RuralMED Mobility | Interreg Euro-MED | Co-funded by the European Union

RuralMED Mobility

Adopting electric mobility in underserved rural and remote MED areas

https://ruralmedmobility.interreg-euro-med.eu/

D1.1.1 MED GUIDE OF GOOD PRACTICES ON SUSTAINABLE MOBILITY

JULY 2024.

CONTENT

Project identification 1
1 List of abbreviations 2
2 Background 4
3 Good practices on EV charging infrastructure 6
3.1 “URBANSOL cross-border integrated electric mobility e-charger network" 6
3.2 “MOVES III Plan - Incentives for Efficient and Sustainable Mobility" 9
3.3 "Electric mobility in Portugal - Mobi.E Network" 12
3.4 "ALANDROAL E-BIKE" 15
3.5 "Electric vehicle competence and experience centre - EVCC" 17
3.6 "GreenAura - Setting Up Cooperation Of GREEN Communities With AUgmented Reality Assisted Living Labs" 20
3.7 "E-charging infrastructure project in City Municipality Kranj" 23
3.8 "AUTO HIT" 26
3.9 "inTegRated and Innovative actions for sustainaBle Urban mobiliTy upgrade - project TRIBUTE” 29
3.10 "Enel for electric mobility" 32
3.11 "RICARICA VALLI BRESCIANE" 34
3.12 "EMOBICITY" 37
3.13 "Green eMotion" 40
4 Good practices on shared sustainable mobility schemes 43
4.1 “TADEX Transport On Demand service in Extremadura” 43
4.2 “AMBici” 46
4.3 "Electric fleet at A Anta - Cultural and Development Association of Beirã" 48
4.4 "E.V. acquisition for passenger transportation in the Crato Municipality" 50
4.5 "CIVITAS DYN@MO" 52
4.6 "Municipal public sector car-sharing system" 55
4.7 "Transitioning to e-bus fleet" 58
4.8 "Gorenjska e-bike network" 60
4.9 "Micromobility in Stara Zagora" 62
4.10 "Improving shared mobility policies to support a shift away from private car use and move towards more sustainable options - SMAPE" 65
4.11 "Green Inter-e-Mobility" 67

4.12 "E-MOB" 70
5 Good practices on sustainable mobility integration with other transport systems 73
5.1 "Open data platform on public transportation for the City of Cáceres" 73
5.2 “ENERNETMOB Mediterranean Interregional Electromobility Networks for intermodal and interurban low carbon transport systems” 76
5.3 “Green Deliveries by CTT – Correios de Portugal, S.A.” 79
5.4 "Framework Agreement for the acquisition of electric vehicles for passenger transport" 81
5.5 "Implementation of measures to improve the quality of life in the city of Stara Zagora, financed under the Operational Program "Environment" 2014-2020" 83
5.6 "APAM: fleet renewal with purchase of hydrogen and electric buses” 85
5.7 "SHared automation Operating models for Worldwide adoption- SHOW" 87
5.8 "MultiDEPART" 91
6 Conclusion 94

Project identification

Project full title	Adopting electric mobility in underserved rural and remote MED areas
Mission	Promoting green living areas
Programme priority	Greener MED
Specific objective	RSO2.4: Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system based approaches
Deliverable number and title	D1.1.1: MED guide of good practices on sustainable mobility
Work package number and name	Work package 1: Rural EV infrastructure in Med area: SoA, needs and potential
Activity number and name	Activity 1.1: Capitalization of innovative policies in sustainable mobility
Partner in charge	REAN
Partners involved	AGENEX, AREANATejo, BSC KRANJ, CERTH, CIMAA, CIMNE, COM, JUNTAEX, KCKZ County, RAUSK, RDFWM, REAN, SZ REDA
Status	Final
Distribution	Public
Date(s) of production	24/05/2024 (version 1 – first draft) 17/07/2024 (version 2) 25/07/2024 (version 3 – final draft) 19/08/2024 (version 6 – comments by PO included)

Previous steps/deliverables	Reported deliverable	Further steps/deliverables
D.1.3.1 Stakeholders and local actors database D.1.4.1 Transnational Cooperation Strategy	D1.1.1: MED guide of good practices on sustainable mobility	D1.2.1 Joint self-assessment study on sustainable mobility in the regions RuralMED Mobility

1 List of abbreviations

AC – Alternating Current

AGENEX - Consortium Extremadura Energy Agency

AR - Augmented Reality

AREANATejo - Regional Energy and Environment Agency from North Alentejo

AVs - Autonomous Vehicles

BEV - Battery Electric Vehicle

BSC KRANJ - Business support centre L.t.d., Kranj

CERTH - Centre for Research and Technology Hellas

CIMAA - Intermunicipal Community of Alto Alentejo

CIMNE - International Centre for Numerical Methods in Engineering

C-ITS - Cooperative Intelligent Transport Systems

CMK - City Municipality of Kranj

COM - Consortium Oltrepò Mantovano

CP - Charging Point

CTT - Post, Telegraph and Telephone

D – Deliverable

DC – Direct Current

DRT - Demand Responsive Transport

ECS – Electric Charging Station

e-HDV – electric Heavy-Duty Vehicle

EMSP - Electric Mobility Supplier

EU – European Union

EV - Electric Vehicle

EVCC - Electric Vehicle Competence and Experience Centre

EVSE - Electric Vehicles Supply Equipment

GHG – Greenhouse Gas

GP - Good Practice

GPS – Global Positioning System

GTFS - General Transit Feed Specification

H2020 – Horizon 2020

ICE - Internal Combustion Engine

ICT – Information and communication technology

ITS - Intelligent transportation system

JUNTAEX - Directorate-General for Transport of the Government of Extremadura

KCKZ – Koprivnica-Krizevci County

KPIs - Key Performance Indicators
LaaS - Logistics as a Service
LLs - Living Labs
MaaS - Mobility as a Service
MED - Mediterranean
N/A - Not Applicable
NRRP - National Recovery and Resilience Plan
OCA - Open Charge Alliance
OCPP - Open Charge Point Protocol
PO – Project Officer
POSEUR - Operational Programme for Sustainability and Efficient Use of Resources
PRR - Portugal's Recovery and Resilience Plan
PTAs - Public Transport Authorities
PV – Photovoltaic
RAUSK - Development Agency of Una-Sana Canton
RDFWM - Regional Development Fund of Western Macedonia
REAN - Regional Energy Agency North
RES – Renewable Energy Sources
ROP - Regional Operational Programme
RSO - Regional Specific Objective
SECAP - Sustainable Energy and Climate Action Plan
SHOW - SHared automation Operating models for Worldwide adoption
SMEs – Small and Medium-Sized Enterprises
SoA – State of the Art
SULP - Sustainable Urban Logistics Plan
SUMP - Sustainable Urban Mobility Plan
SZ REDA - Stara Zagora Regional Economic Development Agency
TEN-T - Trans European Network – Transport
ToD - Transport-On-Demand
UCs - Use Cases

2 Background

As the world grapples with the urgent need to address climate change and environmental sustainability, the importance of transitioning towards more sustainable modes of transportation has become increasingly apparent. In the Mediterranean region, where diverse landscapes and communities intersect, the promotion of sustainable mobility practices holds particular significance.

The initial step is to identify existing innovative policies designed to bolster sustainable mobility initiatives. This crucial groundwork sets the stage for a comprehensive capitalization process, laying the foundation for a roadmap aimed at refining and enhancing existing policies. This guide serves as a testament to our collective commitment to fostering a greener, more resilient future for the region.

Good practice (GP) is a project or methodology that has been shown to be effective in one city/region/country and might be effective in another one too. To ensure a good capitalization process, the first step is to identify the current existing innovative policies to support sustainable mobility, define their capitalization process and later the roadmap to improve existing policies. This document "MED Guide of good practices on sustainable mobility[1]" will gather best practices in sustainable mobility in three (3) different fields of action:

1) In successful and improved EV charging infrastructure that supports the uptake and use of electric vehicles, including booking services for charging stations,
2) In shared electromobility schemes, either public or privately promoted (e.g. e-bike sharing, car sharing, e-buses, etc.),
3) In the integration of EV with other transport systems, considering on-demand transport.

Firstly, we explore the domain of electric vehicle (EV) charging infrastructure, assessing successful models and advancements that facilitate the uptake and utilization of electric vehicles. This includes an exploration of booking services for charging stations, vital for streamlining accessibility and usage.

Secondly, we pivot to the realm of shared electromobility schemes, both publicly and privately promoted. Here, we aim to unearth exemplary practices that promote collaborative and efficient utilization of resources, fostering a culture of shared mobility that transcends traditional boundaries.

Lastly, we investigate the integration of EVs with other transport systems, with a keen focus on accommodating on-demand transport needs. This entails a holistic approach to mobility, where electric vehicles seamlessly intertwine with existing transportation modalities, ensuring a cohesive and sustainable ecosystem.

The project's mission is to enhance rural mobility by prioritizing community needs over commercial interests. Through collaboration with local authorities, investments in EV

[1] The document was created by RuralMED Mobility project (Capitalization of innovative policies in sustainable mobility), financed by the Interreg EURO-MED Programme

infrastructure, leased vehicles, and advanced technology will be made to promote sustainable travel options. Also, through collaboration and knowledge sharing among project partners, this guide compiles a wealth of insights, experiences, and best practices in sustainable mobility. By highlighting innovative approaches, success stories, and lessons learned, we aim to inspire and empower stakeholders across the Mediterranean to embrace and implement sustainable transportation solutions. By reducing CO_2 emissions and improving access to public services, the project aims to create a greener, more connected future for rural communities.

From the adoption of electric vehicles to the development of shared electromobility schemes and the integration of innovative technologies, the journey towards sustainable mobility is multifaceted and dynamic. This guide offers a comprehensive overview of the landscape, equipping readers with the tools and inspiration needed to drive positive change in their communities.

The outcomes of this initiative will not be confined to mere documentation; rather, the insights garnered will be disseminated to the Euro-MED Academy, enriching the collective knowledge base, and serving as a beacon for sustainable mobility initiatives across the region. Through collaborative efforts and knowledge sharing, we aspire to pave the way for a greener, more sustainable future in the realm of transportation.

We extend our gratitude to all those who contributed to the development of this guide and to the broader effort to promote sustainable mobility in the Mediterranean region. Together, let us embark on this journey towards a more sustainable future.

3 Good practices on EV charging infrastructure

3.1 "URBANSOL cross-border integrated electric mobility e-charger network"

Website:

https://www.redurbansol.com/

Objectives:

Its main objective was to reinforce sustainable local development along the entire Spanish-Portuguese border strip, in the EUROACE zone (Extremadura and the Portuguese regions of Alentejo and Centro), with pilot interventions in locations of special tourist or social importance, aimed at developing sustainable urban models that promote efficiency in the use of resources and services, developing energy self-sufficiency and a low-carbon economy.

Among its 4 sub-objectives, it had one devoted to electric mobility: Evaluation and promotion of infrastructures linked to electric mobility in EUROACE. This included both the installation of EV charging points and the creation of a "cross-border integrated electric mobility network" unifying the charging points installed and other already-existing charging networks both in Spain and Portugal, using an interoperable charging protocol and application for users (SGRU).

Location:

City: N/A

Region: Cross-border EUROACE Region (Extremadura, Alentejo, Centro)

Country: Spain/Portugal

Partners/Institutions involved:

Partner Organisations: AGENEX (ES), Plasencia Municipality (ES), Portalegre Municipality (PT), Cáceres Municipality (ES), Don Benito Municipality (ES), Vagos Municipality (PT), AREANA TEJO (PT), Mérida Municipality (ES), Badajoz Provincial Council (PT), CIMAA (PT), CIMAC (PT), Cáceres Provincial Council (ES), Batalha Municipality (PT), Fundâo Municipality (PT), Ovar Municipality (PT), Badajoz Municipality (ES)

Implementation year:

01/09/2017 – 31/12/2020

Brief description:

One of the main achievements of the RED URBANSOL project is the creation of a "cross-border integrated electric mobility network" in the EUROACE region. Originally aimed at connecting 10 municipalities over 5,000 to 9,000 km², the project exceeded expectations by reaching 25 municipalities and installing 43 EV charging points. This includes 7 points in 5 Portuguese municipalities and 37 in 20 municipalities in Extremadura, Spain. The difference in installations between the two countries is due to Portugal's extensive existing charging network via MOBI.e.

The integrated network not only includes the 43 new charging points co-financed by RED URBANSOL but also incorporates additional points funded by various sources, making a total of 83 in Spain and 500 in Portugal. This integration was facilitated by the Urbansol Network

Management System (SGRU) using the "Open InterCharge Protocol" to ensure interoperability among different platforms (Figure 1).

Specifically, the "cross-border integrated electric mobility network" now comprises:

- 26 charging points in the province of Badajoz through the Movem Plan (Badajoz Provincial Council),
- 44 charging points in the province of Cáceres through the MOVECA Plan (Cáceres Provincial Council),
- 9 charging Points in the Extremadura Hotel Network (Junta de Extremadura),
- 3 charging points managed by the Municipality of Cáceres,
- 4 charging points managed by the Municipality of Plasencia,
- MOBI.e charging point network (500 in Portugal).

Financial sources and financing details

Total investment value: 3.572.170,71 € (Total project budget)

Sources of financing: Interreg VA Spain - Portugal 2014-2020 (POCTEP) at 75%, 25% own funds.

Savings (electricity/fuel): N/A

Cost savings: N/A

Figure 1 RED URBANSOL App and one installed charging point

Project implementation benefits

URBANSOL has removed a major barrier to electric vehicle adoption by unifying different charging point operators through the "Open InterCharge Protocol" provided by the SGRU application. This integration allows various applications and charging protocols in Extremadura and Portugal to work seamlessly. The SGRU app, available for iOS and Android, gives EV users access to over 600 charging stations across Spain and Portugal, covering Extremadura, Alentejo, and Portugal.

Through agreements with major charging operators in Spain and the MOBI.e operator in Portugal, SGRU has simplified access to charging stations without administrative hurdles. Users can access the "cross-border integrated electric mobility network" by registering with any participating operator or directly with SGRU.

Lessons Learned and Recommendations

Interoperability among charging networks is essential for EV users, especially in EU regions with low EV market penetration, where multiple cards are often needed for different networks. The URBANSOL EV initiative in Spain and Portugal has demonstrated that efficient cooperation can achieve this goal. Standard organizations like eMI3, ISO/IEC, AVERE, and the Open Charge Alliance (OCA) are working towards global network roaming, although full interoperability remains a long-term goal.

Existing protocols such as the Open Charge Point Protocol (OCPP) allow any compliant EV charging station to operate with compatible software, making OCPP a global benchmark for interoperability. However, the full application and benefits of such protocols are yet to be realized.

Ongoing or recently finished H2020 projects such as user-CHI project (end in July 2024) are also working on promoting large-scale electromobility market take up in Europe through smart solutions, novel business models and new regulatory framework conditions. The aim will be to integrate innovative charging technologies and put the user at the centre of the entire transition, so their results should also be carefully watched by any project wishing to replicate and improve the results achieved by URBANSOL in this area.

Transferability and replication

As Urbansol, User-CHI and other projects working on interoperability have shown the interoperability of the charging infrastructure for EV across the EU can only be guaranteed if all member states integrate some minimum requirements in their legal framework and all involved stakeholders across the EU comply with them. For this to happen in a uniform way (also in terms of timing), the establishment of these minimum requirements needs to be pursued at the highest levels of the EU decision making instances.

For the moment, URBANSOL and other cross-border interoperable networks have shown locally or regionally that these solutions are feasible, even in relatively isolated and poor areas of Europe such as Extremadura, Alentejo and Regiâo Centro, but their results need to be implemented in other different cross-border areas in isolated areas of the MED space in order to check the case with other EV charging networks, protocols and users.

As a general remark for replication, EV users need to be considered more widely. Their convenience when charging and their acceptance of new technologies and regulations is essential for the needed uptake of EV. If the regulations and technical solutions (like uniform payment system) are not accepted by the EV users, interoperability will merely exist on paper. The success of the massive uptake of EV, strictly depends on solutions that satisfy EV user's needs.

3.2 "MOVES III Plan - Incentives for Efficient and Sustainable Mobility"

Website:

https://www.idae.es/ayudas-y-financiacion/para-movilidad-y-vehiculos/programa-moves-iii

Objectives:

The primary objective of the MOVES III Plan in Catalonia is to encourage sustainable and environmentally friendly mobility. To achieve this, the program has established the following specific goals:

- Promote the acquisition of electric vehicles and hydrogen fuel cell vehicles: The program provides financial incentives for citizens and businesses to purchase cleaner and more environmentally friendly vehicles. This contributes to reducing greenhouse gas emissions and improving air quality,
- Boost charging infrastructure: The MOVES III Plan also supports the installation of charging points for electric vehicles. By increasing the availability of charging stations, a significant barrier to widespread adoption of electric vehicles is removed.

Location:

City: N/A

Region: Catalonia

Country: Spain

Partners/Institutions involved:

Partner Organisations: The Catalan Institute for Energy (ICAEN) and the Department of Climate Action, Food, and Rural Agenda.

Implementation year:

2021 - 2023

Brief description:

The MOVES III Plan is a comprehensive initiative aimed at fostering sustainable and efficient mobility in Catalonia. It offers incentives for purchasing electric vehicles and installing charging infrastructure. Key components include:

- Vehicle Purchase Incentives: Grants of up to 9,000 € are available for individuals, businesses, and other entities in Catalonia purchasing electric or hydrogen fuel cell vehicles, promoting cleaner transportation and emission reduction.
- Charging Infrastructure Support: The plan provides financial assistance of up to 800,000 € for businesses and organizations to install charging points across Catalonia, enhancing accessibility and convenience for electric vehicle owners (Figure 2).

Beneficiaries include individuals engaged in economic activities, adult individuals with fiscal residence in Spain, community associations, and validly established legal entities in Spain, among others. These grants comply with European regulations on de minimis aid.

The MOVES III Plan represents a significant stride toward fostering a more sustainable and eco-friendly transportation system in Catalonia by encouraging electric vehicle adoption and bolstering crucial charging infrastructure.

Financial sources and financing details

Total investment value: 139 million €

Sources of financing: The program is funded through the European Next Generation EU Funds

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The MOVES III initiative has garnered substantial interest, with 27,558 requests for electric vehicle acquisitions and 15,358 requests for charging infrastructure installations. On average, requests amounted to 4,174 € for vehicles and 6,128 € for infrastructure. Of these, 18,460 vehicle requests and 8,575 infrastructure requests were approved.

By promoting electric mobility, the program anticipates a significant reduction in pollutant emissions and greenhouse gases, thereby combating climate change and improving public health. Investments in charging infrastructure and electric vehicle adoption are poised to invigorate the local economy and generate employment opportunities in sustainable mobility sectors. Transitioning from diesel and gasoline vehicles to electric ones will also contribute to enhanced air quality in urban environments.

Figure 2 MOVES III EV charging point installation

Lessons Learned and Recommendations

As the program is implemented, data and experiences should be collected to assess its effectiveness. This includes analysing grant demand, citizen acceptance, and any challenges encountered.

Maintaining ongoing communication with users and stakeholders is recommended to identify potential program improvements and adjustments.

Transferability and replication

Other regional and municipal governments can learn from Catalonia's experience and replicate a similar approach to promoting electric mobility in their own areas. Collaboration between government institutions, private companies, and civil society is key to the success of similar programs elsewhere.

3.3 "Electric mobility in Portugal - Mobi.E Network"

Website:

https://www.mobie.pt/en/

Objectives:

The Mobi.E Network enables everyone to charge their vehicle at any of the Network's charging points (Mainland, Azores, and Madeira), regardless of the Charging Point (CP) Operator or the CP Owner, if they have a valid contract with any Electric Mobility Supplier (EMSP).

The network includes:

- All public access charging points installed by any of the CP operators,
- Private access charging points connected to the network by the CP Owner option.

Location:

City: N/A

Region: N/A

Country: Portugal

Partners/Institutions involved:

Electric Mobility Suppliers - Electric Mobility Suppliers (EMSP or CEME in Portuguese), CP Operators, CP Owner, MOBI.Chargers, Manufacturers

Implementation year:

2012 - present

Brief description:

The Mobi.E Network, Portugal's Electric Mobility Network, comprises universally accessible, interoperable, and user-centered electric vehicle charging stations. Though currently operational only in Portugal, it holds potential for integration with other European electric mobility networks, enhancing its replicability. The network features nearly 4,700 publicly accessible charging stations nationwide, over 1,650 of which are fast or ultra-fast with power exceeding 22 kW (Figure 3).

The network includes all public and private access charging stations installed by various operators, and private access stations connected to the network. Charging stations on the Mobi.E network are classified by power as follows:

- Normal stations: less than 7.4 kW,
- Semi-fast stations: 7.4 kW up to and including 22 kW,
- Fast stations: above 22 kW up to 150 kW,
- Ultra-fast stations: 150 kW or greater.

The types of charging provided are:

- Slow charging: Suitable for residential areas without garages/parking lots, allowing overnight or weekend charging, taking more than 8 hours.
- Semi-fast charging: Suitable for high-density residential and commercial areas, with a maximum charging time of up to 4 hours for greater rotation.
- Fast charging: Suitable for commercial and mixed-use areas (residential/commercial/services), with charging times between 1 hour to 1.5 hours.
- Ultra-fast charging: Ideal for high-traffic areas such as highways, with charging completed in up to 1 hour.

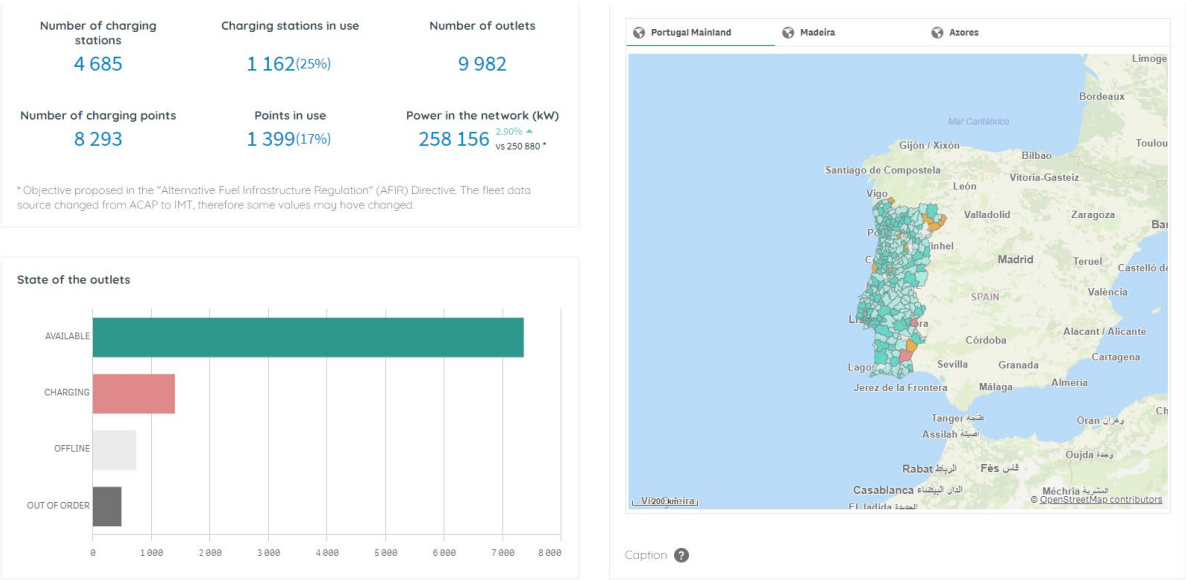

Figure 3 Map of EV charging points in Portugal

Financial sources and financing details

Total investment value: 111,2 million € until 2025

Sources of financing: Community funds, PRR, POSEUR, State funds

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The establishment of a centralized network of electric vehicle charging stations not only aligns with European and national regulations but also promotes more sustainable mobility. This centralized system, managed through a common platform, simplifies the process for users, who can easily manage their electric vehicle charging using a single card linked to an energy supply contract. Consequently, charging an electric vehicle within the Mobi.E network becomes straightforward and highly convenient, providing significant value to electric vehicle users.

Lessons Learned and Recommendations

The initial phases of the Mobi.E network implementation have been highly successful, marked by the substantial number of charging stations installed and a significant percentage of electric vehicle charging. Looking ahead, Mobi.E is planning to expand the network significantly by installing approximately 42,000 new charging stations (equivalent to 76,000 charging points) by 2050, with an investment exceeding 1.5 billion euros.

Transferability and replication

Leveraging a centralized network of electric vehicle charging stations makes it possible to provide a practical service for users. Even though its management is complex, its use is very simple. In this way, it becomes an excellent example for replicability in areas/countries that are taking the first steps in the creation/expansion of the electric mobility network.

Figure 4 Example of CP in Portugal

3.4 "ALANDROAL E-BIKE"

Website:

https://www.cm-alandroal.pt/visitante/lazer-visitar/e-bike/

Objectives:

The main objective is to encourage the use of this non-polluting vehicle when making short urban routes, progressively reducing car circulation, and contributing to the use of electric means of transport. It is also intended to provide those who visit Alandroal, with another way of getting to know its towns and villages.

Location:

City: Alandroal

Region: Alentejo

Country: Portugal

Partners/Institutions involved:

Município de Alandroal; BLU, SA

Implementation year:

2022

Brief description:

Through this initiative, the Alandroal Municipality has made several investments, including the acquisition of two parking stations and ten e-bikes equipped with GPS systems (Figure 5). Additionally, a web platform and app have been developed to provide users with an integrated system for managing their rides and monitoring e-bike autonomy. The municipality website now includes the usage rules for these facilities. The Tourism Post is tasked with overseeing the management of the equipment. The investment is split between two locations: one in Alandroal, which is already operational, and the other in Juromenha, where the infrastructure (station and bikes) is currently being implemented.

Figure 5 Alandroal's bike-sharing system

Financial sources and financing details

Total investment value: 51.200 €

Sources of financing: Alandroal Municipality

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The project complements the leisure activities of the municipality, allowing a more complete touristic activity overall, since instead of walking through the village, the visitors cycle through the local monuments. Because the Tourism Post set a schedule for the usage of the bicycles during the day, they can be fully charged at night, showing no signs of battery deficiency.

Lessons Learned and Recommendations

The information system that supports the service required a lot of maintenance in the beginning of the implementation process, to ensure the correct functioning. After the first year, the project demands less software maintenance. During the first month of functioning, the bicycles were target of vandalism, which is a sign for the need of improvement of the anti-vandalism protection system of the parking station. The adhesion to the initiative is slowly increasing as a reflection of the tourism dynamics, that indicates an upgrade, from a dominantly sporadic and fast type of visit to a more family centred type of destination. This change of dynamic is seen by the managing service as an increase in demand and urgency to adapt to a multilanguage User Manual.

Transferability and replication

The municipality is already looking forward to expanding the project to its other locals, starting with Juromenha. They believe the uniformization along the municipality is needed not only to promote the tourism but also to provide this type of service, that is well integrated in Alandroal's case. The materials produced like the phone APP, the User Manual and the lessons learned are all possible to transfer to identical types of investment.

3.5 "Electric vehicle competence and experience centre - EVCC"

Website:

https://keep.eu/projects/25950/Electric-vehicle-competence-EN/

Objectives:

The overall objective of the project is to increase the capacity of Koprivnica and Pecs communities to develop and conduct electromobility measures to ease the implementation of the same. The specific objectives are the following:

1.) Increase the capacity of the expert personnel of beneficiaries, the technical experts, spatial planers, and other expert personnel.
2.) Increase the awareness of sustainable mobility options among the citizens,
3.) Develop a joint document on electromobility that would be used by other interested stakeholders,
4.) Set up of informal Electric vehicles competence and experience centres to spread the acquired knowledge,
5.) Purchase of two e-vehicles for promotion and 3 charging stations on lampposts. The vehicles and the infrastructure will be used for demonstration activities on 12 info days, 6 in Hungary and 6 in Croatia, directed at the citizens (Figure 6, Figure 7).

Figure 6 EV charging station on the lamppost

Figure 7 Electric vehicle for the promotion of sustainability

Location:

City: City of Koprivnica

Region: Koprivnica-krizevci County

Country: Croatia

Partners/Institutions involved:

Lead Partner: City of Koprivnica (HR)

Partner Organisations: Regional Energy Agency North (HR), Government of Baranya County (HU), University of Pécs (HU)

Implementation year:

2017-2019

Brief description:

The EVCC project aims to promote electromobility through:

1. Info days and workshops,
2. Useful studies and analysis on e-mobility,
3. Procurement of an electric vehicle for the promotion of e-mobility and citizen test drives,
4. The pilot installation of 3 charging stations for electric vehicles implemented in the public lighting system.

Financial sources and financing details

Total investment value: 218,975.46 € (Total project budget)

Sources of financing: Interreg V-A Hungary-Croatia operation programme 2014-2020 (85 %)

Savings (electricity/fuel): 2.000 litres of fuel/year

Cost savings: 2.700 €/year

Project implementation benefits

The variety of actions developed in our project, among other initiatives, has enabled us to achieve significant results in promoting electromobility. By organizing workshops and information days, we have raised public awareness about the benefits of electromobility, such as reducing emissions and improving air quality. Additionally, the collaborative document on e-mobility serves as a valuable resource for stakeholders, providing comprehensive information and promoting knowledge sharing. Procuring electric vehicles (EVs) and chargers for demonstration purposes has allowed citizens to experience the technology firsthand, leading to increased interest and understanding. Furthermore, establishing a joint expert team has facilitated collaboration and expertise exchange among partners, enhancing the effectiveness of our efforts. Notably, being the first in Croatia to implement EV charging stations within public lighting infrastructure demonstrates our commitment to innovation and sustainable transportation solutions. Finally, offering EV test drives to citizens has encouraged adoption by showcasing the benefits of EVs in terms of performance, convenience, and environmental impact.

Lessons Learned and Recommendations

In the initial stages, local communities in Croatia and Hungary faced challenges in promoting the adoption of electric vehicles (EVs) and lacked the necessary knowledge and tools to facilitate usage. Public infrastructure predominantly supported conventional, fossil-fuelled vehicles, leading to restrictive policies aimed at preserving urban landscapes. However, as perspectives shifted towards cleaner transportation options, pilot actions were undertaken to introduce new EV chargers and promotional activities. These endeavours aimed to better understand the complexities involved in implementing electromobility and gauge citizen reactions to the initiatives. Initial findings suggest a positive response from citizens, indicating a growing interest in cleaner vehicles and sustainable urban mobility solutions.

Transferability and replication

Given that charging stations on public lighting poles were installed for the first time in Croatia through this project, the whole preparing procedure, and the analysis of the use of such EV stations is extremely important for the replicability of such activities in other cities in Croatia as well as in other countries in EU.

3.6 "GreenAura - Setting Up Cooperation Of GREEN Communities With AUgmented Reality Assisted Living Labs"

Website:

https://projects.pte.hu/en/green-aura

Objectives:

The project establishes a living lab at Pécs at the premises of the University and improves the new living lab of Koprivnica with Augmented Reality solution with an accent on e-mobility. Partners develop different parts of the labs to share capacities: Pécs puts focus on involving citizens by awareness raising on decarbonisation and explaining technologies the city provides for them. Croatia's new LL will be improved by adding AR content as an innovative knowledge transfer tool. Koprivnica concentrates on better connecting the city with suppliers and researchers by providing them basic infrastructure for testing and deployment their products and services.

Following specific objectives were reached:

1) Direct involvement of social, institutional, and industrial actors in cross-border cooperation,
2) Elaborating new governmental method based on participative planning and experimentation,
3) Raising awareness on e-mobility solutions and decarbonisation investments of cities by cutting-edge technologies (AR solution),
4) Establishing and improving living labs on both sides of the border,
5) Multiplying the results by forwarding the LL concept to local administrations of the border region.

Location:

City: City of Koprivnica

Region: Koprivnica-krizevci County

Country: Croatia

Partners/Institutions involved:

Partner Organisations: Pécsi Tudományegyetem (HU), Pécsi Városfejlesztési Nonprofit Zrt. (HU), Regional energy agency North (CRO), City of Koprivnica (CRO)

Implementation year:

2021-2022

Brief description:

In the Green AURA project, Living Labs were established in Pécs and enhanced in Koprivnica, functioning as dynamic innovation hubs primarily centred around the e-mobility sector. Koprivnica's primary focus has been on cultivating partnerships with suppliers and researchers to devise cutting-edge solutions for electric vehicle (EV) mobility. This initiative includes the

development of Augmented Reality (AR) content (Figure 8) designed to elucidate technologies related to safe and sustainable mobility, renewable energy, and energy-efficient solutions, with a specific emphasis on their environmental impact. Through targeted collaborations with suppliers and researchers, advanced AR content has been created, offering comprehensive insights into EV technologies and their practical applications in urban settings.

Koprivnica's diverse array of sustainable solutions, such as EV charging infrastructure, has served as a platform to enhance citizens' knowledge through engaging technological experiences. The objective is to enable citizens to interact with real-life products and deepen their understanding through AR technology. For instance, AR content has been integrated into actual EV charging stations in Koprivnica, providing users with informative visuals of electric cars, charging points, and informative billboards detailing charging types (AC, DC), EV operations, grid connections, and more. Of the 14 locations featuring AR content, four were gamified, encouraging citizens not only to learn about current technologies but also to actively engage. Through this process, participants accumulated points and received rewards upon reaching certain milestones, fostering a sense of achievement and participation. Ultimately, the overarching goal of the project is to expedite the transition to sustainable urban environments by fostering efficient cooperation and leveraging technological innovation.

Figure 8 Augmented Reality used as awareness raising tool

Financial sources and financing details

Total investment value: 270,134.45 € (Total project budget)

Sources of financing: Interreg V-A Hungary-Croatia operation programme 2014-2020 (85 %)

Savings (electricity/fuel): Not applicable

Cost savings: Not applicable

Project implementation benefits

Establishing Living Labs (LLs) equipped with Augmented Reality (AR) tools enhances citizens' understanding of electric vehicle (EV) adoption and smart mobility solutions, promoting eco-friendly behaviours, and providing comprehensive insights into sustainable transportation and energy-efficient technologies. LLs serve as platforms for citizens to express their technology needs, enabling local governments to refine services based on feedback specifically related to EV mobility. For instance, in the City of Koprivnica, LLs facilitated the testing of EV infrastructure like charging stations, aiding in informed decision-making, and preventing potential issues. Additionally, collaboration with the academic sector fosters innovative solutions tailored to EV mobility, integrating insights into educational initiatives and research publications.

Lessons Learned and Recommendations

During the Green AURA project, we encountered initial hurdles in engaging local communities in Croatia and Hungary to embrace electric vehicles (EVs), compounded by a lack of knowledge and tools to facilitate adoption. Prevailing public infrastructure predominantly supported conventional, fossil-fuelled vehicles, leading to restrictive policies aimed at preserving urban landscapes. However, as awareness grew about the need for cleaner transportation options, we initiated pilot actions to introduce new EV chargers and promotional activities. These endeavours were pivotal in understanding the intricate process of implementing electromobility and underscored the importance of stakeholder engagement, participative planning, and innovative communication methods. Moving forward, we recommend sustaining stakeholder involvement, investing in capacity building, and fostering collaboration across borders to replicate successful practices. By prioritizing sustainability planning and embracing a holistic approach to urban mobility, we can accelerate the transition to greener, more resilient cities and pave the way for a sustainable future for all.

Transferability and replication

The development of an Augmented Reality (AR) solution aimed at educating on crucial topics has yielded positive outcomes, particularly in the realm of sustainable mobility. This innovative approach to capacity building can serve as a commendable example, inspiring other projects within the EU to explore the development of AR or similar solutions for their own capacity-building initiatives. Additionally, the project introduced the Living Lab concept to local governments, facilitating interactions with citizens, academia, and suppliers to invigorate the economy of the cross-border region.

Pécs and Koprivnica's Living Labs serve as demonstration sites, providing guidance to other public bodies on legal, social, and economic aspects. Importantly, the AR products developed for EV and e-mobility education have the potential for adaptation to other languages and countries within the EU. To adopt a similar approach, potential replicators would require access to the AR technology and content development expertise. The transferability of the approach lies in its flexibility and scalability, allowing for customization to suit the specific needs and contexts of different regions. Green AURA's robust communication activities play a vital role in disseminating knowledge and achieving decarbonization objectives aligned with EU directives and local action plans, thus contributing to the attainment of RIS3 goals.

3.7 "E-charging infrastructure project in City Municipality Kranj"

Website:

N/A

Objectives:

In the Gorenjska region, the City Municipality of Kranj (CMK) set up e-charging infrastructure for electric buses and other battery electric vehicles (BEVs) to reduce greenhouse gas emissions and promote alternative fuel mobility. The CMK implemented this project by involving the energy sector, legal advisories, business support institutions, expert companies, and fostering public support.

Location:

City: Municipality of Kranj

Region: Gorenjska

Country: Slovenia

Partners/Institutions involved:

Partner Organisations: City Municipality Kranj, the Institute for Private-Public Partnership, Electro Gorenjska, BSC, Ltd, Kranj - RDA of Gorenjska, company RIKO Ltd, energy, logistics systems, Vizije Mobilnosti Ltd

Implementation year:

2020 - now

Brief description:

The e-charging infrastructure project in the Gorenjska region is part of a strategic initiative to transition public sector transportation to electric mobility and provide public charging infrastructure. Implemented in stages with four investment pillars—renewable energy provision, e-charging infrastructure, battery electric vehicles (BEV), and a digital managing system—the project saw significant developments from 2020 to 2023.

Key milestones include:

- 2020: Completion of pre-investment activities and project documentation.
- 2021-2022: Purchase of equipment and land, installation, and operational start of electric charging stations (ECS) for bus traffic, accompanied by technical inspections, information analysis, communication with stakeholders, and permit acquisition (Figure 9).
- 2022-2023:
    - Installation of 4 ECS for electric buses, totalling 300kW charging power across two locations, each with two charging points and additional BEV charging options. These locations include provisions for future expansion, with one site featuring a 300kW battery storage unit and a planned 100kW solar power plant.

- Setup of 15 ECS across the municipality for public administration car-sharing and public use.
- Installation of 43 ECS for utility cars and public institutions' car-sharing systems.

Figure 9 ECS for bus traffic in Gorenjska region

Financial sources and financing details

Total investment value: over 1.1 million €

Sources of financing: Climate Change Fund (4.000 € subvention per unit for alternating current (AC) ECS); EU Cohesion fund / ERDF; ELENA Facility (EBRD) for technical assistance

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

Setting up the charging infrastructure for the municipal public fleet and general public is a key element in transitioning to alternative fuel mobility and sets a positive example for the general public, other public authorities, cities, and organizations. This intervention enabled CMK to start implementing pillar 3 actions. The charging infrastructure for e-buses and other BEVs was the first step toward building a larger hub for EV charging, including light-duty vehicles, personal BEVs, and potentially e-HDV in the future.

Lessons Learned and Recommendations

Thorough strategic and integral project planning is essential when setting up electric charging stations. Key points to address when planning ECS include:

- Expert Project Consortium: Establish a team with reliable experts.
- Green Energy Provision: Ensure the electricity is sourced from renewable energy to avoid merely offsetting pollution from thermal power plants.
- Localisation: Choose publicly accessible and desirable locations near the grid, considering higher power needs or planning for slow, opportunistic charging times and locations to optimize investment costs.
- Financing Structure: Plan financing resources carefully due to municipalities' limited financial capacities. Explore available funding instruments and have a backup plan. In CMK's case, the initial financing sources differed from the final ones. Timing is crucial when relying on EU funds or other grants.
- Timing: Develop a time plan based on verified data and include a time buffer.

Transferability and replication

Setting up charging infrastructure isn't novel, but comprehensive strategic planning remains challenging for many city municipalities, particularly smaller rural ones. Therefore, it's crucial to form a project consortium, develop comprehensive strategic investment projects for charging infrastructure, and learn from this and similar case studies. The good practices described here, or at least most of their elements, can be replicated and transferred to any urban or rural area. In the case of CMK, the network is expanding.

3.8 "AUTO HIT"

Website

N/A

Objectives:

The objectives of the charging station in the Stara Zagora Region, where there are 59 locations with electric car charging stations including 20 with fast chargers, are to achieve efficient charging with up to 180 kW of power, significantly reducing charging time for electric vehicles. Among these fast chargers, one, noted as a good practice, features several charging connectors serving cars of clients at the Audi and VW service centre. By accommodating all makes and models of electric cars, the station enhances its utility and encourages a broader user base. Strategically located in front of an Audi showroom, it maximizes visibility and accessibility, potentially attracting more users. Additionally, by providing a fast and convenient charging option, the station supports the broader adoption of electric vehicles, aligning with environmental sustainability goals.

Location:

City: Stara Zagora

Region: Stara Zagora

Country: Bulgaria

Partners/Institutions involved:

Partner Organisations: "AUTO HIT" and "Volkswagen Group"

Implementation year:

2022

Brief description:

The charger, installed in front of the Audi showroom, offers up to 180 kW of power, enabling mainstream electric cars to charge up to 80 % in less than 30 minutes. It is compatible with all makes and models of electric cars, with charging fees set at market rates (Figure 10).

Financial sources and financing details

Total investment value: 126.000 €

Sources of financing: Financed by "VW Group" and co-financed by owner

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

This experience has enabled the enhancement of future developments in sustainable mobility, and effectively sharing insights from these projects with various areas requires a strategic approach that combines innovation, collaboration, and communication.

Fostering collaborative ecosystems by creating cross-sectoral partnerships involves encouraging collaborations between the automotive industry, energy suppliers, technology companies, and governmental bodies. These partnerships can lead to shared insights, integrated solutions, and significant advancements in sustainable mobility. Additionally, cooperating with academic and research entities, such as universities and research institutions, can help explore cutting-edge technologies and methodologies. These collaborations are also valuable for studying the societal and environmental impacts of sustainable mobility solutions.

Leveraging data and analytics through data sharing platforms is essential. Developing platforms for sharing data among stakeholders involved in sustainable mobility projects, including data on usage patterns, energy consumption, and environmental impacts, is invaluable for optimizing current systems and designing future projects. Furthermore, using predictive analytics and modelling allows for the prediction of future trends in mobility, assessing the potential impact of new technologies, and identifying areas for improvement or innovation.

Figure 10 EV charging point at Audi showroom in Stara Zagora

Lessons Learned and Recommendations

Several major challenges need to be addressed when implementing fast EV charging stations.

Cost Transparency poses a significant concern, as charging costs based on dynamic rates may be unclear to users, leading to confusion or dissatisfaction. Establishing clear price-setting policies aligned with electricity market prices is crucial to provide transparency.

Energy Demand Management is another key issue, as high-capacity charging stations can strain the local electricity grid, especially during peak times. Implementing demand-response pricing and conducting thorough grid load planning simulations are essential to prevent grid overload.

Accessibility During Peak Times can be compromised due to high demand, resulting in longer waiting times and reduced convenience for users. While fast and ultra-fast charging stations

can alleviate this issue, pricing must be balanced with real-time demand to ensure efficient use and accessibility.

Awareness and Utilization of charging infrastructure are also critical. Despite strategic placement, potential users might not be aware of the charging station or its benefits. Effective communication strategies are necessary to increase awareness and utilization, ensuring the success of the charging network.

Transferability and replication

The project's implementation offers valuable insights for transferability and replication. Improving cost transparency involves clearly displaying charging rates, including any variations based on time or energy use, both at the station and online. Providing a mobile app or website feature for users to estimate charging session costs beforehand enhances accessibility. Enhancing energy management entails deploying smart charging solutions to manage demand effectively, potentially adjusting charging speeds based on overall demand and grid capacity. Exploring the integration of renewable energy sources like solar panels can offset energy demands. Optimizing station accessibility involves introducing a booking system for charging slot reservations to reduce wait times and ensure availability. Increasing the number of charging points or establishing additional stations nearby can distribute demand more evenly. Boosting awareness and utilization requires launching marketing campaigns showcasing the station's benefits, such as speed, compatibility, and sustainability contributions. Partnering with local businesses or municipalities to promote the charging station and encourage EV adoption is crucial. Lastly, monitoring and adapting involve regularly reviewing usage patterns, gathering customer feedback, and tracking technological advancements to refine services and address emerging challenges. Establishing feedback loops with users enables continuous enhancement of the charging experience and adjustment of strategies accordingly.

3.9 "inTegRated and Innovative actions for sustainaBle Urban mobiliTy upgrade - project TRIBUTE"

Website:

https://tribute.adrioninterreg.eu/

Objectives:

The main goal of the project is to improve urban transport through the development of more efficient services and customized solutions, electromobility. To achieve this, it was necessary to identify innovative mobility solutions that promote public transport and active modes of travel, while simultaneously reducing individual transport and car ownership in the Adriatic-Ionian region and increasing the awareness of sustainable mobility options among the citizens.

As specific objectives, the TRIBUTE project also includes:

1. the identification of stakeholders in the project, more than 190 different stakeholders were presented, while 57 signed letters of intent,
2. The identification of external conditions and technical requirements necessary to enable the inclusive use of sustainable and innovative solutions concerning urban mobility, use of innovative methods and tools,
3. Action Plans and identified pilot actions are to be developed within the TRIBUTE living lab, action plans will be established to support sustainable mobility in eight project partner cities.

Location:

City: The City of Sarajevo

Region: Sarajevo Canton

Country: Bosnia and Herzegovina

Partners/Institutions involved:

Lead Partner: Politecnico Milano, Department of Mechanical Engineering.

Project Partners: City of Sarajevo, City of Zagreb, City of Ljubljana, City of Maribor, Capital City Podgorica, City of Novi Sad-City Administration for Traffic and Roads, Municipality of Milan, Municipality of Patras

Implementation year:

01/01/2021 – 30/06/2023

Brief description:

Through the TRIBUTE project, City of Sarajevo and the Canton of Sarajevo have developed the Action Plan of Sarajevo. This plan outlines a short to medium-term vision with a series of actions and measures to establish a new concept of mobility based on five key components: infrastructure, electromobility, auxiliary services, renewable energy sources, and digital solutions. The aim is to reduce the negative effects of traffic on citizens and the environment, promote the transformation of urban mobility, and encourage sustainable development. Key

interventions include the shared use of electric vehicles (cars, bicycles, scooters), clean energy production (solar, wind), and the installation of electric charging stations with a detailed study identifying five suitable locations in the city. Additionally, the plan improves access to public transportation and amenities such as cafés, smart benches, storage lockers, toilets, and information points, all supported by digital solutions.

Financial sources and financing details

Total investment value: 3.269.400 €

Sources of financing: European Union co-financing (ERDF contribution: 2,414,000.00 € + IPA II funds: 364,990.00 €)

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

As a result of the TRIBUTE project "Integrated and Innovative Actions to Improve Sustainable Urban Mobility," the City of Sarajevo has developed the concept of the Island of Mobility. This concept represents an attractive location/facility that offers users environmentally clean and practical travel options. By combining infrastructure and services in one place, it creates a reliable model for a new way of getting around the city that saves money, promotes health, and increases participation in "green" city transport.
The Island of Mobility offers various benefits, including:

- Electric Modes of Transport: Provision of electric scooters, bikes, and cars intended for shared use.
- Clean Energy Production: On-site generation of renewable energy.
- Electric Charging Stations: Installation of charging infrastructure for electric vehicles.
- Increased Accessibility: Practical and diverse travel methods that improve citywide accessibility.
- Attractive and Functional Design: The appealing design and form enable the creation of a "5-minute city."

The "5-minute city" vision ensures that shared electric mobility options are available within a 5-minute walk from most locations in the city. This concept will be implemented in four locations across Sarajevo: Nedžarići, Otoka, the Campus of the University of Sarajevo, and Skenderija.

Lessons Learned and Recommendations

Integrating e-mobility into sustainable urban mobility planning involves more than just swapping diesel and gasoline vehicles for electric ones. In the early stages, the City of Sarajevo and Canton Sarajevo encountered various challenges, such as establishing charging infrastructure, collaborating with diverse users, procuring new vehicle fleets for public bodies and carriers, and adapting parking regulations and management. Despite these hurdles, successfully implementing this concept in four locations—Nedžarići, Otoka, the University of Sarajevo Campus, and Skenderija—marked a significant achievement.

Transferability and replication

To enhance future developments in electromobility, it is essential to first establish a strategic and legislative regulatory framework for the development and use of e-vehicles, e-buses, e-taxis, and other electric modes of transport. Encouraging e-mobility in Sarajevo requires ensuring adequate infrastructure for charging electric vehicles. This begins with creating a strategy to analyse primary locations and the distribution of charging points. Additionally, it's crucial to provide various types of power supply for extra fast, fast, and slow charging. Implementing a network of charging stations that includes a combination of slow, fast, and extra fast chargers should initially focus on urban areas with high visibility and demand. To further encourage the transition from conventional to electric vehicles, offering incentives such as free or reduced-price parking spaces for electric vehicle users is important. Investing in the electrification of public transport is particularly significant for reducing CO_2 emissions. Urban road traffic significantly contributes to emissions and noise pollution, especially in densely populated areas. According to the European Commission, the transport sector is responsible for almost a quarter of Europe's greenhouse gas emissions and is a major cause of air pollution in cities. By establishing a robust regulatory framework, ensuring comprehensive charging infrastructure, and providing incentives, cities can successfully replicate and transfer these practices to promote sustainable urban mobility and reduce environmental impact.

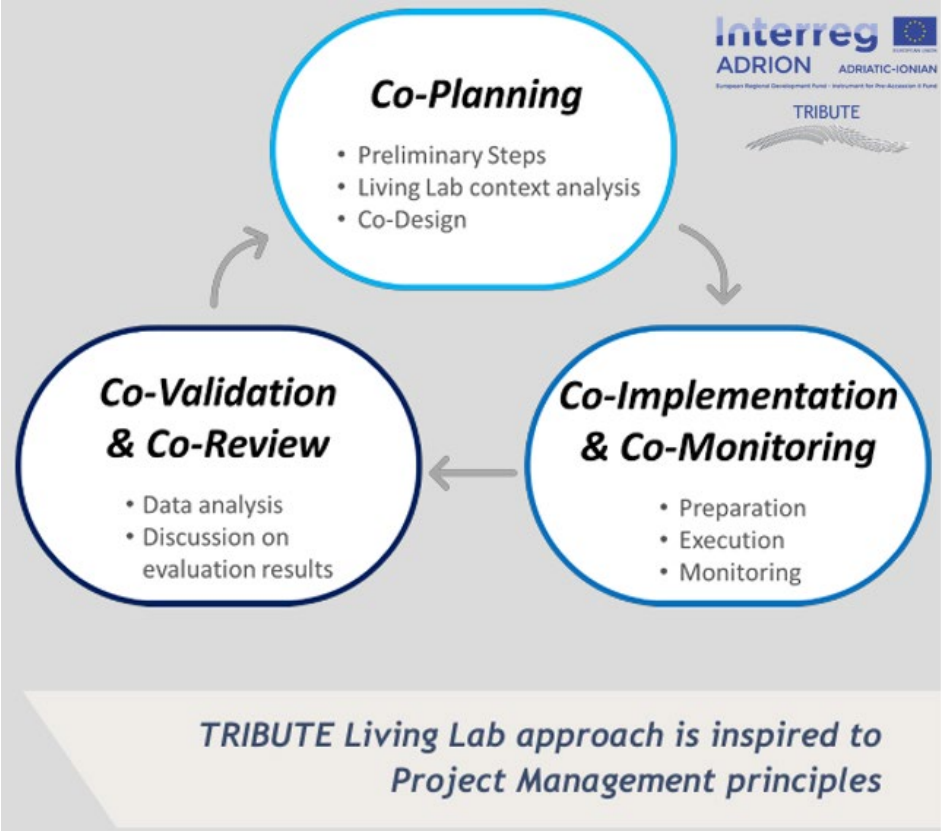

Figure 11 TRIBUTE project principles

3.10 "Enel for electric mobility"

Website:

https://www.enel.com/media/explore/search-press-releases/press/2017/05/enel-and-ald-automotive-launch-electric-mobility-offers-for-all-needs

https://www.quattroruote.it/landing/2016/enel-e-go.html

Objectives:

Enel (Italian National Agency for Electric Energy) has launched an initiative for the development of electric mobility and zero emission mobility, establishing strategic partnerships with automakers, industry operators and institutions and creating a country-wide recharging network. The aim of the nationwide initiative is to support public authorities, companies, and citizens to make the transition of their vehicle fleet from thermal to hybrid or full electric power.

Location:

City: N/A

Region: N/A

Country: Italy

Partners/Institutions involved:

Project Partners: ENEL SpA, Nissan Italia, ALD Automotive Italia

Target: citizens, enterprises, municipalities

Implementation year:

2018 - ongoing

Brief description:

Enel has launched the "e-go ricarica" app for public electric vehicle recharging, simplifying the process at Enel's stations nationwide. With integrated geolocation, users can easily locate and recharge at service stations. The service is priced at 0.025 €/min (1.5 €/h). Enel also offers the "e-go all inclusive" package in partnership with Nissan, providing the Nissan LEAF and home recharging infrastructure (Figure 12). Additionally, Enel sells electric bikes and various recharging stations, including the Box Station, Pole Station, and Fast Recharge for ultrafast charging.

Figure 12 ENEL's e-mobility services

Financial sources and financing details

Total investment value: N/A

Sources of financing: Private funding

Savings (electricity/fuel): N/A

Cost savings: 500 to 1.000 €/year per e-car

Project implementation benefits

The collaboration between Enel, Nissan Italia, and ALD Automotive Italia brings tailored solutions catering to diverse needs, from large corporations to SMEs, professionals, self-employed individuals, and private users. Electric vehicle drivers enjoy benefits such as free access to restricted traffic zones in cities, complimentary curbside parking, and exemption from car possession taxes.

Lessons Learned and Recommendations

Our experience underscores the importance of structural solutions to incentivize the adoption of electric cars. Three primary strategies have emerged: reducing purchase costs, enhancing battery autonomy, and expanding infrastructure networks. Partnerships, exemplified by our collaboration with ALD Automotive Italia, are pivotal in promoting zero-emission mobility. We suggest further leveraging such alliances to craft tailored packages that meet the diverse needs of private individuals, SMEs, and large corporations. Customized packages are vital to address the varied requirements of different audiences. By offering solutions tailored to specific segments, including private users, small businesses, and major enterprises, we can drive widespread adoption of electric vehicles. Implementing these insights and recommendations will not only promote zero-emission mobility but also contribute to sustainable transportation solutions locally and globally.

Transferability and replication

The success of these initiatives lies in the effective partnership between Enel, Nissan Italia, and ALD Automotive, showcasing the pragmatic integration of new technologies, infrastructures, and innovative IT tools. These collaborations aim to stimulate the electric vehicle (EV) market and enhance the user experience for electric drivers.

The Enel-Nissan Italia project offers a replicable model for promoting electric mobility. By providing a turnkey solution inclusive of the box station for home charging, the Nissan LEAF with a substantial battery range, and the user-friendly e-go app for locating charging stations, this initiative addresses key barriers to EV adoption. The "E-go All Inclusive" package, available for a fee plus a down payment, offers flexibility and affordability for consumers, with the option to return or refinance vehicles at the end of the contract period.

Similarly, the Enel-ALD project demonstrates a scalable approach to promoting electric mobility through dedicated offers that combine EV usage with access to charging infrastructure. By tailoring solutions to the needs of diverse customer segments, including private individuals, SMEs, and large corporations, this initiative can be replicated to drive widespread adoption of electric vehicles across different markets.

3.11 "RICARICA VALLI BRESCIANE"

Website:

https://www.interregeurope.eu/good-practices/ricarica-valli-bresciane-project

Objectives:

The project's aim is to install a network of charging infrastructure for electric vehicles in the Lombardy Region, with the goal of addressing the limited availability of charging stations and promoting widespread adoption of electric mobility.

Location:

City: Brescia province

Region: Lombardy

Country: Italy

Partners/Institutions involved:

Project Partners: Province of Brescia, Azienda Speciale Consorzio Servizi Valle Camonica, Municipality of Chiari, of Iseo, of Ospitaletto, of Pisogne, of Ponte di Legno, of Rogno, of Sulzano, of Verolavecchia, Mountain Community of Valle Sabbia and Valle Trompia

Implementation year:

2020

Brief description:

The project aims to address the limited availability of charging stations for electric vehicles in the Lombardy Region by installing a network of charging infrastructure. With co-funding secured from the Lombardy Region's call for co-funding (PNIRE) and support from the Ministry of Transport, the project "Ricarica Valli Bresciane" led by the Province of Brescia plans to install 12 normal power columns (22kW) and 2 high power columns (50 kW) across 11 municipalities. This initiative, with a budget of approximately €400,000, includes the development of an executive project, construction works, and a communication campaign to promote electric mobility.

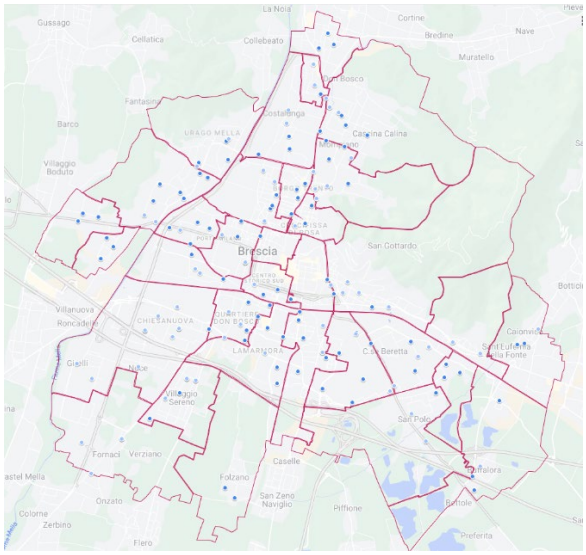

Figure 13 Locations of EV chargers across 11 municipalities

Financial sources and financing details

Total investment value: 400.000 €

Sources of financing: Co-financed by Italian State and Partners

Savings (electricity/fuel): N/A

Cost savings: 500 to 1.000 €/year per e-car

Project implementation benefits

The installation of 14 recharging infrastructures for electric-powered vehicles across the 12 project partner territories creates a comprehensive public network to serve hybrid and electric vehicles. This network enhances accessibility and convenience for electric vehicle owners, encouraging the adoption of sustainable transportation options and reducing reliance on traditional fossil fuel-powered vehicles (Figure 14).

Figure 14 EV charging point to promote sustainable mobility

Lessons Learned and Recommendations

Clear identification, effective signage, and real-time updates are crucial for enhancing EV recharging accessibility. Utilize dedicated mobile applications like Bresciapp! and A2A's E-Moving app for instant availability updates. It is recommended to always ensure visibility with clear markings, improve real-time information accessibility, educate users, gather feedback, and maintain and expand infrastructure as needed.

Transferability and replication

Utilization of existing infrastructure in Brescia and Lake Garda to establish refuelling points along provincial roads, fostering economic and environmental benefits. It is good to develop a scalable model adaptable to rural contexts, securing funding from governmental bodies like the Italian State and Lombardy Region. Fostering collaborative partnerships and knowledge sharing for widespread adoption and sustainable impact.

3.12 "EMOBICITY"

Website:

https://projects2014-2020.interregeurope.eu/emobicity/

Objectives:

The EMOBICITY (Increase of energy efficiency by Electric MOBIlity in the CITY) project has sought to improve the uptake of electric vehicles in its partner cities and regions by sharing knowledge and expertise to help them improve their regional, national, or local policy framework. Under the leadership of the Centre of Renewable Energy Sources and Savings (CRES), in Greece, the partners have examined the barriers to e-mobility in their regions and explored good practices from across Europe that can help to overcome them, comparing their regions against the state-of-the-art and determining where they can improve.

Location:

City: N/A

Region: N/A

Country: Greece

Partners/Institutions involved:

Project Partners: Centre for Renewable Energy Sources and Savings (CRES), Energy Institute Hrvoje Pozar (EIHP), Regional Management Northern Hesse GmbH (RMNH), Azorean Government - Regional Directorate for Energy (AZORES), Portuguese Energy Agency (ADENE), North-West Regional Development Agency (NWRDA)

Implementation year:

2023

Brief description:

EMOBICITY aims to strengthen the capacities of all key-stakeholders on e-mobility, especially regarding policy making, through workshops, study visits and peer reviews, as well as to raise public awareness by open campaigns and other communication activities. EMOBICITY will support policy learning on e-mobility at a national and regional level, by the increase of knowledge and exchange of experience, between the project partners, policy and decision makers and other project stakeholders from the EU participating countries. For this reason, the project will provide workshops, study visits and other activities, bringing together all key players for discussions and brainstorming, highlighting relatively good practices. By this way, EMOBICITY will generate high leverage and provide action plans for the improvement of the policy instruments addressed by the partnership, proposing enrichments and amendments, leading to increased e-mobility integration, thus contributing to a low-carbon economy. The following enhancements and innovations are proposed to be examined during the project, to be included in policy instruments:

- Legislative amendments to overcome current obstacles for e-mobility integration,
- Improvement of Charging/Taxation Models - Energy price for charging,

- Specialized Regional policies for the development of e-mobility,
- Promotion of e-mobility in low integration fields,
- Integration of incentives in policy instruments to stimulate e-mobility by private users,
- Inner city logistics and autonomous driving,
- Integration of RES in the energy mix for EV charging.

Financial sources and financing details

Total investment value: 1.071.804 €

Sources of financing: Interreg Europe

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

On Promotion of E-mobility, introducing tax incentives for companies to acquire e-vehicles, regulate the e-vehicles market and charging services, and a subsidy scheme (Go Electric) for electric vehicle acquisition by companies and individuals (Figure 15).

Go Electric will provide 100 million EUR over 18 months (August 2020 – December 2021) to subsidise purchase of e-vehicles, including e-taxis, e-scooters, and e-bicycles. In its first month, the scheme received 6,455 applications, already covering 12% of the total budget.

EMOBICITY has also enabled a change in Greek public procurement law, enabling public offices to purchase electric vehicles. The law, established in 1990, only referred to conventional fuel, meaning that tenders for e-vehicles were often rejected by auditing authorities. After identifying and raising this issue at a meeting with the stakeholder group, CRES recommended a change that would enable green public procurement, stimulating the e-mobility market. The law was adapted in March 2020 to include a clear reference to alternative fuel vehicles and e-vehicles, to present this issue in future.

Figure 15 E-mobility uptake in Greece

Lessons Learned and Recommendations

The Invitations concerned a total of 332 Municipalities, of which 328 submitted their proposals and were designated beneficiaries of the program. The submission of their proposals was completed in October 2021. They were completed in record time and no extension was needed during them.

The program is evolving rapidly. By February 2022, 26 Municipalities have submitted supporting documents for funding and the payment of 23 Municipalities has been completed. The rest are in the evaluation process. The implementation of this program, since the necessary funding can be secured and with the cooperation of local government and the state, can be implemented in other countries.

This program is the precursor and gives the impetus for the creation of the necessary infrastructure, distributed throughout the territory, to facilitate and further develop e-mobility in our country. The purpose is to expand the charging network of electric vehicles, so that at regular kilometers there is the possibility of charging vehicles. To achieve this goal, all information about the charging positions of electric vehicles resulting from the preparation of S.F.H.O., will be gathered in one application, where any interested party will be able to enter and be informed about the nearby charging points of his vehicle.

Transferability and replication

As CRES, the EMOBICITY Lead Partner, was a member of the Committee for the formation of "GO ELECTRIC", it became the bridge between the project findings and the subsidy scheme. Through EMOBICITY, the subsidy scheme was inspired by the experience of the other project countries (All: HR, DE, PT, RO); thus, it was based on in depth research and selection of EU best practices. Transfer of experience focused on:

- Amount of subsidy (up to 5.000 € for BEV) (All)
- Application procedure, eligibility criteria, documentation, evaluation (All)
- Types of EVs subsidized: car, bike, scooter, van, and taxi (All)
- Micro-mobility supported (PL)
- Focus on target groups (taxis, NL)
- List of e-cars subsidized (Rampla Plus, RO)
- Tourism economy (Azores): Focus in businesses based in islands.

In conclusion, "GO ELECTRIC" has integrated best practices from all over the EU and as its first results show, it is a successful funding scheme that can be replicated in other local contexts.

3.13 "Green eMotion"

Website:

https://www.interregeurope.eu/good-practices/green-emotion

Objectives:

The objectives of Project Green eMotion (GeM), a Green Cars Initiative of the European Economic Recovery Plan (EERP), were to:

1. Accelerate the widespread introduction of electric vehicles (EVs) in the European market,
2. Harmonize with European Union policies on the efficient use of electricity and the reduction of greenhouse gas emissions,
3. Facilitate the direct market introduction of commercially viable EV models.

To achieve these goals, 42 participants joined forces under the Green eMotion Project.

Location:

City: Kozani

Region: Western Macedonia

Country: Greece

Partners/Institutions involved:

Industries: Alstom, Better Place, Bosch, IBM, SAP, Siemens

Electric Companies: Danish Energy Association, EDF, Endesa, Enel, ESB, Eurelectric, Iberdrola, RWE, PPC

Electric Car Manufacturers: BMW, Daimler, Micro-Vett, Nissan, Renault

Municipalities: Barcelona, Berlin, Bornholm, Copenhagen, Cork, Dublin, Malaga, Malmo, Rome, Budapest, Athens, Kozani

Research and University Institutions: Cartif, Cidaut, CTL, DTU, ECN, Imperial, IREC, RSE, TCD, Tecnalia

Technological Institutions: DTI, FKA, TÜV Nord

Implementation year:

2014

Brief description:

Green eMotion considered smart grid developments, innovative ICT solutions, different types of EVs, as well as urban mobility concepts. There are currently around 2.000 electric vehicles operating in Green eMotion's 12 regions (10 demo regions and 2 replication regions), supported by 2.500 charging points. One of the main achievements in Greece was the installation of a rural and urban charging infrastructure, consisting of 8 public charging posts in Kozani (Region of Western Macedonia) and 7 public charging posts in Athens (Attica) and 15

leased EVs (Figure 16). Electromobility was a totally new experience in those cities and especially local authorities were invited to use the EVs. This direct experience motivated the policy makers to support necessary actions for the further electromobility roll-out. Greece's largest energy provider PPC (stakeholder in REGIO-MOB) was responsible for this pilot project.

Figure 16 Greek charging infrastructure

Financial sources and financing details

Total investment value: 42,308,930 € (24,226,955 € funded by European Comission) Public (EU)

Sources of financing: Funded by European Comission

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

In Greece within the timeframe of 1-year electromobility was initiated (through EVs) and 8 charging stations were installed in RWM (Region of Western Macedonia). The pilot project raised public awareness for the potential of electromobility and brought together the authorities responsible for the creation of the proper institutional frame. Next to successfully implementing roaming, the pilot project allowed addressing various practical issues and laid foundations for easier implementation of future electromobility projects.

Lessons Learned and Recommendations

To enable a mass roll-out of electromobility in Europe, social acceptance is a prerequisite. However, major concerns of the customers are the costs and the range of EVs. Through the installation of the charging stations and the everyday use of the EVS by public authorities, the good practice raised awareness of the electromobility advantages and became more friendly to the potential users. It became part of everyday life of the citizens, even small children became aware of the fact that EVs do exist and can be seen even in small cities. Only with clear commitments from all levels of policymakers, from the municipality level to the national and European level, will a holistic and consumer friendly future mobility incorporating EVs happen.

Transferability and replication

Demo of Greece is the first electric mobility project in Greece with public charging stations on the sidewalks and cooperation with electric vehicles.
It is not intended to cover an area geographically with stations, nor to collect and analyse car traffic data and driving habits, due to the small number of vehicles and the short duration of the pilot.
The goal of GeM is to raise the awareness of all actors involved in electrification, to inform and highlight the problems that need to be solved for the wide spread of electrification and to transfer the European experience from similar projects.
It also aims to create the initial collaborations between different stakeholders, partners and institutional actors who, having the first experience from the installation of the pilot project, will then be inclined to work on the formulation of the institutional rules of electric mobility in Greece.

4 Good practices on shared sustainable mobility schemes

4.1 "TADEX Transport On Demand service in Extremadura"

Website:

https://www.interregeurope.eu/good-practices/transport-on-demand-for-extremadura-tadex

Objectives:

Faced with a series of challenges, the regional government of Extremadura has committed to developing several projects to improve the mobility of its citizens, especially in the rural areas of its territory, that comprise most of the surface of the region. Given the geographical and demographic complexity of its large rural areas and its low population density, the Extremadura Regional Government decided to start experimenting at pilot level with "Transport-On-Demand" (ToD) public transport service (Figure 17).

The objective of the service is:

- to increase the energy and economic efficiency of the transport system,
- to adapt the offer size to the demand size (i.e. the kind and size of vehicles),
- to improve the schedules and routes,
- to encourage the use of public transport,
- to improve the control and management of the service.

Location:

City: Monterrubio, Vivares, Ruecas and Hernán Cortés Municipalities

Region: Extremadura (East of Badajoz Province)

Country: Spain

Partners/Institutions involved:

Partner Organisations: Extremadura Regional Government, Public Transport Bus Companies, ICT experts (big data analysis of mobility patterns, user booking app development, service provider managing interface and mobility service simulation tools for the design of new on-demand service).

Implementation year:

2022

Brief description:

This pilot service was firstly developed in the Eastern part of the Badajoz province (comprising the rural towns of Monterrubio, Vivares, Ruecas and Hernán Cortés), starting in February 2022. The service has also been recently developed at pilot level in rural towns surrounding the cities of Badajoz and Cáceres, but this good practice identification will only deal with the case of Monterrubio, Vivares, Ruecas and Hernán Cortés, which has been thoroughly monitored and analysed.

This ToD service was planned for conventional public bus lines (Figure 18), but it is highly relevant for RuralMED as we intend to develop this kind of service with shared EV and in the

framework of multimodal transport solutions (mixing conventional public transport with EV transport). It is also relevant as this service runs in a rural area located in the East of Extremadura composed by towns of about 2.000 inhabitants. These towns are separated from each other and the networks hubs by an average of 25-50 km.
The service is composed by 2 intercity bus lines. Users can request and book their trips via APP, website and/or phone calls. Before launching the service, a dissemination campaign was made with the aim to increase the number of users/customers.

Figure 17 TADEX Logo and poster

Figure 18 ToD in Extremadura (Spain)

<u>Financial sources and financing details</u>

Total investment value: 20.000 € (programme design + 2 years ICT management)

Sources of financing: 100% own funds

Savings (electricity/fuel): 777 fuel litres/month in relation with previous pre-scheduled lines

Cost savings: 11.189 €/year

Project implementation benefits

The data is processed on real time with a back-office APP, in which the following results were achieved in the year 2022 only:

- Distance savings of 2.331 km/month in relation with previous pre-scheduled lines,
- Users/customers loyalty,
- Rate of trips cancellation under 5%,
- Average of 153 trips per vehicle/month,
- More than 70% of bookings are made by phone.

Lessons Learned and Recommendations

Provision of public transport can have low cost-effectiveness in areas of low use, or in areas with low population densities, but it is an absolute necessity for parts of the community without access to private vehicles. Encouraging greater use of public transport is also a major part of strategies to reduce carbon emissions. Demand-responsive transport can provide a solution, making public transport available to those who need it, but running only when there is a need. Many different configurations are in use, and this practice demonstrates various good aspects, including multiple methods of booking (app, web, phone), as well as a wide area implementation. The results are promising, with savings in distance covered (and therefore reduced carbon emissions), with good take-up by the community and with an expansion of the service to other rural areas in Extremadura around the cities of Badajoz and Cáceres in years 2023-2024.

Transferability and replication

The pilot project demonstrates the administrative and technical solutions needed for transport on demand services in rural areas. Since 2022, it has been replicated in other areas of Extremadura (rural villages and towns surrounding the cities of Badajoz and Cáceres). This same kind of services has already been extensively applied in rural areas in France (Saint-Omer, Bretagne, Pays de Loire, among others) and Germany (Land of Rheinland-Pfalz), showing its adequacy to a different series of environments and population patterns in different rural areas of Spain, France and Germany.

Some tips should be considered when considering replicating ToD services:

- While regular public transport is viable with a minimum of demand density, smart ToD services can be configured to connect to regular public transport networks, thus increasing their number of users rather than competing with them,
- Considering the development of Mobility as a Service (MaaS) solutions, the ToD represents one of the rural mobility options that help improve the global coverage of a territory and uninterrupted travel,

- Dynamic ToD services allow to establish intelligent health transport services in rural areas dedicated to the most vulnerable to serve health or vaccination centres, to relieve or to complement regular lines in compliance with health measures.

4.2 "AMBici"

Website:

https://www.ambici.cat/en/

Objectives:

The AMBici initiative aims to promote sustainable mobility in the metropolitan area of Barcelona.

It facilitates bike-sharing services across 15 municipalities, encouraging people to use electric bicycles for their daily transportation needs.

Location:

City: Metropolitan area of Barcelona

Region: Catalonia

Country: Spain

Partners/Institutions involved:

Partner Organisations: Metropolitan Area of Barcelona (AMB) and Transports Metropolitans de Barcelona (TMB)

Implementation year:

2024

Brief description:

AMBici is a public bicycle-sharing system in the Barcelona metropolitan area (Figure 19), integrating electric bicycles for eco-friendly short-distance travel. With 100 % electric fleet equipped with lithium-ion batteries, users enjoy comfort and safety. AMBici promotes intermodal mobility, connecting cycling with public transit, operating daily from 5 am to 12 midnight. Registration is free via the website or app, offering flexible pricing options including an Annual Pass for 40 €. Stations are strategically located for easy access, with real-time availability updates on the app.

Figure 19 Public bike-sharing system at Metropolitan Area of Barcelona

Financial sources and financing details

Total investment value: 7 million €

Sources of financing: Recovery, Transformation, and Resilience Plan (financed by the NextGenerationEU program)

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

AMBici promotes sustainable transportation, reduces traffic congestion, and improves air quality.

It provides an alternative to private car usage, benefiting both the environment and public health.

Lessons Learned and Recommendations

The project was launched recently. Unfortunately, specific lessons learned, and recommendations are not available yet.

Transferability and replication

The success of AMBici could serve as a model for other cities and metropolitan areas looking to enhance sustainable mobility options.

4.3 "Electric fleet at A Anta - Cultural and Development Association of Beirã"

Website:

https://aanta.pt/

Objectives:

"A ANTA" – Cultural and Development Association of Beirã is a local development organization and a Private Social Solidarity Institution of public utility based in the municipality of Marvão, Portugal. The primary goal of this initiative was to modernize A ANTA's vehicle fleet by acquiring two electric vehicles: a van designed for meal transport and distribution, and another vehicle adapted for individuals with reduced mobility (Figure 20).

Figure 20 A ANTA's electric vehicle

Location:

City: Beirã, Marvão

Region: Alto Alentejo

Country: Portugal

Partners/Institutions involved:

Project partners: Social Security Institution, responsible for financing the vehicles, and Amatoscar Beiras - Comércio Automóvel, S.A., responsible for supplying the vehicles.

Implementation year:

2023

Brief description:

In this project, A ANTA identified the need for vehicles specifically equipped for two purposes: meal transportation and distribution, and transporting people with reduced mobility. Upon learning about potential funding from Social Security, A ANTA collaborated to apply for this support and successfully acquired the necessary electric vehicles. After obtaining the vehicles, work routes were adjusted to ensure optimal autonomy and service conditions for the community.

Financial sources and financing details

Total investment value: 61.100,00 €

Sources of financing: 25.000,00 € financed by Social Security Institution and 36.100,00 € by the institution itself

Savings (electricity/fuel): ~ 6.000 litres of diesel

Cost savings: ~ 9.000,00 € year

Project implementation benefits

Lowering maintenance and fuel expenses, streamlining meal delivery routes for users, enhancing user comfort, and improving vehicle accessibility, especially for individuals with reduced mobility.

Lessons Learned and Recommendations

Driving more ecologically to better manage the car's battery, planning routes with Google Maps and the MOBI.E website to find charging stations. This allows viewing locations and different types of charging points (slow, fast, and ultra-fast) from all suppliers, helping to manage consumption and optimize routes based on charging station availability.

Transferability and replication

Monitoring vehicle charging to ensure environmentally friendly driving involves adopting behaviours that extend the battery and car's useful life, such as opting for slow charging whenever possible. These measures could be promoted through a good practice's manual, developed from collected charging data, and shared on social media to raise awareness. Benefits include reduced fossil fuel consumption and significant annual cost savings for A Anta. This project demonstrates clear advantages, making it easily replicable and transferable to other local, regional, or national areas.

4.4 "E.V. acquisition for passenger transportation in the Crato Municipality"

Website:

https://cm-crato.pt/wp-content/uploads/2024/04/ficha_projecto_autocarro.pdf

Objectives:

The Crato Municipal Council annually defines criteria and standards for allocating school transport, according to the legal competence of municipalities regards school transportation. Therefore, the Municipal School Transportation Plan aims to ensure equal opportunities for access to pre-school education and school education, including students covered by additional measures within the scope of inclusive education. With this initiative, the municipality aims to gradually replace the fossil fuelled bus fleet, for 100 % electric vehicles.

Location:

City: Crato

Region: Alentejo

Country: Portugal

Partners/Institutions involved:

Project partners: Município do Crato, Oceântia. Lda

Implementation year:

2024

Brief description:

The project consists in the renovation of the municipal fleet, in concrete, the buses used for school transport (Figure 21). The municipality used POSEUR Fund to acquire an electric bus at the price of a regular diesel bus. This way the municipality is not only promoting sustainable transport near the children, but also promoting their life quality.

Figure 21 Electric school bus

Financial sources and financing details

Total investment value: 368.980 €

Sources of financing: POSEUR 2020 and Município do Crato

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

Although there is a substantial decrease in diesel and maintenance expenditure for the municipality, it is still soon in the projects life to determine other benefits with the desired detail. There is an overall decrease in GHG emissions, an improvement in the children's life quality and the assurance of school transport. The passenger vehicle is only functioning since April 2024, so the information about the benefits is still limited.

Lessons Learned and Recommendations

Although it is too soon for the elaboration of lessons and recommendations resulting from this project, there were challenges to the completion of the procedure within the established timetable. This was mostly due to external factors like the pandemic and the temporary lack of stock of the selling company.

Transferability and replication

Being one of the first municipalities in the sub-region with this type of initiative, the project stands out as a benchmark for the green transition amongst the Alto Alentejo transports. Even though the bus is just starting to function, already other municipality is considering of following the example of Crato Municipality.

4.5 "CIVITAS DYN@MO"

Website:

https://civitas.eu/projects/dynmo

Objectives:

DYN@MO included two "learning cities" - one of which was Koprivnica - and two "leading cities". It enabled Koprivnica to fund and implement six mobility measures:

1) Develop and adopt a SUMP,
2) Develop a zero-CO_2 part of the university campus,
3) Develop a public transport system,
4) Develop a university curriculum in sustainable mobility,
5) Launch municipal car sharing,
6) Set the city up for zero-emission public transport.

Location:

City: City of Koprivnica

Region: Koprivnica-krizevci County

Country: Croatia

Partners/Institutions involved:

Project partners: City of Aachen, City of Palma de Mallorca, City of Gdnya and City of Koprivnica.

Local partners: City of Koprivnica, Development agency North (DAN), Infrastruktura Development and Investment, Cazmatrans Nova, Koprivnica Municipal company Kampus, Municipal Utility company Komunalac.

Implementation year:

2012-2016

Brief description:

The CIVITAS DYN@MO project helped the City of Koprivnica to implement 8 bike stations, 70 public bikes, 81.5 km of cycling lanes, 2 fully electric public buses, and public transport lines in city centre (Figure 22, Figure 23).

Figure 22 Municipal fleet of EVs

Figure 23 Public e-bikes on a bike station

<u>Financial sources and financing details</u>

Total investment value: 13,100,000.00 € (Total project budget)

Sources of financing: Co-financed by EU: 8,500,000.00 €

Savings (electricity/fuel): Not applicable

Cost savings: Not applicable

Project implementation benefits

Main achievements:

- By preparing a SUMP, Koprivnica developed one of the first strategic documents of its kind in Croatia. Its aims are to provide a mobility policy that meets people's needs, to guarantee accessibility for all and to reduce the negative environmental impact of transport,
- CO_2 emissions of the municipal fleet were reduced by 25 % and the operating costs for the fleet of vehicles decreased by 28 %,
- CO_2 emissions have been reduced by 20 % compared to a conventional bus fleet operation,
- The intense promotion of the measure contributed to a gradual increase of the use of electric vehicles by citizens and companies at the local and regional level, as well as to reaching national targets regarding the deployment of chargers for electric vehicles in Croatia, also affecting the increase of charging station facilities outside Koprivnica.

Lessons Learned and Recommendations

Pioneering the advancement of electromobility in Croatia presented notable challenges. Limited vehicle options in the market and the need for adjustments to local legislation were significant hurdles. However, the innovative approach taken in introducing electric vehicles at the regional level provides valuable insights applicable to rural mobility initiatives. Lessons learned from this endeavour include the introduction of e-bus lines in rural areas, the implementation of car-sharing programs that garnered citizen interest, and the acquisition of knowledge on setting up public transport, a novel undertaking in Koprivnica. These experiences offer valuable guidance on navigating similar challenges in rural mobility projects. By examining the strategies employed and the obstacles overcome, stakeholders can gain insights to inform decision-making and strategy development, facilitating the successful integration of electromobility solutions.

Transferability and replication

The City of Koprivnica has overcome the challenge of having a small market for electric vehicles in Croatia. Now that the benefits can be measured, the system can be potentially transferred to other regional companies and cities. The innovative car sharing concept, developed for the first time in the national and regional context, will be widely promoted through local, national, and international networks. It is realistic to expect that Koprivnica is becoming a best-case contact point for e-car sharing schemes in Croatia.

4.6 "Municipal public sector car-sharing system"

Website:

https://www.kranj.si/zacel-se-je-20-evropski-teden-mobilnosti

Objectives:

In Gorenjska region, the City Municipality Kranj (CMK), decided to optimise the number of vehicles used by municipal public organisations and eliminate fossil fuel fleet and with this step coming closer to the overall objective of reducing emissions in transport and reducing noise. The municipality formed a consortium inviting legal advisory company, an expert company for e-mobility, energy and ecology and a vehicle import company. The task has been to transition 130 public fossil fuel vehicles, from EURO 3 to EURO 6 technology standard.

Location:

City: Kranj

Region: Gorenjska

Country: Slovenia

Partners/Institutions involved:

Project partners: City Municipality Kranj, the Institute for Private-Public Partnership, Vizije Mobilnosti Ltd, Porsche Slovenia

Implementation year:

2020 onwards

Brief description:

The transition to electric mobility in the public sector has been a comprehensive strategic project, encompassing four investment pillars: renewable energy provision, e-charging infrastructure, battery electric vehicles (BEVs), and a digital management system. Preceded by pre-investment activities in 2020, the project focused on electrifying the entire fleet of the City Municipality Kranj (CMK), including public institutions such as schools, kindergartens, utilities, healthcare facilities, and other municipal organizations. With the goal of optimizing and reducing the number of vehicles, 130 fossil fuel vehicles were replaced with BEVs.

To address resource and expertise limitations, CMK partnered with an e-mobility expert company and a vehicle import company. The e-mobility expert company manages vehicle leasing, maintenance, and charging, providing flexibility tailored to each organization's needs. This customized sharing system offers a variety of BEV types, including small vehicles for utility services, 8+1-seater e-vans for school trips/excursions, and other vehicles based on specific tasks. Users can book vehicles per hour or for several days through an internal booking platform provided by the e-mobility expert company.

Furthermore, the system encompasses logistics, cleaning, maintenance, and charging services, ensuring seamless operation. By the end of 2023, 55 BEVs were deployed through this sharing system. This approach not only replaces conventional car-sharing systems but also provides

enhanced flexibility and customization to meet the diverse needs of public administration in CMK.

Financial sources and financing details

Total investment value: 5.1 million €

Sources of financing: Private funding and ELENA Facility (EBRD) grants

Savings (electricity/fuel): at least 452 MWh of energy or 150 tonnes of CO_2 in 15 years

Cost savings: 340.000 € annually in average

Project implementation benefits

The project significantly contributed to lowering CO_2 emissions, reducing maintenance costs of public organization vehicles, and decreasing the number of vehicles and associated purchasing costs. It was designed to support innovation and technology transfer, with innovativeness being an award criterion. Evaluation criteria included the total cost to the grantor for using the vehicle fleet, the number of installed electric chargers, the service cost for managing and maintaining electric charging stations, the installed power for renewable energy production, and the innovativeness of the proposed solution.

Figure 24 Municipal car sharing system

Lessons Learned and Recommendations

Engagement and Participation Strategy: Before the City Council's decision on project implementation, a thorough public consultation engaged a wide range of stakeholders, including individuals, NGOs, local communities, women, vulnerable groups, and end users.

To promote fleet optimization, targeted awareness campaigns were conducted among public institutions and the general public to showcase project benefits. Regular open-door events provide opportunities for civil society to interact with the project, including testing vehicles and learning about its objectives.

Enhanced Stakeholder Engagement: During open-door events, stakeholders are invited to learn about the project and test vehicles, fostering direct engagement and feedback. Implementing shared asset economy principles enables collaboration among public institutions and, later, external users during non-peak hours.

Complaints and Feedback Management: A dedicated mechanism within the project contract ensures efficient management of complaints and user feedback, enhancing transparency and accountability.

Economic Efficiency and Fiscal Sustainability: The project model prioritizes economic effectiveness and fiscal sustainability, ensuring long-term viability and maximizing benefits for stakeholders.

Transferability and replication

The project's replicability extends beyond Slovenia to global contexts. Technical assistance for this endeavor received co-financing through the ELENA Facility (EBRD). Moreover, a larger initiative to implement e-mobility in Slovenia is underway, supported by the ELENA Facility (EIB). This initiative involves nine municipalities and two state-owned companies - ELES (operator of Slovenia's electric power transmission system) and Post of Slovenia - collaborating to promote sustainable mobility.
The sharing system is highly scalable. BSC, Ltd., Kranj, spearheaded the promotion of this system through a pilot action, inviting all 18 municipalities to participate. Eight municipalities responded positively. Applications of the system included transporting elderly individuals, providing transportation support during two sporting events, testing e-vans on challenging mountainous terrain for tourist and school transportation, as well as for regular municipal use. Recently, the smallest municipality in the Gorenjska region, with the fewest inhabitants, decided to join the system, further indicating its adaptability and appeal.

4.7 "Transitioning to e-bus fleet"

Website:

https://e-mobilitygorenjska.si/en/new-e-buses-in-city-municipality-kranj/

Objectives:

In the Gorenjska region, the City Municipality Kranj (CMK) embarked on a phased transition, opting to replace buses powered by internal combustion engines (ICE) with battery electric buses (BEVs). This initiative aims to mitigate the adverse emissions associated with public bus transportation and to diminish noise pollution. The overarching goal is to completely replace the entire fleet of 16 buses by 2024. Progressing steadily toward this objective, CMK has successfully replaced 8 ICE buses with BEVs to date.

Location:

City: Kranj

Region: Gorenjska

Country: Slovenia

Partners/Institutions involved:

Project partners: City Municipality Kranj, the Institute for Private-Public Partnership, ARRIVA Slovenia

Implementation year:

2020 onwards

Brief description:

The project strategically integrates battery electric buses (BEVs) into public transportation, aiming to transition towards electric mobility. It encompasses three key investment pillars: renewable energy provision, e-charging infrastructure, and BEV adoption. Pre-investment activities initiated in 2020 included thorough research, market analysis, and business model evaluations. Agreements were forged with the concessionaire of road public transport, and meticulous planning was undertaken for bus facilities.

The acquisition process, prioritizing green procurement, involved rigorous testing and selection of MAN Lion's City E buses. The chosen vehicle underwent comprehensive testing in 2022, ensuring its suitability for urban passenger transport. Delivery commenced gradually, with four buses arriving in May 2023, followed by another four in March 2024 (Figure 25).

These 12-meter-long buses boast powerful electric motors, providing a total power of up to 240 kW, and batteries with a capacity of 480 kWh. Advanced energy systems, utilizing regenerative braking, further enhance efficiency. Despite their substantial weight when fully loaded, these e-buses cover over 250 kilometres on a single battery charge.

With spacious interiors designed to accommodate up to 80 passengers, including 35 seats and 45 standing places, these buses offer a comfortable and sustainable transportation solution.

Drivers underwent specialized training to optimize performance, ensuring smooth integration into the public transportation network.

Figure 25 MAN Lion's City E buses for urban passenger transport

Financial sources and financing details

Total investment value: 2.8 million €

Sources of financing: Climate Change Fund (1.4 million €); monthly rents for the buses

Savings (electricity/fuel): in average 250 L of diesel fuel per tank

Cost savings: 169.500 €/per bus

Project implementation benefits

The transition to e-buses is estimated to yield significant environmental benefits. With eight vehicles and four e-bus charging stations, the decarbonization impact is projected to reach 626.000 kilometres, resulting in an annual reduction of 720,000 kilograms of CO_2 emissions. Over the 15-year lifespan of the vehicles, this translates to a total reduction of 10.8 million kilograms of CO_2 emissions.

While the immediate capital expenditure (CAPEX) savings for CMK amount to 1.4 million €, the financial gap between total investment and EU/national subsidies will gradually be covered by monthly fleet rental fees. Additionally, savings are generated from energy produced by the solar plant. However, data regarding the correlation between savings and energy market prices remain unavailable.

The transition brings significant benefits to residents, including noise reduction and decreased emissions, which has been positively received by the general public.

Lessons Learned and Recommendations

The affordability of the chosen e-bus, priced at 490,000 euros per vehicle, was facilitated by EU grants obtained through national financial funding mechanisms, rendering the investment economically feasible.

Timing played a crucial role in the project's implementation. The availability of EU grants was contingent upon specific application periods, with a call for grants opening in 2019 and subsequently two years later. Missing the call in 2019 impacted the project timeline significantly.

A thorough cost-benefit analysis was essential in decision-making. Evaluating various investment scenarios, including the purchase of e-buses with larger battery capacities for extended range versus cheaper e-buses requiring additional charging infrastructure, was imperative. Ultimately, investing in infrastructure proved to be the more prudent choice.

Transferability and replication

Over the coming years, the entire bus fleet of CMK is set to transition to electric. Moreover, there's an initiative to extend this practice to other municipalities, provided that the financing model's viability and business model are conducive to successful implementation.

4.8 "Gorenjska e-bike network"

Website:

https://www.gorenjska.bike/

Objectives:

BSC Kranj, along with various stakeholders and local communities, is actively engaged in the development of a comprehensive regional cycling infrastructure. This initiative encompasses the establishment of a regional cycling network, the implementation of cycling infrastructure such as bike service and rest points, and the installation of e-charging points for bicycles.

All relevant data pertaining to this initiative, including the regional bike system, is collected, and made accessible through iRegija, an online Geographic Information System (GIS). As part of this effort, Gorenjska.bike operates as a public bike-sharing system, currently spanning across 10 municipalities with 73 sharing stations, offering 160 e-bikes and 250 normal bikes.

Furthermore, Gorenjska.bike is integrated into a broader network known as mobiln.si, which includes more than 34 Slovenian municipalities with compatible bike-sharing systems. This interconnected network facilitates seamless mobility and accessibility for cyclists across the region.

Location:

City: N/A

Region: Gorenjska

Country: Slovenia

Partners/Institutions involved:

Project partners: BSC Kranj, local communities (municipalities) in the region and company responsible for management of the bicycle rent system

Implementation year:

2016 onwards

Brief description:

Regional bike sharing system in Gorenjska started with its implementation in 2016. The implementation was based on more than 2 years of planning and building the joint vision and overcoming feasibility challenges.

Currently, the bike sharing network connects 8 local communities with 59 bicycle stations and 351 bicycles including e-bikes.

Financial sources and financing details

Total investment value: more than 2.4 million €

Sources of financing: LEADER funds, local communities' funds

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The introduction of e-bikes presents several advantages, including reducing fuel costs by replacing other forms of transportation, both public and private, with eco-friendly alternatives. This initiative also expands mobility options for residents, allowing for convenient bicycle travel between urban and rural areas. Moreover, the integration of e-bikes into existing public transport systems creates opportunities for seamless multimodal journeys (Figure 26).

Additionally, the implementation of a user-friendly payment system facilitates bike travel between cities, encouraging more people to opt for this sustainable mode of transportation. This service is instrumental in fostering a shift in behaviour among residents, who previously relied less on bikes for longer journeys between local communities. E-bikes make longer distances more manageable and require less physical effort, making them an attractive and accessible option for a wide range of users.

Figure 26 E-bike sharing system in Gorenjska region

Lessons Learned and Recommendations

One of the primary challenges lies in strategically locating rental stations to optimize usage, considering daily migration patterns and residential areas. Randomly situating stations solely based on land availability frequently leads to stations being underutilized.

Key locations for rental stations include proximity to public transport hubs and high-traffic areas in city centres, supported by footfall analyses. However, in city centres, investors encounter cultural and environmental obstacles. In rural areas, additional efforts are required to attract new users.

Strategic station planning plays a pivotal role in network development, ensuring optimal accessibility and usage. Despite being a public infrastructure accessible at a nominal cost to users, owners often face funding constraints for maintenance and further expansion.

Transferability and replication

This model is particularly suitable for regions characterized by moderate distances between settlements and a blend of urban, semi-urban, and rural areas.
Since 2016, the system has undergone gradual enhancements, including the introduction of e-bikes, aimed at improving user experience and accessibility.

4.9 "Micromobility in Stara Zagora"

Website:

https://www.li.me/

Objectives:

Starting from July 28, 2021, Stara Zagora becomes the third regional city in the country, following Sofia and Plovdiv, to introduce electric scooters provided by Lime, the world's largest operator of shared electric vehicles. The objective is to enhance electric e-mobility and sustainable means of transport by installing 200 electric scooters available for rent. These scooters will be strategically placed in 13 key locations around Stara Zagora to maximize accessibility and convenience for users. To access the scooters, users will pay a fee of BGN 1.49

(0.76 €) for the initial unlock and BGN 0.29 (0.15 €) for each minute of riding, promoting usage while ensuring affordability for riders.

Location:

City: Stara Zagora

Region: Stara Zagora

Country: Bulgaria

Partners/Institutions involved:

Project partners: Stara Zagora local authorities.

Implementation year:

2021

Brief description:

Since the introduction of rental scooters, Lime has expanded its fleet to 200 scooters in Stara Zagora. Over 46,800 trips have been completed by over 10,600 individuals, averaging about 10 minutes per trip, covering approximately 1 km each (Figure 27).

Figure 27 Introduction of rental scooters in Stara Zagora

Financial sources and financing details

Total investment value: 110.000-150.000 € (100 % private investment)

Sources of financing: Private company

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

Introducing this innovative e-mobility option eliminates various drawbacks associated with cars, such as traffic congestion, carbon emissions, and vehicle dependency. By envisioning urban spaces without cars, cities can reclaim streets for pedestrians and prompt citizens to consider alternative modes of transportation. The primary objective is to prioritize micromobility and promote awareness of sustainable transportation among city dwellers.

Lessons Learned and Recommendations

Addressing the challenges of scooter mobility involves tackling issues such as vandalism, regulatory shifts, and urban redevelopment to facilitate rule compliance and improve citizen access to alternative transportation. To deter vandalism, scooter rentals are restricted to adults. When implementing a public e-scooter system, several factors must be considered. These include limiting scooter speed to 20 km/hour, ensuring scooters are equipped with front lights, side reflectors, and two independent brakes, and incorporating signalling devices for user safety. Local regulations should establish criteria for scooter use areas, safety standards, age restrictions, municipal responsibilities, and potential training requirements.

Transferability and replication

Safety remains a paramount concern, especially regarding the protection of vulnerable road users. It's crucial to implement strict speed and power restrictions for scooters and to prohibit their use on sidewalks where cycling is disallowed. In areas permitting scooter use on cycle paths, capping speeds at 20 km/hour, as seen in Paris and Sweden, is essential. Enforcement strategies typically involve fines and/or equipment confiscation for rule violations. Various strategies can enhance e-scooter safety and adoption, spanning design, regulation, and operation: prohibiting sidewalk usage or enforcing low-speed limits, enforcing speed limits of 30 km/h or less in areas shared with vulnerable road users, enhancing vehicle design for improved road grip and stability, collecting crash data to evaluate scooter safety performance, and eliminating incentives for risky behaviour, such as per-minute rental fees.

4.10 "Improving shared mobility policies to support a shift away from private car use and move towards more sustainable options - SMAPE"

Website:

https://www.interregeurope.eu/smape

Objectives:

The Shared Mobility Action Programmes Exchange (SMAPE) project aims to improve shared mobility policies. More specifically, the project will focus on aspects like shared mobility integration with public transport and Mobility as a Service, usage of data (dashboards) for monitoring and policy adjustments and data sharing, influence attitude and behaviour, optimising the mix of mobility modes, regulations, frameworks for public private partnerships and policy recommendations and contributions to Sustainable Urban Mobility Plans (SUMPs). Based on best practices, SMAPE will apply an integral approach to improve or draft shared mobility policies.

Location:

City: Mantova province

Region: Lombardy

Country: Italy

Partners/Institutions involved:

Project partners: Free Hanseatic City of Bremen, Province of Mantua, Bucharest-Ilfov Regional Development Agency, City of Bergen, Regional Development Agency of Ljubljana Urban Region, net – Carshare Belgium, POLIS Network, University of West Attica, Walloon Public Transport Authority, Regional Development Fund of North Aegean

Implementation year:

2023 - 2027

Brief description:

Over the course of 4 years, the project's main goals are promoting sustainable multimodal urban mobility, optimizing the mix of mobility modes, and integrating shared mobility in local mobility networks and MaaS systems - all in line with the EU's Sustainable and Smart Mobility Strategy, its Urban Mobility Framework, and the Territorial Agenda.

Financial sources and financing details

Total investment value: 2.285.846 €

Sources of financing: Co-financed by Interreg EUROPE

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The SMAPE project addresses the challenges of urbanization by promoting shared mobility solutions, aiming to reduce car dependency and emissions while enhancing liveability. By improving policy effectiveness, integrating shared mobility with public transport and MaaS, and utilizing data-driven decision-making, SMAPE fosters safer, greener, and more sustainable transportation systems. Through multi-national collaboration and policy recommendations, the project contributes to creating more diverse travel options, lower car ownership, and healthier modes of transportation, ultimately leading to more liveable and environmentally friendly cities.

SMAPE will work on the policy instruments of 7 partner cities/areas: Bremen, Bucharest, Bergen, Ljubljana, Walloon, North Aegean, Mantova Province

Lessons Learned and Recommendations

During the first year of project implementation, main lessons learned are the following:

- the importance of creating a permanent stakeholder group at local level, aimed at address mobility challenges, committed to actively participate and contribute to future shared mobility initiatives,
- to improve the Mantova Territorial Plan of Provincial Coordination Plan (PTCP), it is necessary to build on existing best practices from the project consortium and beyond, learning from positive outcomes of strategic planning and community engagement in promoting sustainable transport,
- the importance of creating public-private partnerships in the field of public transport.

Transferability and replication

The project will focus on aspects such as the integration of shared mobility with public transport, optimising the mix of mobility modes, influencing attitudes and behaviour, and using and sharing data for monitoring. The theme of the SMAPE project will be applied at the provincial level through the Provincial Coordination Territorial Plan (PTCP), which constitutes the reference framework for supra-local territorial policies, thus also for shared mobility policies; in particular, it may be dealt with in the Provincial Bicycle Plan, as a sector plan of the PTCP currently being updated. As the Italian partner of the SMAPE project, the Province of Mantua recognises the importance of involving local stakeholders to share the project objectives and, above all, to collect contributions and proposals useful to co-plan solutions suited to the Mantuan context and specific mobility needs. The Consorzio Oltrepò Mantovano, representing its 20 associated municipalities, will benefit from the process of co-planning sustainable mobility solutions to be applied to the entire provincial territory.

4.11 "Green Inter-e-Mobility"

Website:

https://green-inter-e-mobility.eu/

Objectives:

The main project's objective is to design and apply an energy-efficient, regional intelligent transportation system (ITS) that will support the efficient realization of both the tourist promotion of the cross-border area, the student's daily transport and the facilitation of residents in their daily transport. Specific objectives are:

1. The added value of the area's touristic sites through the e-minibuses routes,
2. The enhancement of the cross-border cultural relations,
3. An optimal route scheduling in coordination with the design & implementation of PV charging stations for minibuses,
4. The realization of the ITS that will facilitate both tourists, residents' (elderly, disabled, distant residents) and students' daily transportation. Especially for accessibility of elderly and disabled people, a utility e-vehicle and a relative smart phone application is predicted,
5. The decarbonisation of transport and the support to the electricity grid.
6. Cooperation between partners during the optimal route studies, development & operation phases,
7. Public awareness about the integration of e-vehicles fuelled by the sun in cities, and communication & dissemination of the project results to national, regional & local authorities to promote green transport.

Location:

City: Prespes & Florina

Region: Western Macedonia

Country: Greece

Partners/Institutions involved:

Project partners: The Research Committee of the University of Western Macedonia, The municipality of Bitola, The municipality of Resen, The municipal enterprise of Prespa, The municipality of Florina, The Research committee of the University of Patras

Implementation year:

2023

Brief description:

The program includes the installation of four electric vehicle charging stations in the four municipalities (Prespes, Florina, Bitola, Resen)

1. Four Photovoltaic systems
2. Eight electric vehicles - Four passenger cars and the four electric mini-buses in the four municipalities

3. Creation of intelligent transport systems – ITS
4. Finding optimal route planning per municipality

Actions include studies elaboration, electric vehicles procurement, construction of charging-stations, configuration of the bus stops, installation of the communication systems, pilot use-operation & technical evaluation of the integrated system, studies for the 4 photovoltaic charging-stations (external parking-lots) for the electric vehicles and tender preparation for the procurement of the equipment for their construction and for the configuration of the bus stops (Figure 28).

Figure 28 EV and charging stations from Green Inter e-Mobility

Financial sources and financing details

Total investment value: 1.017.627,40 €

Sources of financing: The Interreg IPA CBC Programme "Greece- Republic of North Macedonia 2014-2020"

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The project implementation offers numerous benefits. Dissemination efforts will highlight the advantages of electric mobility to the local and regional population, emphasizing cost savings on transport and maintenance, as well as environmental benefits. Electric vehicles (EVs), particularly when paired with solar charging, can become a significant touristic attraction, appealing to environmentally sensitive tourists, and contributing to the area's thematic tourism development. Additionally, the project is expected to create eight permanent job positions for EV drivers, boosting local employment.

Moreover, the initiative will add value to local tourist sites, enhance cross-border political relations, and facilitate optimal route planning. Increased accessibility for the elderly and

disabled will be achieved, promoting inclusivity. The project supports the decarbonization of transport and bolsters the electrical grid. Furthermore, public awareness of electric vehicle integration will be raised, promoting green transport and renewable energy sources (RES).

Lessons Learned and Recommendations

Lessons learned and recommendations from the project include several key points. Firstly, optimal route scheduling studies can demonstrate that the same transport means can be used for various purposes, thereby increasing their efficiency. Social groups such as children, the elderly, and disabled individuals can benefit greatly from this service, improving their quality of life. The 20 kW charging station was appropriately sized to meet the needs of electric vehicles, supporting the Municipality of Prespa's overall energy efficiency plan to reduce its carbon footprint.

Adjustments were necessary due to differing market and legal frameworks in each country. For example, a 9-seat vehicle requires special driving permits in North Macedonia but not in Greece. Users could view available routes for their chosen dates and times and book seats for free. The electric vehicles proved very useful for municipal personnel, further reducing the municipality's carbon footprint.

Additionally, many elderly people from rural areas used the electric vehicles by booking them via phone calls for transport to medical centers or for medicine delivery from pharmacies. The electric vehicles also supported the Ministry's "Home Assistance" programme”. It is crucial to consider ongoing expenses for project support after its conclusion, such as securing drivers' salaries and vehicle insurance.

Transferability and replication

Dissemination of the results to the local and regional population will drive the idea of electrification, which includes savings in transport and maintenance costs combined with environmental benefits.
Electric vehicles, especially when combined with solar charging, can be used as an important tourist attraction for the region, especially for the development of thematic tourism. In recent years, environmentally sensitive tourists and thematic tourism have been developing rapidly. Therefore, electric vehicles can provide added value to the tourism development of the region. Optimal route planning studies are an opportunity to highlight that the same means of transport can be used for different purposes and increase its efficiency.

4.12 "E-MOB"

Website:

https://projects2014-2020.interregeurope.eu/e-mob/

Objectives:

The E-MOB project aims to promote electric mobility as the future of transportation by reducing the heavy energy consumption and emissions from cars, trains, and planes. It focuses on enhancing regional mobility by connecting secondary and tertiary nodes to the Trans European Network - Transport (TEN-T) infrastructure, including multimodal hubs. A key objective is to promote strategies to reduce CO_2 emissions, especially in urban areas, through sustainable urban mobility plans and relevant measures to aid adaptation. To address the bottleneck of insufficient charging stations, the project will install stations supported by solar panels to prove CO_2 emission reduction. Additionally, the project promotes a low-carbon economy through investments in energy efficiency, sustainable multimodal urban mobility, and urban development. It also seeks to enhance the Regional Operational Programme (ROP) to focus more on sustainable mobility, urban quality of life, road and personal safety, energy savings in transport modes, and new environmental measures and technologies. These efforts aim to lower exhaust emissions from transport, offer alternative transportation options, and discourage private car use, making cities better places to live for their inhabitants.

Location:

City: Municipalities of Western Macedonia

Region: Western Macedonia

Country: Greece

Partners/Institutions involved:

Project partners: Aufbauwerk Region Leipzig GmbH, Amiens Metropole, City of Koprivnica, Research Committee of the University of Western Macedonia, Vorarlberg University of Applied Sciences, Regional Development Agency Centru Romania, Municipality of Cieza, University North Croatia, Paks Transportation Ltd.

Implementation year:

2022

Brief description:

The Investment Priority (PI) 7b focuses on enhancing regional mobility by connecting secondary and tertiary nodes to the Trans European Transport Networks (TENT) infrastructure, including multimodal hubs. Additionally, two related priority axes are considered: PA3, which promotes a low-carbon economy through investments in energy efficiency in buildings, public lighting, and sustainable multimodal urban mobility, and PA4, which supports sustainable integrated urban development and the regeneration of deprived urban areas. A key objective is to reduce CO_2 emissions in urban areas by promoting sustainable urban mobility plans and relevant adaptation measures. This high-priority objective will finance investments based on these

mobility plans. In line with EU CO_2 reduction policies, the goal is to support the transition to a low-carbon economy in all sectors by reducing transport emissions, offering alternative transportation options, and discouraging private car use. This will make cities more liveable for their residents. The Regional Operational Programme (ROP) should be improved to focus more on sustainable mobility, urban quality of life (including road and personal safety in urban transport, and energy savings in transport modes), and the promotion of new environmental measures and technologies.

Financial sources and financing details

Total investment value: 1.535.195 € (30,000 Euro per charging station)

Sources of financing: The Interreg Europe

Savings (electricity/fuel): around 35 kWh/day and 15kgCO_2/day

Cost savings: N/A

Project implementation benefits

The three EVs of the municipality are now used by the personnel of the technical service for visiting construction and maintenance works sites. Most of the routes are urban, therefore, the reduction of the urban carbon footprint of the project is achieved. Moreover, since the charging stations are supported by solar panels, the CO_2 emissions of the municipality are reduced. One full charge per day comes from solar energy (almost 35 kWh). One fast charger is obtained (11 kW) and three slow chargers (3,6 kW) were constructed and supplied to the site by the University (Figure 29).

Figure 29 The municipality of Kozani PV-charging stations and EVs

Introducing electromobility to taxi fleets is crucial, as taxis contribute significantly to vehicle kilometers travelled within cities. Notable progress in other cities, such as Amsterdam, where 16% of the taxi fleet is electric, highlights the need for similar initiatives in Thessaloniki and Greece, where electromobility is still developing (Figure 30).

Figure 30 Electric taxis in Thessaloniki

Lessons Learned and Recommendations

This good practice demonstrates how universities can serve as technical support for municipalities in the green transport sector, especially when funding is limited. Additionally, it acts as a living lab, illustrating that staff mobility can be carbon-neutral if electric vehicles (EVs) are powered by solar energy and municipalities invest in self-consumption solutions.

Transferability and replication

The good practices of this program inspired University of Western Macedonia, to involve the recently established Regional Energy Community of Western Macedonia as the main stakeholder. This entity, like the Austrian Regional Energy Supplier, could expedite the development of a public charging station network in the region, supported by a solar energy-producing station owned by the Energy Community, operating in net metering mode with these public charging stations. Eight existing fast-charging stations in the region could be reactivated, and the development of new ones, as outlined in the municipal Charging Stations Plans (CSP-ΣΦΗΟ), could be accelerated. A new project for this purpose could be funded by the PI, with proper support from this action plan by the University of Western Macedonia.

5 Good practices on sustainable mobility integration with other transport systems

5.1 "Open data platform on public transportation for the City of Cáceres"

Website:

https://www.interregeurope.eu/good-practices/opendata-caceres

Objectives:

All the information included in the platform can be used to create smartphone applications making the information more usable to population. This platform can also nurture an entrepreneurial environment because it gives enough tools so that applications can be developed by everyone with the needed skillset. Another goal of this project was to provide to all citizens and tourists of Cáceres, information in real-time on city buses and other transport-related information, by providing the needed data and underlying tools so user-apps could be created. Datasets and the related apps are available in the platform. Apps are available in Google Play as well.

The open data service on public transport in Cáceres aims to share all the information (stops, lines, fares, schedules, real time bus location and combined routes) with everyone interested. The information is free and can be found and downloaded on the platform's website.

Also related to transport, the Open Data Platform includes datasets and apps regarding bike and motorbike parking facilities, taxi services, tourist routes and public parking lots availability around ATMs to avoid traffic jams.

Location:

City: Cáceres

Region: Extremadura (Cáceres Province)

Country: Spain

Partners/Institutions involved:

Project partners: Municipality of Cáceres and QUERCUS Software Engineering (Extremadura University)

Implementation year:

2017 - 2018

Brief description:

Having access to open data about public transportation and other transport-related issues, involves a great cooperation between institutions in charge of the public transportation sector. Sometimes it is available but not cantered in a single platform which may difficult the good usage of the information.

The open data service on public transport provides timetables, bus locations, and fares data for local bus services in the Municipality of Cáceres (Figure 31). It is free open data and does not

require a licence. Users might simply start using the Apps services or downloading data for analysis. The application currently in use, improves the previous ones, because it allows the user to make combined routes, including transfers, in addition to visualizing the position of the buses in real time.

The other transport-related services also provide real-time accurate data on bike and motorbike parking availability, parking availability around ATMs and basic taxi services information (taxi stops location and taxi availability at the stops). Apps are also available in these cases.

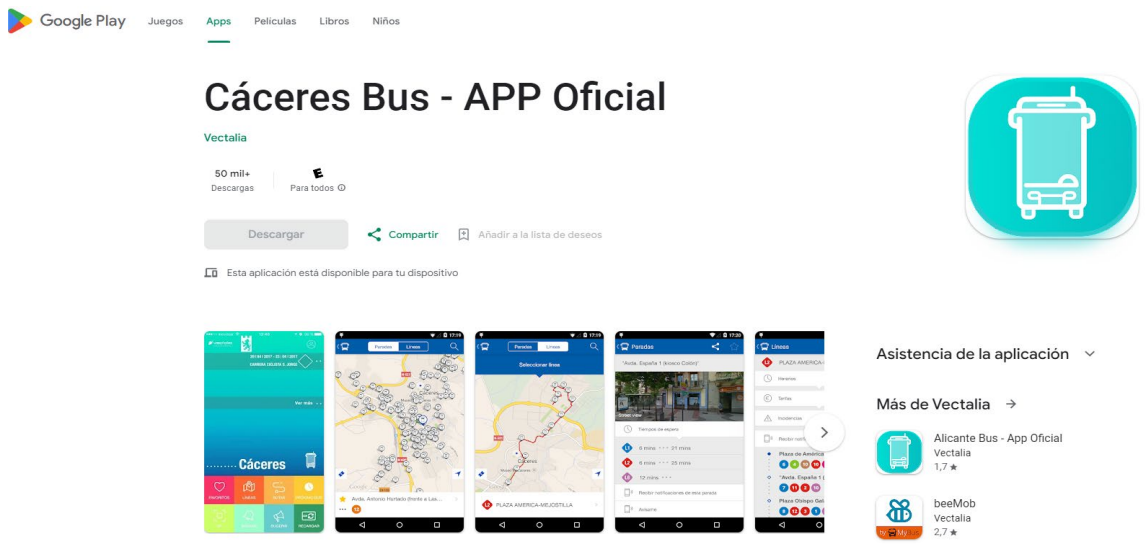

Figure 31 Cáceres Bus App

Financial sources and financing details

Total investment value: 20.000 €

Sources of financing: 100 % own funds

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The most used App is "Buses CC": public transport has achieved an enhanced efficient urban transport by reducing the fuel consumption and CO_2 emissions, while allowing to provide extra services on public buses (combination of routes, fares, schedules).

Other data provided on the platform are used in several Apps that have allowed to reduce the traffic jams in the city (i.e. allowing to find ATMs near parking places avoids double parking). Other Apps inform on real time about events in the city that impact on daily traffic (i.e. "Semana Santa" that informs on street closed to traffic due to Easter celebrations).

Lessons Learned and Recommendations

If a city has information available, joining all of it in a single platform may be useful to everyone. It is needed to join efforts with the local transport operators, so they make important information available, and have the technical skills to translate the data into open data formats.

Several initial problems were met to get the buses real-time positions from the transport company. Scripts were created to transform the data in open data formats. Workload was significant when representing all de data in GTFS (General Transit Feed Specification).

Transferability and replication

Digitalisation and data play an increasing role in supporting transport sustainability. Several legislative frameworks already contain data-sharing obligations, which establish a list of datasets (including datasets concerning public transport).

Moreover, the Digital Transport and Logistics Forum is working on a concept of 'federated platforms' to define what needs to be done at the EU level to facilitate data-sharing/re-use by connecting different public and private platforms. Furthermore, networks of national access points to make data available exist in the Member States where the data are made available with a view to serving road safety, traffic, and multi-modal travel information services, with data generated by the public and the private sector.

Wide availability and use of data in public transport systems has the potential to make them more efficient, green and customer friendly. Data use to improve transport systems is also a central feature of smart cities and shall be considered when designing SUMPs, SULPs and SECAPs.

5.2 "ENERNETMOB Mediterranean Interregional Electromobility Networks for intermodal and interurban low carbon transport systems"

Website:

https://www.enernetmob.eu/

Objectives:

EnerNETMob aimed to draft, test and improve parallel "Sustainable Electromobility Plans" according to common standards and low carbon policies, to set an "Interregional Electromobility Network" crossing cities of all the Interreg MED area. The project promoted sharing mobility and land-sea intramodality using electric transport systems, by implementing interurban and interregional pilot networks of Electric Vehicles Supply Equipment (EVSE) also co-powered by Renewable Energy Sources. It developed electromobility solutions and tested pilot actions to overcome medium-trip limitations and to coordinate future investments on electric transport.

Location:

City: N/A

Region: All the Interreg MED area

Country: Greece, Italy, Spain, France, Portugal, Slovenia, Croatia, Malta, Albania, Montenegro, Cyprus, Austria

Partners/Institutions involved:

Project partners: Austrian Mobility Research- AMOR, Capenergies, Centre Internacional de Mètodes Numèrics en Enginyeria, Port de Bar société holding, Dynamic Vision P.C, Libre Consortium de Municipalités de Raguse, Agence de l'Environnement et de l'Énergie d'Arrábida, Université de Palerme - Department of Agricultural, Food and Forest Sciences, Regijska razvojna agencija severne Primorske d.o.o. Nova Gorica, Comté de Primorje et Gorski Kotar, Région de Thessalie - Department of Development and Planning, Albanian Institute of Transport, Ministère des Transports, Communications et des Travaux, RAM Logistica Infrastrutture e Trasporti S.p.a., Autoritatat-Trasport Malta

Implementation year:

01/02/2018 – 30/04/2022

Brief description:

The EnerNETMob project aims to enhance the capacity for planning and implementing Interregional Electromobility Networks across the Mediterranean area. It seeks to promote electromobility plans with common standards, integrating regional networks of Electric Vehicles Supply Equipment (EVSE) to facilitate medium-range interurban and interregional travel. Specific objectives include analysing and implementing joint strategies for electromobility systems within existing regional mobility networks, creating regional Small-Scale Infrastructure Networks for electric transport displacement, and sharing common design

guidelines and technical standards. Ultimately, the project aims to establish a transnational framework for Battery Electric Vehicle mobility and charging services (Figure 32).

Figure 32 Developing a network for EVs

Financial sources and financing details

Total investment value: 5,186,292.27 € (Total project budget)

Sources of financing: 2014 - 2020 INTERREG VB Mediterranean (85 %)

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

EnerNETMob has created joint guidelines to implement electromobility networks at transnational level, by using same Best Available Technologies as well as International Technical Standard and common communication protocols of charging systems.

Based on common guidelines and strategies, EnerNETMob partners have implemented Sustainable Electro-Mobility Plans to foresee long term electric transport infrastructures and their integration with existing local mobility and intermodal networks. Following the "Action Plans of Sustainable Electro-mobility Plans" developed by the project, EnerNETMob created Small-scale Infrastructure Networks while the pilot actions involved the three major thematic challenges for electromobility: Intermodal transport, Sharing mobility and Logistics.

Executive design of EV charging, and electric transport infrastructure was produced along with an ICT Platform designed to allow:

- the management and monitoring of charging infrastructures,
- the interconnection of local small scale infrastructure networks in a wider Interregional Electromobility Network.

Figure 33 EnerNETMob's shared e-mobility

Lessons Learned and Recommendations

Ensuring interoperability among charging networks is essential for enhancing the electric vehicle (EV) user experience. The EnerNETMob initiative demonstrates the importance of integrating small-scale charging infrastructures to improve accessibility and usability for EV owners. By connecting regional networks, it aims to assess the viability of local EVSE networks and promote their development and enhancement.

Also, it leverages existing interoperable charging protocols like the Open Charge Point Protocol (OCPP). This standard facilitates communication between EV charging stations and network software, enabling seamless operation across different platforms. Despite the availability of interoperable protocols like OCPP, their widespread adoption and full benefits have yet to be realized. However, initiatives like EnerNETMob play a crucial role in promoting interoperability and advancing the EV charging industry.

Transferability and replication

As part of its deliverables, the EnerNETMob project has introduced a unified design guideline for electromobility systems, incorporating consistent technical standards and communication protocols. These guidelines ensure that all MED regions adhere to the same design standards for Electric Vehicle Supply Equipment (EVSE) and share integrated ICT protocols.

By establishing common guidelines, the project facilitates the implementation of transnational electromobility networks, promoting interoperability and standardization across different regions. Additionally, the project has developed an ICT platform, which is now publicly accessible. This platform serves as the foundation for further ICT tool development in the RuralMED project, extending the impact of EnerNETMob's initiatives.

5.3 "Green Deliveries by CTT – Correios de Portugal, S.A."

Website:

https://www.ctt.pt/grupo-ctt/media/noticias/ctt-reinforces-its-alternative-fleet-with-160-citroen-ami-cargo?language_id=1

Objectives:

CTT – Correios de Portugal, S.A. is a Portuguese company that operates as both the national postal service of Portugal and a commercial group with subsidiaries operating in banking, e-commerce, and other postal services.

Currently, CTT's main objectives are to electrify 50 % of its last-mile fleet with electric vehicles by 2025 and 100 % by 2030, for its subcontracted road activity to use 45 % environmentally friendly vehicles by 2030 and to reduce carbon emissions by at least 30 % by 2025 compared to 2013.

Figure 34 CTT's electric vehicle

Location:

City: N/A

Region: N/A

Country: Portugal

Partners/Institutions involved:

Utilities: Grupo EDP

Car Brands: Citroen, Peugeot

Financial Institutions: Novo Banco, S.A, Banco Bilbao Vizcaya Argentaria S.A

Implementation year:

2019 - present

Brief description:

In February 2019, CTT began decarbonizing its fleet with an investment of around 12 million € over five years. By 2023, 13 % of the fleet was electrified, featuring 70 Peugeot e-Expert vans and 160 Citroen AMI vans. Additionally, five fully electric delivery centres were inaugurated, and a partnership was established with Grupo EDP. This partnership involves installing solar energy production centres in over 40 locations across Portugal. The surplus energy is sold by EDP to nearby communities at reduced prices, creating solar neighbourhoods. In March 2024, CTT also contracted 35 million € in commercial paper linked to sustainability objectives.

Financial sources and financing details

Total investment value: Total of 47 million euros

Sources of financing: 12 million in own financing and 35 million contracted with Novo Banco, S.A., and Banco Bilbao Vizcaya Argentaria S.A.

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

A sharp reduction in fuel costs, the use of 100 % renewable energy in 5 delivery centres and the creation of solar neighbourhoods using the surplus produced.

Lessons Learned and Recommendations

This nationwide renovation requires a very high level of logistical organization, not only in terms of replacing the vehicles, but also in terms of the charging points because, given the large number of stations to be installed, they must be installed at strategic points to meet the needs of each location.

Given CTT's high number of journeys, the project will considerably reduce the carbon footprint, as well as the costs with fuel consumption.

Transferability and replication

Not only is the project moving towards achieving the goals set for the electrification of the fleet, but it will eventually be possible to expand the electric delivery centres and solar energy production centres to the rest of the country. In this way, it will be possible to create more solar neighbourhoods, which will allow a greater part of the population to have access to low-cost electricity, and the amount available at the end of the month.

After the project was contracted and started, it was publicized on various media channels, and it was also possible to reach a larger percentage of the population through social networks, attendance at round tables and workshops.

As such, this project demonstrates the clear advantages of its implementation, which will allow it to be easily replicated and transferred to other areas, at local, regional, or national level.

5.4 "Framework Agreement for the acquisition of electric vehicles for passenger transport"

Website:

N/A

Objectives:

The main objective is the green transition process and then reduction of GHG emissions in the municipality. Through a POSEUR fund, the aim was to renovate the bus fleet of the sub-region's (Baixo Alentejo) municipalities with less costs. The result was the gradual acquisition of electric buses by the price of diesel buses. Overall, this project will result in better air and life quality for the sub-region and the improvement of the bus fleets, including in this case, the purchase of a smaller bus for the school transport.

Location:

City: Castro Verde

Region: Alentejo

Country: Portugal

Partners/Institutions involved:

CIMBAL - Comunidade Intermunicipal do Baixo Alentejo, Câmara Municipal de Castro Verde, Oceântia Lda.

Implementation year:

2024

Brief description:

The Intermunicipal Community of Baixo Alentejo (CIMBAL) Purchasing Centre, provided the Castro Verde Council with an electric bus with capacity for 45 passengers, including 1 seat for passengers with reduced mobility (Figure 35). The procedure included the phased acquisition of other vehicles. The CIMBAL Purchasing Centre is a centralized negotiation and acquisition system, for the benefit of 30 participating entities, its objective is to rationalize expenses, reduce bureaucracy and simplify contractual procedures.

Financial sources and financing details

Total investment value: 474.239,78 €

Sources of financing: POSEUR

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The benefits are most present in the centralization of the acquisition process, which is integrated in a series of public transport vehicles foreseen in the CIMBAL Purchasing Centre. The project enables a gradual transition to low carbon footprint transports fleet, through international public tenders that are resolved in less than 30 days. The main benefit of the project is the improvement of the air quality in the urban areas and near schools, as well as the reduction of costs related to fuel and vehicle maintenance.

Figure 35 Electric bus for public transport

Lessons Learned and Recommendations

The acquisition is recent, so there is still much to learn about the project implementation. Although the concern for the bus autonomy is already present in the planning of routes. This type of transport, and the smaller sized buses as well, are seen as ideal for school transport, as they are appropriate for smaller routes and unharmful for the children's lungs.

Transferability and replication

The framework agreement is a tool very useful for low density sub-regions, that allows for a more sustainable and gradual transition, to a low carbon public transport system. It is coordinated with another agreement for the rent of electric buses supported by the National Funds, and together they enable an opportunity for underdeveloped sub-regions to follow the national green transition objectives.

5.5 "Implementation of measures to improve the quality of life in the city of Stara Zagora, financed under the Operational Program "Environment" 2014-2020"

Website:

https://elkontrol.com/en/news/743-we-completed-the-project-for-construction-of-charging-stations-for-electric-buses-in-stara-zagora

Objectives:

The objective of the European project is to deliver 33 new electric buses along with 18 double charging stations to support sustainable urban mobility. This initiative aims to transform European cities into environmentally friendly urban spaces by promoting non-polluting transportation solutions.

Location:

City: Stara Zagora

Region: Stara Zagora

Country: Bulgaria

Partners/Institutions involved:

Municipality of Stara Zagora, the municipal company "Trolleybus and Bus Transportation", the private company "El bus truck and coach Bulgaria" LTD and the manufacturer "Irizar E-mobility"

Implementation year:

2023

Brief description:

Supplying 33 new 12-meter electric buses and associated equipment for Stara Zagora's public transportation needs. Additionally, designing and constructing two transformer stations to power the charging stations, along with the installation of cable routes to connect the charging stations.

Figure 36 Electric buses for public transport in Stara Zagora

Financial sources and financing details

Total investment value: 27 486 613,9 €

Sources of financing: Co-financed by The European union at 85% (2014-2020 Bulgarian Environment Operational Programme)

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The project aimed to achieve several benefits in urban transport, including increased efficiency, integration, and speed, while reducing energy consumption. It also sought to enhance the accessibility of secondary public transport infrastructure and introduce eco-friendly modes of urban transportation.

Lessons Learned and Recommendations

The delivery of 33 new electric buses and associated infrastructure in Stara Zagora marks a significant stride in modernizing and greening the city's public transport. This initiative, including transformer stations and cable routes for charging, has seen successes and challenges, offering insights for future endeavours. Electric buses reduce carbon emissions and pollutants, aligning with global sustainability goals, while dedicated transformer stations and charging cables lay a robust foundation for an electric transport ecosystem. Stara Zagora's commitment to clean energy positions it as a leader in sustainable public transport, enhancing public awareness of green technologies and promoting environmental responsibility. However, challenges such as high initial costs, technical complexity, operational reliability, and maintenance and training requirements persist. To address these, exploring funding opportunities, forming partnerships, investing in monitoring systems, developing training programs, launching awareness campaigns, conducting trials, and working on supportive

policies are recommended. By implementing these strategies, Stara Zagora can enhance its public transport system's sustainability and efficiency, serving as a model for other cities transitioning to clean energy transportation solutions.

Transferability and replication

To ensure successful replication of projects like the electric bus initiative in Stara Zagora, cities must approach the transition to zero-emission bus systems strategically. This involves thorough planning, pilot programs, and ongoing performance analysis. Local adaptation is crucial, considering factors like technology suitability, route prioritization, and procurement strategy tailored to each city's context. Assessing various zero-emission bus technologies available and adopting a Total Cost of Ownership (TCO) approach for procurement are essential steps. Collaboration among stakeholders and knowledge sharing are key to success, enabling cities to replicate and scale up sustainable urban mobility solutions effectively.

5.6 "APAM: fleet renewal with purchase of hydrogen and electric buses"

Website:

https://www.solarisbus.com/en/press/five-hydrogen-powered-solaris-buses-for-mantua-italy-2136

Objectives:

In line with the National Recovery and Resilience Plan (NRRP) 2024-2026 and the Minimum Environmental Criteria it provides for the renewal/replacement of a percentage of buses in the operating fleets with zero-emission vehicles, APAM has set up a major project for the introduction of so-called 'clean' buses. The aim of the investment is to implement zero-emission vehicles in the fleet for the further reduction of CO_2 emissions, in order:

1. to comply with the Italian NRP goals,
2. to support the decarbonization of the public transport buses circulating in the city of Mantova.

Location:

City: Mantova

Region: Lombardy

Country: Italy

Partners/Institutions involved:

APAM SpA (local public transport agency)

Implementation year:

2024 – 2026

Brief description:

APAM had already embarked on the road to sustainability when, in 2017, it launched the 'Methanisation' project for its bus fleet, which will be fully completed in 2024 for the urban fleet - it will continue for the intercity part. In fact, the methanisation project will be completed with the purchase of 32 new buses over the next two years, which will replace the oldest ones and increase the number of methane-powered vehicles, reaching the important goal of 93% of the urban fleet, with very low average age at 3.5 years (maximum at 10 years). From 2024 the new investment programme will begin through access to PNRR funds, and their allocation decided by MIMS Decree no. 530 of 23/12/2021, which allocated the sum of €5,390,855 to the Municipality of Mantua for the purchase of at least 8 electric or hydrogen-powered buses with related infrastructure in the period from January 2024 to June 2026. After careful evaluation of the merits, limits and technical maturity times of electric and hydrogen propulsion, the company has strategically decided to include both with the provision of a carefully planned service and the necessary infrastructure. The first two short electric buses will be purchased in 2024, with the simultaneous installation of recharging points and a system for storing electricity produced on site by the photovoltaic plant inside the depot in Via dei Toscani, while another two short electric vehicles will arrive in the first half of 2026, to complete the supply of buses destined, due to their low daily mileage and the peculiarities of electric traction of silent operation and zero emissions, to the CC Circular line that serves the city centre (Figure 37).

Four hydrogen-powered long buses will also arrive in 2026 and a suitable refuelling plant will be built inside the Mantua depot.

Figure 37 APAM's electric bus

Financial sources and financing details

Total investment value: 5.390.855 €

Sources of financing: Financed by Italian State (NextGenerationEU funds)

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

Choosing hydrogen power, despite initial higher costs for vehicles and refuelling stations, ensures zero emissions during use and higher mileage compared to electric buses. This decision also eliminates the need to replace expensive battery packs, reducing long-term maintenance costs and environmental concerns associated with battery disposal.

Lessons Learned and Recommendations

APAM, in collaboration with the Municipality of Mantua, opts to prioritize diverse green power sources to explore their unique characteristics and evolving technologies in the years ahead. This proactive approach ensures readiness for future investments, contingent upon available resources and funding channels.

Transferability and replication

The assessment of vehicle quality emphasizes two key factors: active service life and engine power supply. APAM's fleet demonstrates a significant shift, with the average service life decreasing from 7.3 years in 2023 to 5.6 years in 2024, reflecting fleet expansion and renewal. Notably, the transition towards greener technologies is evident, with the introduction of electric buses and an increase in CNG buses. By 2026, diesel buses will be phased out entirely, replaced by a fleet comprising 33 natural gas, 4 electric, and 5 hydrogen-powered buses, boasting an average lifespan of 3.1 years.

5.7 "SHared automation Operating models for Worldwide adoption- SHOW"

Website:

https://show-project.eu/

Objectives:

SHOW aims to pave the way towards effective and persuasive sustainable urban transportation by deploying shared, connected, cooperative, and electrified fleets of autonomous vehicles in various operational chains. This includes Public Transport (PT), Demand Responsive Transport (DRT), Mobility as a Service (MaaS), and Logistics as a Service (LaaS) in real-life urban demonstrations across Europe. The project involves deploying a fleet of 74 L4/L5 autonomous vehicles, including buses, shuttles, pods, robo-taxis, and automated cars, catering to passengers, cargo, and mixed transport. These vehicles will operate in dedicated lanes and mixed traffic, connected to supporting infrastructure like 5G, G5, and IoT. The initiative aims to address urban mobility needs across 20 cities by satisfying 7 families of Use Cases (UCs) and 22 single UCs. Project pilots will run for 24 months, with seamless operation in each pilot site lasting at least 12 months, transporting over 1,500,000 passengers and 350,000 units of goods with AV fleets. Led by UITP and supported by a Consortium of 77 Partners and 13 third parties, the initiative involves collaboration with 60 stakeholders and twinning actions with organizations globally.

Figure 38 SHOW automated urban mobility

Location:

City: Thessaloniki, Trikala

Region: Central Macedonia, Thessaly

Country: Greece

Partners/Institutions involved:

Union Internationale des Transports Publics, Ethniko Kentro Erevnas Kai Technologikis Anaptyxis (CERTH), European Road Transport Telematics Implementation Coordination Organisation - Intelligent Transport Systems & Services Europe, EasyMile, EasyMile GmbH, Transdev Group, Transdev Sverige AB, NAVYA, Keolis, Keolis Sverige AB, Wiener Linien GmbH & Co KG, Upstream-Next Level Mobility GmbH, Rhein-Neckar-Verkehr GmbH, e.GO MOOVE GmbH, e.GO Mobile AG, ZF Friedrichshafen AG, Empresa Municipal de Transportes de Madrid SA, Irizar e-Mobility SL, Datik Informacion Inteligente S.L, Sensible 4 Oy, Société des Transports Intercommunaux de Bruxelles SSF, Gruppo Torinese Trasporti S.P.A, Valeo Vision SAS, Siemens Mobility Austria GmbH, Ericsson AB, Ericsson GmbH, T-Systems International GmbH, Robert Bosch GmbH, Robert Bosch Car Multimedia GmbH, Eurocities ASBL, Freie Hansestadt Bremen, International Road Federation, European Passengers' Federation IVZW, Pole de Competitivite IDFORCAR, Gruau Laval SAS, Stadt Aachen, Aachener Straßenbahn und Energieversorgungs AG, Trafikselskabet Movia, Ballerup Kommune, Anaptyxiaki Etaireia Dimou Trikkaion Anaptyxiaki Anonymi Etaireia OTA, Kapsch TrafficCom AG, AVL List GmbH, AVL Software and Functions GmbH, FEV Europe GmbH, FEV IO GmbH, Swarco Italia SRL, Combitech AB, Luxoft Italy SRL, Indra Sistemas SA, Bestmile SA, Euromobilita SRO, BAX Innovation Consulting SL, IESTA - Institut für Innovative Energie- und Stoffaustauschsysteme, Sitowise Oy, ARTIN Spol. s r.o., Information Technology for Market Leadership, CTLUP SRL, JRC - Joint Research Centre - European Commission, Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek TNO, Statens Väg- och Transportforskningsinstitut, Institut Vedecom, Teknologian Tutkimuskeskus VTT Oy, Vrije Universiteit Brussel, RISE Research Institutes of Sweden AB, AustriaTech - Gesellschaft des Bundes für Technologiepolitische Maßnahmen GmbH, AIT Austrian Institute of Technology GmbH, IDIADA Automotive Technology SA, Erevnitiko

Panepistimiako Institouto Systimaton Epikoinonion Kai Ypologiston, FZI Forschungszentrum Informatik, Ethnicon Metsovion Polytechnion, Commissariat à l'énergie atomique et aux énergies alternatives, Fundacion Tecnalia Research & Innovation, Salzburg Research Forschungsgesellschaft m.b.H., Fondazione LINKS - Leading Innovation & Knowledge for Society, Danmarks Tekniske Universitet, Universita degli Studi di Genova, Centrum Dopravního Výzkumu v.v.i., Université de Genève, Virtual Vehicle Research GmbH, Deutsches Zentrum für Luft- und Raumfahrt e.V., PDCP GmbH, Bahnen der Stadt Monheim GmbH, ioki GmbH, Yunex Traffic Austria GmbH, BETI, Rhein-Main-Verkehrsverbund Servicegesellschaft mbH, traffiQ Lokale Nahverkehrsgesellschaft Frankfurt am Main mbH, Remoted Oy

Implementation year:

2024

Brief description:

On-demand automated mobility serves as a valuable addition to public transportation in Trikala, facilitating transportation in underserved suburban areas and aiding delivery services within pedestrian zones. This initiative, known as CCAM, aims to reduce the reliance on internal combustion engine vehicles in the city while fostering the development of a comprehensive multimodal transportation system aligned with the city's vision of healthier, safer, more affordable, and sustainable mobility. Specific objectives include showcasing the integration of autonomous vehicles (AVs) into public transit networks, connecting them with key points of interest such as the railway station and university, and incorporating delivery robots into pedestrian areas to meet local delivery needs.

Financial sources and financing details

Total investment value: 36.122.690,96 € (EU contribution 29,968,148.57)

Sources of financing: European Commission - Horizon 2020

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The project implementation benefits encompass a holistic approach to promoting electric mobility, enhancing transportation access, integrating advanced technologies, and fostering sustainability and community engagement. By introducing electromobility in taxi fleets and on-demand electric vehicle services, the project reduces reliance on Internal Combustion Engine (ICE) vehicles, minimizing carbon emissions and promoting environmental sustainability. Seamless integration of Autonomous Vehicles (AVs) in public transportation and deployment of delivery robots' fleets enhances transportation services within pedestrian areas. Advanced technologies like Cooperative Intelligent Transport Systems (C-ITS) optimize trips, enhance safety, and improve efficiency. EVs, coupled with renewable energy sources like solar charging, further reduce carbon emissions and environmental impact. Free-of-charge transportation services and efficient delivery solutions engage the public and local stakeholders, fostering community involvement and support. Increased accessibility and convenience lead to higher user satisfaction and acceptance of electric mobility solutions. Transitioning to electric-

powered vehicles and delivery robots reduces operational costs and environmental impact, contributing to a cleaner and healthier urban environment. These benefits collectively advance urban mobility towards a greener and more efficient future.

Lessons Learned and Recommendations

The rise of connected and automated driving is pushing for an evolution of Traffic Management systems. Especially highly automated vehicles need to be aware of everything happening on the route ahead, also beyond their own sensors. Therefore, in the future, Traffic Management should be able to support the automated vehicles' interaction and communication with their surroundings, providing the necessary data to increase road safety and efficiency. Connected and automated vehicles, with their advanced sensing systems, are also expected to enable the provision of more reliable and efficient Traffic Management services, with high quality and detailed data on the status of the road network (e.g., road conditions, traffic state and incidents that they encounter while driving, etc.).

Transferability and replication

The vision is to establish collaborative Traffic Management practices incorporating new technologies like AVs, requiring strong cooperation between public and private sectors. SHOW, with its holistic approach, aims to revolutionize urban mobility automation. It will transport over 1.5 million people and 350,000 goods containers using a fleet of 70+ vehicles across 20 European cities, setting industrial standards and involving the full autonomous PT mobility value chain. With 13 OEMs and operators, 5 tier 1 and Telco providers, and various local authorities, industries, SMEs, and academia representatives, SHOW integrates diverse geographical areas, city sizes, and business models, ensuring adaptation to local needs and technologies.

5.8 "MultiDEPART"

Website:

https://www.eiturbanmobility.eu/projects/multidepart/

Objectives:

MultiDEPART is dedicated to developing cutting-edge tools tailored for Public Transport Authorities (PTAs), aimed at streamlining the planning, management, and oversight of Demand Responsive Transport (DRT) solutions across European cities. By addressing the challenges inherent in DRT services, the project endeavors to:

1. Establish a standardized methodology and key performance indicators (KPIs) to effectively plan, design, and monitor DRT services.
2. Create simulation and decision support tools specifically designed to assist PTAs in the planning and management of DRT services.
3. Analyse various operational models, public-private collaboration frameworks, and economic models to identify best practices suitable for different urban contexts.

MultiDEPART's comprehensive approach includes the synthesis of best practices from diverse areas, ensuring the harmonization and scalability of DRT services. The project's tools have been successfully applied in cities such as Lisbon, the Barcelona Metropolitan Area, and Thessaloniki, contributing to the advancement of urban mobility solutions. Additionally, MultiDEPART benefits from co-funding provided by EIT Urban Mobility, further bolstering its efforts to address the evolving needs of public transportation systems.

Figure 39 MultiDEPART project

Location:

City: Thessaloniki

Region: Central Macedonia, Thessaly

Country: Greece

Partners/Institutions involved:

CARNET, FACTUAL, Capgemini Engineering, Universitat Politècnica de Catalunya, Carris, Aimsun, Centre for Research & Technology Hellas (CERTH), The Thessaloniki Transport Authority, Tusgsal, Nemi and Àrea Metropolitana de Barcelona (AMB).

Implementation year:

2022

Brief description:

The MultiDEPART project team has developed three key tools to aid Public Transport Authorities and Operators in scaling Demand Responsive Transit Services. These tools include a Planning tool, Dashboard, and Business tool. The project workshop will unveil these tools, ready for commercialization, showcasing their potential to support transport operators and authorities in implementing demand-responsive transportation solutions across cities and metropolitan areas. Additionally, insights from MultiDEPART city partners will be shared on how the project is shaping public transport strategies and future actions.

Financial sources and financing details

Total investment value: 944.819 €

Sources of financing: EIT Uban Mobility Co-funded by the European Union

Savings (electricity/fuel): N/A

Cost savings: N/A

Project implementation benefits

The MultiDEPART project aims to create tools for DRT planning and management, targeting PTAs to streamline services across European cities. It defines a common methodology and KPIs, develops simulation tools, and characterizes operational models. Solutions are trialed in Lisbon, Barcelona, and Thessaloniki. Capgemini and KMF Ventures will market the tools, aiding operators. The toolkit includes planning, dashboard, and business tools. Pilots ran from March 2021 to March 2022, involving Barcelona, Thessalonica, and Lisbon. UPC collaborated on the planning tool with AIMSUN.

Lessons Learned and Recommendations

DRT services are gaining momentum in Europe, especially in medium and small cities and in the low-density suburbs surrounding large metropolitan areas. DRT, also known as Bus On Demand or Microtransit, enables the provision of public transport service through flexible routes and schedules, based on actual demand collected from users through digital or other communication tools. A concept widely known and exploited for many years in rural areas (mostly based on telephone calls and manual routing of services), it has a growing potential to solve accessibility in low-demand urban areas thanks to the digitisation of public transport and the massive adoption of mobile phones by many segments of the population.

Transferability and replication

Even though the project finished on 31 March 2022, the project partners have already been able to secure 2 new pilots in which the tools developed will be deployed for new demand-responsive services: one in Thessaloniki (Greece) and another one in Lisbon (Portugal).

6 Conclusion

The "MED Guide of Good Practices on Sustainable Mobility" emerges as an indispensable resource in the quest for sustainable transportation solutions in the Mediterranean region. This document compiles and analyses exemplary initiatives in three crucial areas: EV charging infrastructure, shared sustainable mobility schemes, and the integration of electric vehicles with existing transport systems. By highlighting these areas, the guide provides a well-rounded perspective on how various regions are advancing urban mobility, reducing emissions, and promoting eco-friendly transportation options.

The guide's findings underscore the multifaceted efforts undertaken across the Mediterranean to foster sustainable urban mobility. In the realm of EV charging infrastructure, the projects highlighted showcase the importance of robust and accessible charging networks. These initiatives illustrate how collaboration between public and private sectors, combined with innovative technologies like augmented reality and interoperable charging protocols, can significantly enhance the adoption and utilization of electric vehicles.

In the area of shared sustainable mobility, the guide presents a diverse array of innovative projects that enhance eco-friendly transportation options. From on-demand transport services to public bicycle-sharing systems and the introduction of electric vehicle fleets, these initiatives demonstrate the potential for creating more efficient and sustainable transport systems. By focusing on policy improvements and infrastructure development, these projects support a shift towards low-carbon mobility, contributing to the reduction of emissions and the creation of more liveable urban environments.

Furthermore, the guide emphasizes the significance of integrating sustainable mobility solutions with existing transport systems. By enabling easy access to real-time information and promoting multimodal travel, these initiatives enhance the user experience and encourage the adoption of sustainable transport options. The establishment of interregional electromobility networks and the modernization of public transportation fleets with electric and hydrogen-powered vehicles are key examples of how technological advancements and collaborative efforts can lead to more sustainable and efficient transportation systems.

The "MED Guide of Good Practices on Sustainable Mobility" serves as a testament to the collective commitment to fostering a greener and more resilient future for the Mediterranean region. Through the identification and capitalization of innovative policies, the guide aims to inspire stakeholders to embrace sustainable mobility solutions and drive transformative change in transportation. By promoting knowledge sharing and fostering collaboration, the document provides a comprehensive roadmap for policy improvements, infrastructure development, and the implementation of sustainable transport systems.

For partners and the wider community, the guide offers a wealth of insights and practical examples that can be replicated and adapted to various contexts. It serves as both an inspiration and a practical tool for implementing sustainable mobility solutions, providing a foundation for a more resilient and environmentally friendly future. The examples from this guide will be valuable for the future development of project deliverables and the implementation phase of pilot actions. It acts as the initial step in identifying potential synergies

between the good practices mentioned in this document and the deliverables or pilot actions that are forthcoming.

The positive impacts of this guide are far-reaching, paving the way for a collective commitment to sustainability and the creation of more sustainable and efficient transportation systems in the Mediterranean region and beyond.

By the end of July 2024, the partnership identified the following good practices and their possible uses and synergies in the framework of the activities to be developed by RuralMED Mobility. These final 12 good practices are considered by the partnership the most valuable experiences and they will be replicated and adapted to our project, especially in WP2 and WP3, that are the "core work packages" in the sense that they develop the pilot regional actions (investments), the regional/local strategies and are also subject to the evaluation activities in WP4.

Category	Good Practice	RuralMED WP or Activity	Uses and synergies for RuralMED Mobility
Good practices on EV charging infrastructure	3.1 URBANSOL cross-border integrated electric mobility e-charger network	WP 2 WP·3	This GP is especially useful for the development of interoperable charging points, which is one of the features of many of the investments in the project. In this case it also included interoperability among 2 different countries, which makes it very relevant. URBANSOL has removed a major barrier to electric vehicle adoption by unifying different charging point operators through the "Open InterCharge Protocol" provided by the SGRU app. URBANSOL and other cross-border interoperable networks have shown locally or regionally that these solutions are feasible, even in relatively isolated and poor areas of Europe such as Extremadura, Alentejo and Regiâo Centro, but their results need to be implemented in other different cross-border areas in isolated areas of the MED space to check the case with other

			EV charging networks, protocols and users.
Good practices on EV charging infrastructure	3.2 MOVES III Plan - Incentives for Efficient and Sustainable Mobility	A2.4	This GP is relevant and valuable for the design of local/regional strategies and policy tools, hence, A2.4 could benefit from this information. The MOVES III initiative has garnered substantial interest, with 27,558 requests for electric vehicle acquisitions and 15,358 requests for charging infrastructure installations. On average, requests amounted to 4,174 € for vehicles and 6,128 € for infrastructure. Of these, 18,460 vehicle requests and 8,575 infrastructure requests were approved. Other regional and municipal governments can learn from Catalonia's experience and replicate a similar approach to promoting electric mobility in their own areas. Collaboration between government institutions, private companies, and civil society is key to the success of similar programs elsewhere
Good practices on EV charging infrastructure	3.3 Electric mobility in Portugal - Mobi.E Network	WP 2 WP·3	Related to GP 3.1, This GP is especially useful for the development of interoperable charging points. It is also at the same time an important example of the role that public institutions can have when facilitating the use of common standard protocols.
Good practices on EV charging infrastructure	3.5 Electric vehicle competence and experience centre – EVCC	A4.2 A4.3	Main points of the project were: Increasing the capacity of the expert personnel of beneficiaries, the technical experts, spatial planers, and other expert personnel, and increasing the awareness of sustainable mobility options among the citizens,

			This project has enabled the partners to achieve significant results in promoting electromobility. By organizing workshops and information days, the project has raised public awareness. This GP will be especially useful in A4.2, A4.3
Good practices on EV charging infrastructure	3.12 EMOBICITY	A2.4 A4.2 A4.3	EMOBICITY aims to strengthen the capacities of all key-stakeholders on e-mobility, especially regarding policy making, through workshops, study visits and peer reviews, as well as to raise public awareness. The project also helped introduce tax incentives for companies to acquire e-vehicles, regulated the e-vehicles market and charging services, and created a subsidy scheme (Go Electric) for electric vehicle acquisition by companies and individuals
Good practices on shared sustainable mobility schemes	4.1 TADEX Transport On Demand service in Extremadura	WP 2 WP·3	This GP is very relevant for the planning and implementation of transport-on-demand solutions, which is one of the of the "Mobility as a Service" uses that should be planned and simulated in WP2 and implemented in WP3. Provision of public transport can have low cost-effectiveness in areas of low use, or in areas with low population densities, but it is an absolute necessity for parts of the community without access to private vehicles. Encouraging greater use of public transport is also a major part of strategies to reduce carbon emissions. Demand-responsive transport can provide a solution, making public transport available to

			those who need it, but running only when there is a need.
Good practices on shared sustainable mobility schemes	4.6 Municipal public sector car-sharing system	WP 2 WP·3 A4.3	This GP is quite relevant for the planning and implementation of shared transport solutions, which is one of the of the "Mobility as a Service" uses that should be planned and simulated in WP2 and implemented in WP3. It also constitutes a good example of awareness-raising campaign. This customized sharing system offers a variety of BEV types, including small vehicles for utility services, 8+1-seater e-vans for school trips/excursions, and other vehicles. Users can book vehicles per hour or for several days through an internal booking platform provided by the e-mobility expert company. To promote fleet optimization, targeted awareness campaigns were conducted among public institutions and the general public to showcase project benefits. Regular open-door events provide opportunities for civil society to interact with the project, including testing vehicles and learning about its objectives.
Good practices on shared sustainable mobility schemes	4.10 Improving shared mobility policies to support a shift away from private car use and move towards more sustainable options - SMAPE		The Shared Mobility Action Programmes Exchange (SMAPE) project aims to improve shared mobility policies. More specifically, the project did focus on aspects like shared mobility integration with public transport and Mobility as a Service. the project's main goals are promoting sustainable multimodal urban mobility, optimizing the mix of mobility modes, and integrating shared mobility in local mobility networks and MaaS systems

			This GP revealed the importance of creating a permanent stakeholder group at local level, aimed at address mobility challenges, committed to actively participate and contribute to future shared mobility initiatives,
Good practices on shared sustainable mobility schemes	4.11 Green Inter-e-Mobility"	A2.4	The main objective was to design and apply an energy-efficient, regional intelligent transportation system (ITS). It also included the installation of charging points, the procurement of public EV to be used as regular public transport and/or individual rental, with a booking system (online or phone). In terms of innovative solutions, this GP is especially relevant when developing or upgrading mobility strategies, as the ITS was partially centered on the connection of rural citizens to the services provided in bigger towns, which is one of the drivers of RuralMED.
Good practices on sustainable mobility integration with other transport systems	5.1 Open data platform on public transportation for the City of Cáceres	A2.2	The open data service on public transport in Cáceres aims to share all the information (stops, lines, fares, schedules, real time bus location and combined routes). The information is free and can be found and downloaded. It also includes datasets and apps regarding bike and motorbike parking facilities, taxi, tourist routes and public parking lots availability around ATMs. If a city has information available, joining all of it in a single platform may be useful. It is needed to join efforts with the local transport operators, so

			they make important information available, and have the technical skills to translate the data into open data formats. This experience can serve as an excellent example to be replicated in our project when designing the project's platform in A2.2
Good practices on sustainable mobility integration with other transport systems	5.2 ENERNETMOB Mediterranean Interregional Electromobility Networks for intermodal and interurban low carbon transport systems	WP2	Probably one of the most valuable experiences for our project if not the most valuable. The EnerNetMob project aimed to enhance the capacity for planning and implementing Interregional Electromobility Networks. It demonstrated the importance of integrating small-scale charging infrastructures to improve accessibility and usability for EV owners. By connecting regional networks, it aims to assess the viability of local charging networks. Also, it leveraged existing interoperable charging protocols like the Open Charge Point Protocol (OCPP). The ICT Platform was designed to allow: • the management and monitoring of charging infrastructures, • the interconnection of local small scale infrastructure networks in a wider Interregional Electromobility Network. Our project will directly adapt some of the tools of the ICT platform, it will also use the know-how created by CIMNE (participant in both projects) when facilitating the interoperability of charging points in their areas and,

			whenever possible, among RuralMED's participants. It is relevant in all the pilot preparation activities (WP2), covering many aspects, hence it's importance. It is also part of the know-hoe of CIMNE, who is the main ICT reference in RuralMED.
Good practices on sustainable mobility integration with other transport systems	5.8 MultiDEPART	WP2 WP3	Very relevant as it developed and created the capacities to develop demand-responsive transport services in regular transport operators and civil servants. As we know, transport-on-demand solutions is one of the goals of the most advanced pilots in our project and the example of this GP will be closely analyzed. Given the central role of transport uses (including MaaS solutions) in our project, this GP is relevant both for the pilot preparation and implementation, the strategy definition and the technological point of view, so both WP2 and WP3 will be impacted by this GP.