

D.4.4.1 INNOVATIVE ELECTRIC LIGHT VEHICLES SHARING SERVICE SUPPORTED BY A “MOBILE HUB” IN EMILIA- ROMAGNA REGION

Working Package n:	4. Analysing and piloting new sustainable mobility solutions
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1. Background, scope and description of the pilot action

This Mimosa pilot action is related to the launch of an innovative electric light vehicles sharing service supported by a “Mobile Hub”¹ in the Emilia-Romagna Region and – more in particular - to the procurement of the equipment needed. The aim of the pilot was to develop and test an innovative sharing service for tourists with a focus on electric bikes. This report focuses on the equipment purchased (32 e-bikes and related GPS systems) for the sustainable sharing mobility service pilot development and testing.

Background: The Emilia-Romagna Region developed several policies and measures aimed to promote sustainable mobility in the regional territory. In particular, the Emilia-Romagna coastal area is characterized by very high touristic flows, mainly during the summer period, with congestion problems in several coastal urban areas. For all these reasons, it was important to develop and test new solutions and measures able to reduce the car dependency of the tourists reaching the coastal area and moving along the coastal area.

The Romagna coastal cities have a high level of public transport services. All the main touristic cities are efficiently connected with the national main destinations via reliable train services. Thanks to different investments conducted in the last years, the frequency of these trains was increased. The train services are complemented by a wide buses public transport service and in the southern coastal area by the “Metrobus”, a high frequency bus service on a dedicated and separated line connecting Rimini with Riccione.

Considering the good quality of existing public transport services in the pilot area, the challenge is to provide effective sustainable mobility services for the “last-mile travels” at urban and inter-urban levels. Only with the development of last mile sustainable solutions it will be possible to offer a “car free” holiday to interested tourists.

In order to address this challenge, the Institute for Transport and Logistics (ITL), in collaboration with the Emilia-Romagna Region and Federalberghi Cervia (hotels association), worked on defining, implementing and testing an innovative e-bike sharing services able to reduce the car dependency of tourists. The first step in this direction was developed in another EU INTERREG Italy-Croatia project called MOSES. In this project an 18 e-bikes free sharing service for tourists was tested in the Ravenna Cruise Terminal during the Summer of 2018. The justification for putting in places such a service was related to the distance existing among the Ravenna Cruise Terminal and the Ravenna city center (more than 11 km). Considering also the high average age of the tourists arriving in the Ravenna cruise terminal, the e-bike was identified as the best

¹ The Mobile Hub is intended as a digital tool aimed at supporting management and data collection of the pilot. The Mobile Hub was developed in the framework of WP5 (i.e. D.5.3.3 Innovative Mobile Hub). It is meant to support the e-bikes sharing services implemented in Cervia-Milano Marittima municipalities and to provide an e-bikes sharing service in a more flexible and economic way. For more details on the Mimosa Mobile Hub please see the report of D.5.3.3.

solution as it can provide an incentive for older people when choosing a sustainable mode of transport.

The collected data (and in particular the data collected by the GPS systems installed in each e-bike) showed how the developed solution was an effective and reliable solution for tourists traveling from the cruise terminal area to the city center. Moreover, there were cases of people combining the e-bikes use with existing public transport solutions (ferry and buses), demonstrating these sharing electric services can be a good solution in terms of intermodality promotion.



Figure 1. Images of the E-bikes used during the Italy-Croatia MOSES project

Scope: The main scope of the MIMOSA pilot in Cervia/Milano Marittima was to design, implement and test an innovative and flexible electric bikes sharing service aimed to promote sustainable intermodal solutions in Cervia/Milano Marittima urban area. A flexible sharing service was required in order to better adapt the sustainable solution offer to the high tourist flows flexibility in this area and in order to provide an effective service at lower cost compared to a traditional bike sharing service.

Considering this general scope, the specific technical key objectives of this MIMOSA pilot were to:

- **Increase the number of tourists using sustainable transport solutions** in the project's area (Cervia/Milano Marittima and surrounding areas);
- **Widen the sustainable transport solutions offer for tourists**, in particular considering the **last mile** travels;
- Allowing a **better access to cycle tourism** and longer touristic bicycle paths (in particular for older, not trained people, etc.);
- Test **innovative public-private cooperation schemes** aimed at promoting and managing sustainable transport services at local level;
- Define reliable and effective **business models** for micro-mobility electric sharing services;
- Collect **data on tourist travel behaviors** in an innovative way;
- Support the local public administrations in **planning** in a most efficient way the sustainable **mobility infrastructures**, in particular cycle paths.

All these different objectives contribute to the general goal related to the definition of replicable solutions, both at EU and local contexts, able to continue also after the MIMOSA project conclusion.

Description of the pilot investment. The MIMOSA Cervia/Milano Marittima pilot can be summarized in the following key numbers:

- The pilot is based on **32** high quality electric bikes. These e-bikes were purchased by ITL using the MIMOSA thematic equipment budget. In the procurement phase a particular attention was given in selecting high quality e-bikes (battery power of more than 450 Wh, unisex models allowing a large use among all the tourists categories, reinforced tyres and thefts reduction systems);
- Each e-bike was provided with **safety equipment** (helmets and lock system);
- The touristic free sharing service was directly managed by **16** local hotels selected for their high sustainability standards. Each hotel received 2 e-bikes. Each e-bike was branded by the MIMOSA project logo and with a progressive numbering that allowed the easy identify the e-bikes;
- All the e-bikes were monitored with a GPS system allowing to collect in real time data on tourists' behaviors and paths. Moreover these **32 GPS systems** can be used to monitor the e-bikes during all day in order to prevent thefts.
- **Two testing periods.** The MIMOSA Cervia/Milano Marittima pilot was tested in 2021 from June to November 2021 and in 2022 from March to December 2022.
- An **online platform** allows the possibility for ITL to monitor in real time the service (described more in details in the deliverable D.5.3.3. Innovative Mobile HUB). In the first testing period a basic version of this platform was tested. In the second testing period a more innovative platform was tested.

2. Implementation of the pilot action (including a description of the externalized services/supplies/works)

The MIMOSA pilot in Cervia/Milano Marittima was officially launched on 28/06/2021 with a public event held in Cervia. Due to COVID-19 emergency, only the hotel managers and public authorities directly involved in the project were invited. The first testing period of the e-bikes sharing services ended in November 2021. The second testing period was activated from March to December 2022.

The core of the MIMOSA WP4 pilot in Cervia/Milano Marittima were the **32 e-bikes**. These e-bikes were purchased by ITL Foundation following a public tender held in the first semester of 2021. The selected supplier of these e-bikes was **Fabbrica Italiana Veicoli Elettrici (FIVE)**, an Italian company producing made in Italy e-bikes respecting the highest environmental standards.

In the tender procedure the largest attention was given to adopt the highest technical standards mainly in terms of battery duration and bike design allowing the largest use of them (both in urban and rural trails and trained and not trained people).

As it is possible to see in the photos, each e-bike was provided with the MIMOSA project logo and colors. Moreover, each e-bike was branded with a “safe code” aimed to reduce the possibility to re-use the e-bikes in case of thefts. Each e-bike was also equipped with a **lock system** and a **Helmet**.





Figure 2. Pictures of the e-bikes used in the MIMOSA pilot action in Cervia-Milano Marittima.

The selected e-bikes model was the “*FIVE Trail Rear Unisex*” model with a **630 Wh** Li-Ion cells Samsung battery. One of the most important conditions requested to the e-bike supplier was the integration of the battery in the e-bikes body in order to reduce the possibility of batteries thefts. In the provided e-bikes the battery is integrated to the e-bike body and it was possible to remove them only for maintenance activities with a dedicated key.

BATTERIE — BATTERIES



Li-Ion cells Samsung 36V,
FIVE

LONG

417 Wh | 36 V - 11,6 Ah | 6h | 2,5 kg

EXTRALONG

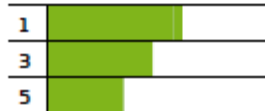
504 Wh | 36 V - 14 Ah | 7h | 2,5 kg

EXTRA 630

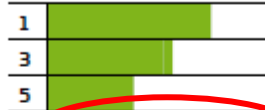
630 Wh | 36 V - 17,5 Ah | 8h | 3,1 kg



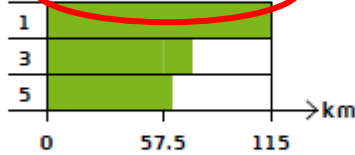
LONG max 65



EXTRALONG max 85



EXTRA 630 max 115



Le autonomie riportate variano in funzione dei seguenti fattori:
livello di assistenza selezionato, percorsi caratterizzati da pendenze
accentuate e lunghe salite; pavimentazione dissestata; ghiaia;
direzione del vento; peso del ciclista; temperatura esterna.

Autonomies vary according to the following
factors: level of assistance selected, length and
steepness of slopes; rough pavement; gravel;
wind direction; weight of the cyclist; temperature.

Figure 3. Batteries details (source: FIVE, 2021)

The other key technical characteristics of the selected MIMOSA e-bikes are summarized in the table below.

TECNOLOGIA — TECHNOLOGY

TRASMISSIONE - TRANSMISSION

catena - chain KMC

TELAIO - FRAME

alluminio batteria integrata 45 cm

aluminium integrated battery 45 cm

RUOTE - WHEELS

28"x1,75"

MOTORE - MOTOR

centrale - central 250W Brushless FIVE

PESO (senza batteria) - WEIGHT (excluding battery)

19,5 kg

FRENI - BRAKES

anteriore e posteriore a disco - front and rear disc brake

VELOCITÀ - SPEED

max 25 km/h

SELLA - SADDLE

Selle Monte Grappa

FORCELLA ANTERIORE - FRONT FORK

Suntour 63 mm

CAMBIO - GEAR

7 rapporti - 7-speed Shimano

SENSORE DI PEDALATA - PEDALLING SENSOR

sensore di velocità integrato - integrated speed sensor

LUCI - LIGHTS

anteriore e posteriore - front and rear LED

DISPLAY

LCD retroilluminato: 5 livelli di assistenza,

dispositivo soft start

backlight LCD: 5 levels of engine assist and soft start device

Figure 4. MIMOSA e-bikes details (source: FIVE, 2021)



MOTORE POSTERIORE — REAR MOTOR



BATTERIA INTEGRATA — INTEGRATED BATTERY



FRENI A DISCO ANTERIORE E POSTERIORE — FRONT AND REAR DISC BRAKES

Figure 5. Images of some MIMOSA e-bikes details (source: FIVE, 2021)

Each e-bike is also equipped with a dedicated and integrated GPS system linked directly to the e-bike battery. The GPS System work also as an **alarm**. Each GPS had a dedicated SIM allowing the data collection and they were connected to a dedicated online platform where it was possible to monitor in real time the position of the e-bikes and the level of the batteries.

3. Information about stakeholders role/involvement

One of the key objectives of the MIMOSA WP4 and WP5 pilot was to test an innovative public-private partnership allowing to involve public and private stakeholders working directly with the tourists. Moreover, the e-bike sharing service management model was designed in order to guarantee a potential continuation of the pilot also after the end of the MIMOSA project. For this reason, the Institute for Transport and Logistics (ITL), in collaboration with the Emilia-Romagna Region, paid particular attention on the development of a pilot management scheme able to involve all the relevant local stakeholder interested in the provision of sustainable mobility services. In particular, after a consultation with all the most relevant stakeholders held in 2021, a public-private cooperation scheme was defined.

The MIMOSA key involved stakeholders were:

- **Emilia-Romagna Region (tourism and sustainable mobility departments).** It provided the general institutional framework for the development of the pilot.
- **Institute for Transport and Logistics (ITL).** ITL had in the pilot development a crucial role in terms of involvement of the key stakeholders, procurement of the 32 e-bikes and coordination of all the needed technical activities. Moreover, ITL was in charge to monitor the e-bikes effective utilization.
- **Federalberghi Cervia.** FederAlberghi Cervia is an association representing the largest part of the hotel of the Cervia-Milano Marittima urban area. Its involvement in the pilot was crucial as it managed the selection of the 16 hotels involved in the project (randomly selected among the most sustainable ones) and the maintenance of the direct contacts with the single hotels. Moreover FederAlberghi Cervia took care also of the local communication activities.
- **Cervia and Milano Marittima Hotels.** For the conduction of this pilot 16 hotels of the Cervia municipality were selected. Each selected hotel received 2 e-bikes and the related equipment. All the e-bikes responsible persons were trained by ITL with 2 dedicated events (the first event was organized involving also the e-bikes provider FIVE in order to explain the e-bikes functioning and maintenance rules) and with some dedicated online communication. Each hotel was in charge, using the platform developed by ITL in the WP5, to rent for free the e-bikes to the hotel, manage the booking requests, explain to tourist the pilot conditions and guarantee the maintenance and operation of their e-bikes.
- **E-bike producer (Fabbrica Elettrica Veicoli Elettrici, FIVE).** The e-bikes producer was directly involved in the pilot implementation in the first phases of the pilot development. Its role was mainly related to adapt more than possible the e-bikes to the hotels' needs and to explain the maintenance rules to adopt in order to guarantee a correct functioning of the e-bikes and their maintenance in the medium-long term.

- **E-bikes maintenance point in Cervia.** In collaboration with the e-bikes producer, a maintenance point was identified in the Cervia city center, supporting the hotels in case of technical issues on the e-bikes. If the problem was under “law warranty”, the malfunctioning was fixed for free. On the contrary ITL defined “special prices” for the duration of the MIMOSA project if some part of the e-bikes needed to be replaced.

An agreement was signed between the Institute for Transport and Logistics and Federalberghi Cervia. In this agreement all the responsibilities and obligations of the parts were defined. Once defined this general agreement, the Institute for Transport and Logistics signed a specific agreement with each involved hotel (16 in total). The agreement had a duration until December 2022. Further extensions of these contracts will be defined in the last 6 months of the Mimosa project.

The list of the involved hotels is provided in the table below.

Hotel	Address
Hotel Ariella	VIA MASCAGNI 16, CERVIA
Hotel Athena	VIALE DEI MILLE, CERVIA
Hotel Aurelia	VIALE DUE GIUGNO 34, MILANO MARITTIMA
Hotel Baya	VIALE SPALATO 12, MILANO MARITTIMA
Hotel Bellevue	VIA XIX TRAVERSA A, MILANO MARITTIMA
Hotel Excelsior	V.LE ROMA 104, CERVIA
Hotel Fenice	VIA XVII TRAVERSA 6, MILANO MARITTIMA
Hotel Fior di Pino	VIALE ITALIA 192, CERVIA
Hotel Gadames	VIALE COLOMBO 12, CERVIA
Hotel Galia	PIAZZALE TORINO 16, MILANO MARITTIMA
Hotel Kiss	LUNG G DELEDDA 124, CERVIA
Hotel Losanna	V.LE ITALIA 96, CERVIA
Hotel Miami	V.LE DUE GIUGNO III TRAVERSA 31, MILANO MARITTIMA
Hotel Ondina	VIA MILAZZO122, CERVIA
Hotel Torremaura	VIA XVII TRAVERSA 8, MILANO MARITTIMA
Hotel Corallo	VIA ORTIGARA 10, CERVIA

Table 1. Summary of the involved hotels in the MIMOSA pilot action in Cervia/Milano Marittima

4. Lessons learnt and conclusions

The Mimosa pilot ended in December 2022. In terms of results the pilot implementation was successful as **more than 6.000 km** were travelled during the testing period. More details on the key pilot's results are provided in the report referred to D.5.3.3 "Innovative Mobile HUB".

The advice for stakeholders interested in purchasing a similar equipment for developing a similar e-bike sharing service is to pay a lot of attention on the quality of e-bikes and of the related monitoring systems.

In relation to the e-bikes equipment, the key lessons learnt are:

- **High quality bikes are the key success factor for an effective and attractive e-bikes sharing service.** High quality e-bikes means pay particular attention on the technical characteristic of the purchased e-bikes. A particular attention has to be paid to the battery and to the mechanical components. Our suggestion is to choose a battery with more than 500 Wh in order to cover longer distances;
- **Unisex and mountain e-bikes models.** It is important to select e-bikes models allowing to be used to all the tourists. In this sense the Unisex e-bike design allows to fit the specific needs of all the different tourists. Moreover, it is important to foresee e-bikes settings allowing to ride also off road (gravel cycle paths, etc.);
- **E-bikes needs more assistance and maintenance respected a traditional bike.** For this reason, it is fundamental to foresee at least one assistance point able to check regularly the e-bike correct functioning. In particular during the pilot implementation, evidences were collected on the needs to pay particular attention on the wires connecting the battery with the electric motor.

In relation to the GPS equipment systems the key lessons learnt are:

- **Importance to have integrated GPS system directly fed by the e-bike battery.** This is very important as it simplify a lot the management of these monitoring systems. In fact, GPS with an independent battery needs to be recharged manually. This means to organize a time-consuming monitoring system allowing to know in real-time the status of the batteries recharge in order to have serviceable bikes;
- **GPS system working as alarm system.** One the market there are several GPS systems allowing to provide an automatic alarm system. Using a dedicated App, it is possible to "fix" the e-bikes position in a defined period of time (for example in the night hours or in the winter period). If in these indicated periods the e-bike change its positions, an alarm message was directly sent to all the selected persons. This is an important tool in order to reduce thefts risks;

- **E-bikes GPS monitoring platform.** There are many commercial products on the market related to the monitoring of bikes fleets. In order to select the most suitable management platform, it is important to consider the easiness of the platform, the possibility to export the collected data in different formats, solutions in terms of constant monitoring of the e-bikes status (mainly in terms of batteries status) and the possibility of a remote control of the e-bikes (for example the possibility of block the e-bikes if some anomalies were detected).
- **GPS precision in collecting the data.** There are huge “geographical data resolution” differences in the ability of a GPS system to correctly map the e-bike position. Hence, it is very important to pay particular attention on this aspect in selecting the GPS. Based on the evidences collected during the MIMOSA pilot implementation, we suggested to select the GPS system allowing to provide data in the WGS84 standard and with at least 6 numbers in the coordinate values.

The collected evidences (for more details see the D.5.3.3. Innovative Mobile HUB deliverable) demonstrate that an e-bike sharing service is an effective and efficient way to provide reliable sustainable mobility solutions to tourists at local level. In particular it is possible to conclude that e-bikes guarantee and added value as they allow to cover longer distances (and this is very important for cycle tourism) and they are reliable solutions also for less sportive people (in particular older people).

5. Problems found and adopted solutions

As already reported in the other paragraphs, there weren't major problems related the 32 e-bikes and GPS systems procurement and management. This is strictly related to the high technical standards defined in the procurement phase. High quality e-bikes significantly reduce the risk to have technical problems during the implementation phases. Moreover, in the procurement phase the equipment selected supplier have to take the responsibility on all the malfunctioning and problems during the testing phase. As these aspects were defined in the contract with the thematic equipment supplier, all the problems encountered during the testing phase were solved with a strict collaboration with all the involved stakeholders.

Also the security solutions adopted provided good results as no e-bikes were stolen during the pilot implementation. This was possible thanks to a strict monitoring with the GPS system and the anti-theft marking safe solution adopted. All the e-bikes were registered in the dedicated Italian register aimed to prevent the thefts.

Finally, it is fundamental to adopt public-private cooperation schemes in order to commit all the key stakeholder in the correct functioning of such an e-bikes sharing service.

6. Expected follow up (after project closure)

The MIMOSA Cervia/Milano Marittima pilot action was built for continue also after the MIMOSA project conclusion. ITL defined different options for the continuation of the pilot action also after the MIMOSA project conclusion. In order to identify and adopt the most sustainable and durable management solution, ITL planned different meetings with the key local and regional stakeholders in order to select together the best option.

The ambition in the medium terms (5 years) is to continue the service during the summer seasons involving the hotels/group of hotels with the highest number of kilometers registered during the MIMOSA testing period and the interested local municipalities. Moreover, the ambition is to have an effective data collection from the GPS systems installed on the e-bikes helping the policy makers in collecting new data for improving the cycling policies and have a better support in taking data-oriented policy decisions.

In the long-term perspective, the ambition is to expand this service, both in terms of number of e-bikes used and geographical areas covered. This will be possible thanks a continuous improvement of the business model supporting this initiative and potential new EU projects working on the capitalization of this experience.