

A large, stylized white graphic of a charging cable with a two-pronged plug, curving from the left side of the slide towards the bottom center.

The eC4D demonstrations – Deployment challenges and lessons learned

Maria Pia FANTI, Polytechnic University of Bari (Italy)
07/11/2024

The eC4D demonstration goals

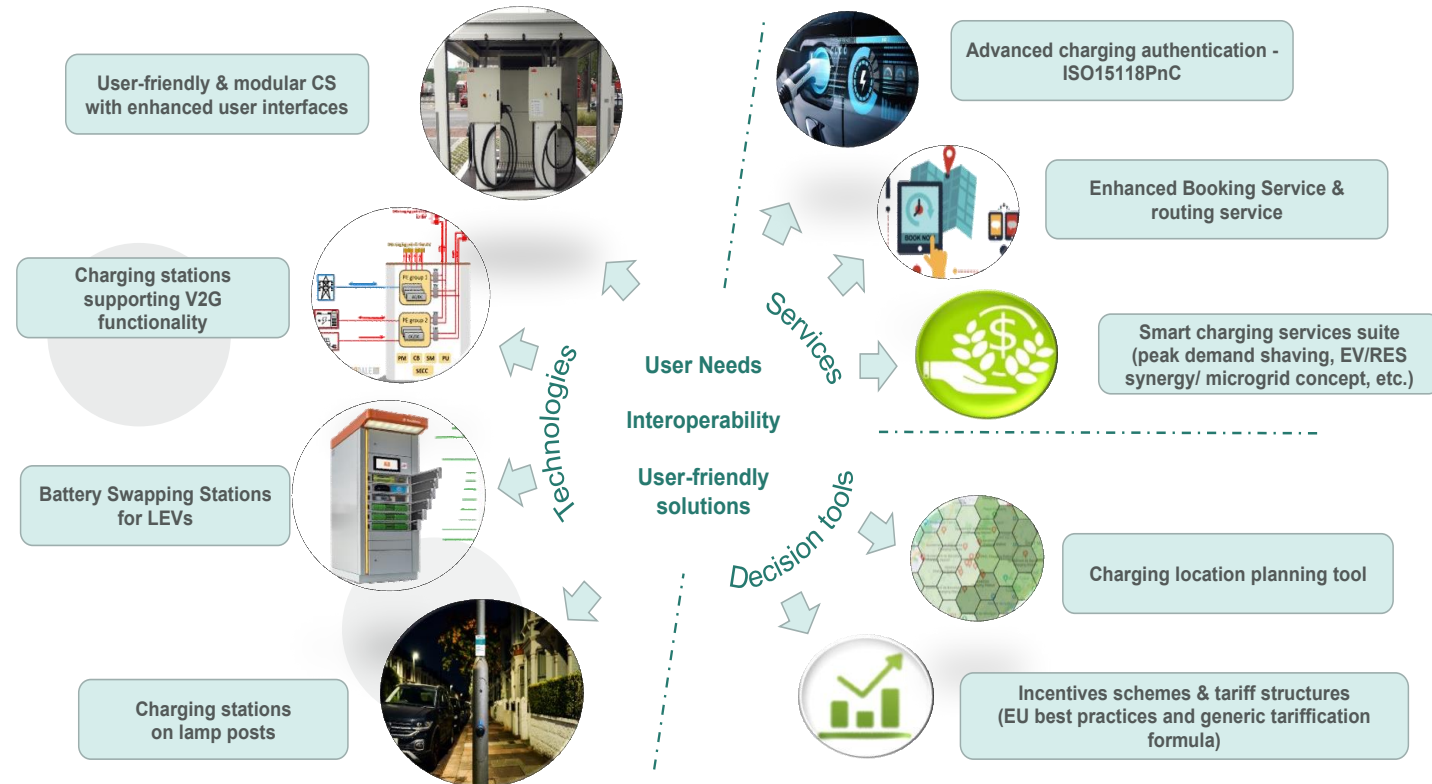


Demo Objectives



- **Demonstrating advanced charging technologies** to serve mobility energy needs of passenger and light EVs
- **Demonstrating user-centric e-mobility charging services** facilitating user's accessibility and exploitability of the charging network
- **Demonstrating tools for planning the charging network** in efficient and sustainable way, **define tariff and incentive policies** towards promoting e-mobility concept.

Demo Solutions



The eC4D demonstration use cases overview



10 use cases

USE CASE ID	USE CASE TO BE DEMONSTRATED	Barcelona	Grenoble	Berlin	Luxembourg	Zellik	Bari	Austria	Northern Italy	Greece	Turkey
UC I-1	User-friendly, low and high-power charging stations for passenger & L3e vehicles with enhanced user interfaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
UC I-3	Battery sharing concept for L1e vehicles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UC I-4	Charging points on lamp posts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UC II-1	Advanced charging authentication - ISO15118PnC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
UC II-2	Enhanced booking service enabling better exploitation of the public charging network	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
UC II-3	Advanced routing service facilitating EV user's accessibility to the public charging network	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
UC II-4	Smart charging suite unlocking new business opportunities	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UC II-5	Preventive Diagnostic and Charging optimization service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UC III-1	EV charging location planning tool	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UC III-2	Incentives schemes and tariff structures towards e-mobility sustainability	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10 demonstration areas/cities

UCI-1: User-friendly, low and high-power charging stations for passenger & L3e vehicles with enhanced user interfaces (Austria, Bari, North Italy, Zellik, Turkey)



Use case objectives

- **Demonstrate user-friendly charging stations** for passenger cars and motorcycles, modular and scalable

Lesson learned

- **new charging points installed** not able to read the RFID card charging points network
- **a new software able to read those cards was installed.**



Mobile container with

- 2 AC WB (22 kW)
- 2 DC WB (24 kW)



UCI-3: Battery sharing concept for L1e vehicles (Barcelona, Berlin)



Use case objectives

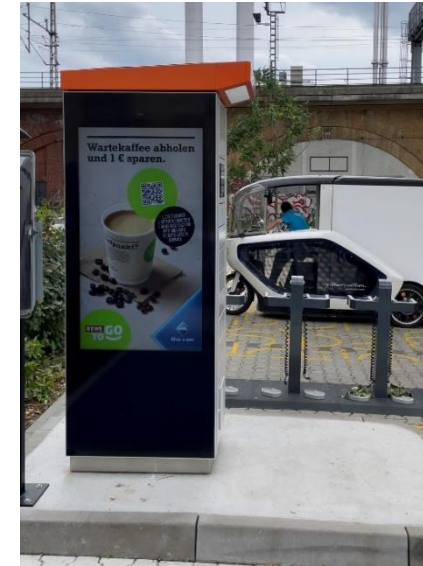
- **Battery swapping stations** for LEVs (L1e)
- Enable Users to take out a full battery and insert the almost empty battery in **less than 2 minutes**

Deployment and operational challenges

- **Location Scouting:** Identifying viable locations to meet accessibility, internet connectivity, and power sources.
- **Location Contract:** Negotiating and finalizing contracts with property owners or local authorities.
- **New ticketing:** Arranging a new ticket for the clients to enter the car park without cost (Barcelona)

Lessons learned

- Restrictive requirements for the installation of battery swapping systems
- Permits to operate



Swapping hubs @ Berlin



UCI-4: Charging points on lamp posts (Grenoble)



Use case objectives

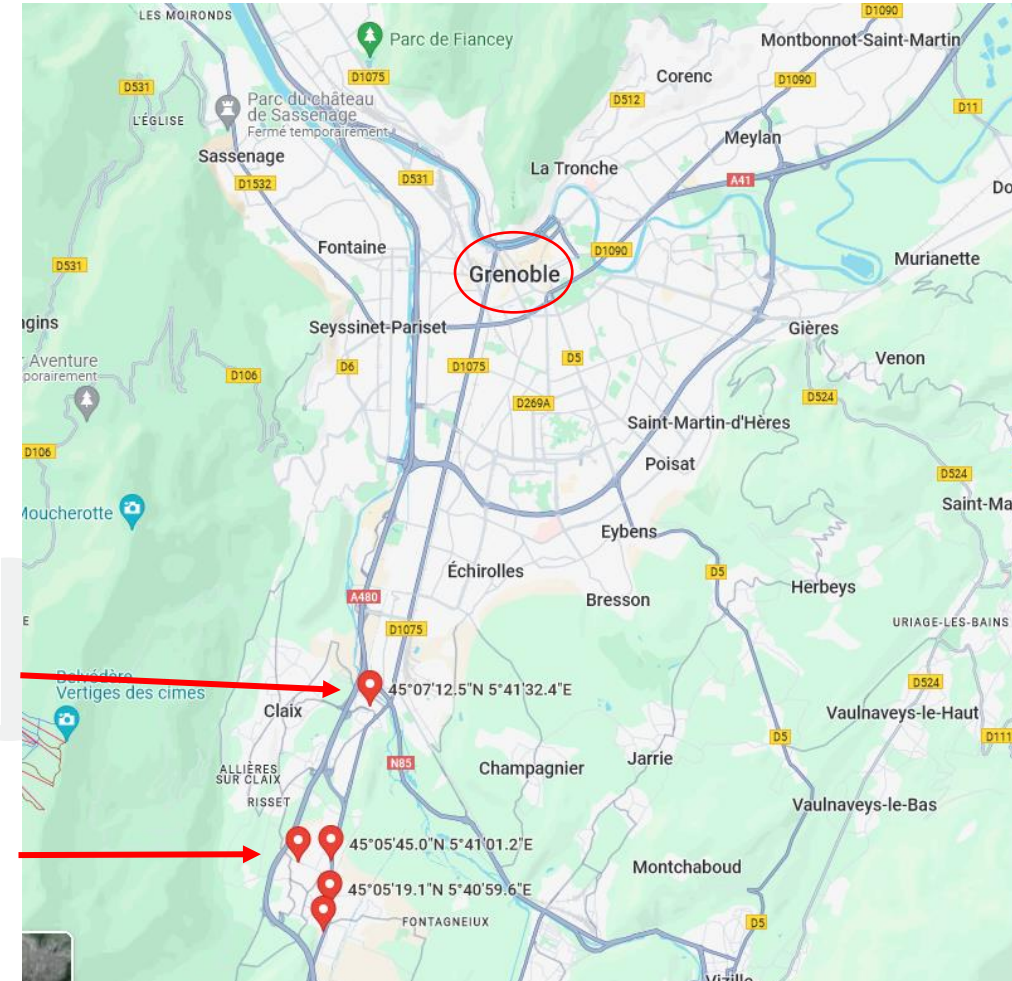
- **System installation and integration** to the supervision of Bouygues Energies & Services (BYES), who acts as the CPO. Grenoble-Alpes Métropole (GAM), provides the lamp posts.
- **6 charging points distributed across five stations** located in the municipalities of Varcès-Allières-et-Risset and Claix

Operational lessons learned

- **Technical difficulty for the charging point** to read the RFID card of GAM charging stations network.

Regulatory lessons learned

- Cities were afraid of paying for electricity consumption
- **Agreement GAM-cities:** GAM ensures the metering of users' consumption



UCII-1: Advanced charging authentication - ISO15118PnC (Austria, Greece, North Italy, Zellik, Turkey)



Use case objectives

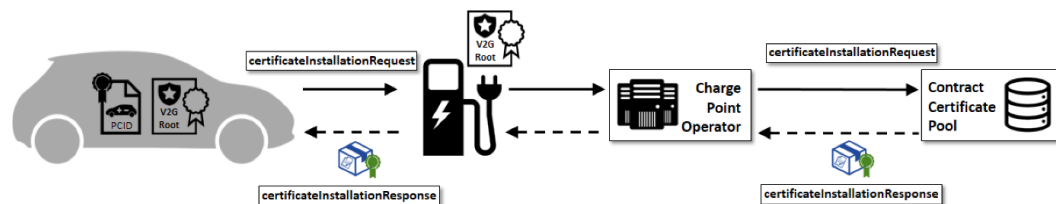
- Demonstrate **ISO 15118 Plug & Charge** feature as an **advanced charging authentication method** to provide increased data security and user-convenience

Operational lessons learned

- Necessity to create **additional touchpoint** with the EV Drivers.
- **Lack of public infrastructure PnC enabled** and enabled EVs to perform test and demo



Technical test of PnC @ Zellik demo



Cross-country PnC test – Successful session

UCII-2: Enhanced booking service enabling better exploitation of the public charging network (Austria, Barcelona, Bari, Berlin, Greece, Zellik, Turkey)

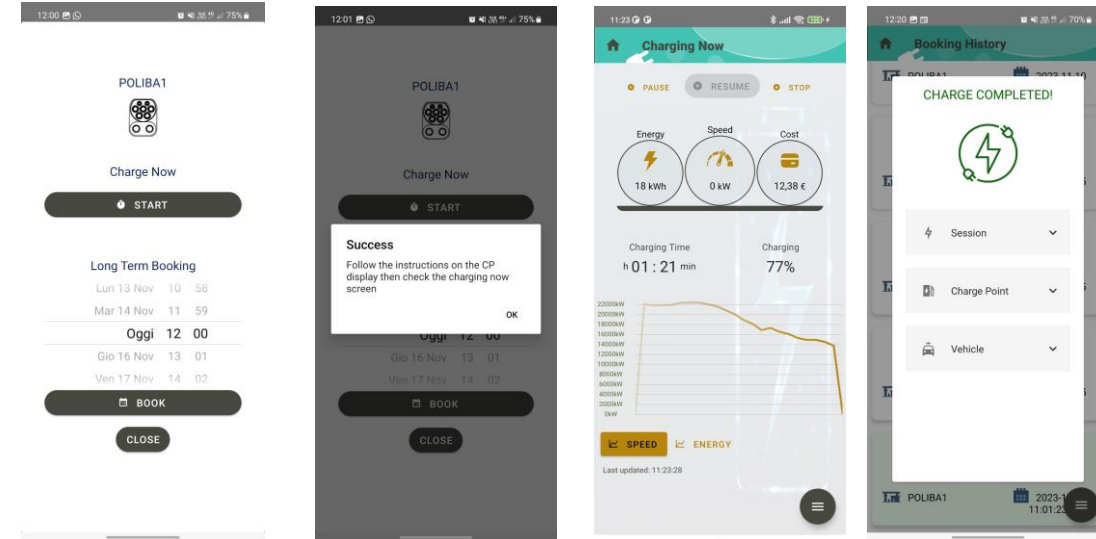


Use case objectives

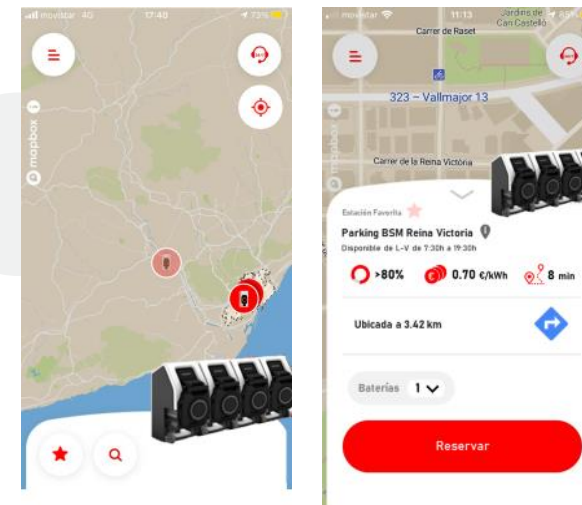
- Enhanced booking services for conductive charging stations (short / long term reservation)
- Enhanced booking services for battery swapping stations

Deployment and operational lessons learned

- Updating the app service and the backend system to address the blocking of a charging point at the moment of the reservation.
- Ensuring that a reserved CP stays available for the booking user,
- Providing long term booking option: the CPO has to manage a reservation calendar based on the request coming from different users



POLIBA app
For CPs



SCUTUM app
For swapping

UCII-3: Advanced routing service facilitating EV user's accessibility to the public charging network (Barcelona, Bari, Greece, North Italy, Turkey)

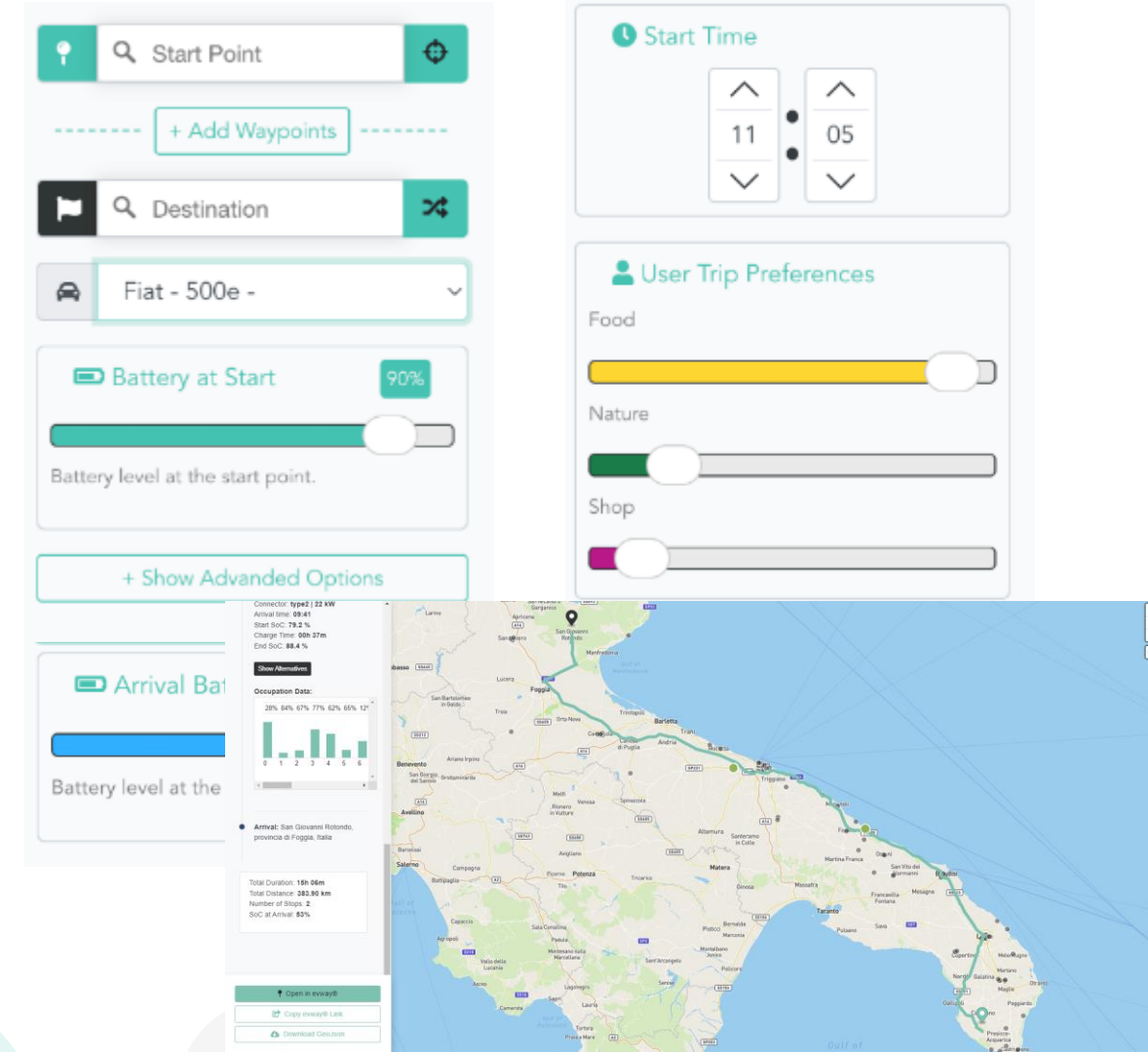


Use case objectives

- Enhanced route planner for long distance trips (web tool)
- Real time route planning via mobile application (app)

Operational lessons learned

- **Operational issues:** the planner failed to find a route under different conditions
- **Necessary connection with the local CPOs** for real time data



UCII-4: Smart charging suite unlocking new business opportunities (Austria, Barcelona, Grenoble, Luxembourg, Zellik)



Use case objectives

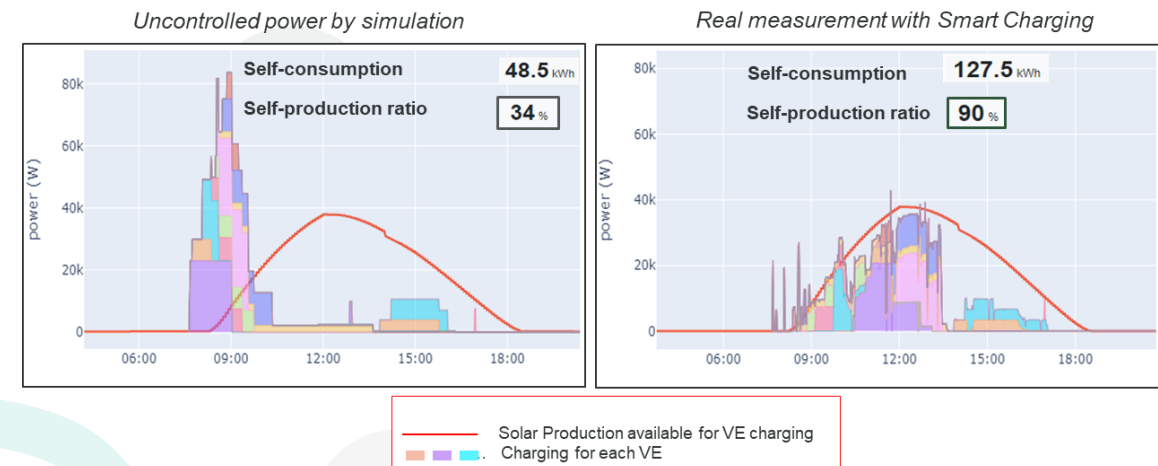
- Smart charging services for exploiting renewable energy, minimizing costs and power balancing.
- Smart charging system schedules and executes an optimized charge session, cars are energy storage tools

Operational lessons learned

- Obtain user's preferences.
- **Software AI based** (machine learning) to estimate the preferences based on history of their charging sessions.
- **Regulation of the battery energy storage system**



EVSE @ CEA for smart charging demonstration



UCII-5: Preventive Diagnostic and Charging optimization service (North Italy)

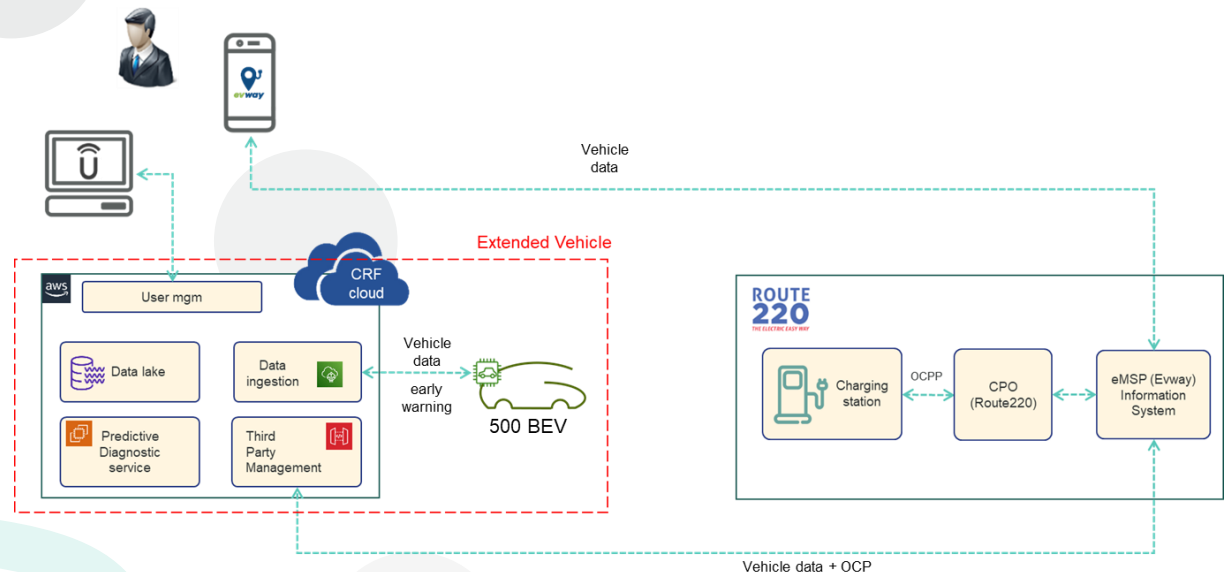
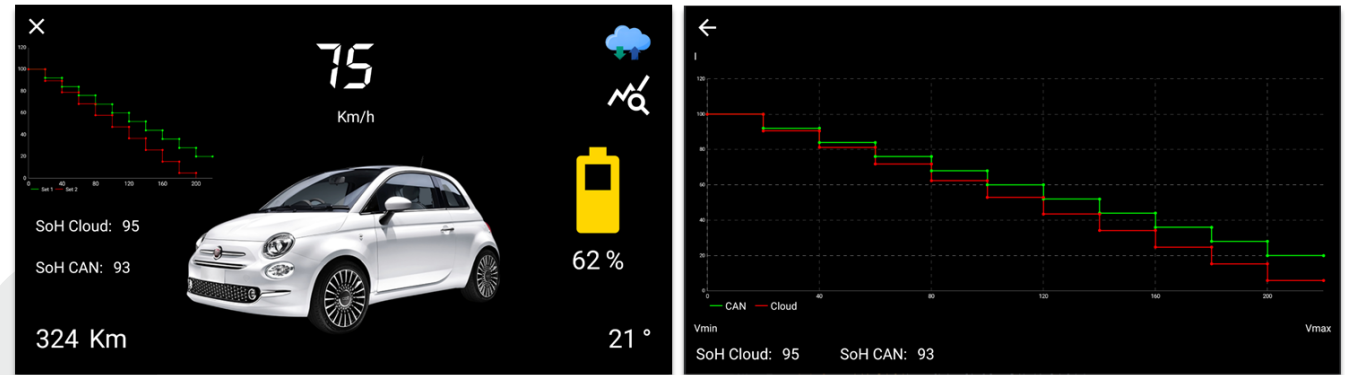


Use case objectives

- Analyse the daily behaviour of the HV batteries of Evs and adapt the charging profile to **extend the lifetime** of the vehicle.
- Provide an early warning to the vehicle owner about the **non-recoverable degradation of the HV batteries**.

Operational lessons learned

- The signals and frequency required too high and not usually managed by a commercial vehicle.



UCIII-1: EV charging location planning tool (Barcelona, Luxembourg, North Italy)

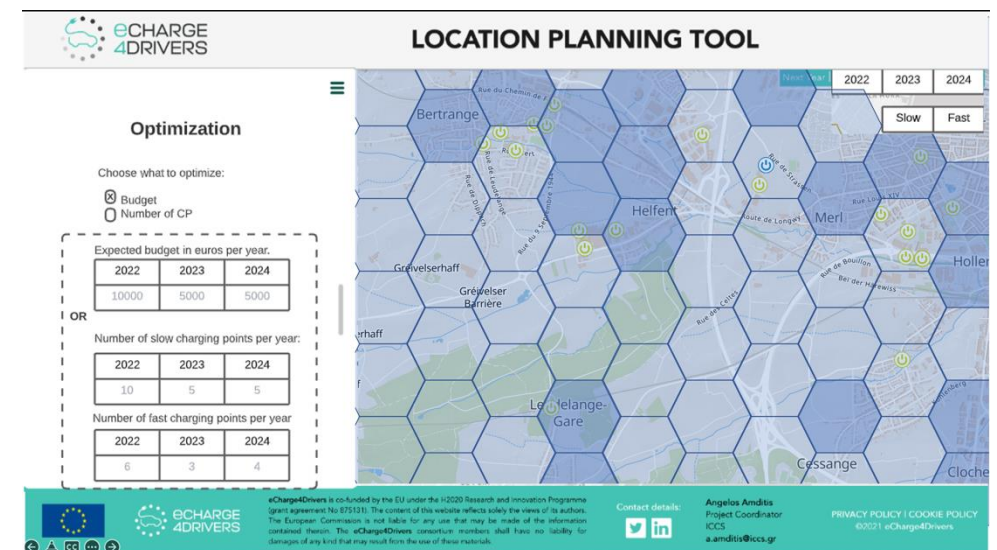


Use case objectives

Location planning algorithm to identify locations that maximize the service coverage of the charging infrastructure or minimize the budget while maintaining a target service coverage.

Lessons learned

Demonstration with the stakeholders: some concerns from the user perspective as regards the **adaptability** of the tool to different conditions or business needs.



UCIII-2: Incentives schemes and tariff structures towards e-mobility sustainability (Barcelona, Bari, Berlin, Grenoble, Zellik)



Use case objectives

- **New tariff schemes and incentives** to shape the demand and support the use of charging options, services and smart strategies.

Regulatory challenges

- Since BSM is a public company that acts as both CPO and eMSP, it requires a **political approval in any tariff change**.
- Having a political view in the approval of tariffs could lead to a change in the **tariff structure that could differ to the technically approved ones**.

The screenshot displays the "Electric charge 4 Earn" website. The homepage features a dark blue background with a glowing blue car head and the text "Electric charge 4 Earn" and "Recharge, collect, redeem!". The navigation bar includes "HOME", "ABOUT US", "REGULATION", "REWARDS", and "CONTACT US".

The "Notifications" section shows a table of rewards:

Description	Points	Date
Gift card Feltrinelli	200	2022-01-08
Gift card Amazon	100	2022-01-08
Booking made	10	2022-01-10

On the left side of the notifications section, there are filters for "Starting date" (01/01/2021), "Finale date" (13/01/2022), and "Select the type of notification to display:" with options: "All" (selected), "Awarded GP", "Revoked GP", and "Redeemed prizes".

Incentive platform @ Bari - POLIBA

Outcomes and lessons learned



- **New and advanced charging technologies**
- **New tools, approaches and strategies** to facilitate accessibility and exploitability
- **Deployment:** necessity to implement **regulations, selection of locations** of the charging points, necessity of **establishing agreements and contracts with the public authorities and private companies, innovation of the infrastructures, lack of public infrastructure PnC enabled** and enabled EVs to perform test and demo
- **Regulatory:** **citizens objections and requirements, public authority requirements,** necessity of **establishing agreements** between the stakeholders, **restrictive requirements** for the installation of battery swapping systems, **permits to operate**
- **Operational:** evaluation of the preference based on **AI approaches, development of web-based services and APP,** connection between the vehicle battery and the charge infrastructure, provide right and accurate information to users.



@fantimp



<https://www.linkedin.com/in/maria-pia-fanti-5385388/>



mariapia.fanti@poliba.it



www.echarge4drivers.eu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 875131 (Innovation Action)