CROSS-SITE EVALUATION MANUAL – FINAL

D7.2 Cross-site Evaluation Manual - Final

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Abstract

The Deliverable 7.2 outlines the evaluation methodology to be applied to all demo sites for providing a common ground on evaluation activities. Different areas of assessment have been considered: environmental impacts, EVs market aspects, charging infrastructure dimension, and EVs users' acceptance. In this framework, the preliminary set of KPIs defined in the preliminary version of this manual (D7.1), including measurement units, activities to monitor and observation time and measurement methodology have been validated by cities representatives, CPOs and USER-CHI product leaders, in order to set-up an effective evaluation of the impact by comparing

"as is/ex-ante" and "to be/ex-post" situation. The assessment, to be performed in T 7.3, will rely on: i) inputs provided by the demo execution and the design phase of USER-CHI solutions; ii) a common methodology to assess socio-economic and environmental impacts

Keywords

KPI, assessment, cross-site evaluation, performance, impact, measured and metrics, outcomes.

Copyright statement

Executive summary

The purpose of this document is to provide common tools for the cross-site evaluation of USER-CHI performance and impact:

- Process analysis: describing how each activity involving USER-CHI solutions (designed in WP2-5) is deployed in demos, together with the key technical factors (e.g. test timing and cycles, effort consumption, stakeholders involved, etc.)
- Outcome measurement: outlining common methods for collecting, analysing and validating measurements of selected indicators as well as defining thresholds and normalisation procedures to effectively compare composite indicators;
- Observational system: defining actors affected by environmental, logistics, economic and socio-economic effects brought by the project and its components.

This document represents the final version of the "Cross-site Evaluation Manual" and includes all agreed features of the cross-site evaluation, such as: (i) the complete and refined set of KPIs; (ii) measurement units; (iii) activities to monitor and observation time; (iv) measurement methodology.

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1. Introduction

1.1 Document structure

The Deliverable 7.2 outlines the evaluation methodology to be applied to all demo sites for providing a common ground on evaluation activities. Different areas of assessment have been considered: environmental impacts, EVs market aspects, charging infrastructure dimension, and EVs users' acceptance.

The general objective is to evaluate the impact generated by USER-CHI products both in technical and social perspective. This translates into the understanding of if and how the design optimisation of charging networks with a user centric approach, the development of an interoperability framework and platform, the enhancement of a scalable infrastructure roll out by means of smart grid integration, and the implementation of innovative and highly-convenient charging systems thanks to the USER-CHI products will bring positive results in terms of boosting EVs massive market acceptance and so also in terms of technical and environmental benefits.

1.2 Background

The population mobility growth and an increased concern on climate change and energy independence have boosted interest in electric vehicles as one way to address these challenges. The expansion of public charging infrastructure network is a strategic component for promoting EVs, and with them dropping GHG emissions imputable to conventional cars and improving the local environment in terms of air pollution decrease.

To stay up-to-date with growing demand and to address range-anxiety issues, charging infrastructure is required, mainly close to public transport hubs, at destination points, and along highways. Additionally, to adequately profit from the flexibility of EVs while facilitating the stability of the energy system, the infrastructure should be deployed in combination with grid edge technologies – such as decentralized generation, storage, microgrids and smart buildings – and integrated into smart grids.

As the share of kilometers driven by EVs raises, urban mobility emissions will be gradually reduced. Moreover, electrification combined with a clean energy mix and optimized charging patterns will further decrease emissions, enhance air quality so ameliorating the ecological footprint.

Finally, smart-charging services – by for instance implementing dynamic charging pricing – will reduce charging costs, while they can create new revenue streams in the energy markets for CPOs and EMSPs able to provide ancillary services.

1.3 USER-CHI products in a nutshell

With the aim to achieve its strategic challenges and objectives, USER-CHI will generate a wide-ranging set of solutions comprehending all aspects of a massive deployment of electric vehicles.

The following table summarizes the main characteristics of USER-CHI products to be implemented in the different Pilot Sites.

Table 1: USER-CHI products to be implemented in the Pilot Sites

Product	Short description
CLICK – Charging Location and Holistic Planning Kit	CLICK will be conceived as an easy-to-use question-and-answer online tool for the top-down location planning for charging infrastructure. The main objectives rely in the optimization of the location and planning of new charging infrastructure in cities and TEN-T corridors, matching the users' needs, preferences, and habits, with the existing charging technologies and typologies available in the market.
INCAR – Interoperability, Charging and Parking Platform	INCAR will consist of a platform able to offer customized solutions to different end-users to satisfy their needs and so improve the customer experience. Its offer includes a set of innovative integrated EV-related services such as (i) interoperability and roaming to access EVSEs, (ii) booking features of parking slots and charging stations avoiding waiting times and increasing the usage of existing infrastructure (park & charge combined service), (iii) real-time information about publicly accessible EVSEs, (iv) searching and routing to EVSEs, and (v) integration with route planning of EV fleets.
SMAC – Smart Charging Tool	SMAC will provide users with a platform offering smart grid integration services for slow, medium, fast, and ultrafast charging. This will be complemented by a set of high-value services for EV drivers such as the maximization of RES electricity supply and competitive charging prices.
INSOC – Integrated Solar-DC charging for LEVs	INSOC will include a software and hardware combined solution to satisfy LEVs charging

Product	Short description
	needs, by also integrating on-site production of RES and theft-proof parking.
INDUCAR – Inductive Charging for e-Cars	INDUCAR will foresee an inductive charging solution to deliver a high level of automated power transfer. This will allow offering a very advantageous charging experience to the user (e.g. avoiding manual handling of cables).

1.4 User needs and evaluation objectives

In the EV ecosystem there are different actors playing a role and each of them has its own needs and objectives that the products to be develop by USER-CHI will tackle.

Cities get the urge to increase citizens and EV users' acceptance and convenience to accelerate the EVs adoption. Additionally, together with **EMSPs** (E-Mobility Service Providers), **CPOs** (Charging Point Operators), **technology providers**, and **EV drivers** (both private and professional) they could take advantage from the introduction of an interoperability framework guaranteeing interoperability and roaming over long distances in concert with a barrier-free and operator-independent charging and parking platform.

EV drivers, CPOs and **energy suppliers** can surely profit from the implementation of smart and highly efficient interconnections with AC and DC-Networks aiming at reducing costs and providing added-value to final users, as well as demonstrating standard solutions that attract investors to boost the infrastructure upscaling.

Finally, highly attractive, and convenient charging systems such as an easily replicable and scalable low-power DC-charging station for LEVs and e-bike sharing services and an inductive charging system for e-cars can result of interest not only to EV drivers and **LEVs users** but also to EMSPs and CPOs.

Usage scenarios, demo activities and related evaluation exercise aim at assessing the USER-CHI products ensuring a full deployment and transferability of them at EU level.

The USER-CHI project aims at bringing concrete benefits to the identified target groups by fulfilling its specific objectives stated in the Description of Action:

Table 2: Specific objectives per target group

	Design optimisation of charging networks with a user centric approach	Deployment of an interoperability framework and platform to support roaming and improve users' accessibility to charging infrastructure in cities and TEN-T corridors	Enhance scalable infrastructure roll out with minimum grid impact by means of smart grid integration	Development of innovative and highly convenient charging systems for higher market acceptance
Cities	✓	✓		
EMSPs		✓		✓
CPOs		✓	✓	✓
Technology Providers		✓		
EV Drivers		✓	✓	✓
Professional EV Drivers		✓	✓	✓
Energy Suppliers			✓	
LEVs Users				✓

2. Steps towards the evaluation assessment

The goal of Work Package 7 in the USER-CHI project is to monitor and assess the impact generated by USER-CHI products against the overall project objectives. The development of measures and metrics to achieve the impact against defined KPIs, comparing "as is/ex-ante" and "to be/ex-post" situation, is comprised. The assessment will rely on:

i) inputs provided by the demo execution and the design phase of USER-CHI solutions;

ii) a common methodology to assess socio-economic and environmental impacts.

It is then important to define a clear and robust methodology able to define a list of KPIs, allowing a sound comparison between ex-ante and ex-post situations as well as a quantitative measurement, for each user scenario defined by the demo sites.

The collection of data is an essential and critical task to the evaluation success. There are two types of data sources:

1. **objective data** automatically collected;
2. **subjective data** collected by different methods that reflect the user's opinions (e.g. questionnaires, interviews, in-app feedback, etc.).

For what concerns **objective data**, EVSEs, for instance, enable to generate large amounts of data internally about different aspects of the charging service, including real-time statistics about the energy use measured in kilowatt-hour and the duration of a session measured in seconds. In addition, the cost of charging transactions based on direct kWh measurement can represent an interesting objective data to be automatically collected by the charging infrastructure software.

For what concerns **subjective data**, they represent all the information collected from the users' opinions, comments and suggestions about the different aspects of the EV charging infrastructure system foreseen by the USER-CHI products (namely the "User Experience"). This input is essential to perform a valuable and meaningful evaluation. User experience feedback are all about subjective data dealing with the charging experience in terms of functionalities, results, usability and functioning as below:

- Functionalities: suggestions or improvements to add in the product/system.
- Results: wrong or incoherent results offered.
- Usability: difficulties to understand how the product works, acceptance and better understanding of use in the future.
- Functioning: technical problems in the system functioning.

For subjective data, several communication channels will be opened between the end-users and the Pilot Leaders to ensure the right collection of the feedback. Questionnaires will be collected

only for real users and in order to ensure users compile the questionnaires; each Pilot Leader will be requested to send reminders or set incentives to the list of participants to increase the rate of compiled questionnaires against the total participants. The user questionnaire should include firstly a background section dealing with information on needs and mobility behaviours of users; then it could be characterized by a set of questions to evaluate usability and acceptance parts.

Another relevant channel to collect USER-CHI users' perspective will be the evaluation screen of the INCAR App, as it will be the main end-user interface, and the beforementioned questionnaire about user acceptance.

2.1 Assessing impacts through the evaluation process

The ability to evaluate whether the USER-CHI products could induce a boost in the **EVs market** penetration is critical to the measurement of targets described in the USER-CHI Description of Action. Examples of KPIs dealing with EVs market increase include:

- Market share of EVs at city level - private cars and LDVs
- Spread of electric micro mobility
- Potential energy bill reduction
- CPOs turnover increase
- (Increase of) EVSE usage rate by EVSE type
- Reduction of EVSE related costs (installation and operational costs reduction, as well as reduced charging costs)

The evaluation process is also aimed at assessing the **environmental** impact of the USER-CHI products implemented in the demo sites. To this end, indicators considering GHG emissions and RES usage as primary energy source are the ones most frequently considered.

The **charging infrastructure** performance and expansion represent additional key dimensions to be assessed through indicators such as:

- Number of new EVSE planned through CLICK and number of CLICK users
- Number of M2M automated EVSE users
- Number of customers registered in the INCAR platform
- Number of EVSEs integrated in the INCAR platform
- Number of integrated services offered in the INCAR platform at demo site level split by type of service
- Number of EVSEs integrated in the SMAC Tool
- Number of new LEVs users charging through INSOC
- Number of wireless charging stations implemented
- kWh inserted in the grid

- Number of power steering requests and Max. power steered

Key questions for assessing EVs users' acceptance includes aspects such as the usage and acceptance of public charging infrastructure, need for change in attitude or a "sympathy" for technological innovations.

In this respect, the target users that will be involved in the demo sites will be interviewed for detecting their understanding of this new mobility approach and the perception of effective benefit that could be brought to the local community; dedicated actions for collecting users' feedback will be put in place during the evaluation phases.

2.2 Set-up of the evaluation process with Pilot sites

The overall development schedule and the key elements of the Pilot Sites has been outlined in the D6.1 and will be further refined in the other deliverables of WP6 and WP7, according to Pilot Sites progresses in design and implementation.

For the purposes of the evaluation plan, each Pilot Site needs to be guided in a process aimed at providing:

- The description of the usage scenarios and related events foreseen in the Pilot Sites, including the overall goal and ambition, partners involved and their specific motivations (to be done through the above-mentioned scoping documents).
- The list of Key Performance Indicators (KPIs) measuring and assessing the outcomes achieved in relation to the implemented solutions.

A preliminary set of such information is presented in section 4, highlighting next steps leading to a proper data collection and validation process.

2.3 Common criteria and process for selecting Key Performance Indicators (KPIs)

Indicators are markers of progress or fulfilment, synthetising the characteristics and/or the performance of systems surveyed. They can be considered as a piece of information summarizing the characteristics of systems or highlighting what is happening in a system. A more exhaustive definition is given by the International Institute for Sustainable Development (IISD): "*An indicator quantifies and simplifies phenomena and helps us understand complex realities. Indicators are aggregates of raw and processed data, but they can be further aggregated to form complex indices.*" Another exhaustive definition was given by the IMPROVERAIL, EC Funded Project:" Key Performance Indicators (KPIs) are quantifiable measurements, agreed to beforehand, that reflect the critical success factors of a project. They will differ depending on the project but nevertheless they are quantitative and qualitative measures used to review an organization's progress against its goals. These are broken down and set as targets for achievement by departments and individuals".

According to OECD terminology, an indicator is "a parameter, or a value derived from parameters, which points to, provides information about, describes the state of a phenomenon /environment/area, with a significance extending beyond that directly associated with a parameter value". Whatever KPIs are selected, they must reflect the project's objectives, they must be key to its success, and they must be measurable. KPIs usually are long-term considerations.

An in-depth analysis of suitable KPIs has been done in the USER-CHI preliminary project activities for the following classes of sources:

- relevant EU funded projects;
- applicable EC/National/Local regulations and guidelines;
- Expert advice.

The resulting definition of KPIs was also done by considering insights deriving from literature review together with direct inputs from partners thanks to their know-how based on previous experiences on the subject.

Once defined a first potential list of KPIs and shared it with Pilot Sites, a robustness analysis was carried out by applying common criteria assuring correlation between strategic evaluation objectives, impacts and indicators as well as appropriateness of the data collection process. This investigation was required for all KPIs to guarantee a minimum viable level for each of the following criteria:

- *Relevance*: each indicator must be an assessment criterion, to have a significant importance for the evaluation process for the selected event to be quantified/assessed.
- *Completeness*: the set of indicators must consider all aspects of the system/concept under evaluation.
- *Availability*: check if the indicator is existing on the ground and can be retrieved.
- *Measurability*: the identified indicators are structured in their definition/formula and can be measured objectively or subjectively.
- *Reliability*: indicators must be clear in their definition, easy to be aggregated and their measurements accurate.
- *Familiarity*: the indicators must be intuitive and easy to understand.
- *Non-redundancy*: indicators should not measure the same aspect of other indicators.
- *Independence*: small changes in the measurements of an indicator should not impact preferences assigned to other indicators of the evaluation framework.

3. Evaluation framework

The evaluation framework to be deployed in the USER-CHI Pilot Sites aims to carry out impact and process evaluation of the project solutions, comparing the measured outputs and outcomes of USER-CHI products implemented in the Pilot Sites.

The evaluation methodology indicates to what extent the application of USER-CHI solutions in the Pilot Sites will improve behavioural change towards e-mobility and boost a smart charging infrastructure deployment.

The evaluation methodology has been elaborated to perform:

- impact evaluation (by Key Performance Indicators - KPIs),
- process evaluation (determining drivers and barriers).

3.1 Impact Evaluation

The objective of the impact evaluation is to carry out a quantified assessment of direct effects of USER-CHI products implemented in the Pilot Sites against the overall project objectives.

The aim is to provide a clear and concise evaluation enabling the interpretation of the findings. Because comparability is important, methods, approaches and indicators must be coordinated across the different Pilot Sites and outputs **normalised** to take into account differences among cities. Evaluation of impacts is in the first place targeted at the question whether the specific objectives connected with the identified users' needs have been achieved (or potentially will be achieved). An initial set of indicators has therefore been selected reflecting these technical objectives that the project aims to achieve and here summarised:

O1. Design optimisation of charging networks with a user centric approach

O2. Deployment of an interoperability framework and platform to support roaming and improve users' accessibility to charging infrastructure in cities and TEN-T corridors

O3. Enhance scalable infrastructure roll out with minimum grid impact by means of smart grid integration

O4. Development of innovative and highly-convenient charging systems for higher market acceptance

The basic elements of the assessment approach will be structured in data logs recorded by various software managing the processes or evaluation forms (questionnaires and INCAR app evaluation screens) with pre-defined answers reflecting the different KPIs.

The impact evaluation generally consists of ex-ante and ex-post analysis. The situation before implementation of USER-CHI products in the Pilot Sites should be compared with the situation characterized using the innovative USER-CHI solutions. **For this reason, this deliverable reports**

relevant data which allows to define the "baseline situation" of the respective Pilot Sites which will test USER-CHI products in Work package 6.

It is important to analyse cause and effect: what can be devoted to the proposed solution and what is caused by other external circumstances. When assessing interchange performance, it is important to keep in mind the outputs and the outcomes resulting from USER-CHI products implementation.
For this reason, the cross-site evaluation, will be introduced by an updated analysis of the main macro-trends that may affect the mobility ecosystem in each demo site during the demo implementation period, in order to provide a critical and context-based interpretation of the KPIs assessment.

Impact evaluation is all about data collection. Data feeds the analysis and provides information about indicators. Depending on the type of information that needs to be collected according to the indicators in question, different methods of data collection (measurement) can be chosen:

a) Direct measurement using instrumentation (including specific software and/or simulation tools);
b) Direct observation or recording of events within the Living Lab;
c) Surveys by:
    - Questionnaire
    - Interviews
    - Diary completion
d) Collection from historical records;
e) Use of focus groups and stakeholder meetings.

It is worth to remark that impacts measured by simulation/estimation cannot be gauged in the same extent as impacts measured by primary data; this will be taken into account when outlining final findings of the evaluation process. Indicators to be used for impact evaluation must answer to the following questions:

- what data is to be collected (performance indicator and measurement unit),
- when data is to be collected (frequency of measurement),
- where the data is to be collected (domain for measurement),
- how the data is to be collected (method of measurement),
- from whom and by whom data is to be collected (data source and target group for measurement),
- which is the level of actual and expected value of data.

Quantitative data means a measure expressed in terms of counts (data corresponding to a frequency measure), measurement or other physical units.
Qualitative data means a measure expressed in terms of people's attitudes, perceptions and/or observations which will be on "nominal" scale (simple classification data, categorical scales), "ordinal" scale (subjective scales data gathered from measurement) or "evaluative" scales (requiring the assignment of a numerical value).
Each KPI included into the framework is composed by the following variables:

Table 3: KPIs variables

Variables	Description
Evaluation Area	This is related to the different evaluation areas defined
Performance indicator ID number	A unique ID number has been assigned to the KPIs
Performance indicator name	This is the name assigned to the KPIs
Performance indicator definition	This is the description of the KPIs
Measurement unit	This indicates the measurement unit defined for each KPI
Method of measurement/Data source	This is a quantitative/qualitative mean of calculation defined for each KPI
Target Group for measurement	This identifies the target group category providing the KPI
Frequency of data collection	This will help to verify the granularity of collected data

3.2 Process Evaluation

Process evaluation is the second crucial element of the USER-CHI evaluation and one which complements the findings of impact evaluation. Process evaluation tries to gain insight in the processes of USER-CHI products implementation and to assess results and outcomes.

Process evaluation in the Pilot Sites aims at identifying facilitators and barriers encountered during the USER-CHI solutions realisation, which will be mainly a qualitative evaluation performed using specific templates for data collection. This translates into understanding the way in which the planning and implementation process was conducted. Hence, there is the need to get answers to questions like:

- How did it go about?
- What went well / wrong and why?
- Who did or should have done what?
- How is the process perceived by key stakeholders?

This with the aim to detect as far as possible the reasons for delays, changes, failures but also success of the tools implemented; of course, this also to prevent making the same mistakes again in the future.

By gaining insight into drivers (factors of success) and barriers (impeding progress) during the implementation and validation of USER-CHI solutions in the Pilot Sites, which approaches, and

methods have been successful in terms of reaching the initial strategic and specific objectives can be pointed out.

This evaluation will then contribute to recommendations that will make project's results transferable to other European cities and beyond. By taking advantage of the consolidated CIVITAS Evaluation Methodology, a series of relevant questions will be asked by considering different aspects such as Political/strategic, cultural, institutional, problem related, involvement/communication, positional, planning, organizational, technological, financial, and spatial.

The process evaluation will be performed by a standardized online survey, which includes the detection of different phases of the project. Therefore, the process evaluation will take place in every project phase (preparation, implementation, and operation phase). As a minimum, the product leaders should participate in this evaluation process, to identify drivers and barriers of all USER-CHI solutions. The questionnaire was evolved by FIT (Source: D7.1) but revised and expanded by IKEM on 25. April 2022. The complete list of questions can be found in Annex 1: Process evaluation questionnaire template.

4. Evaluation Plans at Pilot sites

4.1 Methodology for selecting and monitoring KPIs

The preliminary list of KPIs defined in D7.1, has been discussed with i) USER-CHI products developers and owners, ii) cities representatives iii) Charging Point Operators involved in each demo sites.

In fact, with respect to the preliminary version of this manual, further advances on the development of the USER-CHI products and on the preparation of the demo sites for demo execution, made it possible to validate and integrate the initial list of KPIs, allowing all the attributes described in Table 4 to be specified, providing indispensable information on the source of data needed to feed the KPI monitoring and measurement frequency.

The KPIs list validation & integration process has been carried out through:

- A special session organized during the Consortium Meeting held in Valencia, illustrating the methodology outlined in D7.1 and the requirements of the Impact assessment
- A first mini-workshops in which USER-CHI product leaders were asked to integrate the KPI list with indicators that they consider as relevant to evaluate the effectiveness of USER-CHI products in pursuing project objectives. This meeting was followed by several bilateral exchanges to refine technical details. The result of this process was a first-iteration KPI list, validated and integrated by product leaders, reporting indicators that can certainly be quantified, as the data needed for the valorisation of KPIs belong to the product leaders and/or were automatically generated by the products implemented in each demo-site
- A second mini-workshop involving CPOs and cities representatives to further integrate the list with both demo-site specific informational and technical gaps and to align KPIs with local-specific objectives.

The overall objective of these meetings was to select a list of KPIs that would effectively describe the pursuit of local and project objectives, favoring indicators with a high feasibility of measurement. Furthermore, as far as possible considering, for some indicators, the inhomogeneity of the data sources (e.g. for the Local statistics/ Vehicle registration entity website) and of the actors involved in each demo site (e.g. different units of measurement collected by the CPOs or different willingness to share information e.g. with respect to turnover), an attempt was made to harmonize the different attributes of the indicators (e.g. reference year for the baseline value, data source, units of measurement, etc.) to allow, in D7.3, an effective comparison between the USER-CHI demo sites. A further effort was also made to find data sources that were as "automated" as possible (e.g. by favoring the use of app evaluation screens rather than questionnaires, where possible) that would allow any information or feedback gaps

to be filled (e.g. by relying also on websites as chargemap.com[1] that provides the largest mapping of the charging stations that can be found in European cities thanks to the contribution of a community of over 1,3 million of EV drivers), so as to ensure the effective monitoring of the indicators while minimizing information requests to USER-CHI demo-partners[2]

Furthermore, in order to ensure the availability and completeness of the data sources during the monitoring and evaluation phase, before each workshop, each KPI was broken down into "**primary indicators**", that is the data necessary for the calculation of the KPI itself. During the process of validating and integrating the list of KPIs, each of the actors was therefore also asked to provide this level of detail. This made it possible to define the **baseline values** and the calculation method for each KPI. The complete list of KPIs and related primary indicators can be found in Annex 3. Therefore, the list of KPIs presented in this document can be considered as the final one.

Nevertheless, considering that the delay in the development of INSOC and CLICK, as well as the ongoing procedure of including a CPOs for Budapest is being issued with an amendment of the Grant Agreement which will also include an extension of the project duration by 6 months, FIT Consulting reserves the right to update the KPIs related to INSOC and CLICK and Budapest In particularly, the evaluation related to CLICK will get input from the work to be carried out in T2.4, not started yet because of the unforeseen delays in the product development.

Table 4 Project KPIs selected by each pilot site

Area of impact	ID	KPI	BARCELONA	BERLIN	BUDAPEST	ROME	TURKU
Environment	1	CO2 emissions reduction					
	2	RES energy produced on-site supplied to LEVs					
	3	self-consumption ratio					
	4	% of renewable energy in the LEVs energy consumption					
EVs market	5	Marketshare of EVs at city level - private cars and LDVs					
	6	Energy bill reduction for USER-CHI products users					
	7	CPOs turnover increase thanks to USER-CHI products					
	8	(Increase of) EVSE usage rate by EVSE type					

[1] https://chargemap.com/

[2] In any case, the feedback from the Demo-partners will be considered as privileged and more reliable; the use of other data sources is to be considered solely and exclusively as a back-up

	9	Reduction of EVSE related costs					
Charging infrastructure	10	# new EVSE planned					
	11	#Users of the M2M automated EVSE					
	12	# CPOs using INCAR & SMAC					
	13	# Customers registered in the INCAR platform					
	14	# EVSEs integrated in the INCAR platform					
	15	# integrated services offered in the INCAR platform					
	16	# EVSEs integrated in SMAC Tool					
	17	# New users of DC-charging solutions for LEVs					
	18	# Wireless charging stations					
	19	kWh inserted in the grid					
	20	Nº of power steering requests					
	21	Max. power steered					
	22	# CLICK user					
EV Users acceptance	23	Increase of EV drivers' satisfaction level thanks to new services					
	24	Awareness level on new services					
	25	Increased ease of charging					
	26	Increased EV/LEV drivers' satisfaction					
	27	Recommendation of USER-CHI products					
	28	Safety perceived of INDUCAR					
	29	Asthethical perception					

In term of whole set of KPIs per each pilot site[3], to date Barcelona selected 29 indicators, Budapest included 27 KPIs, Turku 27 indicators, Berlin 21 indicators, and Rome 27 indicators.

[3] As mentioned at the beginning of this paragraph, KPIs related to INSOC and CLICK may be subject to changes and/or additions depending on the finalisation of product development

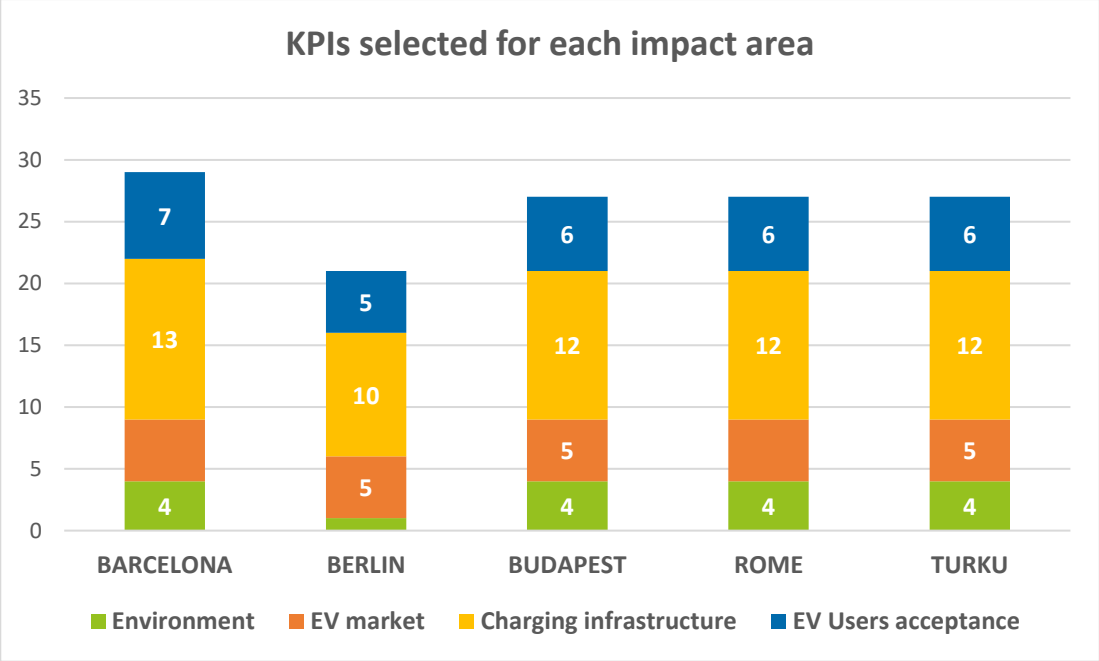

Figure 1 N. of KPIs for each impact area

The following pie charts show the split among different impact areas so to allow for a preliminary outlook of pilot sites main interest in respect to certain categories of impact also reflected in the different USER-CHI products foreseen to be implemented in the demos.

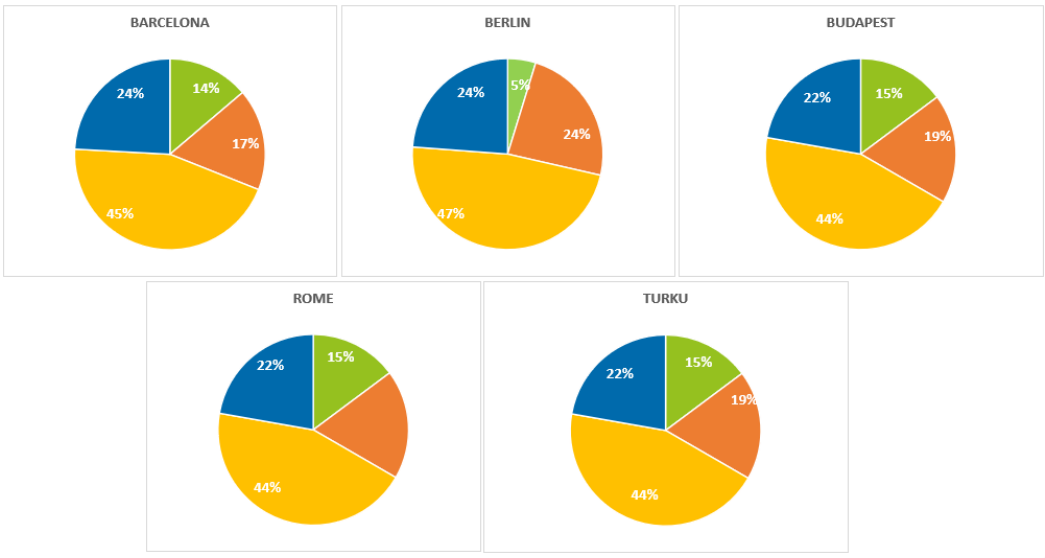

Figure 2 % of KPIs per area of impact for each pilot site

To sum-up, this second deliverable of Work Package 7 serves as a methodological guideline to pilot sites actors and project partners involved in data collection and validation as well as subsequent assessment of the project outcomes.

The following subsections report the detailed list of KPIs selected by each pilot site.

4.2 Barcelona

Barcelona metropolitan area (AMB) counts 3,2 million people and is one of the largest metropolitan areas in Europe in terms of population. As shown in the figure below, the modal split of both Barcelona city and the metropolitan area has a high percentage related to active mobility[4], followed by the public transport usage and private cars having rather similar share. Today the sharing services are mostly concentrated in the city of Barcelona. Car sharing services count for 2% of total car trips, moto sharing services[5] count for 2% of total motorcycle trips. Bicing – the public bike system of the city of Barcelona – counts for 18% of total bike trips in the city.

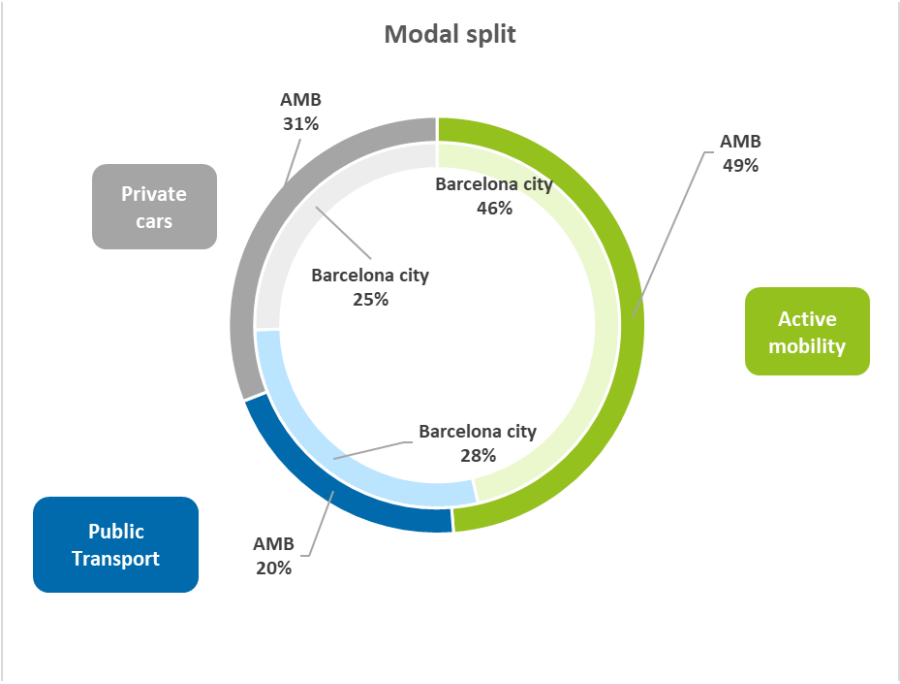

Figure 3: Modal split of Barcelona city and the metropolitan area of Barcelona (AMB) *[Source: Enquesta de mobilitat en dia feiner – EMEF 2021]*

Concerning the current penetration of EVs in the city fleet, the Spanish Ministry of the Interior provides an annual census of registered vehicles; main characteristics of current EV penetration are reported in the table below. The same source was used to define the Baseline value of the KPI relating to the EV market, only estimated figures are available (see Table 5). Nonetheless, it can be stated that the starting point is rather promising also if considering the e-mobility strategy that Barcelona is fostering. From 2011 several policies have been implemented in the

[4] Walking, cycling, scooters.
[5] Only available in Barcelona city.

metropolitan area of Barcelona to encourage electric vehicles usage. Such initiatives include incentives for private cars, LEVs, and commercial vehicles (i.e., HDVs).

Table 5: Estimated figures for e-vehicles in the Barcelona metropolitan area, year 2021 *[Source: DGT, and AMB data]*

City	Barcelona Metropolitan Area		
Year	Dec 2021		
	BEV	Total	Penetration
Private Cars	5.354	1.193.518	0,4%
Light Duty Vehicles	641	112.567	0,6%

The e-mobility deployment strategy pursued by AMB is focused on a core network developed and managed by AMB and other local administration in the metropolitan territory (the city of Barcelona and other big municipalities). In this framework, it is foreseen that private companies, in cooperation with the main energy providers serving the area, could improve the network in the coming years.

From a technical perspective, the Barcelona public charging network includes more than twenty chargers, owned by the city that acts both as CPO and EMP. The AMB public charging network uses the same equipment, under similar conditions (i.e., acting as CPO and EMP) and following comparable instructions, but making use of different apps. AMB network counts of 10 quick chargers and in 2019 delivered more than 380,000 kWh.

Barcelona Metropolitan Area demo is focused on promoting the use of electric vehicles also for professional users through the development of specific charging solutions aimed to address the specific needs.

USER-CHI is then building on the existing EVSE app (AMB Electrolineres) to improve the level of service of the existing metropolitan fast charging network, providing innovative and customised services to EV drivers. In particular, the focus is put on:

- Availability: real-time and reliable information on availability of EVSE, including expected time of availability, and allowing the possibility of doing reservations in advance for EVSE and parking slots.
- Payment method: advanced payment and billing methods will be considered to provide EV-users with added-value services and incentives such as subsidised prices for professional users, different cost schemes, complete billing information, subsidised parking prices.
- Interoperability: thanks to USER-CHI an easy access to all the charging points in a region, whatever the operator or the manufacturer is, will be fostered.
- Information: the main aim is to provide real-time information about location of EVSE, connectors, prices, and payment methods.

It is also foreseen, for facilitating the daily work of municipal employees of AMB, to test an innovative charging solution. One public electric vehicle will be retrofitted to provide a seamless and highly convenient charging experience, which will include:

- Inductive and wireless charging infrastructure that will provide a highly user-friendly experience to municipal EV drivers, allowing them to recharge without handling heavy cables.
- Machine-to-Machine (M2M) communication technology, which directly links the EV and the EVSE and provides automated authentication and communication services.

AMB has recently launched an electric bike-sharing service for citizens of the metropolitan area, called e-Bicibox. The service has more than 300 electric bikes spread across 45 stations in 12 metropolitan municipalities. Hence, within the demo activities the testing of an alternative charging operation scheme addressed both to e-bikes and e-kick scooters is also foreseen to facilitate the service management (mainly for e-bikes that are directly handled by AMB) and the related costs.

4.2.1 USER-CHI products to be implemented in Barcelona

INCAR & SMAC – Interoperability according to user group

Barcelona aims at testing in a combined way INCAR – an interoperability, charging and parking platform – and SMAC – a smart charging tool dynamically optimizing the power supplied to the charging points - products by considering different user profiles to understand if there could be any specific issues when addressing a particular “client”.

To do that both INCAR platform and app including SMAC utilities will be tested in AMB charging points network also including a station with several charging points with different charging capacity (ultra-fast, quick, normal).

Table 6: Barcelona INCAR & SMAC demo details

Technical objectives at local level	The main technical objectives are: - Testing the INCAR app functionalities (i.e., reservation, routing and charging features) both in the short range and long range. - Checking the payments’ function (i.e., compensation) between CPOs and EMSPs through the INCAR platform. - Exploring the accounting platform based on blockchain technology. - Experimenting an intelligent and dynamic management of demand through SMAC.

	- Allowing CPOs to achieve economic benefits from a more efficient use of their charging points.
Social objectives at local level	From a social/user perspective, the main objectives are: - Provision of barrier-free and operator-independent access for end-users. - Maximization of EVSE availability. - Improvement of user convenience and provision of roaming services along the two TEN-T corridors crossing the area concerned with transparent and flexible payment features. - Opportunity for smart and highly efficient interconnections with AC and DC-Networks, focused on reducing costs and providing added-value to final users.
End-user groups involved	- EVs users (professional and private) with and without a contract with AMB. - CPOs using SMAC website interface. - Technical managers working in AMB charging points network.

INDUCAR – Demonstration in AMB

AMB will act as testing case for the innovative inductive charging system INDUCAR by making available an e-car specifically retrofitted for inductive charging to AMB technicians.

Table 7: Barcelona INDUCAR demo details

Technical objectives at local level	The main technical objectives are: - Testing the efficiency of the inductive charging made available through INDUCAR by assessing the high-level automated power transfer, the wireless charging system and the M2M communication system.
Social objectives at local level	From a social/user perspective, the main objectives are: - Increasing the acceptance of inductive charging system.

	- Easing the AMB technicians' workload by a simplification of EV charging procedure and decrease in charging time.
End-user groups involved	- AMB technicians using AMB EVs.

INSOC – Solar DC-charging for LEVs

AMB foresees to install and test a theft-proof parking for e-bike equipped with solar panels for renewable energy production. To this end, a fleet of e-bikes ready for charge with solar DC energy will be made available. Possible location of the testing case could be:

- A theft-proof parking in Gavà rail station (in this case there would be a low number of e-bike users, while solar panels must be installed).
- A e-Bicibox theft-proof parking (in this case e-bikes are not ready for the DC-charging and more solar panels must be installed).
- A e-bike parking at AMB offices (these results to be the most suitable alternative, since only solar panels must be installed, while users will be workpeople of AMB organization).

Table 8: Barcelona INSOC demo details

Technical objectives at local level	The main technical objectives are: - Testing the efficiency and utilities of the Solar DC-charging for LEVs. - Evaluating the advantages of having on-site RES production and theft-proof parking.
Social objectives at local level	From a social/user perspective, the main objectives are: - Checking the acceptance of solar panels installed in public spaces. - Evaluating the users' perception on innovative e-bike parking in terms of increase willingness to use e-LEVs and in case of AMB people the convenience to charge at work.
End-user groups involved	- e-bikers (AMB workforce or not).

CLICK – Holistic planning kit

AMB Mobility department is carrying on an ambitious expansion project with more than 40 quick chargers, 10 normal chargers with photovoltaic production and 30 normal chargers to spread

electromobility around all the municipalities of Barcelona metropolitan area. The CLICK online tool will then support this project to confirm the chargers' location.

Table 9: Barcelona CLICK demo details

Technical objectives at local level	The main technical objectives are: - Assessment of location prediction and holistic planning kit utilities included in the CLICK online tool. - Optimization of the location planning for new charging infrastructure.
Social objectives at local level	From a social/user perspective, the main objectives are: - Evaluation of charging needs. - Appraisal of demands and requirements of citizens and users of different social groups.
End-user groups involved	- Urban mobility planners - Transport planners - City planners

4.2.2 Final[6] list of Key Performance Indicators for Barcelona

The final list of KPIs selected by Barcelona is here presented in respect to the different USER-CHI product to be implemented. Additionally, a group of local indicators has also been included.

4.2.2.1 SMAC/INCAR KPIs

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products

[6] As mentioned at the end of paragraph 4.1, KPIs related to INSOC and CLICK may be subject to changes and/or additions depending on the finalisation of product development

Measurement unit	€/kWh
Method of measurement/Data source	AMB and INCAR; calculated as difference between the average cost of a full charge (60 kWh battery, unless otherwise indicated) and the cost of a full charge made by using USER-CHI products. **Important note: AMB provides free charge to EV drivers** but this KPI will be monitored in any case to appreciate the benefits coming from SMAC/INCAR, by referring to costs of maintenance of the equipment + cost of energy.
Frequency of data collection	Monthly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	7
Performance indicator name	CPOs turnover increase thanks to USER-CHI products
Performance indicator definition	Increase in monthly revenues faced by CPOs using INCAR&SMAC due to a growth in # of transactions. **Important note: AMB provides free charge to EV drivers, therefore the value of this KPI is 0**
Measurement unit	€/month
Method of measurement/Data source	AMB and INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	12
Performance indicator name	# CPOs using INCAR & SMAC
Performance indicator definition	Number of CPOs taking part in the INCAR&SMAC ecosystem.

Measurement unit	n.
Method of measurement/Data source	INCAR and SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	13
Performance indicator name	# Customers registered in the INCAR platform
Performance indicator definition	Number of customers registered in the INCAR platform.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	INCAR customers

Evaluation Area	Charging infrastructure
Performance indicator ID number	14
Performance indicator name	# EVSEs integrated in the INCAR platform
Performance indicator definition	Number of EVSEs integrated in the INCAR platform
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)

Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	15
Performance indicator name	# integrated services offered in the INCAR platform
Performance indicator definition	Number of integrated services offered in the INCAR platform at demo site level split by type of service.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	16
Performance indicator name	# EVSEs integrated in SMAC Tool
Performance indicator definition	Number of EVSEs integrated in the SMAC Tool.
Measurement unit	n.
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	19
Performance indicator name	kWh inserted in the grid
Performance indicator definition	kWh inserted in the grid
Measurement unit	kWh
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	20
Performance indicator name	N° of power steering requests
Performance indicator definition	N° of power steering requests
Measurement unit	n.
Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	21

Performance indicator name	Max. power steered
Performance indicator definition	Max. power steered
Measurement unit	kW
Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Increased ease of charging thanks to services provided by USER-CHI
Performance indicator definition	Increased ease of charging thanks to services provided by the INCAR app
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App; Question asked in the App evaluation screen: How easy was it to recharge your vehicle compared to the recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy
Frequency of data collection	Yearly
Target Group for measurement	EV and LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	Increased EV drivers' satisfaction due to the reservation function
Performance indicator definition	Increased satisfaction due to the ability to plan charging processes via reservation function

Measurement unit	Likert scale
Method of measurement/Data source	INCAR App Question asked in the INCAR App evaluation screen: How satisfied are you with the reservation function? (Likert Scale, 4 options, “very dissatisfied - very satisfied” + “I didn’t use this function”)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of INCAR services
Performance indicator definition	Extent to which users would recommend INCAR services (reservations, etc.) to people who do not yet drive an e-car
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App, Question asked in the INCAR App Evaluation Screen: How likely is it that you would recommend the INCAR services as a considerable advantage to drive an e-car? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it) s
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

4.2.2.2 INSOC KPIs

Evaluation Area	Environment
Performance indicator ID number	2
Performance indicator name	RES energy produced on-site supplied to LEVs

Performance indicator definition	Amount of energy produced by the integrated solar DC charging system and supplied to LEVs
Measurement unit	kWh/day
Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	3
Performance indicator name	self-consumption ratio
Performance indicator definition	The self-consumption ratio is the ratio between the PV production and the portion of the PV production consumed by the loads.
Measurement unit	%
Method of measurement/Data source	INSOC; This ratio is calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by the loads.
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	4
Performance indicator name	% of renewable energy in the LEVs energy consumption
Performance indicator definition	Since the electrical energy from the solar panels is limited, the indicator measures the share of PV energy compared to the total energy used by the LEV.
Measurement unit	%

Method of measurement/Data source	INSOC; Calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by LEV.
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products
Measurement unit	€/kWh
Method of measurement/Data source	CPOs and INCAR; calculated as difference between the average cost of a full charge
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	17
Performance indicator name	# New users of DC-charging solutions for LEVs
Performance indicator definition	Number of new LEVs users charging through INSOC.
Measurement unit	n.
Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	tbd

Target Group for measurement	LEV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	18
Performance indicator name	# Wireless charging stations
Performance indicator definition	Number of wireless charging stations implemented.
Measurement unit	n.
Method of measurement/Data source	INSOC
Frequency of data collection	Yearly
Target Group for measurement	INSOC product developers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	LEV drivers' satisfaction level thanks to INSOC
Performance indicator definition	EV drivers average reported satisfaction with INSOC compared to other traditional electric e-bike/e-scooter sharing services
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2) Question asked: How satisfied are you with INSOC compared to other traditional electric e-bike/e-scooter sharing services? (Likert Scale, 4 options, “much less satisfied – much more satisfied”)
Frequency of data collection	Yearly
Target Group for measurement	LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	29
Performance indicator name	Aesthetical perception of the solar-power charging station
Performance indicator definition	Aesthetic perception of harmonious integration of the charging station into the surrounding background
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: From an aesthetic point of view, How do you think the charging station has integrated into its surroundings? (Likert scale, 3 options, Has improved a lot/improved a little/is indifferent
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

4.2.2.3 INDUCAR KPIs

Evaluation Area	Charging infrastructure
Performance indicator ID number	11
Performance indicator name	#Users of the M2M automated EVSE
Performance indicator definition	Number of M2M automated EVSE users
Measurement unit	n.
Method of measurement/Data source	INDUCAR
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

Evaluation Area	Charging infrastructure
Performance indicator ID number	18
Performance indicator name	# Wireless charging stations
Performance indicator definition	Number of wireless charging stations implemented.
Measurement unit	n.
Method of measurement/Data source	INDUCAR
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Ease-of-use perceived of INDUCAR, especially parking
Performance indicator definition	Level of ease-of-use perceived by people using the new services implemented in the demo site
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2) Question asked in the survey: How easy was it to recharge your vehicle compared to traditional recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

Evaluation Area	EV Users acceptance
Performance indicator ID number	26

Performance indicator name	EV drivers' satisfaction level thanks to INDUCAR
Performance indicator definition	EV drivers average reported satisfaction with the INDUCAR compared to other TRADITIONAL charging services.
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2) Question asked: How satisfied are you with INDUCAR compared to other TRADITIONAL charging services? (Likert Scale, 4 options, "much less satisfied – much more satisfied")
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of INDUCAR
Performance indicator definition	Recommend INDUCAR as an easier way to charge EVs
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2), Question asked: How likely is it that you would recommend the INDUCAR compared to other charging services? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

Evaluation Area	EV Users acceptance
Performance indicator ID number	28
Performance indicator name	Safety perceived of INDUCAR

Performance indicator definition	Level of safetyness perceived
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: How safe do you feel while driving the car? (Likert scale, 4 options, Very safe, no difference with respect to an ICE or BEV car – Very unsafe (please say why)
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

Evaluation Area	EV Users acceptance
Performance indicator ID number	29
Performance indicator name	Aesthetical perception of the wireless charging infrastructure
Performance indicator definition	Perception of the cleanness of the park area without cables
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: From an aesthetic point of view, how much do you think the absence of the cables has improved the parking area? (Likert scale, 3 options, Has improved a lot/improved a little/is indifferent
Frequency of data collection	Yearly
Target Group for measurement	AMB staff (see D6.1, paragraph 3.1.3.6, "User Finding")

4.2.2.4 CLICK KPIs

Evaluation Area	Charging infrastructure
Performance indicator ID number	10

Performance indicator name	# new EVSE planned
Performance indicator definition	Number of additional EVSE (both public accessible and private) planned thanks to the implementation of USER-CHI products in the demo site.
Measurement unit	n.
Method of measurement/Data source	CPOs/CLICK/Cities
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e-mobility providers (cities) and real-state facility providers

Evaluation Area	22
Performance indicator ID number	# CLICK user
Performance indicator name	Number of users using/testing CLICK
Performance indicator definition	n.
Measurement unit	CLICK
Method of measurement/Data source	Yearly
Frequency of data collection	CPOs, Transport planners
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Ease-of-use perceived of CLICK
Performance indicator definition	Level of ease-of-use perceived by CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: How easy was it to use CLICK for locating new charging infrastructures compared to similar tools? (Likert scale, 4 options, Very difficult – Very easy + 1 option - never used any other similar tool before)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of CLICK
Performance indicator definition	Extent to which users would recommend CLICK as a valuable tool to locate new charging stations
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2), Question asked: How likely is it that you would recommend the CLICK to your colleagues as a valuable tool to locate new charging stations? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e-mobility providers (cities) and real-state facility providers

4.2.2.5 LOCAL KPIs

Evaluation Area	Environment
Performance indicator ID number	1
Performance indicator name	CO2 emissions reduction

Performance indicator definition	Estimate of CO2 emissions reduction thanks to the increase in EVs usage
Measurement unit	gCO2 emissions avoided/km
Method of measurement/Data source	INCAR and websites; It will be calculated as the difference between the new EVs registered in the INCAR platform and the disused polluting Diesel and gasoline vehicle; for the calculation, the tool developed by Transport&Environment[7] will be used
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	5
Performance indicator name	Marketshare of EVs at city level - private cars and LDVs
Performance indicator definition	Ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Measurement unit	%
Method of measurement/Data source	Cities: calculated as ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Frequency of data collection	yearly
Target Group for measurement	EV and ELDV drivers

Evaluation Area	EVs market
Performance indicator ID number	8

[7] The tool compiles all the most up-to-date data on CO2 emissions linked to the use of an electric, diesel or petrol car to compare CO2 emissions of EV compared to diesel and Petrol vehicles https://www.transportenvironment.org/discover/how-clean-are-electric-cars/

Performance indicator name	(Increase of) EVSE usage rate
Performance indicator definition	Share of total number of charging sessions by public accessible EVSE charging power / private ones AMB doesn't' have access to information on private EVSE; only public EVSE will be considered for Barcelona
Measurement unit	%
Method of measurement/Data source	CPOs and INCAR
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EVs market
Performance indicator ID number	9
Performance indicator name	Reduction of EVSE related costs
Performance indicator definition	Installation and operational costs reduction, as well as reduced charging costs
Measurement unit	%
Method of measurement/Data source	AMB
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	23
Performance indicator name	Increase of EV and LEV drivers' satisfaction level thanks to new services

Performance indicator definition	EV drivers average reported satisfaction with the quality of the new services offered in the demo sites thanks to USER-CHI. It measures the experience of the user against his/her expectations
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App
Frequency of data collection	Yearly
Target Group for measurement	EV and LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	24
Performance indicator name	Awareness level on new services
Performance indicator definition	Percentage of the target population with knowledge of the new services offered in the demo sites thanks to USER-CHI.
Measurement unit	%
Method of measurement/Data source	WP8
Frequency of data collection	Monthly
Target Group for measurement	Barcelona citizens

4.3 Berlin

Berlin is the capital and one of the 16 federal states of Germany. The city has an area of 891.1 km^2 and it is broken up into 12 districts. Concerning the modal split, an important share is represented by public transport, individual motorised traffic and walking and cycling.

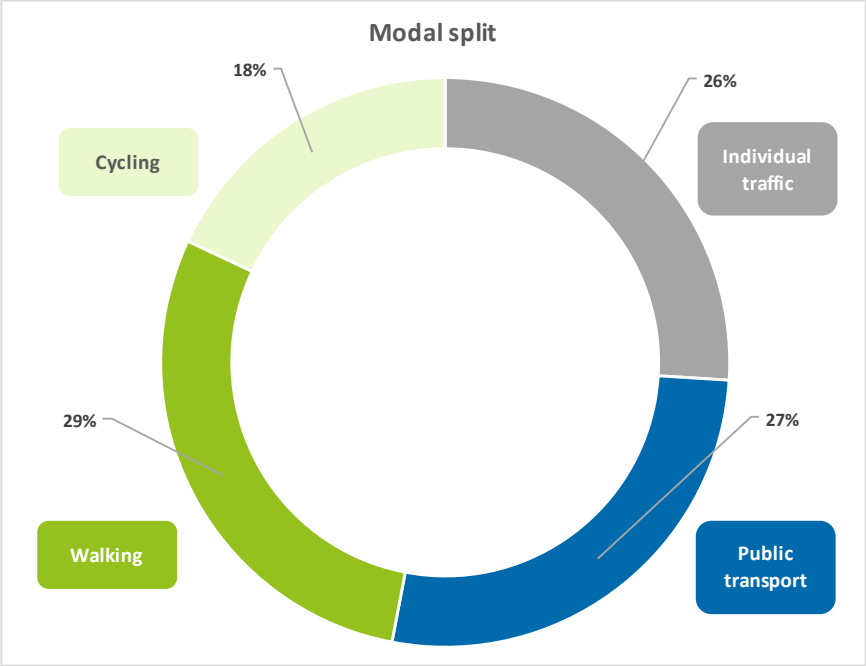

Figure 4: Berlin modal split (total traffic of inhabitants), 2018 *[Source: SRV 2018]*

As reported by the Federal Department of Motor Vehicles (KBA) statistics, in Berlin the total number of BEVs registered in 2019 was equal to 4,868, while the registered PHEVs are 3,474. In 2021, the number of BEVs registered in Berlin was 16.678. The number of PHEVs was 17.496.[8] Therefore the number of electric vehicles in the city expanded highly throughout the last two years.

Table 10: Registered passenger EVs in Berlin, 2021 *[Source: KBA]*

City	City of Berlin				
Year		2021[9]			
	BEV	PHEV	Total	Percentage BEV	Percentage PHEV

[8] Source: Kraftfahrtbundesamt (KBA) (2022): Fahrzeugzulassungen (FZ), FZ1.2.
[9] Key date is 01.01.2022.

Private Cars	16.678	17.496	1.241.793	1,3%	1,4%
	Two-wheelers	**Three- or four-wheelers**	**Total**		**Total**
Motorbikes[10]	111.551	2.388	113.939	Commercial vehicles	133.726

To foster the adoption of EVs, the city of Berlin was a pioneer in the German country in the deployment of a harmonized public, non-discriminatory charging infrastructure network in the urban streets. As of January 2020, overall, there are 287 publicly funded charging stations (with 539 charging points) on public ground. In addition, there are 104 privately funded charging stations (with 208 charging points) from Vattenfall and Innogy, and all of them are publicly available. Additionally, lots of privately-owned charging stations can be found around the city. In May 2022, Berlin has a cluster of 1.849 publicly accessible charging points in public and private space in operation. This includes 1.164 charging points that were set up on public roads. Of these, Allego GmbH operates a total of 994 charging points at 523 locations, which were built on behalf of the Berlin Senate Department for Environment, Mobility, Consumer and Climate Protection (SenUMVK) in the period from 2015 to the end of 2020 as part of the "be emobil" project[11]. In the current analysis, 553 locations were identified, of which 486 are normal chargers (AC), 51 lantern chargers (3.7kW) and 16 fast chargers (DC, 50kW)[12]. In addition, an expansion of up to 1.000 lantern charging points is planned in Berlin, with the start of the installation of the first 200 in summer 2022.[13] In general, the expansion of charging infrastructure in Berlin has increased very strongly over the year.

City	**City of Berlin**			
Status	1st quartal 2022			
	Publicly Accessible	**Includes In public space**	**Includes In private space**	**Lantern charging points** (key date 30.06.2022)

[10] Source: Kraftfahrtbundesamt (KBA) (2022): Fahrzeugzulassungen (FZ), FZ1.1, Krafträder („Motorbikes“). No details about electrification percentages.

[11] Senatsverwaltung für Umwelt, Mobilität, Verbraucher- und Klimaschutz (SenUMVK): https://www.berlin.de/sen/uvk/verkehr/verkehrsplanung/elektromobilitaet/ladeinfrastruktur-im-oeffentlichen-raum/oeffentliche-ladeinfrastruktur-fuer-pkw-und-leichte-nutzfahrzeuge/

[12] Project „emobil“, statistical statistical evaluation from the second quarter of 2022 by IKEM. Key date is 30.06.2022.

[13] https://ecomento.de/2022/03/29/ubitricity-baut-in-berlin-200-elektroauto-ladelaternen-800-weitere-moeglich/

Charging Points	1.849	1.164	685	51

In this framework, a robust strategy for making the city fleet, both private and commercial, as much electric as possible, has been in place from 2012 with the introduction of the so-called "Berlin model" aiming at providing every EV drivers with easy and non-discriminatory access to charging infrastructure on public streets through standardised and easy to use charging points.

4.3.1 USER-CHI products to be implemented in Berlin

INCAR & SMAC – Short range demo

The Berlin site is going to implement a demo for testing the advantages deriving from the INCAR tool with the aim to offer e-parking spots to both Gewobag[14] residents and "external" users.

The physical infrastructure in Berlin's pilot site will be fully completed by the time the demonstration of the USER-CHI products starts. There will be two demonstrations sites in Berlin, in which all the newly installed AC-chargers by Qwello[15] will deploy and demonstrate the functions of the INCAR and SMAC-tools.

Table 11: Berlin INCAR&SMAC demo details

Technical objectives at local level	The main technical objectives are: - Analysing the interoperability between CPOs and INCAR (ad-hoc charging). - Testing the INCAR app functionalities (i.e., reservation, routing and charging features also in a roaming scenario) in the short range. - Testing the payment (compensations) between CPOs and EMSPs through the INCAR platform. - Testing the accounting platform based on Blockchain.
Social objectives at local level	From a social/user perspective, the main objectives are: - Evaluating the users' perception on the advantages of the service offered by INCAR considering different user profiles. - Assessing the opinion and feedback of users about the convenience of roaming services

[14] German real estate company owned by the city of Berlin.
[15] CPO

	characterised with transparent and flexible payment features.
End-user groups involved	- EVs drivers (Gewobag residents and external users) with or without any contract with an EMSP(s) of the INCAR platform. - CPOs having joined the platform.

CLICK – Interoperability according to user group

The city of Berlin will focus on CLICK to optimise the location and planning of new charging infrastructure in the city, matching the users' needs, preferences, and habits, with the existing charging technologies and typologies available in the market.

Table 12: Berlin CLICK demo details

Technical objectives at local level	The main technical objectives are: - Assessing the location prediction functionality. - Evaluating the holistic planning kit utilities.
Social objectives at local level	From a social/user perspective, the main objectives are: - Evaluating the CLICK users' perception on the advantages of the service offered with respect to their business and planning aims. - Appraisal of requirements and needs of different users' categories considered.
End-user groups involved	- Urban mobility planners. - Transport planners. - City planners.

4.3.2 Final[16] list of Key Performance Indicators for Berlin

The final list of KPIs selected by Berlin is here presented in respect to the different USER-CHI product to be implemented. Additionally, a group of local indicators has also been included. In expansion of additional indicators for the evaluation of the Berlin demo site is possible.

4.3.2.1 SMAC/INCAR KPIs

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products
Measurement unit	€/kWh
Method of measurement/Data source	QWELLO and INCAR; calculated as difference between the average cost of a full charge (60 kWh battery, unless otherwise indicated) and the cost of a full charge made by using USER-CHI products
Frequency of data collection	Monthly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	7
Performance indicator name	CPOs turnover increase thanks to USER-CHI products
Performance indicator definition	Increase in monthly revenues faced by CPOs using INCAR&SMAC due to a growth in # of transactions
Measurement unit	€/month

[16] As mentioned at the end of paragraph 4.1, KPIs related to INSOC and CLICK may be subject to changes and/or additions depending on the finalisation of product development

Method of measurement/Data source	QWELLO and INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	12
Performance indicator name	# CPOs using INCAR & SMAC
Performance indicator definition	Number of CPOs taking part in the INCAR&SMAC ecosystem.
Measurement unit	n.
Method of measurement/Data source	INCAR and SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	13
Performance indicator name	# Customers registered in the INCAR platform
Performance indicator definition	Number of customers registered in the INCAR platform.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Monthly

Target Group for measurement	INCAR customers

Evaluation Area	Charging infrastructure
Performance indicator ID number	14
Performance indicator name	# EVSEs integrated in the INCAR platform
Performance indicator definition	Number of EVSEs integrated in the INCAR platform
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	15
Performance indicator name	# integrated services offered in the INCAR platform
Performance indicator definition	Number of integrated services offered in the INCAR platform at demo site level split by type of service.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	16
Performance indicator name	# EVSEs integrated in SMAC Tool
Performance indicator definition	Number of EVSEs integrated in the SMAC Tool.
Measurement unit	n.
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	19
Performance indicator name	kWh inserted in the grid
Performance indicator definition	kWh inserted in the grid
Measurement unit	kWh
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	20
Performance indicator name	N° of power steering requests

Performance indicator definition	N° of power steering requests
Measurement unit	n.
Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	21
Performance indicator name	Max. power steered
Performance indicator definition	Max. power steered
Measurement unit	kW
Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Increased ease of charging thanks to services provided by USER-CHI
Performance indicator definition	Increased ease of charging thanks to services provided by the INCAR app
Measurement unit	Likert scale

Method of measurement/Data source	INCAR App; Question asked in the App evaluation screen: How easy was it to recharge your vehicle compared to the recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy
Frequency of data collection	Yearly
Target Group for measurement	EV

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	Increased EV drivers' satisfaction due to the reservation function
Performance indicator definition	Increased satisfaction due to the ability to plan charging processes via reservation function
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App Question asked in the INCAR App evaluation screen: How satisfied are you with the reservation function? (Likert Scale, 4 options, "very dissatisfied - very satisfied" + "I didn't use this function")
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of INCAR services
Performance indicator definition	Extent to which users would recommend INCAR services (reservations, etc.) to people who do not yet drive an e-car
Measurement unit	Likert scale

Method of measurement/Data source	INCAR App, Question asked in the INCAR App Evaluation Screen: How likely is it that you would recommend the INCAR services as a considerable advantage to drive an e-car? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it) s
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

4.3.2.2 CLICK KPIs

Evaluation Area	Charging infrastructure
Performance indicator ID number	10
Performance indicator name	# new EVSE planned
Performance indicator definition	Number of additional EVSE (both public accessible and private) planned thanks to the implementation of USER-CHI products in the demo site.
Measurement unit	n.
Method of measurement/Data source	CPOs/CLICK/Cities
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	22
Performance indicator ID number	# CLICK user
Performance indicator name	Number of users using/testing CLICK
Performance indicator definition	n.

Measurement unit	CLICK
Method of measurement/Data source	Yearly
Frequency of data collection	CPOs, Transport planners
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Ease-of-use perceived of CLICK
Performance indicator definition	Level of ease-of-use perceived by CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: How easy was it to use CLICK for locating new charging infrastructures compared to similar tools? (Likert scale, 4 options, Very difficult – Very easy + 1 option - never used any other similar tool before)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of CLICK
Performance indicator definition	Extent to which users would recommend CLICK as a valuable tool to locate new charging stations
Measurement unit	Likert scale

Method of measurement/Data source	Survey (see Annex 2), Question asked: How likely is it that you would recommend the CLICK to your colleagues as a valuable tool to locate new charging stations? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

4.3.2.3 LOCAL KPIs

Evaluation Area	Environment
Performance indicator ID number	1
Performance indicator name	CO2 emissions reduction
Performance indicator definition	Estimate of CO2 emissions reduction thanks to the increase in EVs usage;
Measurement unit	gCO2 emissions avoided/km
Method of measurement/Data source	INCAR and websites; It will be calculated as the difference between the new EVs registered in the INCAR platform and the disused polluting Diesel and gasoline vehicle; for the calculation, the tool developed by Transport&Environment[17] will be used
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	5

[17] The tool compiles all the most up-to-date data on CO2 emissions linked to the use of an electric, diesel or petrol car to compare CO2 emissions of EV compared to diesel and Petrol vehicles https://www.transportenvironment.org/discover/how-clean-are-electric-cars/

Performance indicator name	Marketshare of EVs at city level - private cars and LDVs
Performance indicator definition	Ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Measurement unit	%
Method of measurement/Data source	Cities: calculated as ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Frequency of data collection	yearly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	8
Performance indicator name	(Increase of) EVSE usage rate
Performance indicator definition	Share of total number of charging sessions by public accessible EVSE charging power / private ones
Measurement unit	%
Method of measurement/Data source	CPOs and INCAR
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EVs market
Performance indicator ID number	9
Performance indicator name	Reduction of EVSE related costs
Performance indicator definition	Installation and operational costs reduction, as well as reduced charging costs

Measurement unit	%
Method of measurement/Data source	QWELLO
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	23
Performance indicator name	Increase of EV and LEV drivers' satisfaction level thanks to new services
Performance indicator definition	EV drivers average reported satisfaction with the quality of the new services offered in the demo sites thanks to USER-CHI. It measures the experience of the user against his/her expectations
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	24
Performance indicator name	Awareness level on new services
Performance indicator definition	Percentage of the target population with knowledge of the new services offered in the demo sites thanks to USER-CHI.
Measurement unit	%
Method of measurement/Data source	WP8

Frequency of data collection	Monthly
Target Group for measurement	Berlin citizens

4.4 Budapest

Situated along the Danube River, with 1,750 million people Budapest is the capital and the largest city of Hungary and the country's main political, cultural, commercial, industrial, and transportation centre. The overall sustainable mobility strategy foresees an improvement in the modal split in terms of a major shift from private motorised vehicles to both active mobility and public transport.

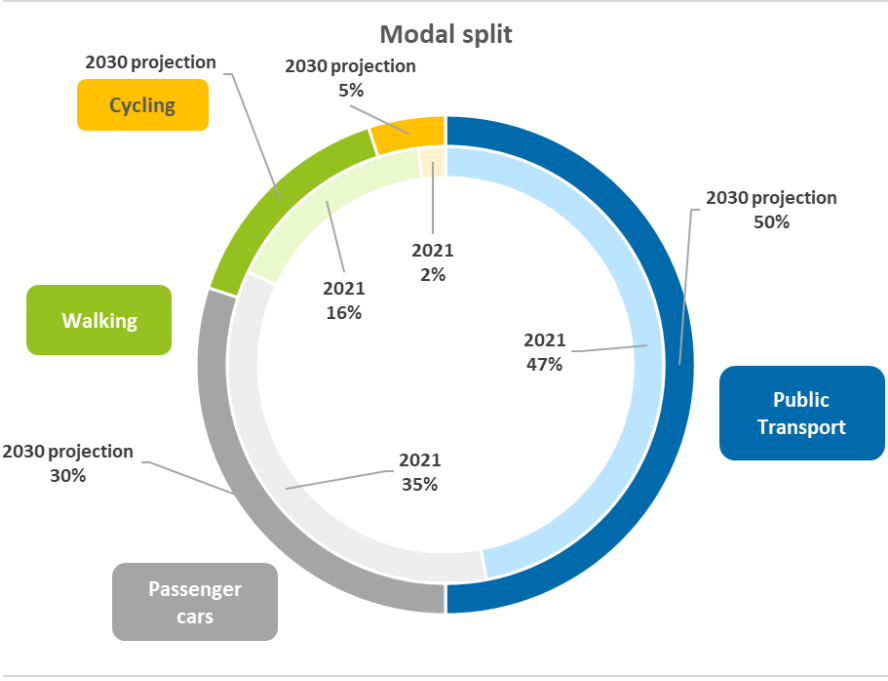

Figure 5: Budapest modal split *[Source:BKK]*

As reported by BKK 2021 Q3 statistics, the EVs fleet in Budapest is composed by around 16,000 EVs (with a 45% share of fully electric BEVs), while the national EV-fleet numbered 38,000 cars. It is important to note that – together with the EVs registered in the Budapest Metropolitan Area – there are 25,000 electric vehicles circulating in the capital. Moreover, in 2021 Q1, 555 of the 1,471 publicly available recharging stations (with one or two charging points) that have received a licence from the Hungarian Energy and Public Utility Authority (MEKH) operated in Budapest

From the e-charging infrastructure perspective, it is worth noting that in 2020 the electricity consumption in the public network in Hungary reached 7.1GWh (out of the national electricity consumption of 45 TWh), despite COVID. In addition, it has been recorded an increase of 37% concerning the share of DC charging among all 709,579 charging transactions and 49% of electricity transfers were made at high power DC charging stations.

Table 13: Budapest EVs fleet *[Source: BKK]*

	Light Electric Vehicles (LEVs)	Light Duty Vehicles (LDVs)	Heavy Duty Vehicles (HDVs)
BEVs	E-kick scooter: ~2,000 shared e-motorbike: ~200 shared	Cars: ~17,800 fully electric in Hungary (~50%, 9,000 in Budapest Cars: ~12,00 range extension) e-cars[18] (~50%, 6,000 in Budapest)	~less than 5, experimental BEV (trucks, garbage trucks) Buses: 20 BEV buses in the city 100 BEV buses serving the metropolitan area
PHEVs		~7,500 Plug-in hybrid in Hungary (~50%, 3,750 in Budapest)-	-

The Hungarian e-mobility laws have defined the set of supporting policies towards a major uptake of zero-emissions vehicles. In particular, the regulation on e-mobility services assumes that the operation of electric charging stations normally comprises also the supply of electromobility services. Nevertheless, operators can reach an agreement with any registered electromobility service provider regarding the supply of e-mobility services to foster the market development and promote the competition among service providers. This can also imply that an electromobility service provider is not obliged to operate chargers and have a corresponding operation license.

4.4.1 USER-CHI products to be implemented in Budapest

CLICK – Holistic planning toolkit

In the framework of boosting e-mobility and with a focus on public space extension and short-range users, the CLICK tool is going to be implemented in Budapest for supporting local urban mobility planners in defining the most suitable places to install new chargers.

[18] A range-extended electric vehicle (REEV), or an extended-range electric vehicle (E-REV), is a battery electric vehicle that runs on electricity but includes an auxiliary power unit known as a 'range extender'. The range extender (usually a small petrol engine) drives an electric generator which charges a battery that supplies the vehicle's electric motor rather than driving the wheels. This allows for an increased range from the vehicle. Source: https://www.greencarguide.co.uk/

Table 14: Budapest CLICK demo details

Technical objectives at local level	The main technical objectives are: - Assessing the location prediction functionality. - Evaluating the holistic planning kit utilities.
Social objectives at local level	From a social/user perspective, the main objectives are: - Evaluating the CLICK users' perception on the advantages of the service offered with respect to their business and planning aims. - Appraisal of requirements and needs of different users' categories considered (e.g., urban mobility planner, public housing company planner).
End-user groups involved	- Urban mobility planners. - Transport planners. - City planners.

INSOC – Solar charging

Budapest foresees to deploy two facilities characterised by a theft-proof parking for e-bike equipped with solar panels for renewable energy production. To this end, the Budapest Council is envisaging a public tender to be launched in 2022 to exploit these facilities.

Table 15: Budapest INSOC demo details

Technical objectives at local level	The main technical objectives are: - Analysing the efficiency and utilities of solar DC-Charging for LEVs. - Assessing the integration of onsite production of renewable energy.
Social objectives at local level	From a social/user perspective, the main objectives are: - Evaluating the acceptance level of solar panels when installed in public spaces. - Appraisal of users' perception about the advantages of a theft-proof parking place for LEVs. - Assessing the convenience for users to charge at work.

End-user groups involved	- LEV users (e-bike, e-kick scooter). - Private e-bikers. - E-bikes sharing users.

SMAC – City Smart Charging

The city of Budapest or a city partner foresees to implement the SMAC tool to dynamically optimise the power supplied to the charging points and so offering both the maximum power and the high-quality level in this charging stations. At night-time, the charging stations would offer long period of charge at medium or low power, and just the opposite during the day: short period of charge at high power.

Table 16: Budapest SMAC demo details

Technical objectives at local level	The main technical objectives are: - Analysing the intelligent and dynamic management of the charging demand. - Allowing CPOs to achieve economic benefits from a more efficient use of their charging points.
Social objectives at local level	From a social/user perspective, the main objectives are: - Evaluating the perceived improvement of quality of service offered to the user. - Appraising the level of utility and ease to use of the service from the users' perspective. - Assessing the level of users' intention to promote the service.
End-user groups involved	- CPOs using the SMAC website interface. - Smart charging services end-users. - Technical managers pertaining to the Budapest charging point network.

INCAR – City Smart Charging short range demo

In Budapest the INCAR tool will be implemented to offer innovative services to both users with an EMSP contract and users without an EMSP contract, considering that the EMSP is participating to the INCAR platform.

Table 17: Budapest INCAR (short range) demo details

Technical objectives at local level	The main technical objectives are: - Testing the INCAR app functionalities (i.e., reservation, routing and charging features). - Checking the payments' function (i.e., compensation) between CPOs and EMSPs through the INCAR platform. - Exploring the accounting platform based on blockchain technology.
Social objectives at local level	From a social/user perspective, the main objectives are: - Assessing the user convenience and provision of roaming services with transparent and flexible payment features. - Evaluating how the platform manages the information flow between CPO . - Appraising the added-value perceived by final users concerning the smart and highly efficient interconnections with AC and DC networks, focused on reducing costs.
End-user groups involved	- Local EMSPs and CPOs participating in the platform. - Private & professional EV drivers.

INCAR – Long range demo

In Budapest the INCAR tool will be implemented also to assess the long-range services offered by the platform.

Table 18: Budapest INCAR (long-range) demo details

Technical objectives at local level	The main technical objectives are: - Testing the interoperability between CPOs. - Exploring the utilities offered with respect to different user groups. - Validating the customisation of the service. - Improving the availability of CPOs.

Social objectives at local level	From a social/user perspective, the main objectives are: - Assessing the user convenience of INCAR features compared to apps already in use. - Appraising the level of utility, the charging experience, and ease to use of the service from the users' perspective. - Assess the level of users' intention to promote the service.
End-user groups involved	- Professional e-drivers (e.g., taxi drivers, delivery services, after sales services). - Private EV drivers.

4.4.2 Final[19] list of Key Performance Indicators for Budapest

The final list of KPIs selected by Budapest is here presented in respect to the different USER-CHI product to be implemented. Additionally, a group of local indicators has also been included.

It should be clarified that the list of KPIs presented here has NOT been validated by the Budapest demo partners. In fact, currently the procedure of including a CPO for Budapest is being issued with an amendment of the Grant Agreement and this has prevented USER-CHI Budapest partners from validating the list presented here. Therefore, similar to what has been specified for the KPIs related to INSOC, FIT consulting reserves the right to amend/include this list.

4.4.2.1 SMAC/INCAR KPIs

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products

[19] As mentioned at the end of paragraph 4.1, KPIs related to INSOC, CLICK and Budapest may be subject to changes and/or additions depending on the finalisation of demo implementation

Measurement unit	€/kWh
Method of measurement/Data source	CPOs and INCAR; calculated as difference between the average cost of a full charge (60 kWh battery, unless otherwise indicated) and the cost of a full charge made by using USER-CHI products
Frequency of data collection	Monthly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	7
Performance indicator name	CPOs turnover increase thanks to USER-CHI products
Performance indicator definition	Increase in monthly revenues faced by CPOs using INCAR&SMAC due to a growth in # of transactions
Measurement unit	€/month
Method of measurement/Data source	CPOs and INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	12
Performance indicator name	# CPOs using INCAR & SMAC
Performance indicator definition	Number of CPOs taking part in the INCAR&SMAC ecosystem.
Measurement unit	n.
Method of measurement/Data source	INCAR and SMAC (ETRA)

Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	13
Performance indicator name	# Customers registered in the INCAR platform
Performance indicator definition	Number of customers registered in the INCAR platform.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	INCAR customers

Evaluation Area	Charging infrastructure
Performance indicator ID number	14
Performance indicator name	# EVSEs integrated in the INCAR platform
Performance indicator definition	Number of EVSEs integrated in the INCAR platform
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	15
Performance indicator name	# integrated services offered in the INCAR platform
Performance indicator definition	Number of integrated services offered in the INCAR platform at demo site level split by type of service.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	16
Performance indicator name	# EVSEs integrated in SMAC Tool
Performance indicator definition	Number of EVSEs integrated in the SMAC Tool.
Measurement unit	n.
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	19

Performance indicator name	kWh inserted in the grid
Performance indicator definition	kWh inserted in the grid
Measurement unit	kWh
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	20
Performance indicator name	N° of power steering requests
Performance indicator definition	N° of power steering requests
Measurement unit	n.
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	21
Performance indicator name	Max. power steered
Performance indicator definition	Max. power steered
Measurement unit	kW

Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Increased ease of charging thanks to services provided by USER-CHI
Performance indicator definition	Increased ease of charging thanks to services provided by the INCAR app
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App; Question asked in the App evaluation screen: How easy was it to recharge your vehicle compared to the recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy
Frequency of data collection	Yearly
Target Group for measurement	EV and LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	Increased EV drivers' satisfaction due to the reservation function
Performance indicator definition	Increased satisfaction due to the ability to plan charging processes via reservation function
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App Question asked in the INCAR App evaluation screen: How satisfied are you with the reservation function?

	(Likert Scale, 4 options, “very dissatisfied - very satisfied” + “I didn’t use this function”)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of INCAR services
Performance indicator definition	Extent to which users would recommend INCAR services (reservations, etc.) to people who do not yet drive an e-car
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App, Question asked in the INCAR App Evaluation Screen: How likely is it that you would recommend the INCAR services as a considerable advantage to drive an e-car? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it) s
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

4.4.2.2 INSOC KPIs

Evaluation Area	Environment
Performance indicator ID number	2
Performance indicator name	RES energy produced on-site supplied to LEVs
Performance indicator definition	Amount of energy produced by the integrated solar DC charging system and supplied to LEVs
Measurement unit	kWh/day

Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	3
Performance indicator name	self-consumption ratio
Performance indicator definition	The self-consumption ratio is the ratio between the PV production and the portion of the PV production consumed by the loads.
Measurement unit	%
Method of measurement/Data source	INSOC; This ratio is calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by the loads.
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	4
Performance indicator name	% of renewable energy in the LEVs energy consumption
Performance indicator definition	Since the electrical energy from the solar panels is limited, the indicator measures the share of PV energy compared to the total energy used by the LEV.
Measurement unit	%
Method of measurement/Data source	INSOC; Calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by LEV.

Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products
Measurement unit	€/kWh
Method of measurement/Data source	CPOs and INCAR; calculated as difference between the average cost of a full charge
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	17
Performance indicator name	# New users of DC-charging solutions for LEVs
Performance indicator definition	Number of new LEVs users charging through INSOC.
Measurement unit	n.
Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	tbd
Target Group for measurement	LEV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	18
Performance indicator name	# Wireless charging stations
Performance indicator definition	Number of wireless charging stations implemented.
Measurement unit	n.
Method of measurement/Data source	INSOC
Frequency of data collection	Yearly
Target Group for measurement	INSOC product developers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	LEV drivers' satisfaction level thanks to INSOC
Performance indicator definition	EV drivers average reported satisfaction with INSOC compared to other traditional electric e-bike/e-scooter sharing services
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2) Question asked: How satisfied are you with INSOC compared to other traditional electric e-bike/e-scooter sharing services? (Likert Scale, 4 options, “much less satisfied – much more satisfied”)
Frequency of data collection	Yearly
Target Group for measurement	LEV drivers

Evaluation Area	EV Users acceptance

Performance indicator ID number	29
Performance indicator name	Aesthetical perception of the solar-power charging station
Performance indicator definition	Aesthetic perception of harmonious integration of the charging station into the surrounding background
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: From an aesthetic point of view, How do you think the charging station has integrated into its surroundings? (Likert scale, 3 options, Has improved a lot/improved a little/is indifferent
Frequency of data collection	Yearly
Target Group for measurement	EV-drivers in the city

4.4.2.3 CLICK KPIs

Evaluation Area	Charging infrastructure
Performance indicator ID number	10
Performance indicator name	# new EVSE planned
Performance indicator definition	Number of additional EVSE (both public accessible and private) planned thanks to the implementation of USER-CHI products in the demo site.
Measurement unit	n.
Method of measurement/Data source	CPOs/CLICK/Cities
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	22
Performance indicator ID number	# CLICK user
Performance indicator name	Number of users using/testing CLICK
Performance indicator definition	n.
Measurement unit	CLICK
Method of measurement/Data source	Yearly
Frequency of data collection	CPOs, Transport planners
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Ease-of-use perceived of CLICK
Performance indicator definition	Level of ease-of-use perceived by CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: How easy was it to use CLICK for locating new charging infrastructures compared to similar tools? (Likert scale, 4 options, Very difficult – Very easy + 1 option - never used any other similar tool before)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27

Performance indicator name	Recommendation of CLICK
Performance indicator definition	Extent to which users would recommend CLICK as a valuable tool to locate new charging stations
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2), Question asked: How likely is it that you would recommend the CLICK to your colleagues as a valuable tool to locate new charging stations? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

4.5 Rome

The municipality of Rome is composed of 15 boroughs, each of them with more than 100 thousand inhabitants, while its metropolitan area is composed of 120 municipalities, and counts 4,4 million of inhabitants, a greater number compared to other major European metropolitan areas.

As reported in the last Sustainable Urban Mobility Plan of the city, if considering the weekday mobility of Rome's residents, the number of journeys is equal to 6,1 million. 59% of people use private vehicles – both car and motorbike (3,75 million total trips), 21.5% concerns public transport – also in combination with other means – (1,3 million of journeys), 18% are the estimated journeys on foot (1.1 million) while 1.4% are made by bicycle (around 90,000 journeys).

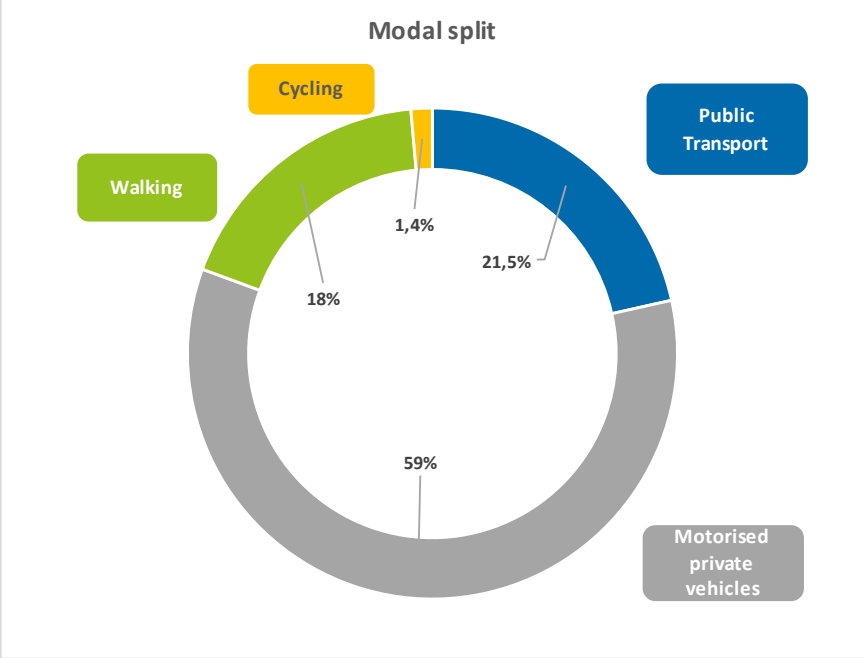

Figure 6: Rome modal split, 2020*[Source: PUMS Roma]*

Among the 1,7 million cars registered in Rome, 24,877 constitute the EV share. The large majority is represented by e-cars, followed by LEVs.

Table 19: Rome EVs fleet, 2021 *[Source: ACI]*

City	City of Rome		
Year	Dec 2021		
	EV	Total	Penetration
Private Cars	16678	1241793	1,3%
Light Duty Vehicles	n.a.	214778	n.a.

In 2018 the rules for the instalment of charging points in public areas in Rome have been defined through the Electric Mobility Plan for the city (Piano capitolino della mobilitá elettrica[20]). Based on the most popular destinations in town, the plan has identified 320 areas in the municipality of Rome for which is possible to submit proposals to install electric charging points.

To foster the enhancement of EVSE, it has been also laid down an action plan for supporting private investments in:

20 https://romamobilita.it/sites/default/files/PIANO%20MOB%20ELETTRICA%20ver%2023%20giugno%202017%20delibera.pdf

- Freight vehicles
- Taxi
- Filling Stations
- Parking lots and garages
- Private buildings

4.5.1 USER-CHI products to be implemented in Rome

CLICK – Holistic planning toolkit

The city of Rome will test the CLICK planning toolkit by making available as much information on urban and territorial data as possible to maximise the tool's advantages. This will be done by making available several computer terminals with access to the online tool together with the creation of a connection with the RSM databases and other open data websites.

Table 20: Rome CLICK demo details

Technical objectives at local level	The main technical objectives are: - Assessing the location prediction functionality. - Evaluating the holistic planning kit utilities. - Demonstrating to be a valid support for the development of the City's Traffic Masterplan.
Social objectives at local level	From a social/user perspective, the main objective is: - Evaluating the CLICK users' perception on the advantages of the service offered with respect to their business and planning aims.
End-user groups involved	- Urban mobility planners.

INSOC – Solar charging

The city of Rome will take advantage of the INSOC product for building a theft-proof parking for e-bike/e-kick scooter equipped with solar panels for renewable energy production. A fleet of e-bikes ready for charge with solar DC energy in the theft-proof parking will then be made available together with hardware facilities and software interface.

Table 21: Rome INSOC demo details

Technical objectives at local level	The main technical objectives are: - Testing the efficiency and utilities of the Solar DC-charging for LEVs (e-bikes). - Evaluating the integration of on-site RES production and theft-proof parking.
Social objectives at local level	From a social/user perspective, the main objectives are: - Verifying the acceptance of solar panels installed in public spaces. - Evaluating the users' perception on innovative e-bike parking in terms of increase willingness to use e-LEVs.
End-user groups involved	- Rental and sharing e-bikes and e-kick scooters users.

SMAC – City smart charging

The city of Rome will implement SMAC in two locations to provide CPOs and EMSPs with a tool including smart grid integration services, RES electricity supply, reduction of grid impact and demand management features.

Table 22: Rome SMAC demo details

Technical objectives at local level	The main technical objectives are: - Analysing smart grid integration services. - Assessing the RES electricity supply. - Estimating the reduction of grid impact and demand management advantages. - Validating the service configuration. - Evaluating the added value for the e-mobility management of having the possibility to display both real time and historic information.
Social objectives at local level	From a social/user perspective, the main objectives are: - Evaluating the users' perception on innovative features offered by the tool.

	- Assessing the level of service from the users' perspective (e.g., level of satisfaction with preferences that can be selected).
End-user groups involved	- CPOs and EMSPs.

INCAR – Short range demo

The city of Rome will test the INCAR platform for short range services by considering different user categories so to maximise the advantages of having such a tool in place.

Table 23: Rome INCAR (short range) demo details

Technical objectives at local level	The main technical objectives are: - Testing the INCAR app functionalities (registration, reservation, routing, charging features). - Verifying the possibility to charge in any of the demo site charging points. - Proving the efficiency of direct payment through the app also from a CPO perspective. - Testing the accounting platform based on Blockchain technology
Social objectives at local level	From a social/user perspective, the main objectives are: - Assessing the CPO manager advantages in making use of the personalised dashboard. - Evaluating how the platform manages the information flow between CPO . - Appraising the quality of payment transactions ad perceived by CPOs being part of the platform.
End-user groups involved	- CPOs and EMSPs. - Private EV drivers.

INCAR – Long range demo

The city of Rome will test the INCAR platform for the long-range case by considering offering the services to foreign EV drivers (e.g. Spanish EV drivers being for some reasons in Rome).

Table 24: Rome INCAR (long range) demo details

Technical objectives at local level	The main technical objectives are: - Analyzing the interoperability between CPOs. - Exploring the utilities according to user groups. - Validating the service customization. - Improving the availability of CPOs.
Social objectives at local level	From a social/user perspective, the main objectives are: - Assessing the INCAR platform level of service platform in terms of usability of functionalities offered to the user (e.g., price, location, connector type). - Evaluating the platform ease of use. - Appraising the quality level perceived by the user when considering smart charging feature.
End-user groups involved	- Private EV drivers being present in AMB database.

4.5.2 Final[21] list of Key Performance Indicators for Rome

The final list of KPIs selected by Rome is here presented in respect to the different USER-CHI product to be implemented. Additionally, a group of local indicators has also been included.

4.5.2.1 SMAC/INCAR KPIs

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products

[21] As mentioned at the end of paragraph 4.1, KPIs related to INSOC and CLICK may be subject to changes and/or additions depending on the finalisation of product development

Measurement unit	€/kWh
Method of measurement/Data source	ENEL-X and INCAR; calculated as difference between the average cost of a full charge (60 kWh battery, unless otherwise indicated) and the cost of a full charge made by using USER-CHI products
Frequency of data collection	Monthly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	7
Performance indicator name	CPOs turnover increase thanks to USER-CHI products
Performance indicator definition	Increase in monthly revenues faced by CPOs using INCAR&SMAC due to a growth in # of transactions
Measurement unit	€/month
Method of measurement/Data source	ENEL-X and INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	12
Performance indicator name	# CPOs using INCAR & SMAC
Performance indicator definition	Number of CPOs taking part in the INCAR&SMAC ecosystem.
Measurement unit	n.
Method of measurement/Data source	INCAR and SMAC (ETRA)

Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	13
Performance indicator name	# Customers registered in the INCAR platform
Performance indicator definition	Number of customers registered in the INCAR platform.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	INCAR customers

Evaluation Area	Charging infrastructure
Performance indicator ID number	14
Performance indicator name	# EVSEs integrated in the INCAR platform
Performance indicator definition	Number of EVSEs integrated in the INCAR platform
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	15
Performance indicator name	# integrated services offered in the INCAR platform
Performance indicator definition	Number of integrated services offered in the INCAR platform at demo site level split by type of service.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	16
Performance indicator name	# EVSEs integrated in SMAC Tool
Performance indicator definition	Number of EVSEs integrated in the SMAC Tool.
Measurement unit	n.
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	19

Performance indicator name	kWh inserted in the grid
Performance indicator definition	kWh inserted in the grid
Measurement unit	kWh
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	20
Performance indicator name	N° of power steering requests
Performance indicator definition	N° of power steering requests
Measurement unit	n.
Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	21
Performance indicator name	Max. power steered
Performance indicator definition	Max. power steered
Measurement unit	kW

Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Increased ease of charging thanks to services provided by USER-CHI
Performance indicator definition	Increased ease of charging thanks to services provided by the INCAR app
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App; Question asked in the App evaluation screen: How easy was it to recharge your vehicle compared to the recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy
Frequency of data collection	Yearly
Target Group for measurement	EV and LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	Increased EV drivers' satisfaction due to the reservation function
Performance indicator definition	Increased satisfaction due to the ability to plan charging processes via reservation function
Measurement unit	Likert scale
Method of measurement/Data source	INCARApp Question asked in the INCAR App evaluation screen: How satisfied are you with the reservation function?

	(Likert Scale, 4 options, “very dissatisfied - very satisfied” + “I didn’t use this function”)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of INCAR services
Performance indicator definition	Extent to which users would recommend INCAR services (reservations, etc.) to people who do not yet drive an e-car
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App, Question asked in the INCAR App Evaluation Screen: How likely is it that you would recommend the INCAR services as a considerable advantage to drive an e-car? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it) s
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

4.5.2.2 INSOC KPIs

Evaluation Area	Environment
Performance indicator ID number	2
Performance indicator name	RES energy produced on-site supplied to LEVs
Performance indicator definition	Amount of energy produced by the integrated solar DC charging system and supplied to LEVs
Measurement unit	kWh/day

Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	3
Performance indicator name	self-consumption ratio
Performance indicator definition	The self-consumption ratio is the ratio between the PV production and the portion of the PV production consumed by the loads.
Measurement unit	%
Method of measurement/Data source	INSOC; This ratio is calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by the loads.
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	4
Performance indicator name	% of renewable energy in the LEVs energy consumption
Performance indicator definition	Since the electrical energy from the solar panels is limited, the indicator measures the share of PV energy compared to the total energy used by the LEV.
Measurement unit	%
Method of measurement/Data source	INSOC; Calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by LEV.

Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products
Measurement unit	€/kWh
Method of measurement/Data source	CPOs and INCAR; calculated as difference between the average cost of a full charge
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	17
Performance indicator name	# New users of DC-charging solutions for LEVs
Performance indicator definition	Number of new LEVs users charging through INSOC.
Measurement unit	n.
Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	tbd
Target Group for measurement	LEV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	18
Performance indicator name	# Wireless charging stations
Performance indicator definition	Number of wireless charging stations implemented.
Measurement unit	n.
Method of measurement/Data source	INSOC
Frequency of data collection	Yearly
Target Group for measurement	INSOC product developers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	LEV drivers' satisfaction level thanks to INSOC
Performance indicator definition	EV drivers average reported satisfaction with INSOC compared to other traditional electric e-bike/e-scooter sharing services
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2) Question asked: How satisfied are you with INSOC compared to other traditional electric e-bike/e-scooter sharing services? (Likert Scale, 4 options, “much less satisfied – much more satisfied”)
Frequency of data collection	Yearly
Target Group for measurement	LEV drivers

Evaluation Area	EV Users acceptance

Performance indicator ID number	29
Performance indicator name	Aesthetical perception of the solar-power charging station
Performance indicator definition	Aesthetic perception of harmonious integration of the charging station into the surrounding background
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: From an aesthetic point of view, How do you think the charging station has integrated into its surroundings? (Likert scale, 3 options, Has improved a lot/improved a little/is indifferent
Frequency of data collection	Yearly
Target Group for measurement	LEV drivers

4.5.2.3 CLICK KPIs

Evaluation Area	Charging infrastructure
Performance indicator ID number	10
Performance indicator name	# new EVSE planned
Performance indicator definition	Number of additional EVSE (both public accessible and private) planned thanks to the implementation of USER-CHI products in the demo site.
Measurement unit	n.
Method of measurement/Data source	CPOs/CLICK/Cities
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	22
Performance indicator ID number	# CLICK user
Performance indicator name	Number of users using/testing CLICK
Performance indicator definition	n.
Measurement unit	CLICK
Method of measurement/Data source	Yearly
Frequency of data collection	CPOs, Transport planners
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Ease-of-use perceived of CLICK
Performance indicator definition	Level of ease-of-use perceived by CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: How easy was it to use CLICK for locating new charging infrastructures compared to similar tools? (Likert scale, 4 options, Very difficult – Very easy + 1 option - never used any other similar tool before)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27

Performance indicator name	Recommendation of CLICK
Performance indicator definition	Extent to which users would recommend CLICK as a valuable tool to locate new charging stations
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2), Question asked: How likely is it that you would recommend the CLICK to your colleagues as a valuable tool to locate new charging stations? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

4.5.2.4 LOCAL KPIs

Evaluation Area	Environment
Performance indicator ID number	1
Performance indicator name	CO2 emissions reduction
Performance indicator definition	"Estimate of CO2 emissions reduction thanks to the increase in EVs usage;
Measurement unit	gCO2 emissions avoided/km
Method of measurement/Data source	INCAR and websites; It will be calculated as the difference between the new EVs registered in the INCAR platform and the disused polluting Diesel and gasoline vehicle; for the calculation, the tool developed by Transport&Environment[22] will be used
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

[22] The tool compiles all the most up-to-date data on CO2 emissions linked to the use of an electric, diesel or petrol car to compare CO2 emissions of EV compared to diesel and Petrol vehicles https://www.transportenvironment.org/discover/how-clean-are-electric-cars/

Evaluation Area	EVs market
Performance indicator ID number	5
Performance indicator name	Marketshare of EVs at city level - private cars and LDVs
Performance indicator definition	Ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Measurement unit	%
Method of measurement/Data source	Cities: calculated as ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Frequency of data collection	yearly
Target Group for measurement	EV and ELDV drivers

Evaluation Area	EVs market
Performance indicator ID number	8
Performance indicator name	(Increase of) EVSE usage rate
Performance indicator definition	Share of total number of charging sessions by public accessible EVSE charging power / private ones AMB doesn't' have access to information on private EVSE; only public EVSE will be considered for Barcelona
Measurement unit	%
Method of measurement/Data source	CPOs and INCAR
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EVs market
Performance indicator ID number	9
Performance indicator name	Reduction of EVSE related costs
Performance indicator definition	Installation and operational costs reduction, as well as reduced charging costs
Measurement unit	%
Method of measurement/Data source	ENEL-X
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	23
Performance indicator name	Increase of EV and LEV drivers' satisfaction level thanks to new services
Performance indicator definition	EV drivers average reported satisfaction with the quality of the new services offered in the demo sites thanks to USER-CHI. It measures the experience of the user against his/her expectations
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App
Frequency of data collection	Yearly
Target Group for measurement	EV and LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	24

Performance indicator name	Awareness level on new services
Performance indicator definition	Percentage of the target population with knowledge of the new services offered in the demo sites thanks to USER-CHI.
Measurement unit	%
Method of measurement/Data source	WP8
Frequency of data collection	Monthly
Target Group for measurement	Rome citizens

4.6 Turku

The city of Turku counts 193,000 inhabitants, (310,000 inhabitants in the entire region) and is one of Finland's biggest cities. It is an easily accessible city (90% of the inhabitants live less than ten kilometres from the city centre), and given its compact size, it is a perfect city for cycling.

Concerning its modal split, the National travel survey carried out in 2016 a total share of sustainable travel modes in the region equal to 48%, while private cars have a share of 49%.

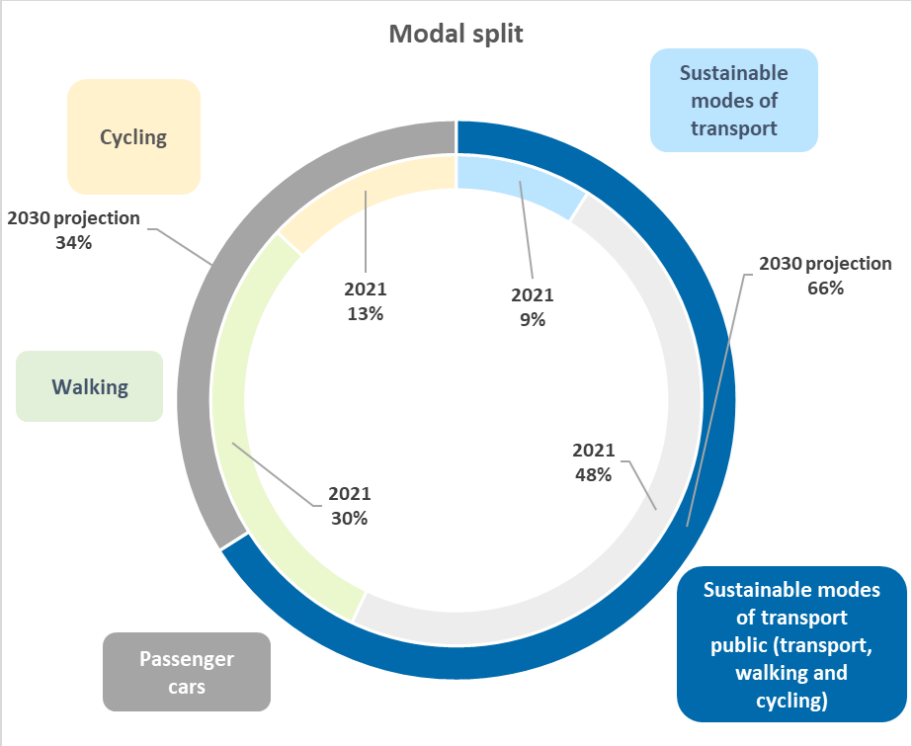

Figure 7: Turku modal split, 2022 *[Source: Turku Climate Plan 2029]*

The following table summarises the registered vehicles in Turku as for 2021 without considering LEVs.

Table 25: Turku fleet, 2021 *[Source: City of Turku]*

City	City of Turku		
Year	2021		
	EV	Total	Penetration
Private Cars	905	1241793	0,1%
Light Duty Vehicles	n.a.	n.a	n.a.

With the objective to be climate neutral by 2029, the city of Turku has in place different and complementary initiatives and solutions to foster e-mobility. To this end, the city is implementing

innovative solutions for sustainable mobility of people and emission free freight logistics together with the enhancement the e-vehicles fleet in services bought by the municipality (e.g., taxi services for disabled people).

Private companies are encouraged to offer EV services and the needed charging services. The main financial support for that is represented by the traffic infrastructure subsidy aiming at promoting the construction of public charging point for EVs.

4.6.1 USER-CHI products to be implemented in Turku

CLICK – Holistic planning toolkit

The city of Turku will test the CLICK planning toolkit in the framework of the city-wide master plan for EV expansion project developed by TURKU Mobility department foreseeing both quick chargers and standard chargers (with and without photovoltaic production) to spread electromobility around the city. The CLICK online tool could support this project to confirm the chargers' location.

Table 26: Turku CLICK demo details

Technical objectives at local level	The main technical objectives are: - Assessing the location prediction and holistic planning kit utilities included in CLICK online tool. - Validating the city-wide master plan of EV.
Social objectives at local level	From a social/user perspective, the main objective is: - Evaluating the CLICK users' perception on the advantages of the service offered with respect to their business and planning aims.
End-user groups involved	- Urban mobility planners. - Public housing company planners.

INSOC – Cheap&Easy use solution for LEVs

The city of Turku will implement INSOC product by building a theft-proof and covered parking for e-bike equipped with solar panels for renewable energy production. Hardware facilities and software interface will be included in the demo implementation.

Table 27: Turku INSOC demo details

Technical objectives at local level	The main technical objectives are:

	- Analysing the efficiency and utilities of Solar DC-Charging for LEV (e-bikes). - Assessing the integration of onsite production of renewable energy, the theft-proof parking, and the safety against snow&ice.
Social objectives at local level	From a social/user perspective, the main objectives are: - Exploring the acceptance level of solar panels in the public space. - Appraising the perceived safety and security level by the users (also including extreme weather conditions). - Evaluating the advantages perceived by users to charge at work.
End-user groups involved	- Private e-bike users.

SMAC – Pääskyvuorenrinne housing area (professional profile)

The city of Turku will include in its demo activities the SMAC utilities with a particular attention to professional users and the advantages the charging tool can bring to them.

Table 28: Turku SMAC demo details

Technical objectives at local level	The main technical objectives are: - Assessing the intelligent and dynamic management of demand brought by the SMAC tool. - Analysing – from both a technical and economic point of view – the efficiency of managing the energy supplied to CPOs. at the same time, improving the service to the end-user.
Social objectives at local level	From a social/user perspective, the main objectives are: - Appraising the increase in quality of service as perceived by the users. - Evaluating the level of utility and ease to use of the service from the users' perspective. - Assessing the level of users' intention to promote the service.

End-user groups involved	- CPOs.

INCAR – Kupittaa area short range demo

The INCAR platform will be tested in Turku with the aim to provide users with a high-quality tool allowing for an interoperability among EMSPs. It is worth noting that up to date, in the Pääskyvuorenrinne area, the CPO (i.e., Turku Energia) does not allow the EV charging of an external user. However, both the CPO and the EMSP (i.e., IGL) consider that such option could be profitable for their businesses. Hence, USER-CHI resulted to be a good field test for evaluating the possibility to include EV charging provision to users without a contract with the EMSP. Through the INCAR platform, in fact, CPOs and EMSPs will have a secure, transparent, and user-friendly way of managing the information and the payment of their transactions, and currently this is one of their main barriers.

Table 29: Turku INCAR (short range) demo details

Technical objectives at local level	The main technical objectives are: - Analysing the interoperability among EMSPs. - Testing the INCAR app functionalities (reservation, routing and charging features in a roaming scenario). - Assessing the payment (compensations) between CPOs and EMSPs through the INCAR platform. - Evaluating the accounting platform based on Blockchain technology.
Social objectives at local level	From a social/user perspective, the main objectives are: - Appraising the increase in quality of service as perceived by the professional users. - Evaluating the level of utility and ease to use of the service from the users' perspective. - Assessing the level of users' intention to promote the service.
End-user groups involved	- Private e-drivers with an existing contract with an EMSP(s) of the INCAR platform. - Private e-drivers without an EMSP contract (ad-hoc charging).

	- Local EMSPs and CPOs taking part to the platform.

INCAR – Long range demo

Turku will test the INCAR platform also for the long-range case. A particular attention will be put on the management of transactions when the user will be travelling to Turku from abroad and the EV charging transaction would be paid to his/her EMSP. In fact, if such EMSP does not own the CP, the EMSP would have to pay the cost of the energy to the CPO which operates the charging point, and this economic transaction will be managed by INCAR.

Table 30: Turku INCAR (long range) demo details

Technical objectives at local level	The main technical objectives are: - Analysing the interoperability among CPOs. - Exploring INCAR utilities according to different user groups. - Validating the customer personalisation. - Assessing the improvement of CPOs availability.
Social objectives at local level	From a social/user perspective, the main objectives are: - Appraising the increase in quality of service as perceived by the professional users. - Evaluating the level of utility and ease to use of the service from the users' perspective. - Assessing the level of users' intention to promote the service.
End-user groups involved	- Professional e-drivers (e.g., taxi drivers, delivery services, after sales services). - Private e-drivers.

4.6.2 Final[23] list of Key Performance Indicators for Turku

The final list of KPIs selected by Barcelona is here presented in respect to the different USER-CHI product to be implemented. Additionally, a group of local indicators has also been included.

4.6.2.1 SMAC/INCAR KPIs

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products
Measurement unit	€/kWh
Method of measurement/Data source	TE, IGL and INCAR; calculated as difference between the average cost of a full charge (60 kWh battery, unless otherwise indicated) and the cost of a full charge made by using USER-CHI products
Frequency of data collection	Monthly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	7
Performance indicator name	CPOs turnover increase thanks to USER-CHI products
Performance indicator definition	Increase in monthly revenues faced by CPOs using INCAR&SMAC due to a growth in # of transactions
Measurement unit	€/month

[23] As mentioned at the end of paragraph 4.1, KPIs related to INSOC and CLICK may be subject to changes and/or additions depending on the finalisation of product development

Method of measurement/Data source	TE, IGL and INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	12
Performance indicator name	# CPOs using INCAR & SMAC
Performance indicator definition	Number of CPOs taking part in the INCAR&SMAC ecosystem.
Measurement unit	n.
Method of measurement/Data source	INCAR and SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	13
Performance indicator name	# Customers registered in the INCAR platform
Performance indicator definition	Number of customers registered in the INCAR platform.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Monthly

Target Group for measurement	INCAR customers

Evaluation Area	Charging infrastructure
Performance indicator ID number	14
Performance indicator name	# EVSEs integrated in the INCAR platform
Performance indicator definition	Number of EVSEs integrated in the INCAR platform
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	15
Performance indicator name	# integrated services offered in the INCAR platform
Performance indicator definition	Number of integrated services offered in the INCAR platform at demo site level split by type of service.
Measurement unit	n.
Method of measurement/Data source	INCAR (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	16
Performance indicator name	# EVSEs integrated in SMAC Tool
Performance indicator definition	Number of EVSEs integrated in the SMAC Tool.
Measurement unit	n.
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	19
Performance indicator name	kWh inserted in the grid
Performance indicator definition	kWh inserted in the grid
Measurement unit	kWh
Method of measurement/Data source	SMAC (ETRA)
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	20
Performance indicator name	N° of power steering requests

Performance indicator definition	N° of power steering requests
Measurement unit	n.
Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	21
Performance indicator name	Max. power steered
Performance indicator definition	Max. power steered
Measurement unit	kW
Method of measurement/Data source	SMAC
Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Increased ease of charging thanks to services provided by USER-CHI
Performance indicator definition	Increased ease of charging thanks to services provided by the INCAR app
Measurement unit	Likert scale

Method of measurement/Data source	INCAR App; Question asked in the App evaluation screen: How easy was it to recharge your vehicle compared to the recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy
Frequency of data collection	Yearly
Target Group for measurement	EV and LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	Increased EV drivers' satisfaction due to the reservation function
Performance indicator definition	Increased satisfaction due to the ability to plan charging processes via reservation function
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App Question asked in the INCAR App evaluation screen: How satisfied are you with the reservation function? (Likert Scale, 4 options, “very dissatisfied - very satisfied” + “I didn’t use this function”)
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of INCAR services
Performance indicator definition	Extent to which users would recommend INCAR services (reservations, etc.) to people who do not yet drive an e-car
Measurement unit	Likert scale

Method of measurement/Data source	INCAR App, Question asked in the INCAR App Evaluation Screen: How likely is it that you would recommend the INCAR services as a considerable advantage to drive an e-car? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it) s
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

4.6.2.2 INSOC KPIs

Evaluation Area	Environment
Performance indicator ID number	2
Performance indicator name	RES energy produced on-site supplied to LEVs
Performance indicator definition	Amount of energy produced by the integrated solar DC charging system and supplied to LEVs
Measurement unit	kWh/day
Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	3
Performance indicator name	self-consumption ratio
Performance indicator definition	The self-consumption ratio is the ratio between the PV production and the portion of the PV production consumed by the loads.

Measurement unit	%
Method of measurement/Data source	INSOC; This ratio is calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by the loads.
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	Environment
Performance indicator ID number	4
Performance indicator name	% of renewable energy in the LEVs energy consumption
Performance indicator definition	Since the electrical energy from the solar panels is limited, the indicator measures the share of PV energy compared to the total energy used by the LEV.
Measurement unit	%
Method of measurement/Data source	INSOC; Calculated as a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by LEV.
Frequency of data collection	Tbd
Target Group for measurement	INSOC product developers

Evaluation Area	EVs market
Performance indicator ID number	6
Performance indicator name	Energy bill reduction for USER-CHI products users
Performance indicator definition	Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products
Measurement unit	€/kWh
Method of measurement/Data source	CPOs and INCAR; calculated as difference between the average cost of a full charge

Frequency of data collection	Monthly
Target Group for measurement	CPOs

Evaluation Area	Charging infrastructure
Performance indicator ID number	17
Performance indicator name	# New users of DC-charging solutions for LEVs
Performance indicator definition	Number of new LEVs users charging through INSOC.
Measurement unit	n.
Method of measurement/Data source	INSOC (IPT and ENEL-X)
Frequency of data collection	tbd
Target Group for measurement	LEV drivers

Evaluation Area	Charging infrastructure
Performance indicator ID number	18
Performance indicator name	# Wireless charging stations
Performance indicator definition	Number of wireless charging stations implemented.
Measurement unit	n.
Method of measurement/Data source	INSOC
Frequency of data collection	Yearly
Target Group for measurement	INSOC product developers

Evaluation Area	EV Users acceptance
Performance indicator ID number	26
Performance indicator name	LEV drivers' satisfaction level thanks to INSOC
Performance indicator definition	EV drivers average reported satisfaction with INSOC compared to other traditional electric e-bike/e-scooter sharing services
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2) Question asked: How satisfied are you with INSOC compared to other traditional electric e-bike/e-scooter sharing services? (Likert Scale, 4 options, "much less satisfied – much more satisfied")
Frequency of data collection	Yearly
Target Group for measurement	LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	29
Performance indicator name	Aesthetical perception of the solar-power charging station
Performance indicator definition	Aesthetic perception of harmonious integration of the charging station into the surrounding background
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: From an aesthetic point of view, How do you think the charging station has integrated into its surroundings? (Likert scale, 3 options, Has improved a lot/improved a little/is indifferent
Frequency of data collection	Yearly
Target Group for measurement	TVT tenants and Turku citizens

4.6.2.3 CLICK KPIs

Evaluation Area	Charging infrastructure
Performance indicator ID number	10
Performance indicator name	# new EVSE planned
Performance indicator definition	Number of additional EVSE (both public accessible and private) planned thanks to the implementation of USER-CHI products in the demo site.
Measurement unit	n.
Method of measurement/Data source	CPOs/CLICK/Cities
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	22
Performance indicator ID number	# CLICK user
Performance indicator name	Number of users using/testing CLICK
Performance indicator definition	n.
Measurement unit	CLICK
Method of measurement/Data source	Yearly
Frequency of data collection	CPOs, Transport planners
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	25
Performance indicator name	Ease-of-use perceived of CLICK
Performance indicator definition	Level of ease-of-use perceived by CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers
Measurement unit	Likert scale
Method of measurement/Data source	Survey (See Annex 2) Question asked: How easy was it to use CLICK for locating new charging infrastructures compared to similar tools? (Likert scale, 4 options, Very difficult – Very easy + 1 option - never used any other similar tool before)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

Evaluation Area	EV Users acceptance
Performance indicator ID number	27
Performance indicator name	Recommendation of CLICK
Performance indicator definition	Extent to which users would recommend CLICK as a valuable tool to locate new charging stations
Measurement unit	Likert scale
Method of measurement/Data source	Survey (see Annex 2), Question asked: How likely is it that you would recommend the CLICK to your colleagues as a valuable tool to locate new charging stations? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)
Frequency of data collection	Yearly
Target Group for measurement	CPOs, smart and integrated e -mobility providers (cities) and real-state facility providers

4.6.2.4 LOCAL KPIs

Evaluation Area	Environment
Performance indicator ID number	1
Performance indicator name	CO2 emissions reduction
Performance indicator definition	Estimate of CO2 emissions reduction thanks to the increase in EVs usage
Measurement unit	gCO2 emissions avoided/km
Method of measurement/Data source	INCAR and websites; It will be calculated as the difference between the new EVs registered in the INCAR platform and the disused polluting Diesel and gasoline vehicle; for the calculation, the tool developed by Transport&Environment[24] will be used
Frequency of data collection	Yearly
Target Group for measurement	EV drivers

Evaluation Area	EVs market
Performance indicator ID number	5
Performance indicator name	Marketshare of EVs at city level - private cars and LDVs
Performance indicator definition	Ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Measurement unit	%
Method of measurement/Data source	Cities: calculated as ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles
Frequency of data collection	yearly

[24] The tool compiles all the most up-to-date data on CO2 emissions linked to the use of an electric, diesel or petrol car to compare CO2 emissions of EV compared to diesel and Petrol vehicles https://www.transportenvironment.org/discover/how-clean-are-electric-cars/

Target Group for measurement	EV and ELDV drivers

Evaluation Area	EVs market
Performance indicator ID number	8
Performance indicator name	(Increase of) EVSE usage rate
Performance indicator definition	Share of total number of charging sessions by public accessible EVSE charging power / private ones
Measurement unit	%
Method of measurement/Data source	CPOs and INCAR
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EVs market
Performance indicator ID number	9
Performance indicator name	Reduction of EVSE related costs
Performance indicator definition	Installation and operational costs reduction, as well as reduced charging costs
Measurement unit	%
Method of measurement/Data source	Turku Energia
Frequency of data collection	Yearly
Target Group for measurement	CPOs

Evaluation Area	EV Users acceptance
Performance indicator ID number	23
Performance indicator name	Increase of EV and LEV drivers' satisfaction level thanks to new services
Performance indicator definition	EV drivers average reported satisfaction with the quality of the new services offered in the demo sites thanks to USER-CHI. It measures the experience of the user against his/her expectations
Measurement unit	Likert scale
Method of measurement/Data source	INCAR App
Frequency of data collection	Yearly
Target Group for measurement	EV and LEV drivers

Evaluation Area	EV Users acceptance
Performance indicator ID number	24
Performance indicator name	Awareness level on new services
Performance indicator definition	Percentage of the target population with knowledge of the new services offered in the demo sites thanks to USER-CHI.
Measurement unit	%
Method of measurement/Data source	WP8
Frequency of data collection	Monthly
Target Group for measurement	Turku citizens

5. Acronyms

Acronym	Meaning
AMB	Barcelona Metropolitan Area
BEV	Battery Electric Vehicle
CLICK	Charging infrastructure Locatlon and HolistiC Planning Kit (product of the project)
CPO	Charging Point Operator
GHG	Green House Gas
INCAR	Interoperability, Charging and Parking Platform
INDUCAR	Inductive Charging for e-Cars
INSOC	Integrated Solar-DC charging for LEVs
KPI	Key Performance Indicators
LEV	Low Emissions Vehicle
EMSP	Electric Mobility Service Provider
ETRA	ETRA I+D (project partner)
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
M2M	Machine-to-Machine
PHEV	Plug-in Hybrid Electric Vehicle
SMAC	Smart Charging Tool
TEN-T	Trans European Network - Transport
USER-CHI	Project Title: innovative solution for USER centric CHarging Infrastructure
VMZ	VMZ Berlin Betreibergesellschaft mbH (project partner)
WP	Work Package

6. References

1. Pilot sites personnel
2. OECD
3. Source: Enquesta de mobilitat en dia feiner – EMEF 2018]
4. *DGT, ICAEN*
5. *AMB*
6. *SRV 2018*
7. *KBA*
8. BKK
9. PUMS Roma
10. ACI
11. National Travel Survey
12. City of Turku
13. https://www.greencarguide.co.uk/

7. Annexes

7.1 Annex 1: Process evaluation questionnaire template[25],[26]

Questions
PART A - General

1. Who are you?	
	• City representative/Local administration • Electromobility Service Provider • Charging Points Operator • Technology provider • Energy supplier • Housing Company • Researcher • Consultant • Other: …. *Please specify*
2. Who are you in the project?	
	• City Leader • Product Leader • Neither of them.

3. Which of the following products are you implementing? *Please select all products.*	
	• None (→ *end of questionnaire*) • CLICK • INCAR • SMAC

[25] Note: the same set of questions and related closed answers have been considered for each USER-CHI product.

[26] Questionnaire was evolved by FIT (Source: D7.1) but revised and expanded by IKEM on 25. April 2022.

	• INSOC • INDUCAR • Involved in the development of INFRA, eMoBest or Station of Future Handbook (→ *only Part E*)

PART B – Product Overview

Part B to D (Question 4 to 14) will repeat for every product, that the person is involved in.

4. **Where in the city is product XXX implemented? *Please specify in a few sentences, where the product will be implemented (location/ address if possible).***	

5. **How is/will product XXX be implemented? *Please specify in a few sentences, how the product is/will be implemented.***	

6. **In which phase is product XXX now?**	
	• Preparation phase • Implementation phase • Operation phase • Transition from preparation phase to implementation phase • Transition from implementation phase to operation phase • I'm not sure/I don't know.

7. **How do you rate the current work phase of product XXX?** • ***Please choose a number from 1 (very good) to 6 (very bad)***	
	• 1
	• 2
	• 3
	• 4
	• 5
	• 6

PART C - Drivers

8. **Which of the following drivers have you encountered in your current work phase?** *Please, select all different types of drivers that may apply:*	
	• a. Political / strategic drivers: o Commitment of key actors based on political and/or strategic motives o Presence of sustainable development agenda or vision o Positive impacts of a local election o Coalition between key (policy) stakeholders due to converging (shared) believes in directions of solution o Other: *please specify* ..... *Please shortly provide some details of the political/strategic driver/s encountered to give an idea of the local context.*
	• b. Cultural drivers: o Facilitating cultural circumstances and life style patterns o Other: *please specify* .... *Please shortly provide some details of cultural driver/s encountered to give an idea of the local context.*
	• c. Institutional drivers: o Facilitating administrative structures, procedures and routines o Facilitating laws, rules, regulations and their application o Facilitating structure of organizations and programs o Other: *please specify* ..... *Please shortly provide some details of the institutional driver/s encountered to give an idea the local context.*
	• d. Problem related drivers: o Pressure of the problem(s) causes great priority o Shared sense of urgency among key stakeholders to sustainable mobility/e-mobility o Other: *please specify* .....

	Please shortly provide some details of the problem related driver/s encountered to give an idea the local context.
	• e. Involvement/communication drivers: o Constructive and open involvement of policy key stakeholders o Constructive and open consultation and involvement or citizens or users o Other: *please specify* ..... *Please shortly provide some details of the involvement/communication driver/s encountered to give an idea the local context.*
	• f. Positional drivers: o The CLICK product is part of a (city) program and/or a consequence of the implementation of a sustainable vision o Exchange of experiences and lessons learned with other similar or complementary initiatives o Other: *please specify* ..... *Please shortly provide some details of the positional driver/s encountered to give an idea the local context.*
	• g. Planning drivers: o Accurate technical planning and analysis to determine requirements of XXX implementation o Accurate economic planning and market analysis to determine requirements for XXX implementation, thorough user needs analysis and good understanding of user requirements o Other: *please specify* ..... *Please shortly provide some details of the planning driver/s encountered to give an idea the local context.*
	• h. Organizational drivers: o Constructive partnership arrangements o Strong and clear leadership o Highly motivated key persons, o Key XXX product persons as 'local champions' o Other: *please specify* .....

	Please shortly provide some details of the organizational driver/s encountered to give an idea the local context.

	• i. Financial drivers:
	  ○ Availability of public funds and subsidies
	  ○ Willingness of the business community to contribute financially
	  ○ Other: *please specify .....*
	
	Please shortly provide some details of the financial driver/s encountered to give an idea the local context.

	• j. Technological drivers:
	  ○ New potentials offered by technology
	  ○ New technology available
	  ○ Other: *please specify .....*
	
	Please shortly provide some details of the Technological driver/s encountered to give an idea the local context.

	• k. Spatial drivers:
	  ○ Space for physical projects
	  ○ Experimentation zones
	  ○ Other: *please specify .....*
	
	Please shortly provide some details of the spatial driver/s encountered to give an idea the local context.

9. Which are the three most important drivers encountered during this phase? • ***Please rank from 1 to 3 the driver field according to importance***
• a. Political / strategic • b. Cultural • c. Institutional • d. Problem related • e. Involvement/ communication

	• f. Positional • g. Planning • h. Organizational • i. Financial • j. Technological • k. Spatial • l. None

10. How strong do you estimate the influence of the drivers? • ***Please choose a number from 1 (very strong influence) to 6 (no influence)***	
	• 1
	• 2
	• 3
	• 4
	• 5
	• 6

11. Anything you like to add that was not mentioned concerning drivers?

PART D - Barriers

12. Which of the following barriers have you encountered in your current work phase? Please, select all different types of barriers that may apply:	

	• a. Political / strategic barriers:
	  ○ Lack of sustainable development agenda or vision.
	  ○ Impacts of a local election
	  ○ Opposition of key actors based on political and/or strategic reasons
	  ○ Conflict between key (policy) stakeholders due to diverging believes in directions of solution
	  ○ Other: *please specify* …..

	Please shortly provide some details of the political/strategic barrier/s encountered to give an idea of the local context.
	• b. Cultural barriers: o Impeding cultural circumstances and life style patterns o Other: *please specify* ..... *Please shortly provide some details of cultural barrier/s encountered to give an idea of the local context.*
	• c. Institutional barriers: o Impeding administrative structures o Procedures and routines o Impeding laws, rules, regulations and their application o Hierarchical structure of organizations and programs o Other: *please specify* ..... *Please shortly provide some details of the institutional barrier/s encountered to give an idea the local context.*
	• d. Problem related barriers: o Complexity of the problem(s) to be solved o Lack of shared sense of urgency among key stakeholders to e-mobility o Other: *please specify* ..... *Please shortly provide some details of the problem related barrier/s encountered to give an idea the local context.*
	• e. Involvement/communication barriers: o Insufficient involvement or awareness of (policy) key stakeholders o Insufficient consultation, involvement or awareness of citizens or users o Other: *please specify* ..... *Please shortly provide some details of the involvement/communication barrier/s encountered to give an idea the local context.*
	• f. Positional barriers: o Relative isolation of the XXX product

	○ Lack of exchange with other similar or complementary initiatives ○ Other: *please specify .....* *Please shortly provide some details of the positional barrier/s encountered to give an idea the local context.*
	• g. Planning barriers: ○ Insufficient technical planning and analysis to determine requirements of XXX implementation ○ Insufficient economic planning and market analysis to determine requirements for XXX implementation ○ Lack of user needs analysis: limited understanding of user requirements ○ Other: *please specify .....* *Please shortly provide some details of the planning barrier/s encountered to give an idea the local context.*
	• h. Organizational barriers: ○ Failed or insufficient partnership arrangements ○ Lack of leadership ○ Lack of individual motivation or know-how of key persons ○ Other: *please specify .....* *Please shortly provide some details of the organizational barrier/s encountered to give an idea the local context.*
	• i. Financial barriers: ○ Too much dependency on public funds and subsidies ○ Unwillingness of the business community to contribute financially ○ Other: *please specify .....* *Please shortly provide some details of the financial barrier/s encountered to give an idea the local context.*
	• j. Technological barriers: ○ Additional technological requirements

	○ Technology not available yet ○ Technological problems ○ Other: *please specify* ..... *Please shortly provide some details of the technological barrier/s encountered to give an idea the local context.*
	• k. Spatial barriers: ○ No permission of construction ○ Insufficient space ○ Other: *please specify* ..... *Please shortly provide some details of the spatial barrier/s encountered to give an idea the local context.*

13. Which are the three most important barriers encountered during this phase? • ***Please rank from 1 to 3 the barrier field according to importance***
• a. Political / strategic • b. Cultural • c. Institutional • d. Problem related • e. Involvement/ communication • f. Positional • g. Planning • h. Organizational • i. Financial • j. Technological • k. Spatial • l. None

14. How strong do you estimate the influence of the barriers? • ***Please choose a number from 1 (very strong influence) to 6 (no influence)***	
	• 1
	• 2
	• 3
	• 4
	• 5
	• 6

15. Anything you like to add that was not mentioned concerning barriers?

PART E - Actions

16. Which actions (i.e. activities) have you taken to handle the barriers and / or to make use of the drivers to reach the objectives of product XXX? Please, select all different types of actions that may apply:	

	• a. Political / strategic actions:
	  ○ (Co-)development of vision on sustainable development or sustainable mobility
	  ○ (Co-)development of a program towards sustainable development or e-mobility
	  ○ Dialogue with key stakeholders (politicians etc.) about the sustainability problems to be solved
	  ○ Other: *please specify* .....
	Please shortly provide some details of the political/strategic action undertaken.

	• b. Cultural actions:
	  ○ Facilitating cultural circumstances and life style patterns
	  ○ Other: *please specify* .....
	Please shortly provide some details of cultural action undertaken.

	• c. Institutional actions: ○ Analysis of and/or proposals to change impeding rules, structures, legislation, organizational structures etc.

	○ Other: *please specify* ….. *Please shortly provide some details of the institutional driver/s action undertaken.*
	• d. Problem related actions: ○ Thoroughly analyzing problems towards sustainable mobility to be solved ○ Activities to explain the pressure of the problem ○ All activities towards sharing the sense of urgency among key stakeholders to e-mobility ○ Other: *please specify* ….. *Please shortly provide some details of the problem related action undertaken.*
	• e. Involvement/communication actions: ○ Consultation of target groups by workshop, conference, focus group, expert meeting, face-to-face interviews or questionnaires, telephone interviews or questionnaires or web based questionnaires ○ Public awareness campaign about the sustainability problems to be solved ○ Bringing together key stakeholders to discuss the sustainability problems to be solved (sharing different viewpoints) ○ Public awareness campaign about the XXX product through media activities ○ Involvement of key stakeholders (politicians etc.) in the XXX product ○ Other: *please specify* ….. *Please shortly provide some details of the involvement/communication action undertaken.*
	• f. Positional actions: ○ Put the XXX product concerned into a running sustainability program (combined with the strategic actions) ○ Activities to exchange experiences with other similar or complementary initiatives (workshop, conference, focus group etc.) ○ Other: *please specify* …..

	Please shortly provide some details of the positional action undertaken.
	• g. Planning actions: o Raising or attempting to raise additional 'time budget' for the XXX product o (Re)conduct the economic and technical planning as well as analysis to determine requirements of XXX product implementation o (Re)conduct market analysis to determine requirements for XXX product implementation, thoroughly analyzing user needs analysis to better understand the user requirements o Other: *please specify* ..... *Please shortly provide some details of the planning action undertaken.*
	• h. Organizational actions: o Activities to raise the competences of the XXX partners (for example special courses etc.) o Activities to raise the motivation of the XXX partners (for example extra-product meetings) o Other: *please specify* ..... *Please shortly provide some details of the organizational action undertaken.*
	• i. Financial actions: o Raising or attempting to raise additional financial budget for XXX product o Developing a context which is attractive to the business community to contribute financially o Other: *please specify* ..... *Please shortly provide some details of the financial action undertaken.*
	• j. Technological actions: o Raising or attempting to raise additional technical resources for XXX (all kind of equipment) o All kind of actions to solve technological problems o Other: *please specify* .....

	Please shortly provide some details of the Technological action undertaken.

	• k. Spatial actions:
	  ○ (Attempts) Adjusting the construction permissions
	  ○ Creating experimental zones / city parts / corridors
	  ○ Other: *please specify* .....
	
	Please shortly provide some details of the spatial action undertaken.

	• L. Comments

17. Anything you like to add that was not mentioned concerning actions taken?

PART F – Final Remarks

18. *General notes*	
	Please shortly provide some general notes regarding the implementation or development of your product(s), that you're like to add.
19. *Queries and comments*	
	Please shortly provide your queries and comments regarding the evaluation process.

20. General Information	
Name, Surname	
Organisation	
City and Country	
E-Mail	

7.2 Annex 2: USER-CHI products acceptance questionnaire template[27]

The evaluation of user acceptance will be done through the deployment of questionnaires. For each question to be asked, a channel to reach the target group (groups of end-userd to whom the questionnaire should be addressed) has been identified, in collaboration with ETRA and EUROCITIES. An overview of the questions to be asked, the KPI and the product related as well as the channel that will be used to get the products' end-users perspective is reported in the table below, while the complete overview of the User acceptance KPIs, is reported in Annex 3.

Performance indicator ID number	Performance indicator name	Questions asked	Target group for measurement (to whom the questionnaire should be addressed)	Channel/Strategy to deploy the questionnaire
23	**Increase of EV drivers' satisfaction level thanks to new services**	Question asked: How satisfied are you with the offered services in USER-CHI compared to other charging services? (Likert Scale, 4 options, "much less satisfied – much more satisfied")	EV drivers	INCAR App for INCAR and INSOC end-users; AMB for INDUCAR end-users
24	**Awareness level on new services**		USER-CHI Cities citizens	WP8 dissemination events
25	**Increased ease of charging**		USER-CHI Products end users	
25.1	Increased ease of charging thanks to services provided by the INCAR app	Question asked: How easy was it to recharge your vehicle compared to the recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy	INCAR app end users	INCAR App_Evaluation screen
25.2	Ease-of-use perceived of INDUCAR, especially parking	Question asked: How easy was it to recharge your vehicle compared to traditional recharging services offered in the past? (Likert scale, 4 options, Very difficult – Very easy	INDUCAR drivers	Questionnaire deployed by AMB to end-users after their driving experience
25.3	Ease-of-use perceived of CLICK	Question asked: How easy was it to use CLICK for locating new charging infrastructures compared	CPOs, smart and integrated e - mobility providers (cities)	Questionnaire will be available on the CLICK website

[27] Note: the same set of questions and related closed answers have been considered for each USER-CHI product.

		to similar tools? (Likert scale, 4 options, Very difficult – Very easy + 1 option - never used any other similar tool before)	and real-state facility providers	
26	**Increased EV/LEV drivers' satisfaction**		EV drivers	
26.1	Increased EV drivers' satisfaction due to the reservation function	Question asked: How satisfied are you with the reservation function? (Likert Scale, 4 options, "very dissatisfied - very satisfied" + "I didn't use this function")	EV drivers	INCAR App_Evaluation screen
26.2	EV drivers' satisfaction level thanks to INDUCAR	Question asked: How satisfied are you with INDUCAR compared to other TRADITIONAL charging services? (Likert Scale, 4 options, "much less satisfied – much more satisfied")	INDUCAR drivers	Questionnaire deployed by AMB to end-users after their driving experience
26.3	LEV drivers' satisfaction level thanks to INSOC	Question asked: How satisfied are you with INSOC compared to other traditional electric e-bike/e-scooter sharing services? (Likert Scale, 4 options, "much less satisfied – much more satisfied")	LEV drivers	INCAR App
27	**Recommendation of USER-CHI products**		USER-CHI Products end users	
27.1	Recommendation of INCAR services	Question asked: How likely is it that you would recommend the INCAR services as a considerable advantage to drive an e-car? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)	EV drivers	INCAR App_Evaluation screen
27.2	Recommendation of CLICK	Question asked: How likely is it that you would recommend the CLICK to your colleagues as a valuable tool to locate new charging stations? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)	CPOs, smart and integrated e - mobility providers (cities) and real-state facility providers	Questionnaire will be available on the CLICK website
27.3	Recommendation of INDUCAR	Question asked: How likely is it that you would recommend the INDUCAR	INDUCAR drivers	Questionnaire deployed by AMB to

		compared to other charging services? (likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it)		end-users after their driving experience
28	**Safety perceived of INDUCAR**	Question asked: How safe do you feel while driving the car? (Likert scale, 4 options, Very safe, no difference with respect to an ICE or BEV car – Very unsafe (please say why)	INDUCAR drivers	Questionnaire deployed by AMB to end-users after their driving experience
29	**Asthethical perception**		INDUCAR and INSOC end useres	
29.1	Asthethical perception of the wireless charging infrastructure	Question asked: From an aesthetic point of view, how much do you think the absence of the cables has improved the parking area? (Likert scale, 3 options, Has improved a lot/improved a little/is indifferent	INDUCAR drivers	Questionnaire deployed by AMB to end-users after their driving experience
29.2	Asthethical perception of the solar-power charging station	Question asked: From an aesthetic point of view, How do you think the charging station has integrated into its surroundings? (Likert scale, 3 options, Has improved a lot/improved a little/is indifferent	LEV drivers	INCAR App

A first draft of the questionnaire has already been drafted and is reported below. The order is still arbitrary and need adjustments. In a next step, the questionnaire will be evolved with a strong interface and recognisation of the product's features and demo sites. Together with ETRA (PO) and EUROCITIES (Dissemination and Communication Manager), the questionnaire will be evolved furthermore and getting more detailed. A strategy for implementation (when, how, where) will be developed.

Question	Method	Products
BLOCK X: GENERAL		
Which type of LEV user are you?	options: • Daily User (every day) • Regular User (more than twice a week)	INSOC INCAR

	• Ocasional user (less than once a week) • Ocasional user (less than once a month) • First time user	
Which type of EV user are you?	options: • Daily User (every day) • Regular User (more than twice a week) • Gelegenheitsuser (less than once a week) • Gelegenheitsuser (less than once a month) • First time user	INDUCAR INCAR
Socio-Demographic Data Age Gender Income City	Fill-in-gap [ ] [ ]	ALL
Comments (at the end)	Open text field [ ]	ALL
BLOCK A: AWARENESS		
How did you found out about the service?	Options (multi-option): • (INCAR) • Website • Sign • Walking/Driving by • Colleagues etc..	INCAR INDUCAR INSOC CLICK**
From an aesthetic point of view, how much do you think the absence of the cables has improved the parking area?	Likert Scale, 4 options A lot – no difference ○ ○ ○ ○	INDUCAR
From an aesthetic point of view, How do you think the charging station has integrated into its surroundings?	Likert Scale, 4 options Very good – very bad ○ ○ ○ ○	INSOC

Do you think the station(s)/charging point(s) is (are) easy recognizable/findable? *Why? Please shortly provide some details.*	• Yes • No • I don't know + open text field	INCAR INDUCAR INSOC
BLOCK B: SATISFACTION		
"How easy was it to recharge your vehicle compared to the recharging services/apps offered in the past?	Likert scale, 4 options, Very difficult – Very easy" + „I can't compare“ ○ ○ ○ ○	INCAR INDUCAR
How safe do you feel while driving the car in comparison with an BEV or ICEV? *Why? Please shortly provide some details.*	Likert scale, 4 options, very safe, – Very unsafe + I can't compare + I've felt no difference ○ ○ ○ ○ ○ + open text field	INDUCAR
How easy was it to use CLICK for locating new charging infrastructures compared to similar tools?	Likert scale, 4 options, Very difficult – Very easy" + „I can't compare“ ○ ○ ○ ○ ○	CLICK**
How satisfied are you with INSOC compared to other traditional electric e-bike/e-scooter sharing services (in general)?	Likert scale, not satisfied – very satisfied + I can't compare ○ ○ ○ ○ ○	INSOC
How satisfied are you with INDUCAR compared to other traditional EV services (in general)?	Likert scale, not satisfied – very satisfied + I can't compare ○ ○ ○ ○ ○	INDUCAR
How satisfied are you with CLICK in general?	Likert scale, not satisfied – very satisfied ○ ○ ○ ○	CLICK**
How satisfied are you with*: • Payment • Booking/ Reservation • Routing • Charging Process • Charging Time	Likert scale matrix, 1-6 not satisfied – very satisfied	INCAR INDUCAR INSOC

• Access • Driving experience • Parking Process	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	
BLOCK C: RECOMMENDATION		
How likely is it that you would recommend INCAR services as a considerable advantage to drive an e-car?	Likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it ○ ○ ○ ○	INCAR
How likely is it that you would recommend CLICK to your colleagues as a valuable tool to locate new charging stations?	Likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it ○ ○ ○ ○	CLICK
How likely is it that you would recommend INDUCAR compared to other charging services?	Likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it ○ ○ ○ ○	INDUCAR
How likely is it that you would recommend INSOC compared to other charging services?	Likert scale, 4 options, I wouldn't recommend it at all - I would strongly recommend it ○ ○ ○ ○	INSOC

*need to be differente and extended by recognizing specific features of the products
**questions for CLICK limited here, as need to get improved with support of T2.4

7.3 Annex 3: Complete Final KPI list and baseline values

Evaluation Area	ID	KPI /Primary Indicator/ Baseline Value	Performance indicator name	Performance indicator definition	Measurement unit	Method of measurement/Data Source	Frequency of data collection	Target group for measurement	BARCELONA	BERLIN	BUDAPEST	ROME	TURKU
Environment	**1**	**KPI**	**CO2 emissions reduction**	**Estimate of CO2 emissions reduction thanks to the increase in EVs usage; It will be calculated as the difference between the new EVs registered and the disused polluting Diesel and gasoline vehicle**	**gCO2 emissions avoided/km**	**INCAR and websites**	Yearly	EV drivers					
	1.0	BV	Baseline value	baseline of the CO2 reduction is 0 gCO2/km by the cars used throught USER-CHI before the demonstration (ex-ante)	0	no need	Yearly	EV drivers	0	0	0	0	0
	1.1	PI	Energy charged	charged energy by loads, registered in the INCAR platform (total kWh in the project at beginning of demonstration and end (ex-ante and ex-post data)	kWh/transaction	INCAR	Yearly	EV drivers					
	1.2	PI	Vehicles-related data	needed data to calculate CO2-emission per km	EV average consumption (kWh/km)	https://www.sprit monitor.de/	Yearly	EV drivers					
	1.3	PI		needed data to calculate CO2-emission per km	EV gCO2/km (WTT)	https://www.transportenvir	Yearly	EV drivers					

	1.4	PI		needed data to calculate CO2-emission per km	ICEV gCO2/km (WTT+TTW)	onment.org/discover/how-clean-are-electric-cars/	Yearly	EV drivers					
	2	**KPI**	**RES energy produced on-site supplied to LEVs**	**Amount of energy produced by the integrated solar DC charging system and supplied to LEVs**	**KWh/day**	**INSOC**	tbd	INSOC product developers					
	2.0	BV	Baseline value	Amount of energy produced by the integrated solar DC charging system and supplied to LEVs	0	INSOC	tbd	INSOC product developers	0	nr	0	0	nr
	3	**KPI**	**self-consumption ratio**	**The self-consumption ratio is the ratio between the PV production and the portion of the PV production consumed by the loads. This ratio can be a value between 0% and 100%, with 100% solar self-consumption meaning that all produced PV energy is consumed by the loads.**	**%**	**INSOC**	tbd	INSOC product developers					

	3.0	BV	Baseline value	PV energy consumed by the loads/ PV energy produced by the solar panels installed in USER-CHI	0	INSOC	tbd	INSOC product developers	0	nr	0	0	nr
	4	**KPI**	**% of renewable energy in the LEVs energy consumption**	**Since the electrical energy from the solar panels is limited, the indicator measures the share of PV energy compared to the total energy used by the LEV.**	**%**	**INSOC**	tbd	INSOC product developers					
	4.0	BV	Baseline value		0	INSOC	tbd	INSOC product developers	0	nr	0	0	nr
EVs market	**5**	**KPI**	**Marketshare of EVs at city level - private cars and LDVs**	**Ratio between the number of new EVs registered and total number of vehicles at city level split by private cars and light-duty vehicles**	**%**	**Cities**	yearly	USER-CHI Cities					
	5.0	BV	Baseline value	number of Evs/total number of vehicles in project city, baseline year is the latest available for all cities	%	Cities	yearly	USER-CHI Cities	1%	1%	#VALOR E!	1%	1%

	5.1	PI	Number of EV per city	Number of EV per city after the pilot start-up	n.	Cities	yearly	USER-CHI Cities	5995	16678	Input missing	12940	905
	5.2	PI	Total number of vehicles per city	Total number of vehicles per city after the pilot start-up	n.	Cities	yearly	USER-CHI Cities	1193518	1241793	Input missing	2313700	81463
	6	**KPI**	**Energy bill reduction for USER-CHI products users**	**Difference between the average cost of a full charge and the cost of a full charge made by using USER-CHI products**	**€/kWh**	**CPOs and INCAR**	Monthly	CPOs					
	6.0	BV	Baseline value	Average cost of a full charge (generic CP), summarized from CPOs out of the project	€/kWh	CPOs		CPOs	- Reference to full charge not available. - 0, 563 €/KWh (including maintainance of the equipment + cost	29 € (Referred to a 60KWh battery) Reference year: 2022	Missing info	- 20 (Referred to 40KWh battery) - 0,45-0,50 €/kWh (fast charge) Reference Year: 2020	Missing info

								of energy); in any case, AMB provides free charge to EV drivers					
	6.1	PI	Average cost of a full charge within USER-CHI	Average cost of a full charge within USER-CHI, after the pilot start-up	€/kWh	ETRA	monthly	CPOs		29		20	
	6.2	PI	Average cost of a full charge outside of USER-CHI	Average cost of a full charge outside of USER-CHI, after the pilot start-up	€/kWh	CPOs		CPOs		29		20	
	7	**KPI**	**CPOs turnover increase thanks to USER-CHI products**	**Increase in monthly revenues faced by CPOs using INCAR&SMAC due to a growth in # of transactions**	**€/month**	**CPOs and INCAR**	Yearly	CPOs					
	7.0	BV	Baseline value	We would need to know: - the number of CP per CPO in the project; - the historical data of monthly revenues; as alternative, we could start observing the revues stream starting from the pilot implementation (i.e. baseline value=0)	x	CPOs		CPOs	0	0	0	0	0

	7.1	PI	Monthly revenues per CPO for USER-CHI	transactions/month (INCAR) per CPO in 2022	transactions/month (INCAR) per CPO	INCAR		CPOs	free services	Information not shared in public report			
	7.2	PI	Number of CP per CPO involved in USERCHI	CPOs who provided data: Barcelona CPO: AMB Berlin: Qwello Budapest: None Rome: None (desk research) Turku: Turku Energia (info from the GA, pag. 99)				CPOs	10 Fast Charging Points (50 kW) 10 Slow CP (3 kW)	Qwello revenues for current installation of 2 CPs	Missing Input	Missing Input	Missing info

	8	**KPI**	**(Increase of) EVSE usage rate by EVSE type**	**Share of total number of charging sessions by public accessible EVSE charging power / private ones**	**%**	**CPOs and INCAR**	Yearly	CPOs					
	8.0	BV	Baseline value	Current number of transactions in public EVSE / private ones	x	CPOs		CPOs					
	8.1	PI	total number of charging sessions by public accessible EVSE charging power	total number of charging sessions by public accessible EVSE charging power after the pilots start-up	**0**	CPOs and INCAR	Monthly (amb)	CPOs	47000	Missing input from Berlin?	Missing input	Missing input	Missing info
	8.2	PI	total number of charging sessions by private EVSE charging power	total number of charging sessions by private EVSE charging power after the pilots start-up	**0**	CPOs and INCAR		CPOs	AMB has no access to this info	Missing input from Qwello	Missing Input	Missing Input	Turku Energia has no access to this info
	9	**KPI**	**Reduction of EVSE related costs**	**installation and operational costs reduction, as well as reduced charging costs**	**%**	**CPOs**	Yearly	CPOs					

	9.0	BV	Baseline value	current average installation and operational costs related to installation of each EVSE per demo site	€	CPOs		CPOs	Quick CP (50 kW) = 25.000 € installation + 30.000 equipment Normal/ Slow CP (3-44 kW) = 20.000 installation + 5.000 equipment	8500	missing input	missing input	missing info
Charging infrastructure	**10**	**KPI**	**# new EVSE planned**	**Number of additional EVSE (both public accessible and private) planned thanks to the implementation of USER-CHI products in the demo site.**	**n.**	**CPOs/CLICK/Cities**	Yearly	CPOs, smart and integrated e-mobility providers (cities) and real-state facility providers					

	10.0	BV	Baseline value	number of existing EVSE (private and public) per city	n.	Demo Leaders; website https://chargemap.com/		CPOs, smart and integrated e-mobility providers (cities) and real-state facility providers	10 Fast Charging Points (50 kW) 10 Slow CP (3 kW)	total: 1847, public:1164, private:683 (31.05.2022)	355	5	17
	10.1	PI	New EVSE planned	New EVSE will be provided by the information that each city will include in the CLICK tool according to their real plans	n.	CLICK		CPOs, smart and integrated e-mobility providers (cities) and real-state facility providers					
	11	**KPI**	**#Users of the M2M automated EVSE**	**Number of M2M automated EVSE users**	**n.**	**INDUCAR**	Yearly	INDUCAR Drivers					
	11.0	BV	Baseline value	Number of M2M automated EVSE users before the pilots start-up	0	INDUCAR		INDUCAR Drivers	Missing Input	nr	nr	nr	nr
	12	**KPI**	**# CPOs using INCAR & SMAC**	**Number of CPOs taking part in the INCAR&SMAC ecosystem.**	**n.**	**INCAR and SMAC**	Yearly	CPOs					

	12.0	BV	Baseline value	Number of CPOs at start of INCAR and SMAC before the pilots start-up	0	INCAR and SMAC		CPOs	0	0	0	0	0
	13	**KPI**	**# Customers registered in the INCAR platform**	**Number of customers registered in the INCAR platform.**	**n.**	**INCAR**	Monthly	INCAR customers					
	13.0	BV	Baseline value	Number of customers at start of INCAR platform before the pilots start-up	0	INCAR		INCAR customers	0	0	0	0	0
	14	**KPI**	**# EVSEs integrated in the INCAR platform**	**Number of EVSEs integrated in the INCAR platform**	**n.**	**INCAR**	Yearly	CPOs					
	14.0	BV	Baseline value	number of EVSEs integrated in INCAR before the pilots start-up	0	INCAR		CPOs	0	0	0	0	0
	15	**KPI**	**# integrated services offered in the INCAR platform**	**Number of integrated services offered in the INCAR platform at demo site level split by type of service.**	**n.**	**INCAR**	Yearly	CPOs					
	15.0	BV	Baseline value	number of services integrated in INCAR before the pilots start-up	0	INCAR		CPOs	0	0	0	0	0
	16	**KPI**	**# EVSEs integrated in SMAC Tool**	**Number of EVSEs integrated in the SMAC Tool.**	**n.**	**SMAC**	Yearly	CPOs					
	16.0	BV	Baseline value	number of EVSEs integrated in SMAC (ex-ante)	0	SMAC		CPOs	0	0	0	0	0

	17	**KPI**	**# New users of DC-charging solutions for LEVs**	**Number of new LEVs users charging through INSOC.**	**n.**	**INSOC**	tbd	Light Electric Vehichles drivers					
	18	**KPI**	**# Wireless charging stations**	**Number of wireless charging stations implemented.**	**n.**	**INDUCAR +SMAC**	Yearly	Light Electric Vehichles drivers and INDUCAR drivers					
	18.1	PI	# Wireless charging stations (INSOC)	# Wireless charging stations (INSOC)	n.			INSOC end users	Input missing	Input missing	Input missing	Input missing	Input missing
	18.2	PI	# Wireless charging stations (INDUCAR)	# Wireless charging stations (INDUCAR)	n.			INDUCAR d users	2	nr	nr	nr	Input missing
	19	**KPI**	**kWh inserted in the grid**	**kWh inserted in the grid**	**kWh**	**SMAC**	Monthly	SMAC product developers					
	19.0	BV	Baseline value	kWh inserted in the grid before the pilot starts-up	0	SMAC		SMAC product developers	0	0	0	0	0
	20	**KPI**	**Nº of power steering requests**	**Nº of power steering requests**	**n.**	**SMAC**	Monthly	SMAC product developers					

	20.0	BV	Baseline value	Nº of power steering requests before the pilots start-up	0,0	SMAC		SMAC product developers	0	0	0	0	0
	21	**KPI**	**Max. power steered**	**Max. power steered**	**kW**	**SMAC**	Monthly	SMAC product developers					
	21.0	BV	Baseline value	Max. power steered before the pilots start-up	0	SMAC		SMAC product developers	0	0	0	0	0
	22	**KPI**	**# CLICK user**	**Number of users using/testing CLICK**	**n.**	**CLICK**	Yearly	CPOs, Transport planners					
	22.0	BV	Baseline value	number of user using click before the pilots start-up	N.	CLICK		CPOs, Transport planners	0	0	0	0	0
EV Users acceptance	**23**	**KPI**	**Increase of EV drivers' satisfaction level thanks to new services**	**EV drivers average reported satisfaction with the quality of the new services offered in the demo sites thanks to USER-CHI. It measures the experience of the user against his/her expectations.**	**Likert scale**	**INCAR App**	Yearly	EV drivers					
	24	**KPI**	**Awareness level on new services**	**Percentage of the target population with knowledge of the new services offered in the demo sites thanks to USER-CHI.**	**%**	**WP8**	Yearly	USER-CHI Cities citizens					

	25	**KPI**	**Increased ease of charging**	**Increased ease of charging thanks to services provided by USER-CHI**	**Likert scale**	**Incar App/Surveys**	Yearly	USER-CHI Products end users					
	25.1	PI	Increased ease of charging thanks to services provided by the INCAR app	Increased ease of charging thanks to services provided by the INCAR app	Likert scale	Incar App	Yearly	INCAR app end users					
	25.2	PI	Ease-of-use perceived of INDUCAR, especially parking	Level of ease-of-use perceived by people using the new services implemented in the demo site	Likert scale	Survey*	Yearly	INDUCAR drivers					

	25.3	PI	Ease-of-use perceived of CLICK	Level of ease-of-use perceived by urban planners	Likert scale	Survey*	Yearly	CPOs, smart and integrated e-mobility providers (cities) and real-state facility providers					
	26	**KPI**	**Increased EV/LEV drivers' satisfaction**	**Increased EV drivers' satisfaction due to the services offered in USER-Chi**	**Likert scale**	**Incar App/Surveys**	Yearly	EV drivers					
	26.1	PI	Increased EV drivers' satisfaction due to the reservation function	Increased satisfaction due to the ability to plan charging processes via reservation function	Likert scale	Incar App	Yearly	EV drivers					
	26.2	PI	EV drivers' satisfaction level thanks to INDUCAR	EV drivers average reported satisfaction with the quality of INDUCAR in the demo sites thanks to USER-CHI. It measures the experience of the user against his/her expectations.	Likert scale	Survey*	Yearly	EV drivers					

	26.3	PI	LEV drivers' satisfaction level thanks to INSOC				Yearly	LEV drivers					
	27	**KPI**	**Recommendation of USER-CHI products**	**Extent to which users of USER-CHI products would recommend their use**	**Likert scale**	**Incar App, Surveys**	Yearly	USER-CHI Products end users					
	27.1	PI	Recommendation of INCAR services	Recommend INCAR services (reservations, etc.) to people who do not yet drive an e-car.	Likert scale	Incar App	Yearly	EV drivers					
	27.2	PI	Recommendation of CLICK	Recommend CLICK as a valuable tool to locate new charging stations	Likert scale	Survey*	Yearly	CPOs, smart and integrated e-mobility providers (cities) and real-state facility providers					
	27.3	PI	Recommendation of INDUCAR	Recommend INDUCAR as An easier way to charge Evs	Likert scale	Survey*	Yearly	INDUCAR end users					
	28	**KPI**	**Safety perceived of INDUCAR**	**Level of safetyness perceived**	**Likert scale**	**Survey***	Yearly	INDUCAR end users					
	29	**KPI**	**Asthethical perception**			**Survey***	Yearly	INDUCAR and INSOC end useres					
	29.1	PI	Asthethical perception of the wireless charging infrastructure	Perception of the cleaness of the park area without cables	Likert scale	Survey*	Yearly	INDUCAR end users					

	29.2	PI	Asthethical perception of the solar-power charging station	Aesthetic perception of harmonious integration of the charging station into the surrounding background	Likert scale	Survey*	Yearly	INSOC end users					
Other relevant indicators (Indicators of significance)			# Nº of test/users of INDUCAR	# Nº of test/users of INDUCAR	n.	Manually collected by the manager	Monthly	test/users of INDUCAR					
			# Nº of test/users of CLICK	# Nº of test/users of CLICK	n.	CLICK	Monthly	test/users of CLICK					
			# Nº of test/users of INCAR	# Nº of test/users of INCAR	n.	INCAR	Monthly	test/users of INCAR					
			# Nº of test/users of INSOC	# Nº of test/users of INSOC	n.	INSOC	Monthly	test/users of INSOC					
			% of reservation usage	# of reservations/ total sessions	% of reservations	Qwello backend	Monthly	INCAR app end users					
			% of integrated cable usage	# of integrated cable/total sessions	%	Qwello backend	Monthly	INCAR app end users					