



USER-CHI

CHARGING YOUR E-MOBILITY FUTURE

REPLICATION BOOKLET



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Replication Booklet

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USER CHI

CHARGING
YOUR
E-MOBILITY
FUTURE

USER-CHI is an industry powered, city driven, and user-centric project that co-created and demonstrated **smart charging solutions** around **7 connecting nodes** of the Mediterranean and Scandinavian-Mediterranean Trans European Network-Transport (TEN-T) corridors between February 2020 and July 2024.

[Check out our videos](#) ▾



CLICK
CHARGING LOCATION AND HOLISTIC PLANNING KIT
An online tool for the location planning of new charging infrastructure in cities and TEN-T corridors.

INCAR
INTEROPERABILITY, CHARGING AND PARKING PLATFORM
INCAR is an advanced platform providing seamless access to EV charging points with innovative features like interoperability, roaming, park & charge booking, and real-time information. It supports various stakeholders, including CPOs, micro-CPOs, EMSPs, and casual EV drivers, by offering customized services and automating billing. The INCAR app enhances user experience by displaying charging station availability, tariffs, and enabling booking, payment options and management of the charging session.

SMAC
SMART CHARGING TOOL
A tool providing smart grid integration and demand management services for slow, medium, fast and ultrafast charging.

INSOC
INTEGRATED SOLAR DC CHARGING FOR LIGHT ELECTRONIC VEHICLES (LEVS)
A solution offering charging and parking for Light Electric Vehicles using clean energy from integrated PV canopy.

INDUCAR
INDUCTIVE CHARGING FOR E-CARS
A wireless and highly automated charging solution for e-cars.

STATIONS OF THE FUTURE HANDBOOK
Guidelines and recommendations to design the perfect user-centric charging station of the future.

EMOBEST
E-MOBILITY REPLICATION AND BEST PRACTICE CLUSTER
A collaboration platform to facilitate the transfer of best practices among the demonstration and replication cities.

INFRA
INTEROPERABILITY FRAMEWORK
A package of rules, guidelines and recommendations to support highly interoperable processes among the electromobility stakeholders



Roadmap of replication milestone

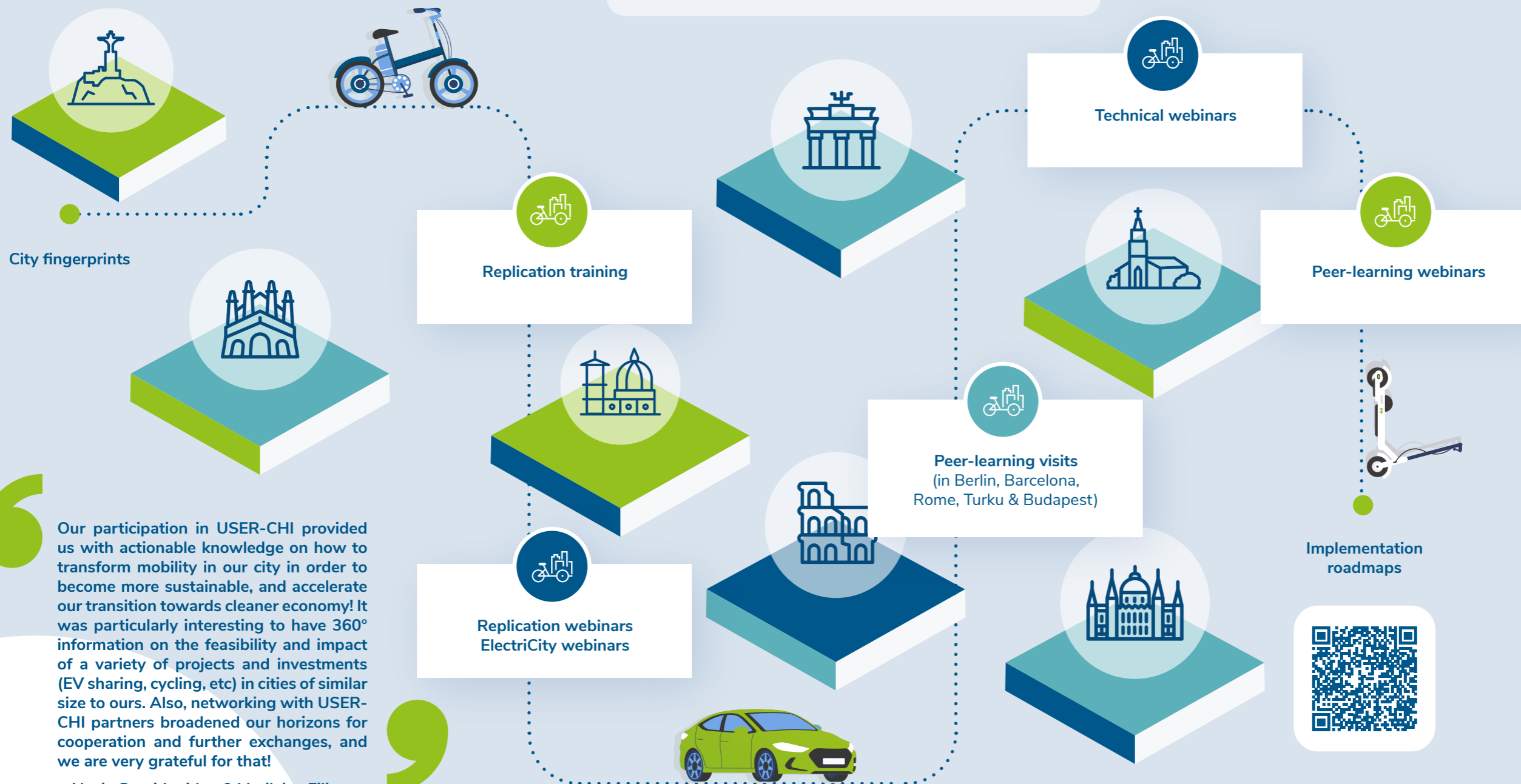
10 FELLOW CITIES joined USER-CHI replication programme

Their questions, feedback, and reports helped identify the replication potential of different solutions and fostered discussions on how to boost the widespread adoption of urban electromobility across Europe and the role of cities in this process.



« Taking part in the USER-CHI programme was a great opportunity to learn from the experiences of contemporaries working in different European cities on the shared objective of seeking to decarbonise transport and move towards city scale infrastructure to support EV uptake. This is, of course, one of the key components to the broader work required to tackle the climate emergency.» »

Andy Hickford
Senior Project Manager
Leeds City Council



- ### List of the fellow cities
- Leeds UK
 - Lisbon Portugal
 - Göteborg Sweden
 - Bucharest Romania
 - Hannover Germany
 - Karditsa Greece
 - Venice Italy
 - Graz Austria
 - Sarajevo Bosnia and Herzegovina

“ Our participation in USER-CHI provided us with actionable knowledge on how to transform mobility in our city in order to become more sustainable, and accelerate our transition towards cleaner economy! It was particularly interesting to have 360° information on the feasibility and impact of a variety of projects and investments (EV sharing, cycling, etc) in cities of similar size to ours. Also, networking with USER-CHI partners broadened our horizons for cooperation and further exchanges, and we are very grateful for that!

Alexia Spyridonidou & Vasileios Filippou
Climate Neutrality Advisors
Karditsa, Greece



FOCUS ON

BARCELONA

SOLUTIONS DEMONSTRATED :
CLICK, INDUCAR, INCAR, SMAC & INSOC
 PARTNERS : Àrea Metropolitana de Barcelona

INCAR ⚡



- **3 charging points** available on the INCAR platform & App
- **24 hours** accessible charging points in public spaces
- For both *private* and *professional* EV drivers
- For now, the charging is **free of charge** on USER-CHI chargers
- The entire AMB charging network offers a public service that is accessible to **any EV user.** 🚗 🚲 🛴



TIPS FOR REPLICATION

Plan ahead! Grid connection and permitting procedures can take longer than expected and may delay the installation of your charging station.

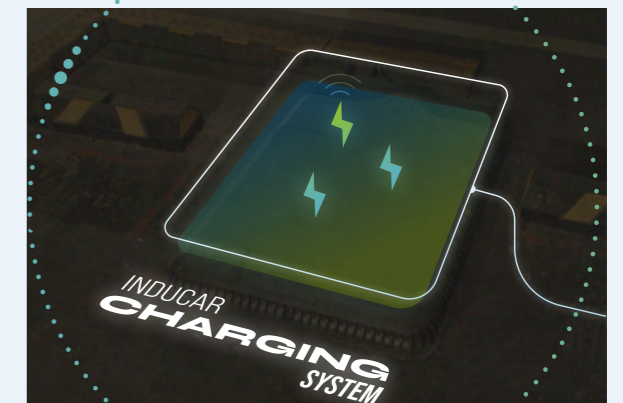
TIPS FOR REPLICATION

The charging service provider must be contractually engaged in implementing new Open Charge Point Protocol (OCPP) necessary for new and future charging features, such as energy balancing, monetary transactions, and platform integration.

INDUCAR ⚡

The **INDUCAR** solution was specifically designed to be tested on AMB premises :

- 2 retrofitted vehicles used
- Administration's employees involved as EV users
- 2 charging pads installed and reserved for wireless charging at the AMB HQ parking premises



TIPS FOR REPLICATION

Ensure that your fleet or vehicle is modern enough to support **CCS communication** for wireless retrofitting.

LESSONS LEARNED

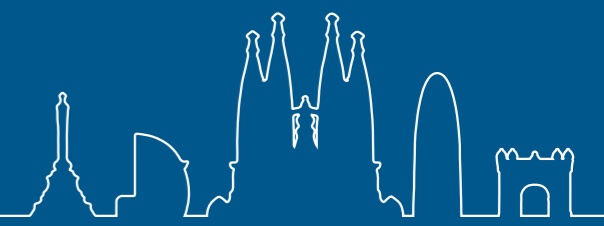
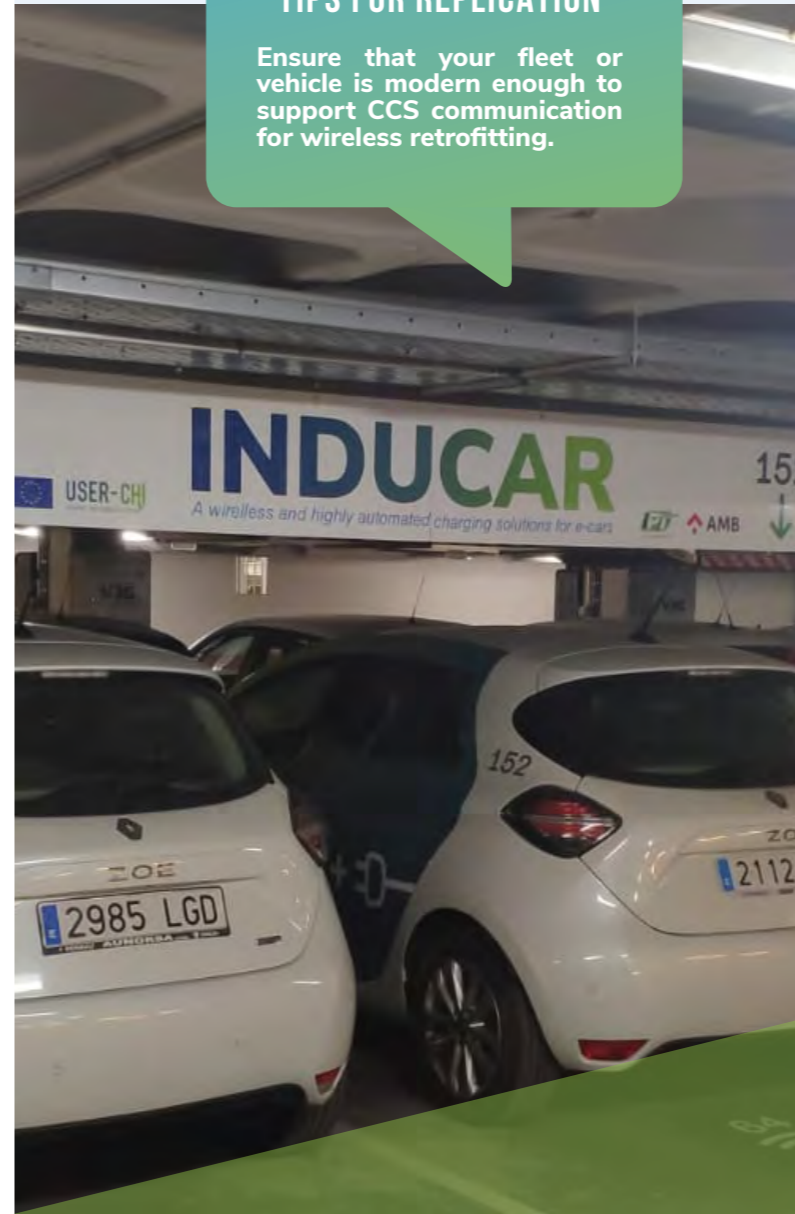
CHALLENGES

- More flexibility needs to be provided in parking positions.
- There is a need to improve compatibility between the vehicles and charging stations.
- The special permitting process required for retrofitted vehicles before they can be driven needs to be considered.

LESSONS LEARNED

OPPORTUNITIES

- There is significant potential for installing inductive charging points in underground parking areas and for company fleets.
- The charging process is more convenient for users as it eliminates the need to handle cables.
- The equipment is less visually intrusive.
- The charging station is simple to install, requiring only a Schuko outlet to connect the pad.





TIPS FOR REPLICATION

Handbooks and user-friendly guides are essential for boosting the use of such decision support system tools.

INSOC ⚡



Fundesplai Centre Esplai
Youth hostel



- **A low-power charging station** for light electric vehicles (LEVs) was installed.
- Employees of the hostel were provided with **4 electric bikes** and tested them for their daily commute to work.
- The test users had access to **free charging at the INSOC station** on the hostel premises.



TIPS FOR REPLICATION

Charging stations for e-bikes in public spaces need extra security and anti-theft parking systems to ensure users feel safe leaving their bikes for several hours.

TIPS FOR REPLICATION

As e-bikes have components around the bike wheel, the parking system should avoid contact with the wheels.

LESSONS LEARNED

- Need for sustainable use cases : Shared LEVs and their use are creating tensions and conflicts in many European cities. Sustainable use cases need to be developed to operate them effectively in urban environments.
- Assess the priorities : Most LEVs can charge using a normal Schuko socket, do not require extra power, and are easy to install indoors. Therefore, the need for public charging solutions for LEVs does not seem to be a high priority and the added value of public charging stations for LEVs lies in providing appropriate and secure parking solutions for these vehicles.

CLICK ⚡

- **CLICK** is being used in the Geographic Information System (GIS) department of **AMB** and their collaborators.
- **AMB** relies on local municipalities to provide their own data and preferences for the deployment of the network.
- The results will be used internally to compare with the current locations decided.
- If the results differ significantly, **AMB** may include the **CLICK** criteria for future tenders in a new extension of the charging stations network.



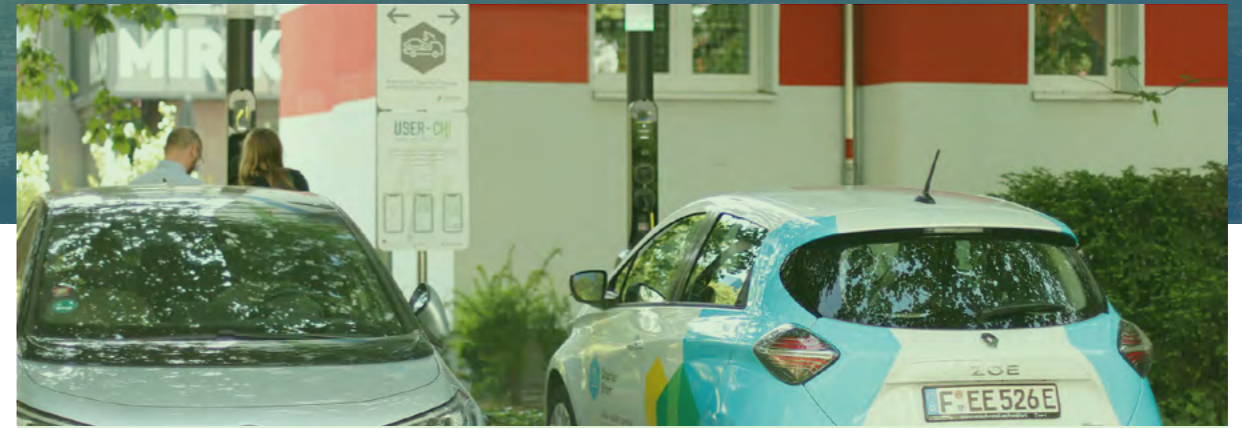


FOCUS ON

BERLIN

SOLUTIONS DEMONSTRATED :
CLICK, INCAR

PARTNERS : Gewobag (housing company), Qwello (CPO), VMZ (technology provider)



INCAR



USER-CHI PARTNERS IN BERLIN demonstrated :

6 publicly accessible AC chargers in 2 different private car parks.

Users Private and professional drivers.

Locations Innovative business model and user-friendly location

A housing company rents private parking spaces to **charge point operators (CPOs)**. CPOs equip these spaces with **charging infrastructure** and make them **available for public use**.



TIPS FOR REPLICATION

Targeted communication and incentives are crucial to engage users and promote the new and innovative charging solutions! Explore the VMZ and Gewobag [communication campaign](#), which effectively combines social media posts, in-person activities, user guidance, and local press promotion to engage and inform the public.

LESSONS LEARNED

This business model promotes the efficient use of existing private infrastructure and supports the expansion of publicly accessible charging networks in urban areas. It addresses the growing demand for publicly accessible charging stations and optimizes the use of private property with advantages for all parties involved.

Property owners :

- increase revenue by optimizing the use of their parking properties, offering them at higher rental rates.

Charge Point Operators (CPOs) :

- faster installation and easier operation of their charging stations due to fewer permits required compared to public spaces.
- further income generated by charging for parking time in addition to revenue from electricity sales.
- revenue-sharing agreements with property owners are established to share income from charging sessions and parking fees based on pre-agreed terms.

EV drivers :

- greater choice of charging options due to access to reservable and secure parking and charging spaces.

THE RESPONSIBILITIES OF EACH PARTNER are as follows

Property Owner

The property owner is responsible for the maintenance of the car park, which includes ensuring adequate and operational lighting, cleanliness of the car park, proper signage, maintenance of access barriers and removal of hazards.



Charging Point Operator (CPO)

The Charge Point Operator (CPO) is responsible for installation, operation and maintenance of the charging points. Additionally, the CPO ensures that the charging points remain operational and is obligated to resolve any technical issues that may arise.

E-Mobility Service Provider (EMSP)

The E-Mobility Service Provider (EMSP) makes the charging points accessible to the public through a mobile application, such as the INCAR app. The mobile app caters to a large user base of electric vehicle drivers, allowing them to locate and reserve the charging points, start and stop the charging sessions, and make cashless payment, which simplifies the entire parking and charging process.

Looking at the bigger picture

The seamless integration of charging infrastructure into private parking spaces represents a significant step forward in building a robust, inclusive, and user-friendly electric vehicle ecosystem. The model is replicable and scalable, allowing for expansion to different types of properties (e.g., commercial real estate) and geographic regions, thereby fostering more widespread adoption of electric vehicles.



Read [Eurocities article on the deployment of public off-street charging infrastructure in Berlin](#).





FOCUS ON

BUDAPEST

SOLUTIONS DEMONSTRATED :
INCAR, SMAC & CLICK

PARTNERS : Municipality of Budapest, BKK (public transport agency), E.ON (CPO)

INCAR ⚡



6 AC chargers have been installed across **4 different locations in Budapest** to test integration with the INCAR app.

This deployment is part of the **MOBILITY POINT NETWORK CONCEPT** that Budapest has been developing since 2020:

3-level service structure

- MicroMobility points (Mobi)
- Mobility points
- Mobility stations

The deployment of each service level depends on the **modes and technologies involved**, as well as **user demand**.

4 e-mobility points and stations

equipped with USER-CHI chargers integrated with INCAR

Used by **car-sharing companies** and **private EV users**.



TIPS FOR REPLICATION

Designing sustainable and future-proof business models with all parties involved is essential before investing in the deployment of charging points.

Take a look at our **STATIONS OF THE FUTURE HANDBOOK** to learn more about sustainable business models for charging infrastructure.



Find out more [here](#) on the « mobility station concept » in Budapest, developed jointly by the Municipality and the public transport company BKK.

CLICK ⚡

The Department for Climate and Environmental Affairs at the Municipality of Budapest, along with the Strategy and Mobility Development Directorates of BKK, tested the CLICK planning tool :

- The results and recommendations are being integrated into Budapest's e-mobility strategy, (currently under development).
- In the long run, **CLICK** will serve as a supporting planning tool for future charging infrastructure.

LESSONS LEARNED

- A decision-support system tool like CLICK is essential for cities, aiding in the planning of their future charging infrastructure. However, CLICK is not a stand-alone solution. In Budapest, it was used in combination with traffic modelling data to cross-check and validate results from current planning strategies.



LESSONS LEARNED

- Build capacity to address the ever-changing landscape of electric mobility:

Electric mobility is a fast-changing ecosystem, influenced by growing demand, advancements in charging technology, vehicle innovations, evolving standards, legislation, and energy availability. Cities often lack the technical capacity, human

resources, and knowledge to keep up with these changes. Therefore, dedicated departments should be established in each city to develop and ensure the proper expertise.

- Think strategically and involve your stakeholders:

Municipalities should develop clear and transparent deployment strategies for charging infrastructure. This includes defining stakeholder roles and responsibilities, as well as providing guidelines on business models and revenue schemes.

PARTNERS : Roma Servizi per la Mobilità (public transport agency), ENELX Way (charging solutions provider)



FOCUS ON

ROME

SOLUTIONS DEMONSTRATED :

INCAR, INSOC, CLICK



INCAR ⚡



The partners in Rome are demonstrating the integration of the whole Roman network of ENELX into the INCAR app.

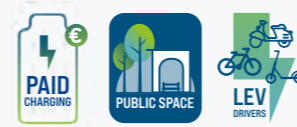
- Around **100 chargers** are now accessible via the INCAR app.
- **Slow, medium and fast** chargers are available.
- This integration aims to test the interoperability and automation of processes and payments between ENEL X as a CPO and ETRA as an eMSP.
- Roma Servizi per la Mobilità is offering a monetary incentive to users charging through the **INCAR app** and has launched an information campaign.



TIPS FOR REPLICATION

It is possible to combine the use of an existing service app with the demonstration of a new and innovative app. The ENEL X app is informing users that they can switch to the INCAR app and receive a discount for testing the services and completing a feedback questionnaire.

INSOC ⚡



- INSOC is being tested in a **publicly accessible private area** near Garbatella metro station in the Ostiense area.
- The charging station is accessible **24/7**.
- It can be used to charge **electric bikes and e-kick scooters**.
- The station is equipped with **6 wireless charging spots**, integrated theft-proof mechanical rack for personal locking, payment services and on-site produced **renewable energy** through the photovoltaic canopy present on the roof of the station.

LESSONS LEARNED

- **Fit for commuters** : INSOC product improves the management of electric light vehicles parking and fleet through a single hub as collection point in Ostiense area. In this area, there is a huge number of commuters and citizens that work and live.

CLICK ⚡

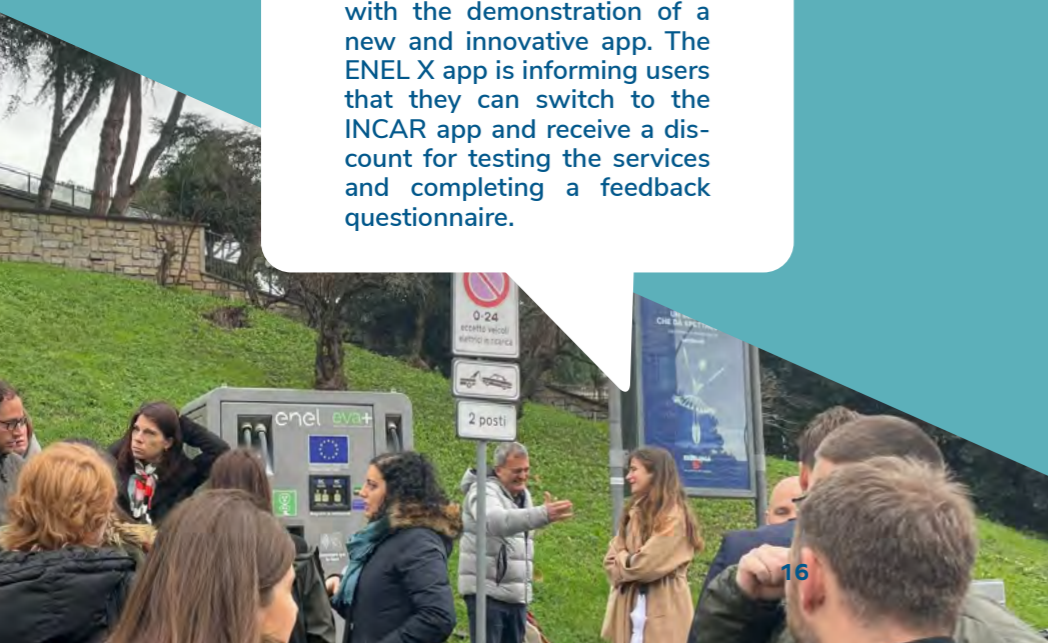
- Roma Servizi per la Mobilità (**RSM**), in cooperation with the Municipality of Rome, has drafted a suitable amendment to the existing Electric Mobility Plan and has developed a model for identifying areas in need of electric charging points.
- RSM technicians, who are directly involved in planning the charging points and amending the Electric Mobility Plan, have tested the **CLICK tool**.
- The areas identified by the CLICK tool will be put out to tender for operators of charging points.
- According to the model, the locations of the charging points are determined by the density of residents and employees and their connection to the electricity distribution network.

LESSONS LEARNED

- In terms of urban planning, the tests of the CLICK product were instrumental in expanding the variables included in the model implemented by RSM for locating charging points in public areas. This use of CLICK is highly replicable as it is applicable to any urban area.

SMAC ⚡

ENEL X will test the SMAC tool using three V2G chargers on the company fleet and on company premises.



PARTNERS : City of Turku, Turku Energia (energy company), TVT ASUNNOT OY (housing company), VASO (housing company) and IGL-Technologies Oy (technology provider).



FOCUS ON

TURKU

SOLUTIONS DEMONSTRATED :
INCAR, SMAC, INSOC, CLICK

The consortium :

In Turku, a local consortium was formed to test and demonstrate USER-CHI solutions in different settings.

2 housing companies



1 energy company



The City of Turku



The Finnish technology provider IGL-Technologies Oy



which manufactures the charging devices, developed a back-end system compatible with the INCAR application as part of the project and also operates the charging devices on the properties.



INSOC use case



The housing company TVT seized the opportunity of their new residential building to test different and innovative ways of charging LEVs as a means to promote their use :

- An INSOC station with six charging points was installed.
- Freely available to all local residents and other commuters.
- Allows for the charging of light electric vehicles, such as electric bicycles and scooters. charging cabinet was installed for safe charging of electric bike batteries inside the building; The battery, removed from the bike, is charged in a compartment that can be opened with an app, ensuring that any malfunction does not pose a fire hazard to the surroundings.

- Separate area for electric senior scooters in the bike storage: This charging area for senior scooters was designed in collaboration with the City of Turku's accessibility board. These indoor functions are available only to the residents of the building.



TIPS FOR REPLICATION

Are you interested in ensuring accessibility of charging infrastructure to all users? Check out our resources here.

TURKU ENERGIA

INCAR use case

26 load-managed charging points, each with a maximum charging power of 22 kW:

- **6 charging points** installed in the parking area of Turku Energia's new headquarters in Kupittaa (for both private vehicles and the company fleet).
- **20 charging points** in front of the office building in Turku Harbor (available to all EV drivers, targeting local workers and boat cruise passengers)



SMAC use case

Turku Energia's Kupittaa office and the office building at Turku Harbor are equipped with electric vehicle charging devices, solar panels, and battery solutions, enabling the testing of the SMAC tool. TVT has been testing intelligent and dynamic demand management since January 2024, allowing the CPO to optimize energy-related costs and enhance the use of renewable energy sources. Additionally, Turku Energia's Kupittaa office venue is equipped with a V2G (Vehicle to Grid) charger, allowing for the piloting of this new charging technology and further development of the SMAC tool.

TIPS FOR REPLICATION

Future-proof your chargers by equipping them with features that allow for smart charging and V2G capabilities.



INCAR ⚡ use case

INCAR-compatible chargers installed at VASO Pääskytuorenrinne's new housing development :

6 22kW chargers intended for residents

- 1 charger for public use.
- chargers are also connected to PV panels and battery storage inverters.



SMAC ⚡ use case

In collaboration with Turku Energia, VASO has developed intelligent electricity control for the VASO Pääskytuorenrinne pilot site. The property is managed with a system that integrates the entire property's energy consumption and production. This system connects to the solar panels, electric vehicle charging, property electricity consumption, battery storage, and hourly-priced electricity. The goal is to maximize benefits for the property owner without compromising the use of controlled loads. For example, consumption management prioritizes chargers that have been in use the longest, and consumption during expensive hours is managed with electricity stored in the batteries.

LESSONS LEARNED

The integration of all charging features (location, booking, session management, integration of RES and demand management) into a single application/platform is highly advantageous and ensures more efficient management of charging demand.



TIPS FOR REPLICATION

Participation in EU-funded research projects allows cities to expand their perspectives and better understand the rapidly changing technologies and innovations in the field of electric mobility.

INSOC ⚡ use case

In June 2023, the City of Turku installed a new portable bike garage in Kupittaa train station area :

- Secure storage, electric charging for e-bikes, and maintenance for bicycles and other small vehicles.
- The bike garage can be disassembled into three parts and transported to a new location if needed.
- Capacity around 40 bicycles, including space for cargo bikes and bicycle maintenance.
- The garage features the INSOC charging device integrated with the INCAR app. Thanks to the solar panels and battery system installed on the roof, the bike garage is energy-positive. The services provided by the garage are free and available to everyone.



CLICK ⚡ and Turku charging masterplan

The Urban Mobility solutions department of the City of Turku used the CLICK tool to determine the optimal locations for the charging network. The CLICK tool's proposal for the charging network in Turku for the year 2030 includes about 2,000 charging points. The data from the CLICK tool is supplemented by the results of an electric charging survey. This data is supplemented by the results of an electric charging survey, which support the recommendations by CLICK. From these results, a plan was created for the phased opening of charging points.



Everything you want to know about Turku electric charging masterplan...

The city of Turku has designed an electric charging masterplan within the framework of USER-CHI project. The plan covers all publicly available charging points on both municipal and privately-owned land. The development of the public charging network will be tied to the increase in the number of electric vehicles, and the actual number of charging points will be monitored annually. For the charging network, the city will use the «charging street» model, where one charging station has multiple charging points (ranging from 4 to 20) depending on the purpose and power requirements of the station. The general plan also defines guidelines for payment, cost structures, accessibility, signage, and parking enforcement for charging points. The city's goal is to ensure that the charging network becomes a functional and cohesive system that is conve-

The safety of the garage is ensured by a surveillance camera and lighting. Accessibility has been considered in the design, with easy access via a ramp and sliding doors that open with a motion sensor.

Two exterior walls of the bike garage are decorated with an artwork by artist Heidi Vuorio titled «Watt is Love.» The piece was selected through a public and jury vote from ideas and proposals submitted for the competition.

The bike garage window also features a display providing useful information, including schedules for nearby buses and trains, a map of the nearest bus stops, information on the mural, details about the services offered, and information about the USER-CHI project.

TIPS FOR REPLICATION

Are you interested in ensuring accessibility of charging infrastructure to all users? Check out our resources [here](#).

LESSONS LEARNED

This type of portable garage can be a solution to the lack of safe parking solutions and maintenance services in cities where the modal split is rapidly shifting towards cycling. It integrates easily into the urban environment and is well-received by residents, especially thanks to the inclusion of artwork.

TIPS FOR REPLICATION

Include extensive options in tenders for charging points to allow for future scalability. This ensures that the size and technology of the charging network can be easily expanded as budget and needs permit.

LESSONS LEARNED

- A decision-support system tool like CLICK can help a city design its masterplan. Beyond determining the size of the charging network, insights on placement and grid power requirements are highly valuable and can guide public authorities in tailoring their charging network to specific urban constraints.
- Learning from others: The City of Turku was inspired by the city of Stockholm's charging network, which has proven effective. A study visit to Berlin also highlighted the risks of a scattered network.
- Turku is particularly focused on developing the city center's charging network, as private entities do not have the same development opportunities in the center as they do outside. Therefore, Turku aims to create a sufficient charging network in the city center to effectively accelerate the electrification of private car use. In other areas, the charging network relies more on private charging at home and on commercial premises.



FOCUS ON

FLORENCE

SOLUTIONS DEMONSTRATED :
INSOC & CLICK

INSOC ⚡

- The **INSOC** charging station has been installed at the Ponte a Greve Park&Ride facility.
- The station features 6 wireless charging spots and uses on-site produced renewable energy from the photovoltaic canopy on the station's roof.

LESSONS LEARNED

- The **INSOC** station is an excellent example of integrating LEV charging infrastructure within a multimodal transport system.
- This new **Park&Ride** facility is one of the largest parking lots in the city, with 324 spots, serving the tramway and including a cycle path. It was created using European funds and enhances access to the tramway while improving traffic flow in the Ponte a Greve area.
- 230 meters of cycle path have been added along the perimeter of the car park to connect it to the rest of the cycling path network.



FOCUS ON

MURCIA

SOLUTIONS DEMONSTRATED :
INSOC & CLICK

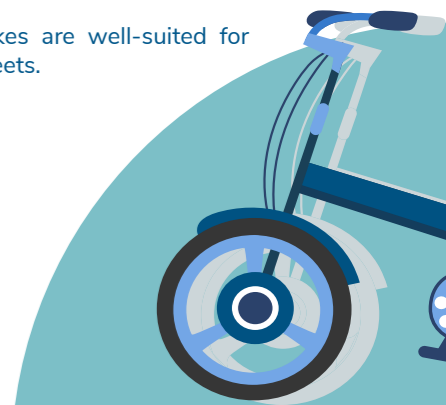
INSOC ⚡

The City of **Murcia** installed an **INSOC** charging station under an existing photovoltaic (PV) panel roof at the local police station. This charging station is equipped with six wireless sockets for charging e-kick scooters and can be used by both municipal employees and private e-bike riders.



LESSONS LEARNED

- Charging stations for e-bikes prevent the parking of light electric vehicles (LEVs) inside the police station. With the increasing number of LEVs, secure parking and charging will become increasingly necessary in urban environments and workplaces.
- Charging stations for e-bikes are well-suited for charging larger municipal fleets.



USER-CHi

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ACCESS
ALL DELIVERABLES
HERE



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