.
- For e-cargobikes, you can advertise in the shipping container, which will help paying implementation costs.

**Success factors**

The rickshaws allow promoting tourism in the city through a new system that focuses on urban sustainability, encouraging saving and energy efficiency, and social integration of people with a mild disability.

**Starting point / objectives / motivation**

Increase the level of awareness of citizens in environmental and sustainable development, raise awareness revealing urban mobility responsible action, encouraging active participation and awareness of employment opportunities for people with disabilities.

Leon City has different options to be visited (tour guides, tourist train, carriage, visitors own means), but this new initiative will promote it with two specific routes with tours of one hour duration each. Routes: historic and modern.

**Purpose of the initiative:**

- Promote tourism in the city and make it known by different routes.
- Raising public awareness on environmental and sustainable responsible behaviour.
- Use the project as a tool for inclusion of people with disabilities within a social sustainable model.

**Supported strategic targets**

- Less pollutant emissions.
- Energy saving and efficiency.
- Improved conditions for universal accessibility.
- Inclusion and social integration.
## Lessons learnt

It is recommended that the parking of rickshaws is in a visible and crowded place and easily accessible. Moreover, it is recommended that the service price is not high because it could limit their use.

## Results

- The cases results had not been assessed yet
- The use of electric tricycles is still limited by its recent implementation. However, it is expected that with the arrival of warm weather and the influx of tourists in summer the number of users will increase.
- KPI’s: number of users
- The case is still running

## Expression of Interest

- We are interested in receiving PRO-E-BIKE project information.
- We are interested in participating in the pilot phase of the PRO-E-BIKE project, if no expenses are required for Leon city council.

## Other relevant information

The project is easily replicable because no civil works or special authorizations are required.

## Website/more information

- [http://soltra.org/](http://soltra.org/)

## Name and contact details of person who has completed this template

Cristina Villalón Robles  
Mobility, Leon city council  
cristina.villalon@aytoleon.es
### Name of the case
2 cases in the city of Burgos (Spain)

1) Goods delivery with electric bike
2) Electric bicycle use for movement of tourists and citizens

### Keywords
- e-cargobike (1)/ pedelec (2)
- delivery of goods/parcels (1), delivery of passengers (2)
- Spain, Burgos

### Case logo or picture
1) ![Image 1](image1.png)
2) ![Image 2](image2.png)
### Case description

1. Agreement between Burgos City Council and the company “Guía Go”
2. 2 e-cargobikes (are the same as following case but adapted for the delivery of goods)
3. Bicicletas Castilla y León, Juárez
4. The “Guía Go” is an Entertainment Guide that is distributed in restaurants, bars, schools, civic centers ... located throughout Burgos city.
6. No, it was an agreement between Burgos City Council and the company “Guía Go”.
7. No.

2.

- Burgos City Council
- 12 e-bikes
- Bicicletas de Castilla y León, Juárez
- Delivery of passengers, mainly tourists.
- SUMOBIS project, INTERREG IV B SUDOE programme (http://www.sumobis.eu/index.php?idioma=EN&seccion=tab1)
- Project partners: Toulouse city, Lisbon city, Ponferrada city, Oviedo city and Huelva city.
- It gives the chance to have, free of charge, an electric bike for a day if you leave your car in the underground car park of the Museum of Evolution in Burgos, as an additional service.

### General benefits

- Reducing air pollution and less noise in city

### Success factors

1. High visibility and impact in the city.
2. Additional free service for the tourist.

### Starting point / objectives / motivation

1. To make a modal shift from car to an environmental friendly vehicle (e-cargobike) solving issues like: car parking availability, access restrictions, avoiding load/unload areas, ...).
2. To give opportunity to tourist to move longer distances without using their car.

Before these initiatives they used cars.

The common purpose is to reduce pollution and improve accessibility in the delivery of goods and tourists to reach places in a safe, quick, non-polluting and clean way.

### Supported strategic targets

- Emissions (better air quality) and noise reduction in city, increased efficiency (not having to search for parking, for example), more accessibility in certain streets, improvement logistics productivity ...

### Lessons learnt

- It is worth value to make agreements with companies in this way, so the company gave much publicity to the E-bike system (as both were related) and likewise, improved productivity.

The Burgos City Council received many more expressions of interest on the E-bike
system. Furthermore, the system was advertised in the “Guía Go” (Entertainment Guide).

| Results                  | • The cases results were not assessed; just monitored the number of e-bikes free rentals.  
|                         | • The number of E-bikes free rentals increases each month, mainly in summer time.  
|                         | • KPI's: number of E-bikes free rentals  
|                         | • The cases are still running |

| Expression of Interest  | • We are interested in receiving PRO-E-BIKE project information.  
|                         | • We are interested in participating in the pilot phase of the PRO-E-BIKE project, depending on our possibilities. |

| Other relevant information | |

| Website/more information | http://www.aytoburgos.es.movilidad-y-transporte/en-bicicleta/burgos-en-bici/bicicletas-electricas-para-los-visitantes-de-burgos  

| Name and contact details of person who has completed this template | José María Diez (proyectos@burgosciudad21.org)  
| | Burgos City Council |
### Name of the case
Valencia City Council

### Keywords
- e-scooter
- delivery of services
- Valencia, Spain

### Case description
- Local administration. Valencia City Council
- 4 e-scooters
- Lighting maintenance service of the city
- October 2009. Still running
- No grant programme.

### General benefits
Implementation of lighting maintenance service of the city with more sustainable vehicles (less noise and emissions)

### Success factors
Support from city council and it's still on use.

### Starting point / objectives / motivation
Urban sustainability and emissions reduction Greenhouse Gas (GHG)
- Using conventional fuel vehicles based on fossil fuels
- Improve citizens’ quality of life

### Supported strategic targets
Emissions reduction and using alternative energy resources.

### Lessons learnt
No data available

### Results
The cases results had not been assessed.
No data available

### Expression of Interest
- We are interested in receiving PRO-E-BIKE project information.
- Sure, we are interested in participating in the pilot phase of the PRO-E-BIKE project

### Other relevant
<table>
<thead>
<tr>
<th>information</th>
<th></th>
</tr>
</thead>
</table>
| **Name and contact details of person who has completed this template** | Carlos Gabaldon  
Climate change department <scambioclimatico@valencia.es>  
Valencia City Council |
<table>
<thead>
<tr>
<th>Name of the case</th>
<th>Home care service for elderly at the municipality of Nynashamn</th>
</tr>
</thead>
</table>
| **Keywords**     | • E-bike  
|                  | • Delivery of services  
|                  | • Sweden |
| **Case logo or picture** | - |
| **Case description** | The home care service department at the municipality of Nynashamn uses three pedelecs in their transport fleet. They are mainly used for transport of personnel and sometimes groceries and cleaning material. They started using pedelecs in the beginning of 2011. The initiative is not part of subsidy programme. |
| **General benefits** | Pedelecs are easy to use and in the city it takes the same amount of time to get from one place to another by pedelec as by car. And you don’t need to spend a lot of time finding a parking lot. |
| **Success factors** | - |
| **Starting point / objectives / motivation** | Some of the main objectives for the municipality is to be environmental friendly, energy efficient and support the increase of wellbeing for the employees. That is why they decided to introduce pedelecs in their work.  
Before the pedelecs were introduced, they used conventional fossil fuelled vehicles (cars). After the introduction the pedelecs have replaced two cars in their fleet.  
The purpose of the initiative is to save energy, be more environmental friendly and to increase the wellbeing of the employees. |
| **Supported strategic targets** | The initiative supports reduced emissions and increased efficiency. |
| **Lessons learnt** | - |
| **Other relevant information** | E-bikes are also used within the home care service for elderly in the following municipalities in Sweden:  
- Båstad  
- Växjö  
- Strömsund  
- Östersund  
- Vaggeryd  
- Vimmerby |
<table>
<thead>
<tr>
<th><strong>Website/more information</strong></th>
<th><a href="http://www.nynashamn.se">www.nynashamn.se</a></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name and contact details of person who has completed this template</strong></td>
<td>Jenny Ohlsson, <a href="mailto:jenny.ohlsson@nynashamn.se">jenny.ohlsson@nynashamn.se</a></td>
</tr>
<tr>
<td>Name of the case</td>
<td>Cyclelogistics</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| Keywords         | • Cargo bike  
|                  | • Delivery of goods/parcels, delivery of services, delivery of passengers  
|                  | • Three-year EU-project encompassing 7 cities in 7 countries. Copenhagen, Utrecht, Ferrara, Cambridge, Graz, Plovdiv, Alba Iulia. |
| Case logo or picture | ![Cyclelogistics Logo](cyclelogistics.eu) |
| Case description | • IEE/Steer project promoting cargo bikes in EU cities on three levels:  
|                  | - families and goods transport  
|                  | - small goods delivery  
|                  | - heavier logistics  
|                  | Featuring all types of cargo bikes, with some e-cargobikes.  
|                  | Promotion of cargo bikes for regular citizens, small and large companies.  
|                  | Shop by bike campaigns, workshops, events.  
|                  | See cyclelogistics.eu for more information. |
| General benefits | Broadcasting the benefits of cargo bikes in cities. Encouraging EU Citizens to consider the cargo bike as transport and for logistics. |
| Success factors | Large EU project, three years. Large budget. Seven cities. |
| Starting point / objectives / motivation | Many trips by car can be reduced with the use of cargo bikes. There are 40,000 cargo bikes in Copenhagen and other cities/citizens can be inspired to consider the cargo bike for trips.  
|                  | Most European cities used to have cargo bikes for goods transport until the 1950s, but they disappeared. Now, with the success of the cargo bike in a city like Copenhagen, as well as other cities in EU, there is potential for re-establishing the cargo bike in cities.  
|                  | The purpose of the initiative is promoting cargo bike use in EU cities. |
| Supported strategic targets | The following strategic targets are supported by the case:  
|                  | - Reduced emissions  
|                  | - Increased efficiency and productivity in the logistics process  
<p>|                  | - Reduced traffic in city centres |</p>
<table>
<thead>
<tr>
<th>Lessons learnt</th>
<th>That cargo bikes are practical transport in cities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other relevant information</td>
<td>-</td>
</tr>
<tr>
<td>Website/more information</td>
<td><a href="http://www.cyclelogistics.eu">www.cyclelogistics.eu</a></td>
</tr>
</tbody>
</table>
| Name and contact details of person who has completed this template | Mikael Colville-Andersen  
CEO – Copenhagenize Design Company  
www.copenhagenize.eu  
info@copenhagenize.eu |
Annex II References

Literature


EC (2011). European Commission. White paper road map to a single European transport area - towards a competitive and resource efficient transport system. COM(2011); 144 final, Brussels


Short History of Cargo Cycling - lessons to be learnt from present and future (2011). Deliverable D2.1 from IEE Cyclelogistics project. Available at http://www.cyclelogistics.eu/


PRO-E-BIKE

Web

http://b-linepdx.com/
http://lebensland.com/en/incentives
http://www.cyclelogistics.eu/
http://www.cyclelogistics.eu/docs/111/CycleLogistics_Baseline_Study_external.pdf
http://www.flanderslogistics.be/
http://www.outspokendelivery.co.uk/about-us/vision
http://wikimobi.nl/wiki/index.php/Accu
http://www.fietsersbond.nl/de-fiets/fietssoorten/elektrische-fietsen/de-accu


Vehicle categorization and related legislation (GoPedelec project), http://www.gopedelec.eu/cms/index.php?option=com_content&view=article&id=125&Itemid=70
PRO-E-BIKE
promoting-electric-bike-delivery

The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.