SUSTAINABLE PLACES 2020

October 27-30, 2020

DIGITAL EVENT

Horizon 2020
European Union funding
for Research & Innovation

Sustainable Mobility: e-Mobility Workshop

Chaired by

MeISTER

GREEN CHARGE

eCHARGE 4DRIVERS

USER-CHI
CHARGING YOUR E-MOBILITY FUTURE

UNIVERSITY of the PELOPONNESE


WELCOME

Housekeeping rules

- **Speakers please mute your micro and switch off your camera while you are not talking**
- **Speakers are invited to switch on the camera while talking**
- **Please speakers stick to your time slot**
- **Attendees, please feel free to ask any question or add comments in the chat while speakers are talking**

Agenda

Start	End	Content
15:30	15:45	**Welcome and presentation of the agenda** MEISTER, Project Coordinator
15:45	16:05	**Mobility Environmentally-friendly, Integrated and economically Sustainable Through innovative Electromobility Recharging infrastructure and new business models** Patricia Bellver Muñoz, MEISTER Project Coordinator Senior project manager, ETRA I+D
16:05	16:25	**Innovative solutions for USER centric CHarging Infrastructure** María del Carmen Tomás, USERCHI Project Coordinator Senior project manager, ETRA I+D
16:25	16:45	**GreenCharge measures and impact evaluation framework** Marit Natvig Senior researcher, SINTEF Digital
16:45	17:05	**Analysis of Electric Vehicle (EV) cost-based charging load profiles** Sotiris Deligiannis, University of Peloponnese
17:05	17:35	**Electric Vehicle Charging Infrastructure for improved User Experience** Dr. Evangelos Karfopoulos Senior project Manager, I-SENSE/ICCS
17:35	17:50	**Roundtable & Questions**
17:50	18:00	**Conclusions**

Mobility **E**nvironmentally-friendly, **I**ntegrated and economically **S**ustainable **T**hrough innovative **E**lectromobility **R**echarging infrastructure and new business models

PROJECT OVERVIEW

MEISTER consortium

Public entities

Málaga City Council

Berlin

Stockholms stad

Industry

etra I+D

>novadays

vmz Verkehr Mobilität Zukunft

e·on

Research Center

IKEM

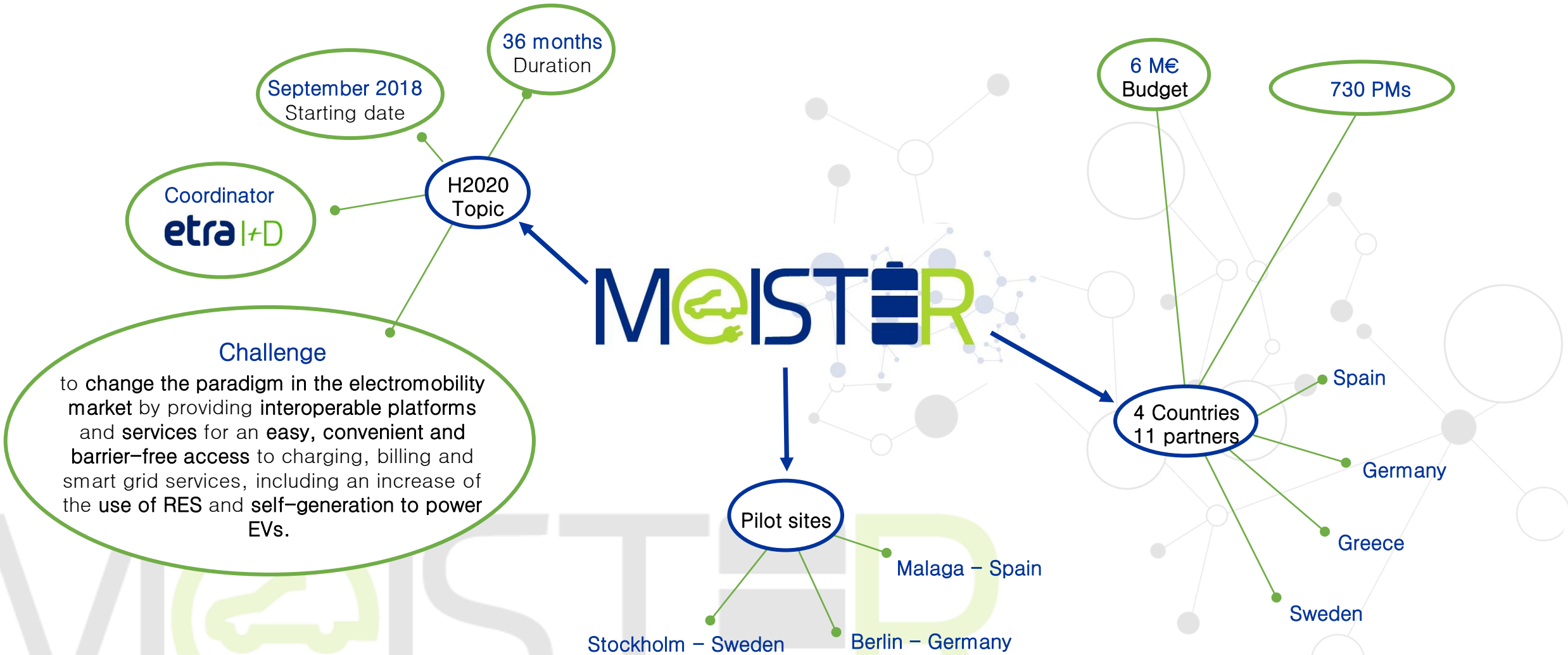
RI. SE

CERTH

Housing company

Gewobag

Project at a glance



Strategic goals

O1. Innovative and sustainable business models for smart e-mobility

- **Reduce installation and operational costs** for charging infrastructure operators **(increase offer)**
- **Reduce charging prices** for customers (**increase demand**)

O2. Deployment of an e-mobility interoperability platform

- **Role models** for **operator** and **provider** - **independent, non-discriminatory information**, **authentication** and **billing schemas** ensuring **interoperability**
- Integrated **real-time information** and **booking** services
- e-mobility **information platform** for smart cities **with three different interfaces**

O3. Integration of e-mobility in the cities' SUMPs and city planning process

- Planning and use of **e-urban space**
- Planning and use of **e-logistics hubs** and **distribution centers**
- Creation of a **European eMobility Expertise Centre (EeMEC)**

O4. Integration with smart grid services

- **Charge scheduling** to **optimise costs** and **RES use**
- EV as supporting **storage for private use**
- EV as supporting **storage for DSO**

MEISTER products

P1. MEISTER Replication, Market Uptake and Deployment Handbook

Description:

Toolset that gives access to the main **project results**, including:

- **BMs** defined by the project
- **How to use the technological solutions** (P2, 3, 4 & 5)
- **Practical results** from the BMs validation at the project sites
- **Supporting legal, administrative and financial tools**

Added-value services:

- **Key outcomes** of the project for boosting large scale deployment of electromobility
- **Lessons learned** from the real application and validation of solutions and products
- Operational **flexibility and user-friendliness**

P1. MEISTER Replication, Market Uptake and Deployment Handbook

MEISTER products

P2. MEISTER Roaming & Accounting Platform

Description:

Independent platform for e-mobility providers that enables an **easy, non-discriminatory, convenient and barrier-free access** to end users for EV charging billing features:

- wherever Electric Vehicle Supply Equipment (EVSE) is located
- whichever EV is used
- whoever operates the EVSE
- whoever supplies the charging service and electricity

Added-value services:

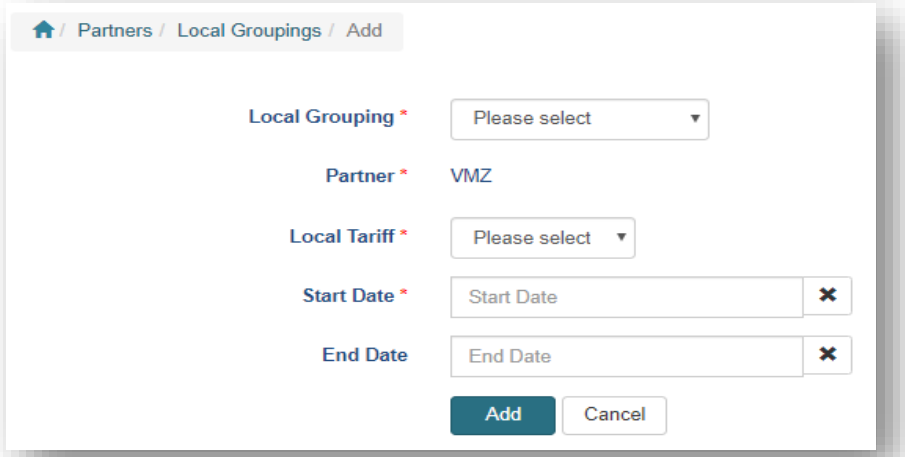
- **Transparent B2B services** establishing connections between different EVSE operators, e-mobility service providers and the platform
- Adoption of **open standards and most used protocols** for roaming
- **Integration** of already **existing platforms**

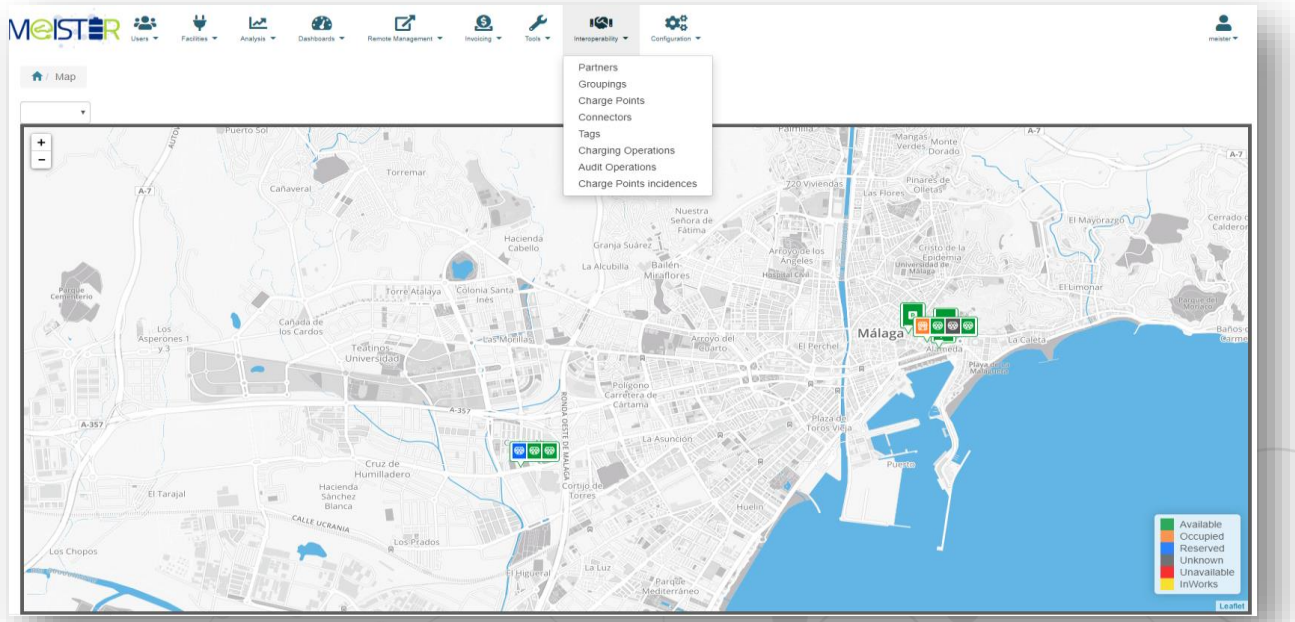
P2. MEISTER Roaming and Accounting Platform

MEISTER products

P2. MEISTER Roaming & Accounting Platform

- **Backend** processes
- Smart use of OCPI protocol for the integration with eMSPs and CPOs





	Rol	Registering Token	Url	Name	Country Code	Party Id	Logo Url	Logo Thumbnail	Logo Category	Web Site	Registered	Active	Push Support
	CPO	9e9a2a5b-dbe8-4db5-b3b7-c8ce2cc39d90	https://clientsmalaga.meisterproject.eu/ocpi/cpo	Ayto. de Málaga	ES	MLG	https://clientsmalaga.meisterproject.eu/logo-ayto-malaga.png		OPERATOR	http://malaga.eu	Yes	Yes	Yes
	CPO	d191ed44-a203-47e3-bb1e-63a1d133b2a4									No	No	No
	EMP	0a9b8f39-f2fb-44b2-9e95-41a7dd4eabb8			GE	VMZ					No	No	No

MEISTER products

P3. MEISTER Integrated Real-Time Information & Booking Services

Description:

- Smart phone **app** for **EV drivers**
- Mobility display for **housing services**
- Application for **urban logistics companies**
- Smart e-mobility **dashboard for the city management**
- **Backend** (integrated services)

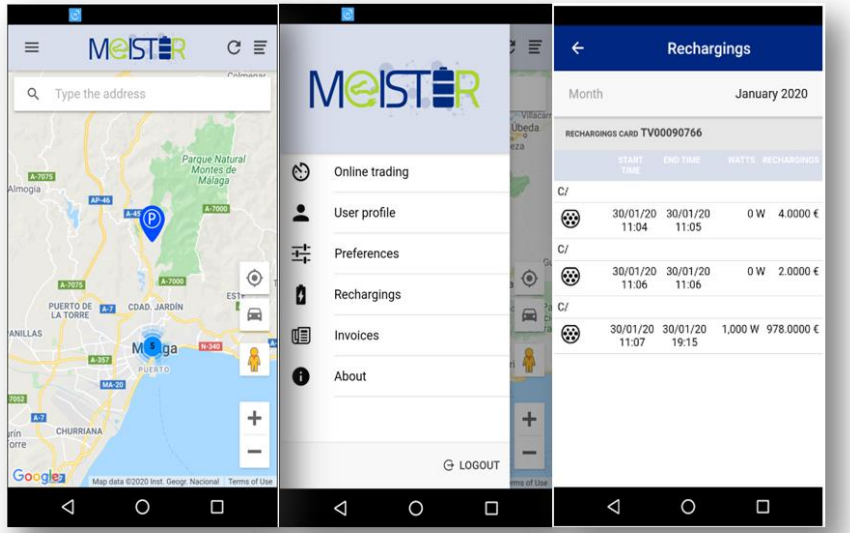
Added-value services:

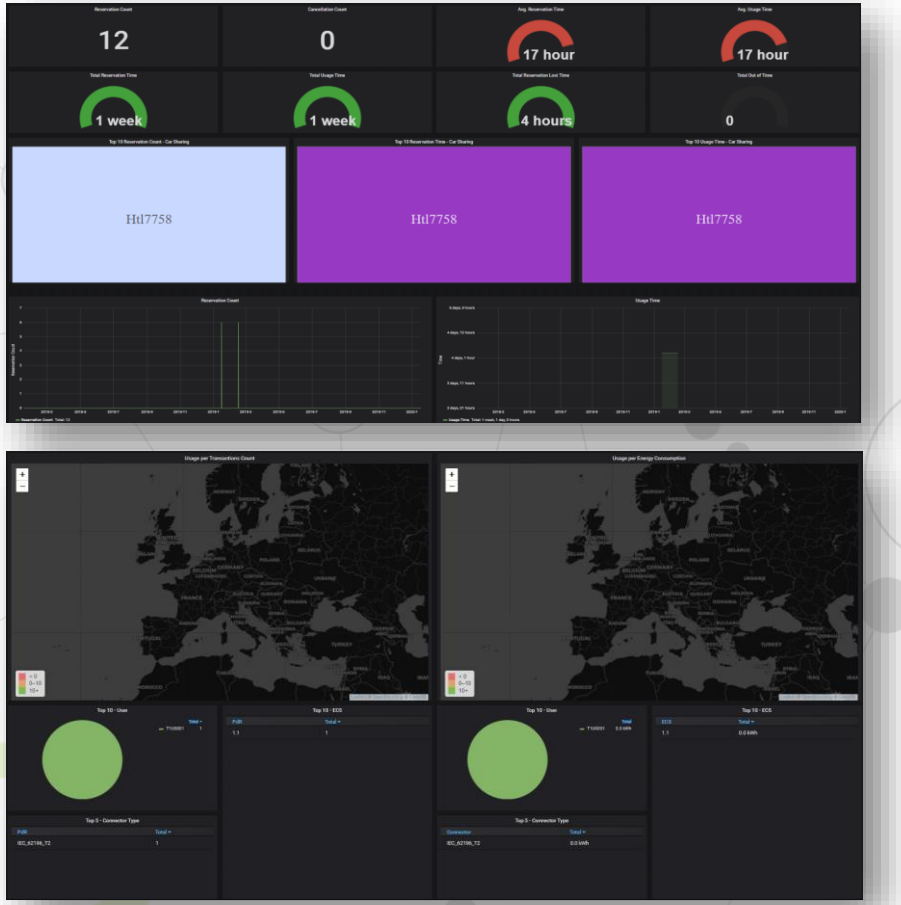
- Combined **smart parking and charging**
- **Monitoring and real-time information** about public EVSE
- **Searching and routing** to EVSE
- **Booking** of parking slots and charging stations
- **Customized services** for different end-users

P3. MEISTER Integrated Real-Time Information & Booking Services

MEISTER products

P3. MEISTER Integrated Real-Time Information & Booking Services





MEISTER products

P4. MEISTER European eMobility Expertise Centre (EeMEC) and eSUMPS knowledge base

Description:

Technical, legal and financial support centre aimed at facilitating:

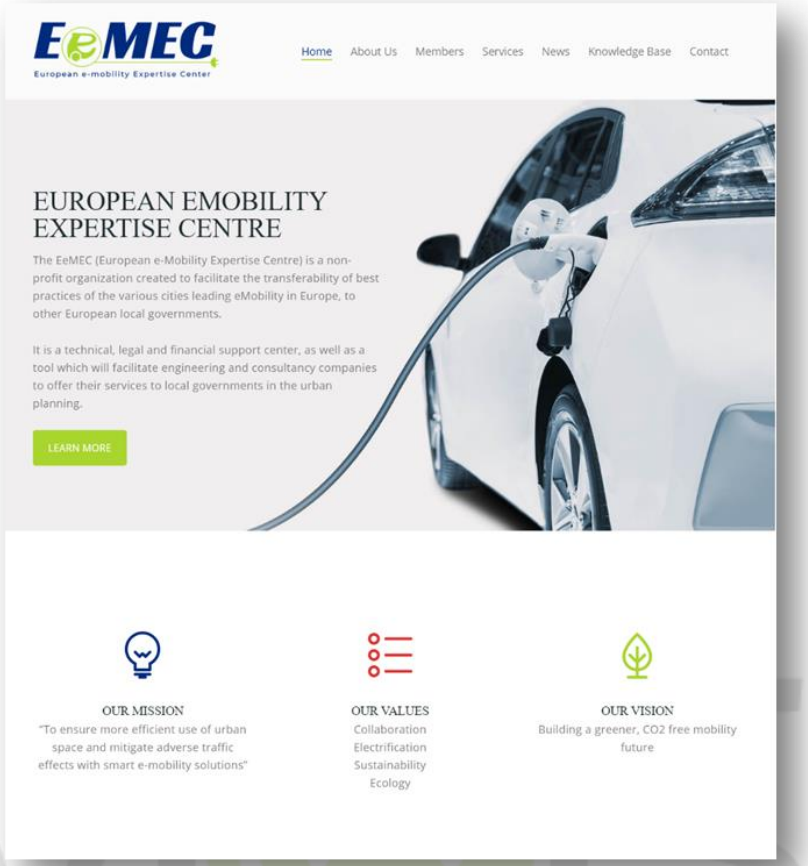
- **Transferability of best practices** from MEISTER pilot sites to other cities
- **Assessment to local governments in the eSUMPs process and urban planning** by engineering and consultancy firms

Added-value services:

- **Technical, legal and economic feasibility of alternatives assessment**
- **Transferability of successful solutions for e-mobility implementation**
- **e-mobility services** information available in a **knowledge database for learning purposes**

MEISTER products

P4. MEISTER European eMobility Expertise Centre (EeMEC) and eSUMPS knowledge base:



Follow us

www.eemec.eu

What is the EeMEC

The **European e-Mobility Expertise Centre** (EeMEC) is a non-profit organization created to facilitate the transferability of best practices of the various cities leading eMobility in Europe, to other European local governments.

It is a **technical, legal and financial support center**, as well as a tool which will facilitate engineering and consultancy companies to offer their services to local governments in the urban planning.

- Established in: **Valencia, Spain**

EeMEC
European e-mobility Expertise Center

EeMEC at a glance

The 3 major barriers for the deployment of Electric Vehicles in the EU are the high cost of vehicles, the low level of consumer acceptance and the lack of recharging stations.

EeMEC try to solve them by **designing, validating & promoting Business Models** to make it more attractive to install and use charging infrastructure.

Our VISION

To build a greener, CO2 free mobility future

Our MISSION

To ensure more efficient use of urban space and mitigate adverse traffic effects with smart e-mobility solutions

Our VALUES

- Collaboration
- Electrification
- Sustainability
- Ecology

EeMEC
European e-mobility Expertise Center

EeMEC Services

E-mobility Studies & Analysis

- Feasibility studies
- Analysis of charging behavior
- Forecasting vehicle trends
- Developing e-mobility strategies

Networking & Fundraising

- Developing partnerships
- Facilitating stakeholders
- Access to European Research Open Calls

Business Consultancy Services

- EV business cases
- Planning of Charging infrastructure
- Operation advice
- Public and business consultation

Sharing of Best Practices

- Public awareness campaigns
- Training
- Seminars, Conferences

MEISTER products

P5. MEISTER Smart Charging and Storage Platform

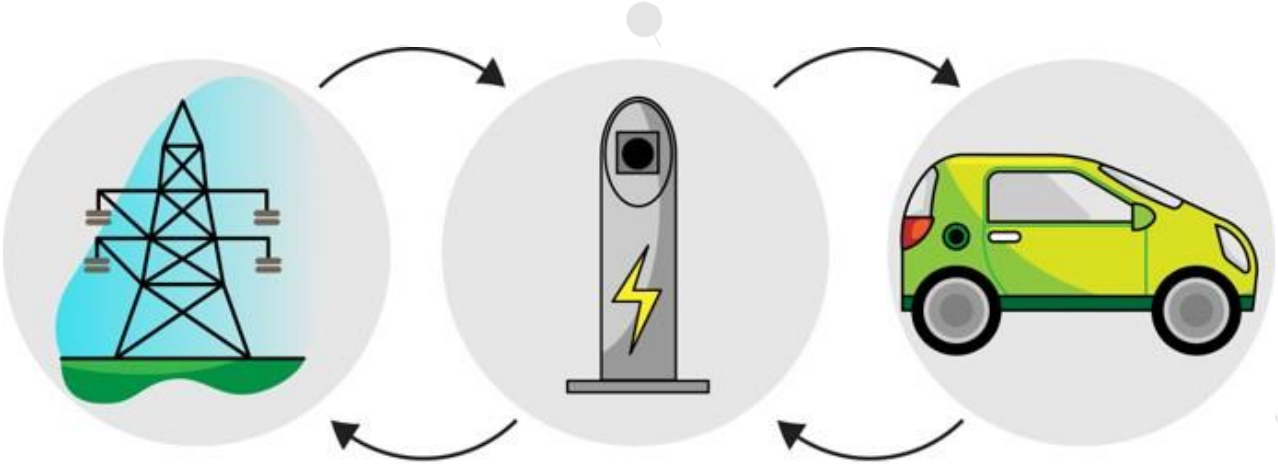
Description:

Platform that allows **vehicle-sharing companies** and **e-fleet managers** to optimize activities related with **smart charging and discharging** of their EVs**:**

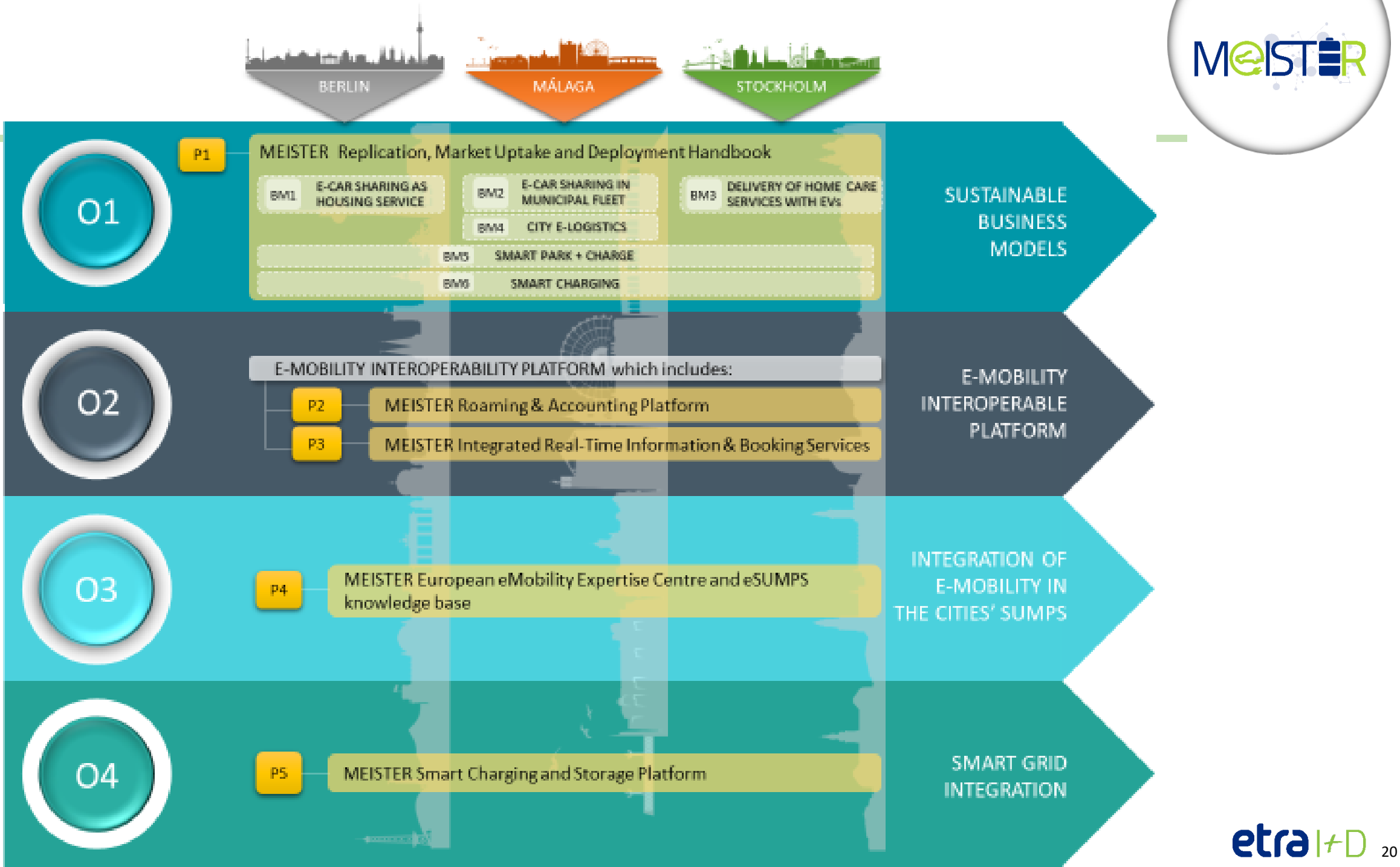
- Using **EVs as dynamic distributed storage** devices
- Feeding electricity stored in their batteries back into the local grid when needed **(V2G supply**)

Added-value services:

- Consider the **renewable generation profile**, the **tariffs,** the driver **requirements and preferences**
- Consider different **types of charging**: on-demand, smart charging, V2G
- Allocation of any excess of energy in the distribution network to **stabilize the grid** (demand side management)



P5. MEISTER Smart Charging and Storage Platform


BERLIN
MÁLAGA
STOCKHOLM
O1
P1
MEISTER Replication, Market Uptake and Deployment Handbook
BM1 E-CAR SHARING AS HOUSING SERVICE
BM2 E-CAR SHARING IN MUNICIPAL FLEET
BM3 DELIVERY OF HOME CARE SERVICES WITH EVs
BM4 CITY E-LOGISTICS
BM5 SMART PARK + CHARGE
BM6 SMART CHARGING
SUSTAINABLE BUSINESS MODELS
O2
E-MOBILITY INTEROPERABILITY PLATFORM which includes:
P2
MEISTER Roaming & Accounting Platform
P3
MEISTER Integrated Real-Time Information & Booking Services
E-MOBILITY INTEROPERABLE PLATFORM
O3
P4
MEISTER European eMobility Expertise Centre and eSUMPS knowledge base
INTEGRATION OF E-MOBILITY IN THE CITIES' SUMPS
O4
P5
MEISTER Smart Charging and Storage Platform
SMART GRID INTEGRATION

MEISTER Pilot sites

BERLIN

Pilot areas: Residential neighborhoods “Mein Falkenberg”, “Wohnpark Mariendorf “ and Lindenstraße

Focus on: business cooperation frameworks and smart mobility services for new urban planning

MALAGA

Pilot areas: City center, Carretera de Cadiz and Humilladero area

Focus on: e-urban collaborative logistics (last mile distribution) and municipal e-car sharing schemes

STOCKHOLM

Pilot area: The whole city

Focus on: adapting the procurement criteria for fostering the use of EVs for Home Care delivery among private operators

BM1: E-carsharing as a housing service

Carsharing in the neighborhood of „Falkenberg“

Falkenberg Demonstration Site (Berlin):

- Stationary, fully electric carsharing
- Deployed in August 2020
- One car with one dedicated charging point
- MEISTER Mobility app to check availability of the service and start the reservation

BM1: E-carsharing as a housing service

Carsharing and parking barriers in the neighborhood „Wohnpark Mariendorf “

Mariendorf Demonstration Site (Berlin):

- Deployed in August 2020
- Three electric cars with three dedicated charging points and parking barriers
- MEISTER Mobility app to check availability of the service and start the reservation

BM5: Smart Park and Charge

Lindenstraße Demonstration Site (Berlin):

- A combination of parking barriers (digitally controllable) and charging infrastructure for a guaranteed accessibility of the charging point
- 2 AC, 2 DC charging points (public)
- EV drivers can access a charging point by reserving and open the parking barrier via app upon arrival

MEISTER products involved

MEISTER e-mobility services can be found in…

MEISTER Mobility App

MEISTER Mobility Display

THANK YOU!
Any Question?

Mobility **E**nvironmentally-friendly, **I**ntegrated and economically **S**ustainable **T**hrough innovative **E**lectromobility **R**echarging infrastructure and new business models

@MEISTER_H2020

Patricia Bellver

Project Manager, ETRA I+D

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement No 769052.

For more information visit: https://meisterproject.eu/

Agenda

Start	End	Content
15:30	15:45	**Welcome and presentation of the agenda** MEISTER, Project Coordinator
15:45	16:05	**Mobility Environmentally-friendly, Integrated and economically Sustainable Through innovative Electromobility Recharging infrastructure and new business models** Patricia Bellver Muñoz, MEISTER Project Coordinator Senior project manager, ETRA I+D
16:05	16:25	**Innovative solutions for USER centric CHarging Infrastructure** María del Carmen Tomás, USERCHI Project Coordinator Senior project manager, ETRA I+D
16:25	16:45	**GreenCharge measures and impact evaluation framework** Marit Natvig Senior researcher, SINTEF Digital
16:45	17:05	**Analysis of Electric Vehicle (EV) cost-based charging load profiles** Sotiris Deligiannis, University of Peloponnese
17:05	17:35	**Electric Vehicle Charging Infrastructure for improved User Experience** Dr. Evangelos Karfopoulos Senior project Manager, I-SENSE/ICCS
17:35	17:50	**Roundtable & Questions**
17:50	18:00	**Conclusions**

USER-CHI

Innovative solutions for user centric charging infrastructure

María TOMÁS
Project Manager, ETRA
mtomas.etraid@grupoetra.com

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No [875187]

29/10/2020

THE CONTEXT

Currently most EV owners have their own garage and live in peri-urban areas...

The market share of full electric vehicles is still low in many European member states…

Current BM and revenues from charging infrastructure are not enough to ensure a sustained market growth…

Innovative solutions are required to allow EV drivers having a similar mobility experience than with conventional vehicles…

THE CONTEXT

CURRENT± HOME TECHNOLOGY REGULATION EMOBILITY SUPPLY NETWORKS DIRECTORY HUB Follow Us

09 Sep / 2020 12:34

Alice Grundy
Reporter, Current±

Affordability and charging concerns remain top barriers for EV uptake

Autovista Group
We value the future of mobility
Our Products Our Customers Our Insights
Home News and insights EV charging anxiety is the new range anxiety

EV charging anxiety is the new range anxiety

28 January 2020

FleetNews NEWS TOOLS FLEET MANAGEMENT FUTURE FLEET ELE

Home » NEWS » Fleet industry news » Charge point anxiety is new barrier to EV take-up, say fle

Charge point anxiety is new barrier to EV take-up, say fleets

03/12/2019 in Fleet industr

THE TIMES Today's sections Past six days Explore

Lack of chargers blocks road to electric cars

Graeme Paton, Transport Correspondent

Wednesday September 02 2020, 12.01am BST, The Times

The UK had 22,613 public or workplace charging points at the end of last year, accounting for as little as 15 per cent of the number needed by 2025 and 5 per cent of that needed by 2030
THOMAS PETER/REUTERS

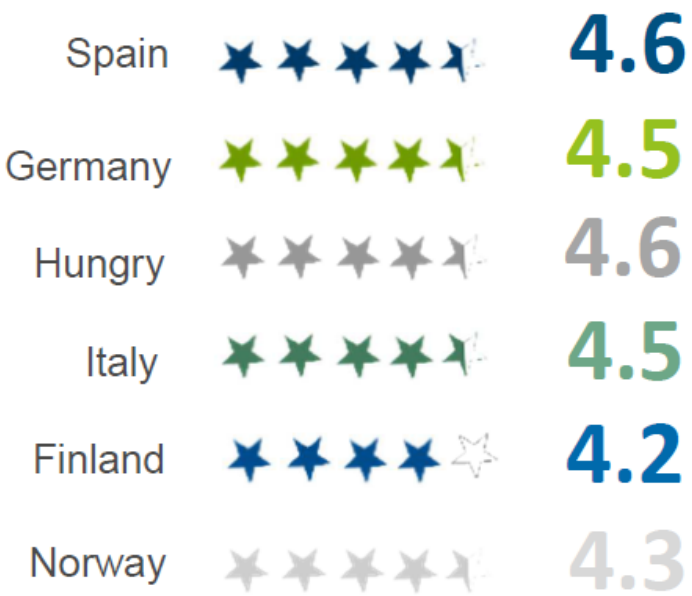
Forbes

Most EV Charging Infrastructure Is Wasted Due To Lack Of New Thinking

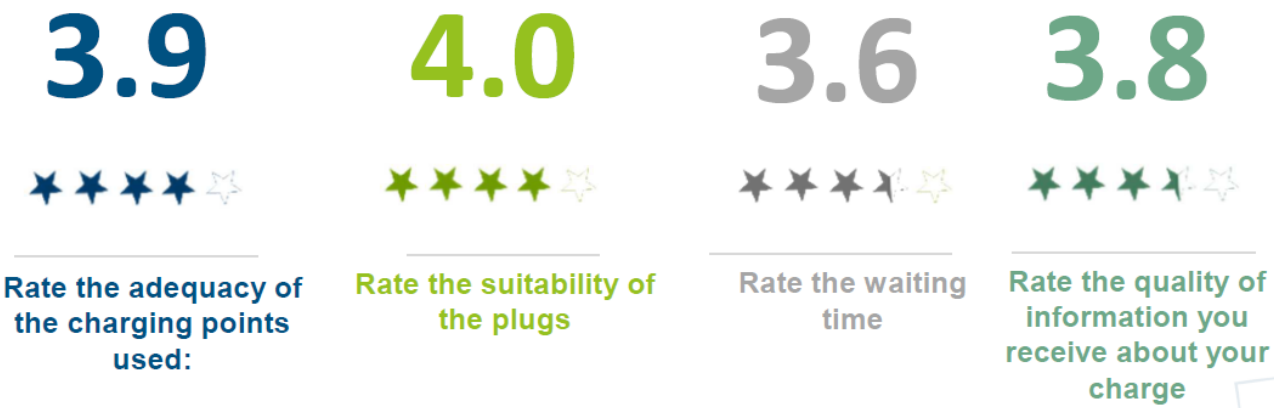
Brad Templeton Senior Contributor
Transportation
I cover robocar technology & previously worked on Google's car team.

THE EV driver's oPINION

EV satisfaction



Charging experience satisfaction



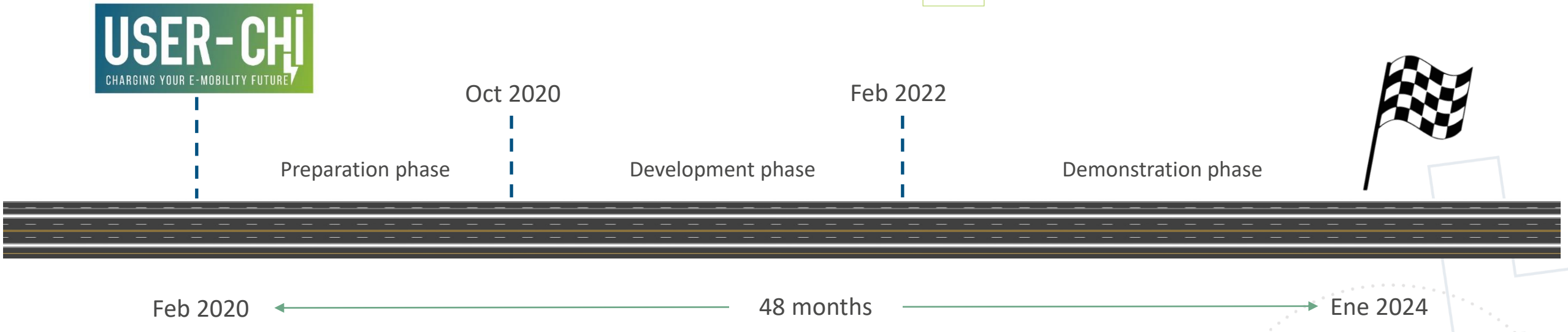
THE CHALLENGE

Support the accelerated deployment of EV charging infrastructure in Europe by ensuring **user satisfaction**

THE PROJECT

USER-CHI is an industry powered, city driven and user-centric project which will co-create and demonstrate smart solutions around 7 connecting nodes of the Mediterranean and Scandinavian-Mediterranean TEN-T corridors to boost a massive e-mobility market take-up in Europe.

- Duration: 2020-2024
- Budget: 17M€
- 24 partners
- Coordinator: etra I+D



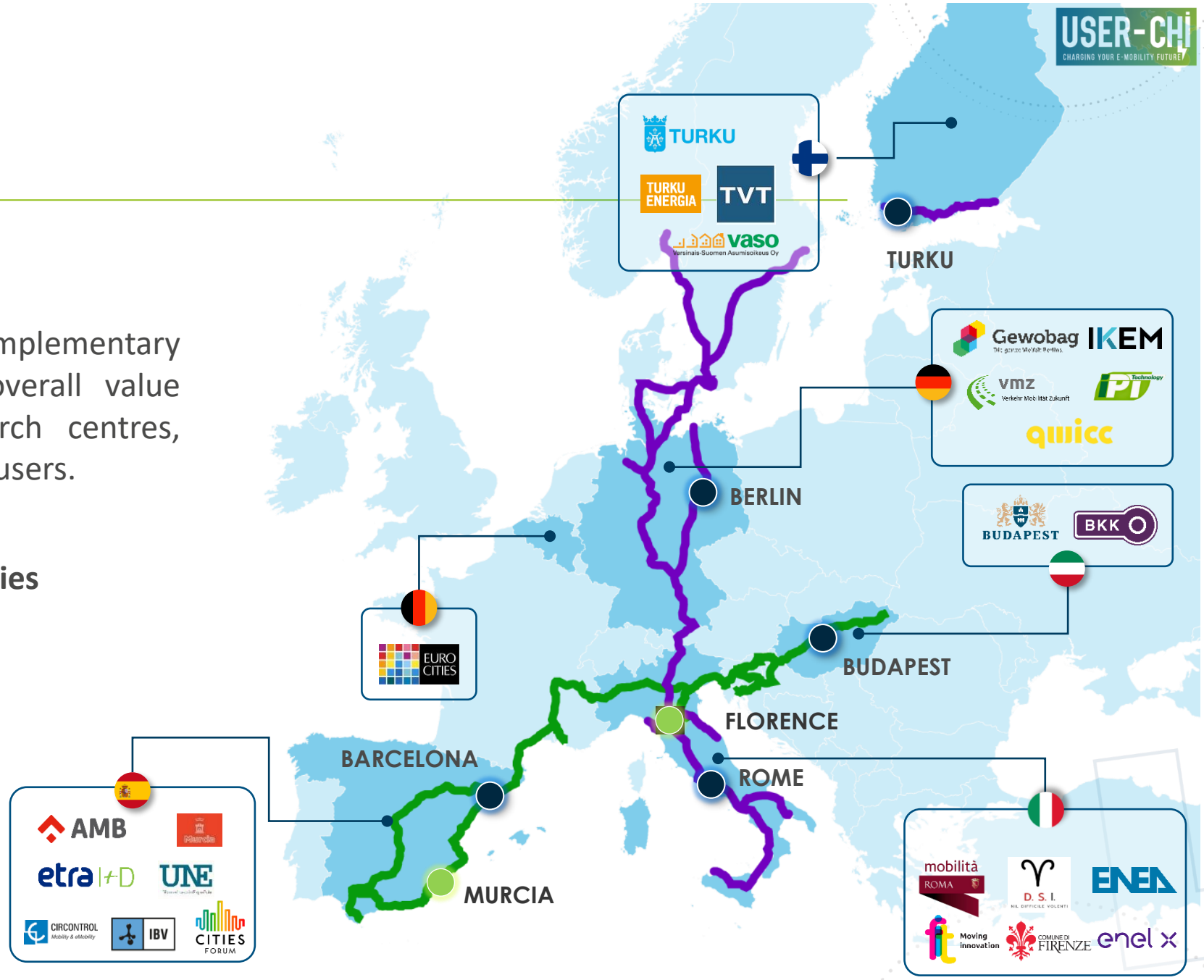
OUR PARTNERS

24 partners from 6 countries

A balanced team of complementary organisations covering the overall value chain of the Project: research centres, technology providers and end-users.

5 demo sites + 2 replication cities

- Barcelona
- Berlin
- Budapest
- Rome
- Turku
- Florence
- Murcia



Objectives

1. DESIGN OPTIMISATION OF CHARGING NETWORKS WITH A USER-CENTRIC APPROACH (P1, P2, P3)
2. DEPLOYMENT OF AN INTEROPERABILITY FRAMEWORK AND PLATFORM (P4, P5)
3. SCALABLE INFRASTRUCTURE ROLL-OUT BY MEANS OF SMART GRID INTEGRATION (P6)
4. DEVELOPMENT OF INNOVATIVE AND HIGHLY CONVENIENT CHARGING SYSTEMS (P7, P8)
5. DEMONSTRATION OF NOVEL BUSINESS AND MARKET MODELS (P2, P3)
6. LEGAL AND REGULATORY RECOMMENDATIONS FOR MASSIVE EV DEPLOYMENT (P2, P3)

USER-CHI products

P1:**CLICK-** Charging location and holistic planning kit

P2:**Stations of the future** handbook

P3:**eMoBest** – e-Mobility replication and best practice cluster

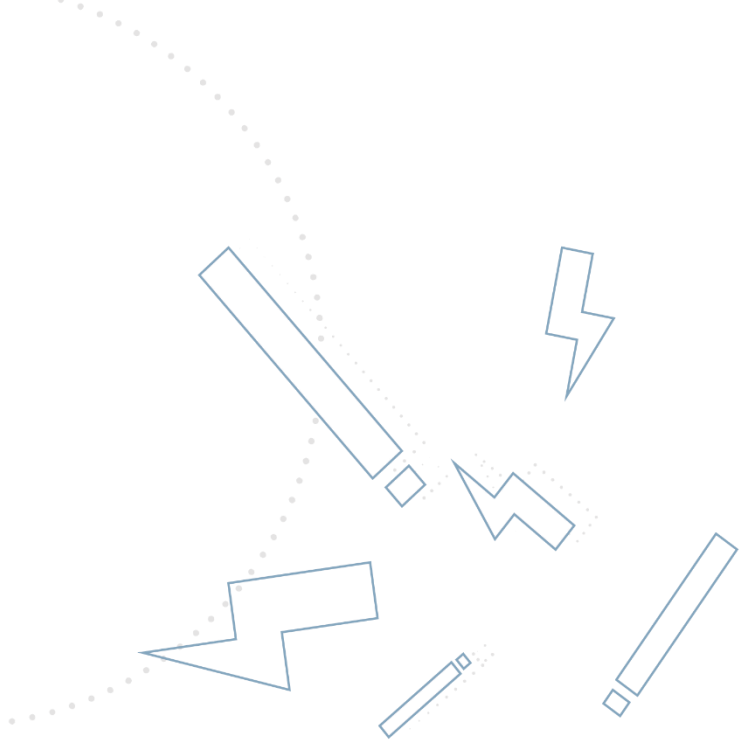
P4:**INFRA** – Interoperability framework

P5:**INCAR** – Interoperability, charging and parking platform

P6:**SMAC** – Smart Charging tool

P7:**INSOC** – Integrated solar DC charging for Light Electric Vehicles (LEVs)

P8:**INDUCAR** – Inductive charging for e-cars



User research – Netnography results

SAMPLE

	Germany	Norway	Spain
Users	123	175	212
Mentioned aspects	183	232	472
Average of mentions	1,5	1,1	2,2
Forums	5	1	3

WEIGHT OF THE EV CHARGE ELEMENTS

	Germany	Norway	Spain
Electric vehicle	28%	33%	50%
Infrastructures	70%	21%	37%
Incentives / Information	2%	46%	8%
Environment	0%	0%	5%

NUMBER OF EV CHARGE INFRASTRUCTURE PER POPULATION

	Germany	Norway	Spain
Tesla supercharger	1 / 1,000,000	1 / 70,000	1 / 900,000
Tesla dest charger	1 / 100,000	1 / 37,000	1 / 100,000
Charging point	1 / 10,000	1 / 2,000	1 / 9,000
Connector	1 / 4,500	1 / 900	1 / 3,400

User research – Netnography results

SHARED EXPERIENCES IN THE EV CHARGING / PROBLEMATIC SITUACIONS THAT NEED TO BE IMPROVED

- The chargers network is in poor condition and lacks of maintenance.
- The parking lots for charging EVs are occupied by fuel vehicles or electric vehicles that are not charging.
- Long range trips require planning; it is necessary charging the batteries along the route.
- Freight prices are high.
- Incompatibility exists between networks and chargers.
- Poor quality of the charging points: slow process, impossibility of carrying out two charges at the same time and cutoffs.

SPECIFIC EXPERIENCES IN THE EV CHARGING / PROBLEMATIC SITUATIONS

Germany

Solutions with extreme/cold weather are not good.

Network access and paying protocols are not reliable; network is not properly signalized and signals are not standard.

Public charging network is short and in poor condition.

To improve security (charger can be unplugged).

Norway

Tesla's network is the largest charging network and prioritizes its vehicles.

Charging problems in Europe due to network shortages, multiple operators, different access forms, payment, and high prices.

Spain

Insufficient network and inequitably distributed; largest network in the north and biggest cities.

Users lack information and do not know how charging points work.

There is no public charging network and the existing private network is slow.

User research – Netnography results

EXPERIENCES IN THE EV CHARGING / SOME CURIOSITIES

- Long range vehicle users are more satisfied with the charging infrastructure network than low range vehicle users.
- The most developed EV market in Europe is Norway. Users present fewer incidents related to the vehicle and the charging infrastructure network, and more contributions related to incentives.
- German market also presents a good penetration of EVs. EVs' valuation of German users is similar to Norwegians, and they have interest on improving infrastructure, probably due to population density.
- Spain is the least developed market, with the lowest percentage of electric vehicles. This market does not have public networks and charging systems are poorly standardized. The market requires increasing the network of charging points, currently 1 / 14,000 inhabitants.

SOME PROPOSALS

- To adapt the availability of chargers in the service areas to current demand.
- To increase the slow charging points in shopping centres and supermarkets; charging while buying.
- To improve the management of charging points in public parkings; free charging linked to minimum purchase.
- Let the users to adjust time and charging power, according to their needs.
- To develop guides informing about the European charging network features, including national operators, compatibility, ways of access and payment.

Getting involved

- [x] Technical webinars
- [x] Replication webinars
- [x] Policy and research recommendations
- [x] Replication manual
- [x] Projects' events
- [x] Follow us!

THANK YOU!

Connect with us:

@Userchi_H2020

https://bit.ly/2W7M3mW

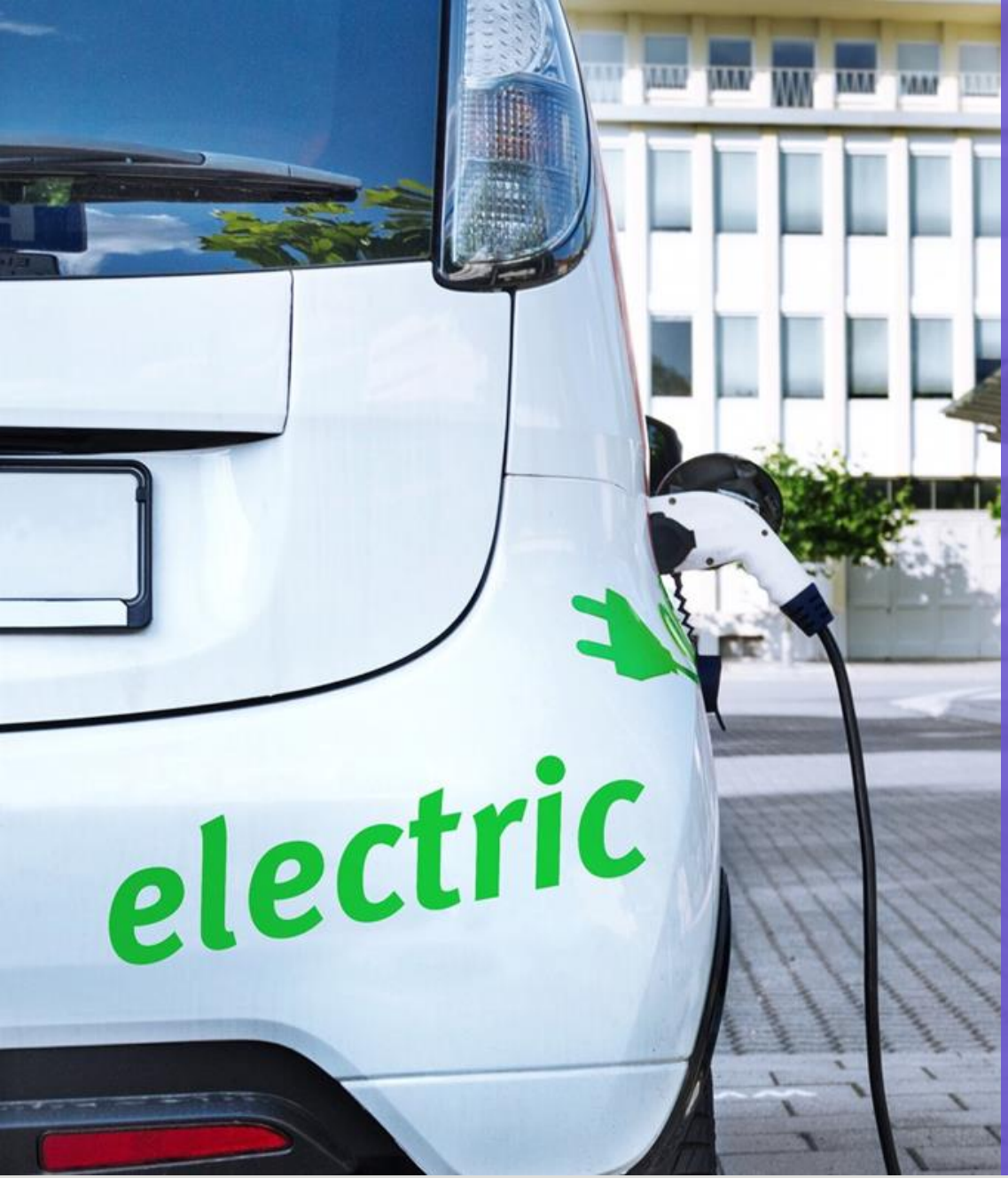
www.userchi.eu

info@userchi.eu

mtomas.etraid@grupoetra.com

Agenda

Start	End	Content
15:30	15:45	**Welcome and presentation of the agenda** MEISTER, Project Coordinator
15:45	16:05	**Mobility Environmentally-friendly, Integrated and economically Sustainable Through innovative Electromobility Recharging infrastructure and new business models** Patricia Bellver Muñoz, MEISTER Project Coordinator Senior project manager, ETRA I+D
16:05	16:25	**Innovative solutions for USER centric CHarging Infrastructure** María del Carmen Tomás, USERCHI Project Coordinator Senior project manager, ETRA I+D
16:25	16:45	**GreenCharge measures and impact evaluation framework** Marit Natvig Senior researcher, SINTEF Digital
16:45	17:05	**Analysis of Electric Vehicle (EV) cost-based charging load profiles** Sotiris Deligiannis, University of Peloponnese
17:05	17:35	**Electric Vehicle Charging Infrastructure for improved User Experience** Dr. Evangelos Karfopoulos Senior project Manager, I-SENSE/ICCS
17:35	17:50	**Roundtable & Questions**
17:50	18:00	**Conclusions**



GreenCharge measures and impact evaluation framework

Marit Natvig

SINTEF

Sustainable Places: MEISTER Workshop
2020-10-29

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769016.

Long-term vision

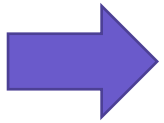
An **electric** mobile future where:

- Charging **easily available** to everyone
- Charging uses **renewable energy**
- Charging infrastructure established **without major investments** in power grid

Electrification of the transport sector

Many barriers

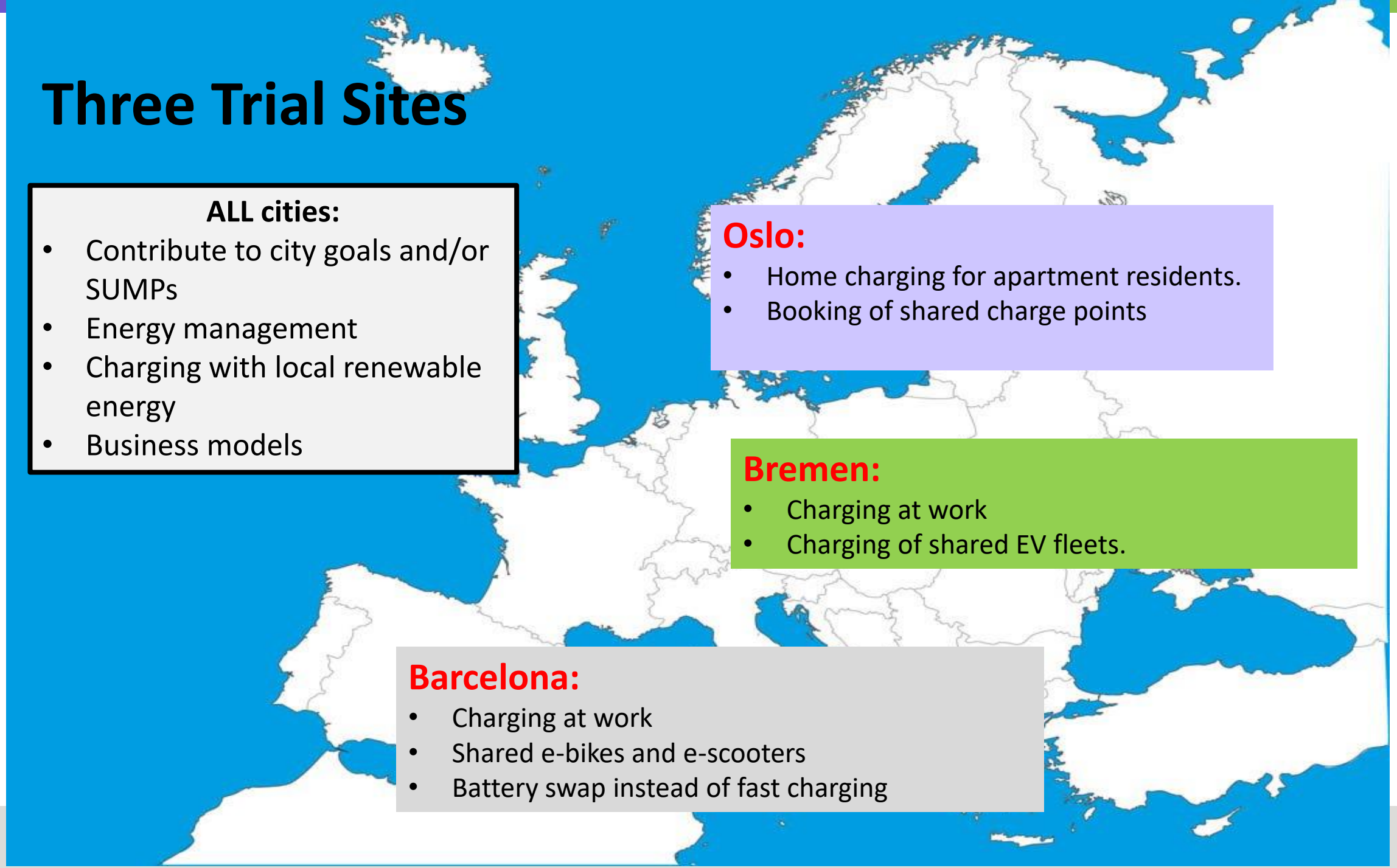
- Potential EV owners worry about **where to charge**
- Charging providers hesitate to **invest in charging infrastructure**
- Building owners and energy providers may struggle to **meet energy requirements**



GreenCharge

- Define a set of **measures** to overcome these barriers
- Develop associated **technologies** and innovative **business models**.
- Apply measures in **7 demonstrators** in 3 European cities.

Three Trial Sites



ALL cities:

- Contribute to city goals and/or SUMPs
- Energy management
- Charging with local renewable energy
- Business models

Oslo:

- Home charging for apartment residents.
- Booking of shared charge points

Bremen:

- Charging at work
- Charging of shared EV fleets.

Barcelona:

- Charging at work
- Shared e-bikes and e-scooters
- Battery swap instead of fast charging

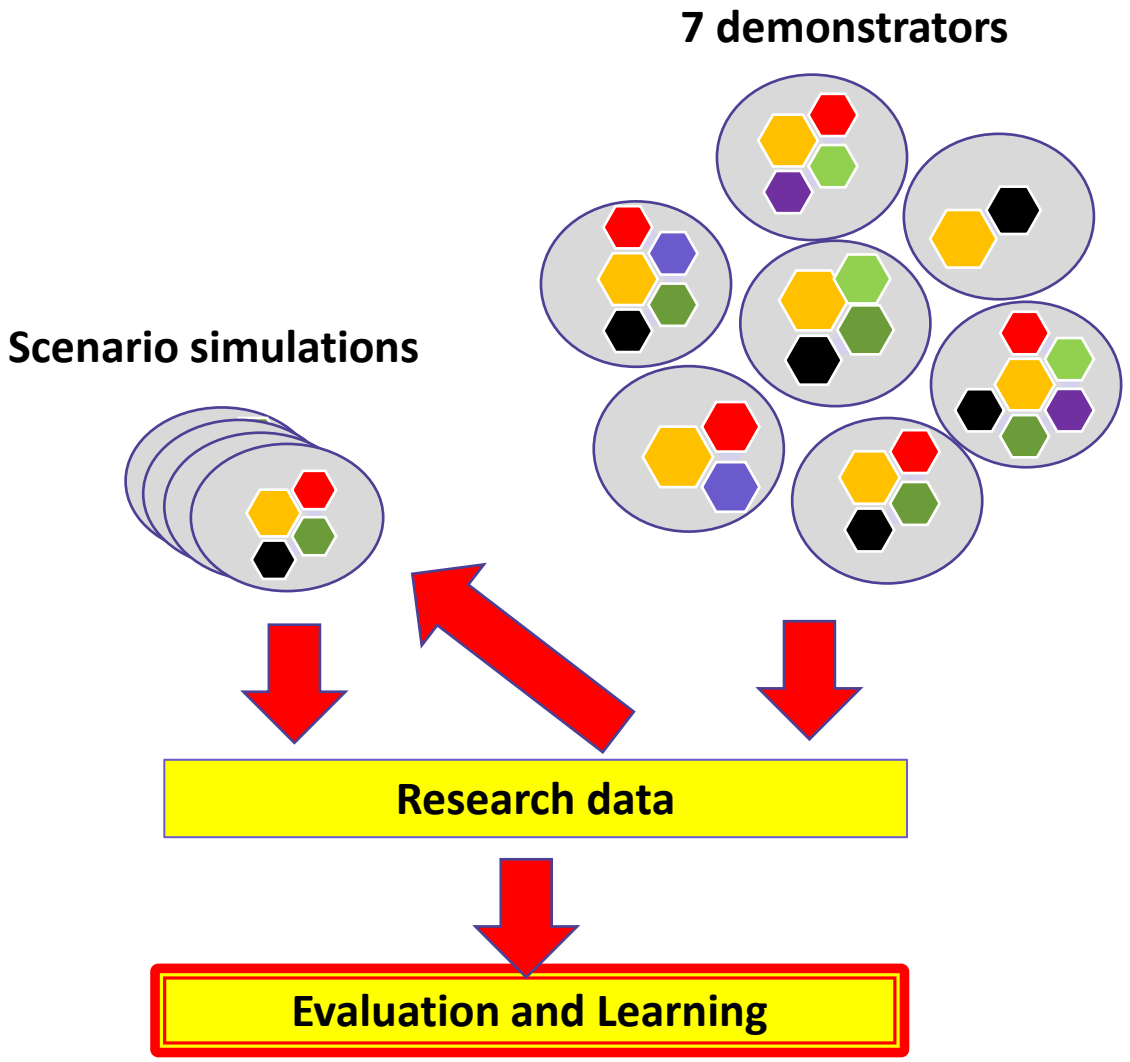
- What was a success/failure, and why?
- Possible impact?
- How to achieve desired impact in different contexts?

We must evaluate the results

How to learn

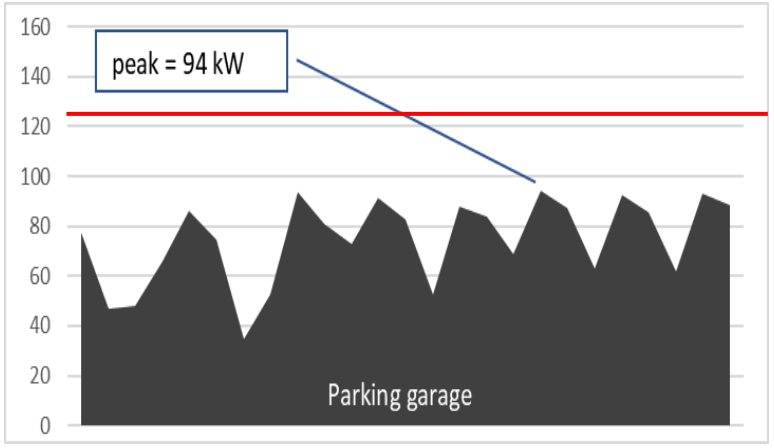
Facilitate learning from

- Demonstrators
- Simulations of "what-if" scenarios

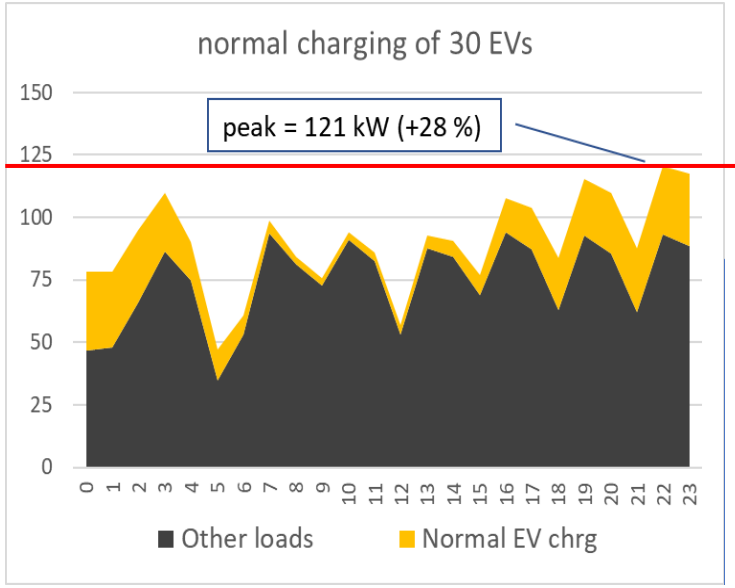


Smart charging =
Charging with smart energy management

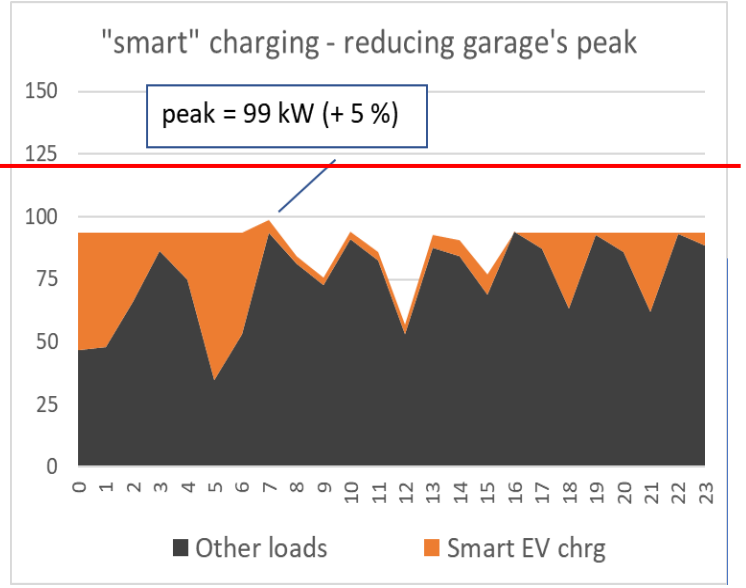
Power consumption with no charging



Normal charging

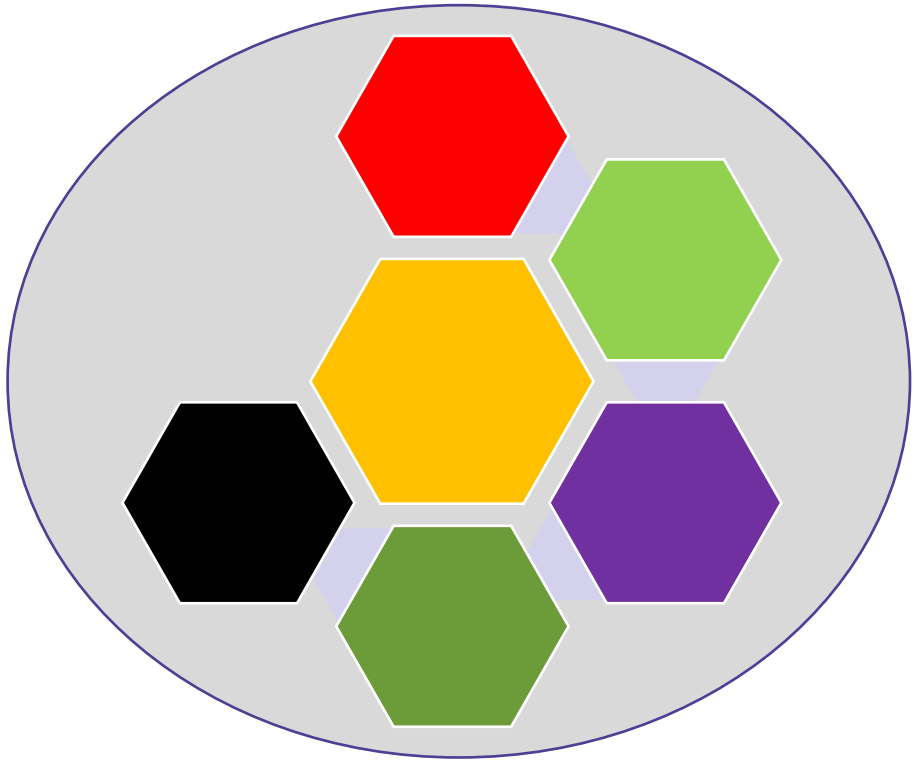


Smart charging



Measures to be evaluated

- Charging
- Smart energy management
- Business aspects
- EV fleets



GreenCharge measures

Charging

Charging measures	Deployed							Simulated
	OSL		BRE		BCL			
	D1	D2	D1	D2	D1	D2	D3	Misc. scenarios
Private charge points	x							x
Shared charge points		x	x	x		x	x	x
Roaming		x		x		x		
Booking of charge point		x		x		x		
Battery swapping and charging					x			

GreenCharge measures

Smart energy management

Smart energy management measures	Deployed							Simulated
	OSL		BRE		BCL			
	D1	D2	D1	D2	D1	D2	D3	Misc. scenarios
Flexible charging	x					x		x
Priority charging	x		x					x
Use of local renewable energy sources (RES)	x		x			x	x	x
Use of stationary energy storage	x		x					x
Exploiting V2G (Vehicle to Grid)								x
Optimal and coordinated use of energy for charging	x		x		x	x	x	x
Optimal and coordinated use of energy – across all energy use	x					x		x
Optimal transport of energy for charging to reduce the need for grid investments			x					

GreenCharge measures
Business aspects

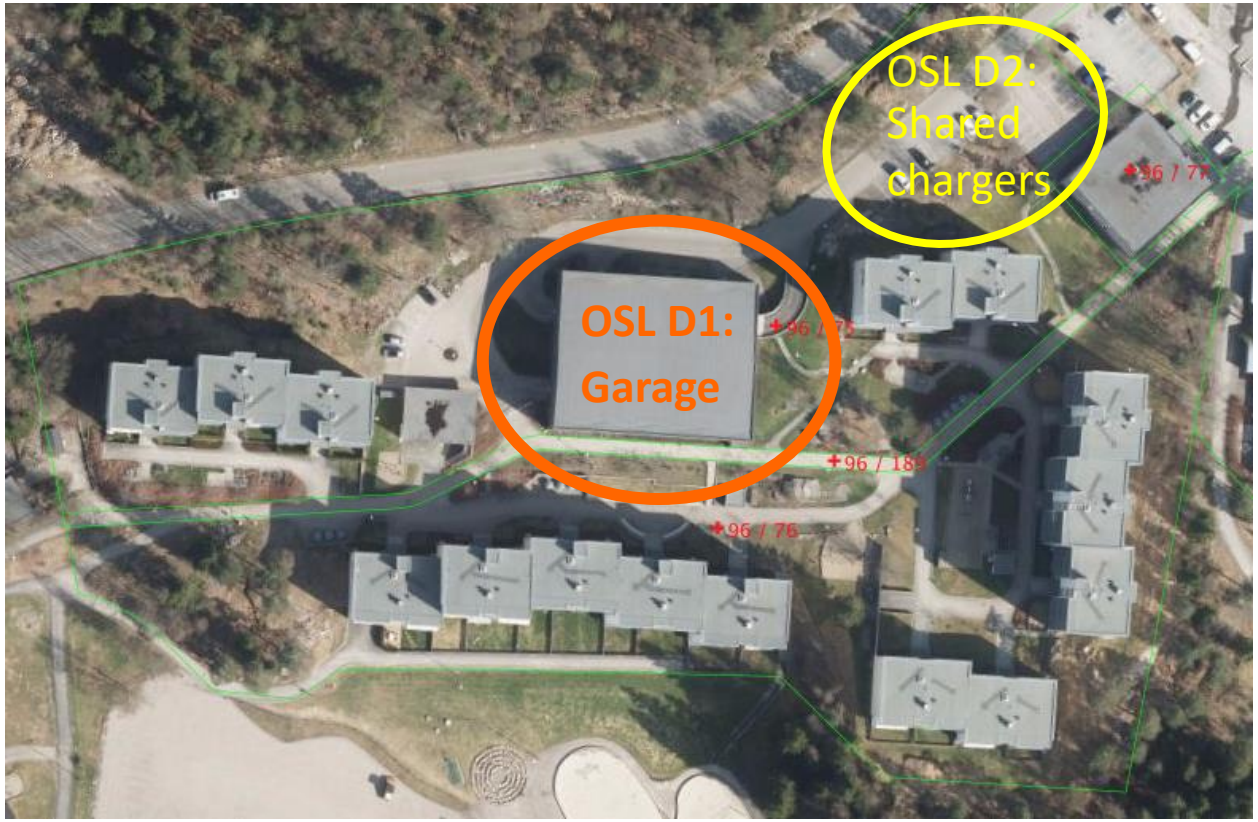
Business related measures	Deployed							Simulated
	OSL		BRE		BCL			
	D1	D2	D1	D2	D1	D2	D3	Misc. scenarios
Business model promoting desired behaviour	x	x				x		x
Business model rewarding procumer	x					x		x
Business model for sharing of charge point		x		x				x
Business models for new eMobility services				x	x		x	

GreenCharge measures
EV fleets aspects

EV fleet related measures	Deployed						
	OSL		BRE		BCL		
	D1	D2	D1	D2	D1	D2	D3
EV fleet management (charging included)				x	x		x
Service providing shared EVs				x	x		x

Example: Demonstrators in Oslo

- Residents and buildings
  - 246 apartments
  - 5 apartment blocks, 1 common house and 1 garage
- Parking facilities
  - 230 parking places inside garage
- Charging facilities
  - Possible 230 private chargers inside the garage (D1)
  - 4 shared chargers (D2)



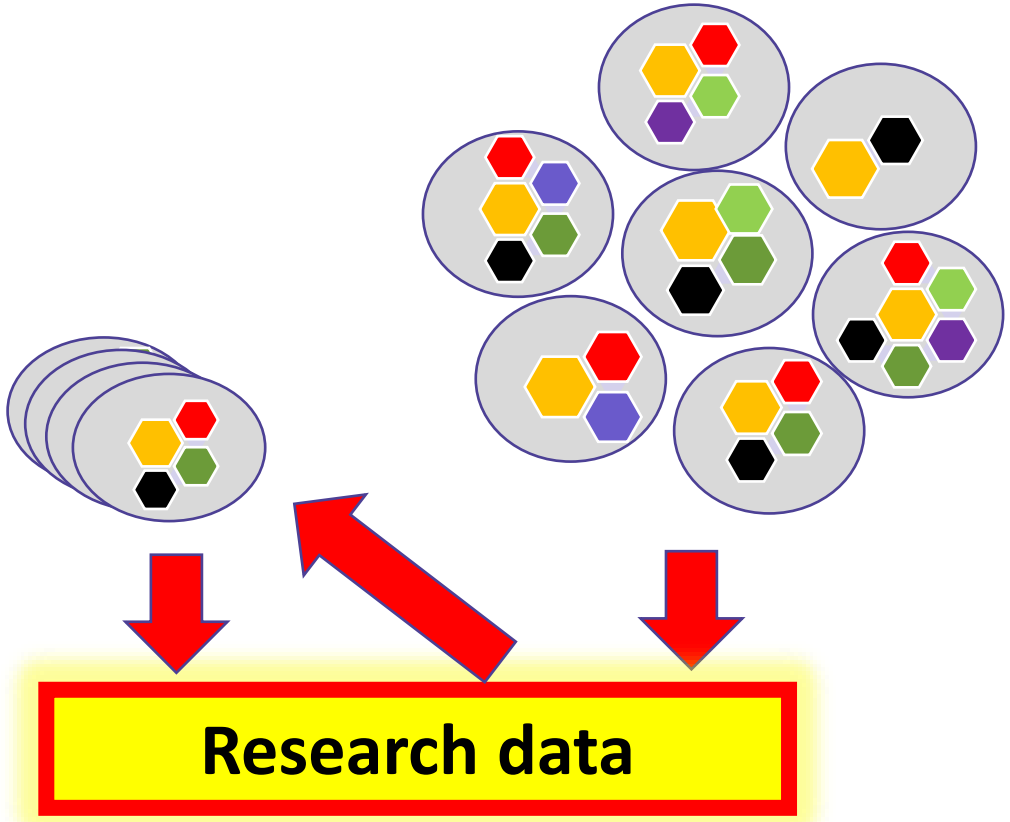
Oslo Demo D1: Charging in garage

- 60 private charge points (CPs) in garage
- PV panels for local energy production
- Stationary batteries for energy storage

- Users use App to start charging and provide input on energy demand, priority or flexibility
- Smart energy management optimizing the use of the grid capacity
- Flexibility is rewarded

Objective – to learn about	Indicators
• Charging behavior • Flexibility of EV users	• Acceptance level • Utilization of charge points • Charging availability • Charging flexibility
• The effects of smart energy management	• Energy mix • Peak to average ratio • Self-consumption • CO2 emissions
• The effects of economic incitements	• Acceptance level • Average operating costs • Average operating revenue • Average charging cost

Data collection



Data collection approaches

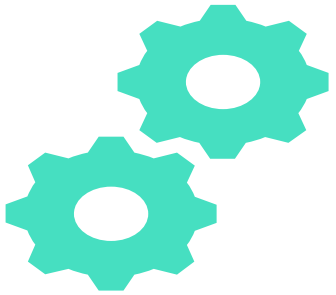
Baseline data and data when measures are demonstrated

A) Surveys

Questionnaires

Interviews

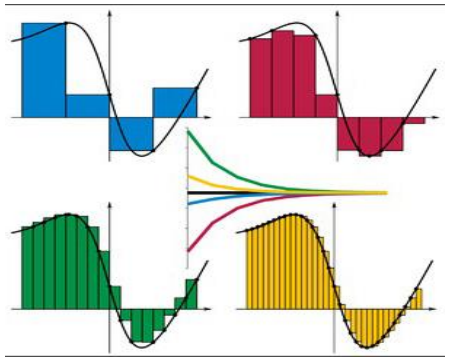
Document studies



B) Automated data collection from software systems

Harmonised across pilot sites

Designed to facilitate automated calculation and visualisation of indicators



C) Data from simulations

Same as B)

"Semi-static" data describing demo site components

Devices delivering data

Energy metres

Charge points

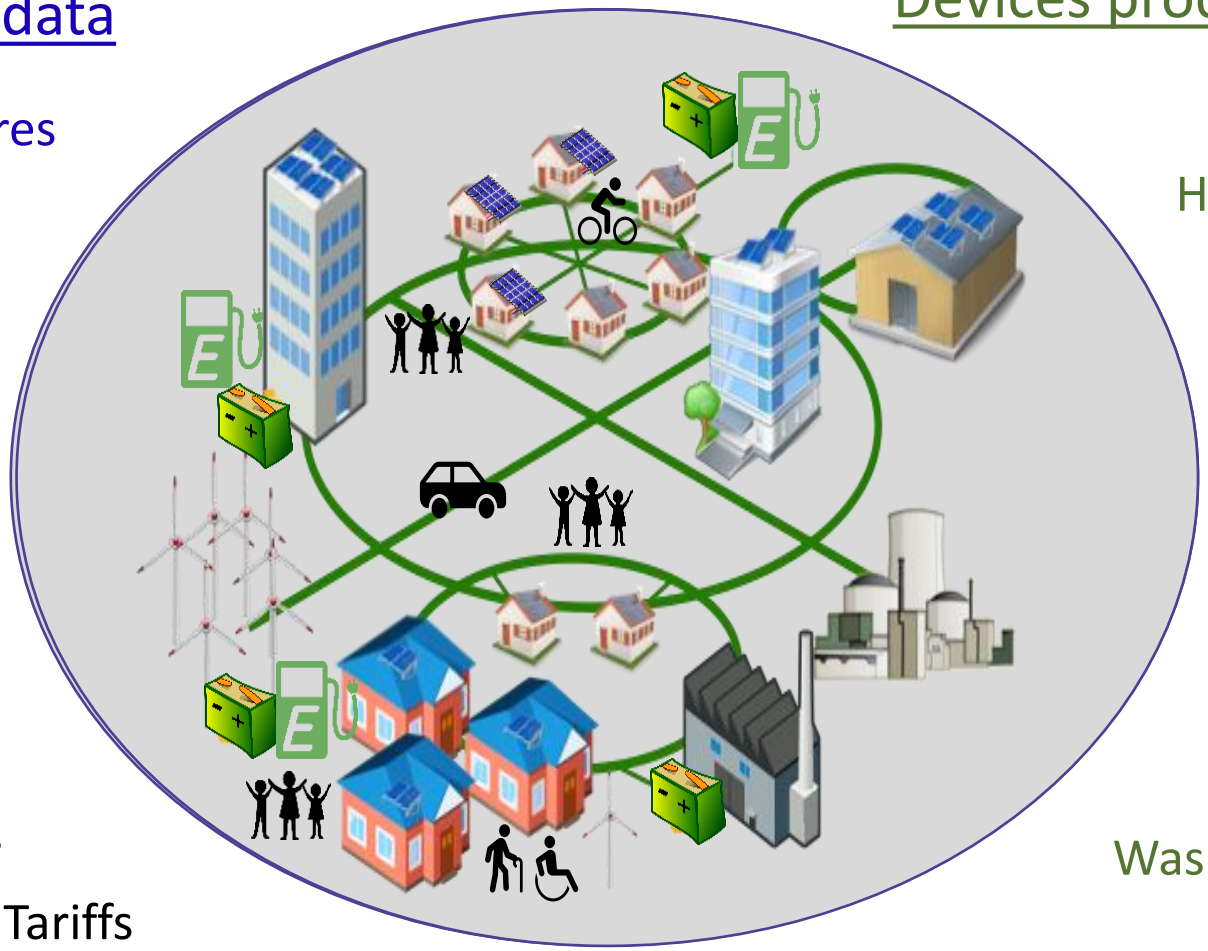
Software systems

Sensors

Business model related data

Price lists

Tariffs



Devices producing/using energy

Heating/ cooling device devices

EVs

Stationary batteries

Solar plants composed of PV panels

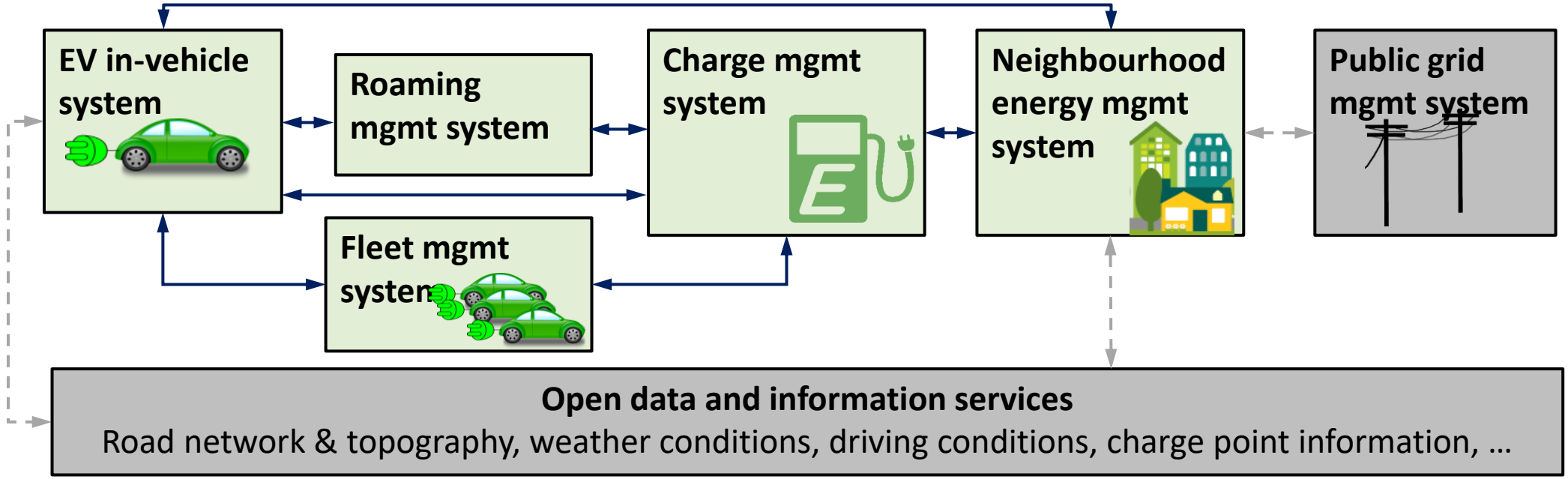
Washing machine/dishwashers

Dynamic data from the software running at demo sites

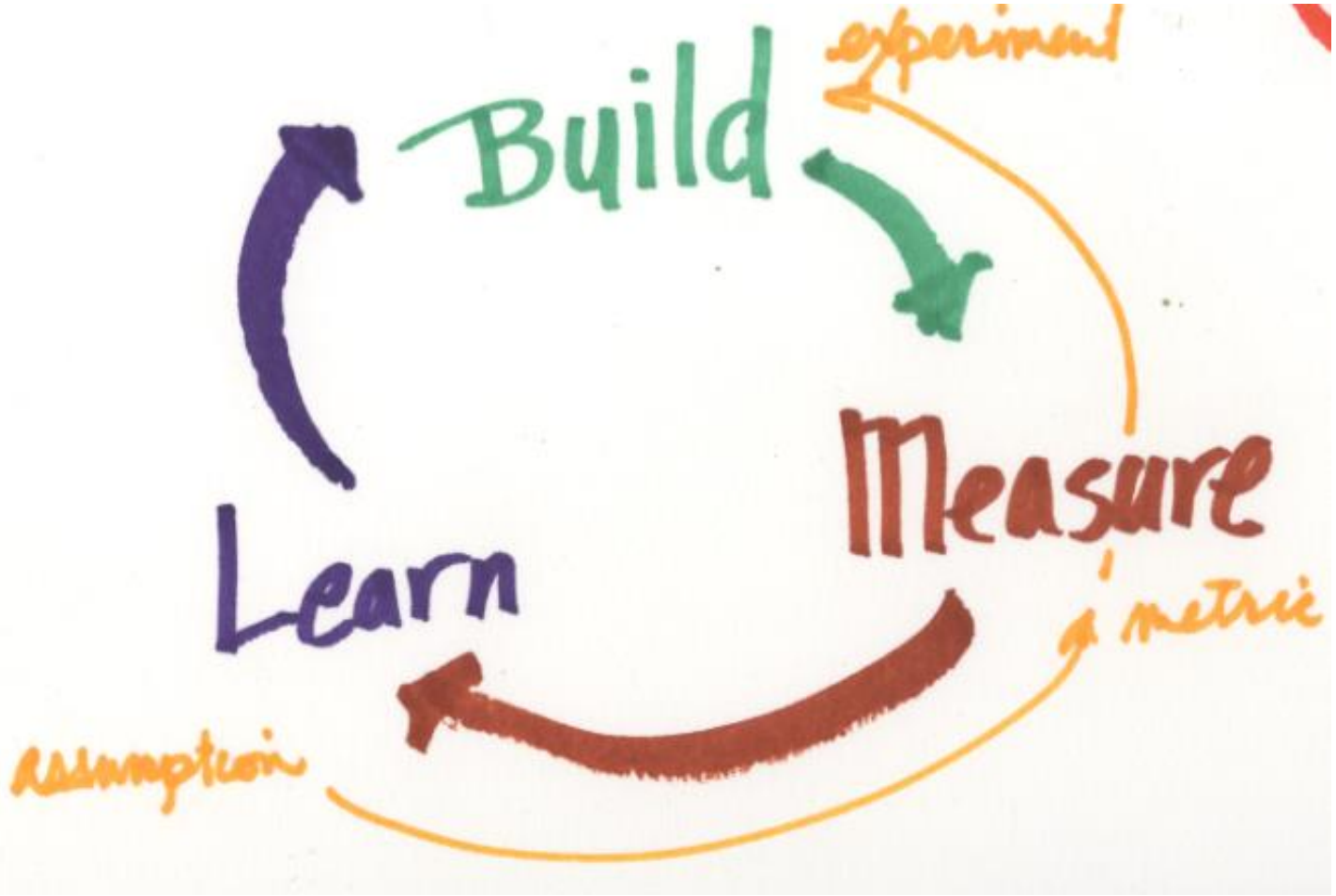
Energy import/export
Grid mix
Energy cost
Energy production
Energy use

Weather

Bookings/reservations
Charging/discharging



Evaluation & Learning



Impact evaluation (CIVITAS approach)

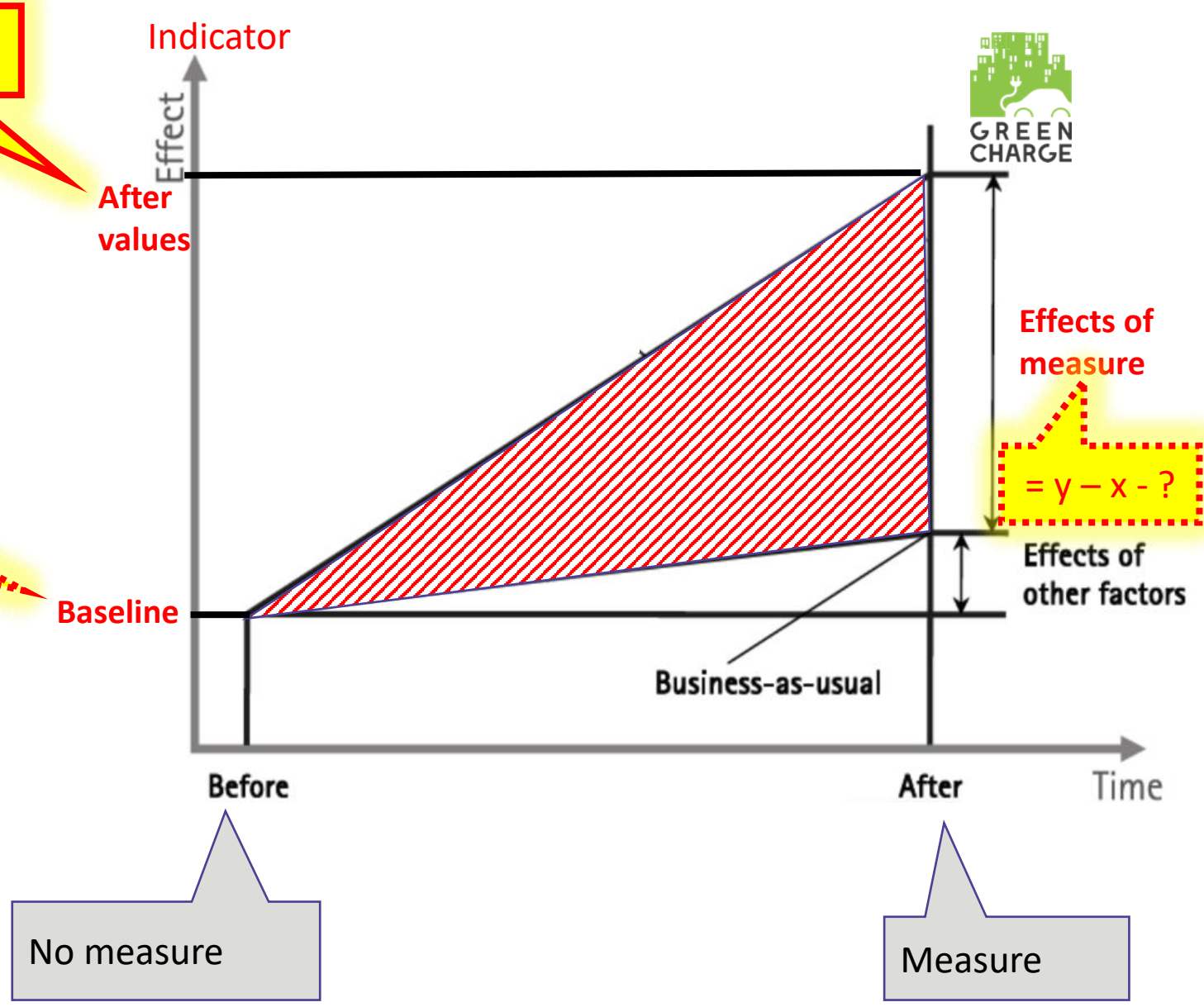
Measure:

- Something new put in place to cause a change

Indicator:

- Characteristics of a situation

Facilitate learning about the effect of measures



Source: CIVITAS Process and impact evaluation framework

Indicators framework

Transport System KPIs

- eMobility
  - Number of EVs
  - Number of charging points
  - Utilization of charging points
  - Charging availability

Energy KPIs

- eMobility
  - Share of battery capacity for V2G
  - Charging Flexibility
- Energy consumption
  - Energy mix
  - Peak to average ratio
  - Self-consumption

Economy KPIs

- Cost
  - Average operating costs
  - Capital investment cost
- Benefit
  - Average operating revenue
  - Average charging cost

Environmental KPIs

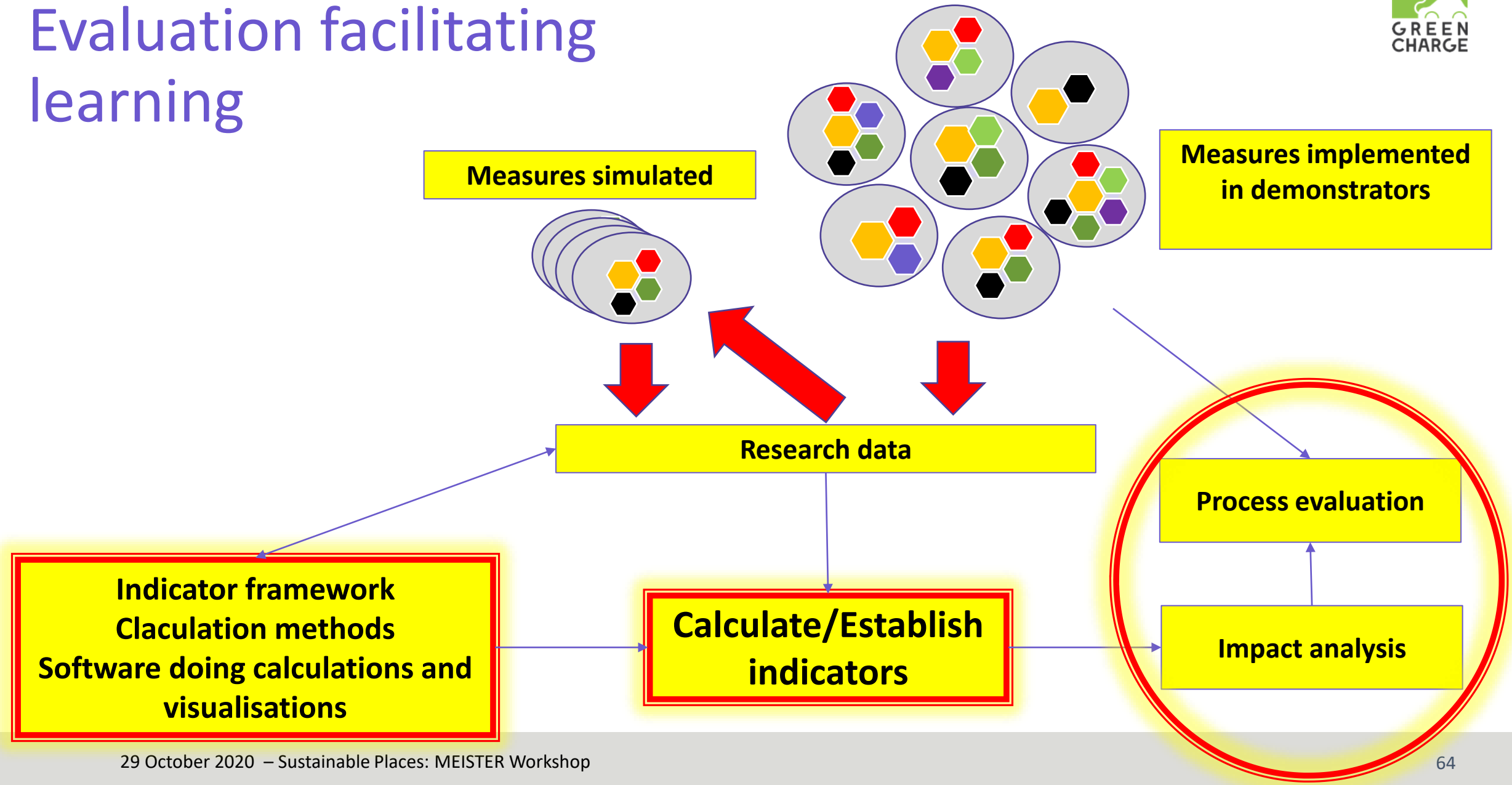
- Pollution/nuisance
  - CO2 emissions

Society-people KPIs

- Acceptance
  - Awareness level
  - Acceptance level
- Accessibility
  - Perception of level of (physical) accessibility of service
  - Operational barriers
  - Relative cost of service
  - Shared EVs per capita

Some indicators are borrowed from CIVITAS. Others are defined by GreenCharge.

Evaluation facilitating learning



Thank you!

Contacts

Marit Natvig (SINTEF) - marit.k.natvig@sintef.no

https://twitter.com/GreenCharge2020

https://www.linkedin.com/company/greencharge-project/

www.greencharge2020.eu

Agenda

Start	End	Content
15:30	15:45	**Welcome and presentation of the agenda** MEISTER, Project Coordinator
15:45	16:05	**Mobility Environmentally-friendly, Integrated and economically Sustainable Through innovative Electromobility Recharging infrastructure and new business models** Patricia Bellver Muñoz, MEISTER Project Coordinator Senior project manager, ETRA I+D
16:05	16:25	**Innovative solutions for USER centric CHarging Infrastructure** María del Carmen Tomás, USERCHI Project Coordinator Senior project manager, ETRA I+D
16:25	16:45	**GreenCharge measures and impact evaluation framework** Marit Natvig Senior researcher, SINTEF Digital
16:45	17:05	**Analysis of Electric Vehicle (EV) cost-based charging load profiles** Sotiris Deligiannis, University of Peloponnese
17:05	17:35	**Electric Vehicle Charging Infrastructure for Improved User Experience** Dr. Evangelos Karfopoulos Senior project Manager, I-SENSE/ICCS
17:35	17:50	**Roundtable & Questions**
17:50	18:00	**Conclusions**

SUSTAINABLE PLACES 2020
October 27-30, 2020
Digital Event

UNIVERSITY of the PELOPONNESE

Analysis of Electric Vehicle (EV) cost-based charging load profiles

E. Koutsi, **S. Deligiannis**, G. Athanasiadou, D. Zarbouti, G. Tsoulos

29/10/2020

MERLON

The work in this presentation is co-funded by the EU HORIZON 2020 program under Grant Agreement no 824386

Introduction

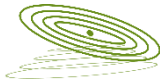
- Transport using fossil fuels
- Major problem of Carbon Dioxide (CO_2)
- Electric Vehicles, as a promising alternative
- Analyze the impact of power demand and the grid load
- Reshape the load profile using different charging scenarios

Electric Vehicles (EVs)

- EVs are characterized from: Battery capabilities and Consumption
- Charge whenever a charging station is provided
- Charging according to different strategies
- Control electricity price in order to postpone some charging sessions

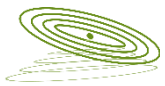
Operations

- Two key operations: G2V (Grid to Vehicle) and V2G (Vehicle to Grid).
- G2V refers to charging using a specific charging power.
  - Uncontrolled and Controlled charging strategies based on the electricity price
  - Slow, Fast and Ultra fast charging
- V2G refers to discharging using a specific discharging power.
  - Electricity returns to the grid during a discharging session.
  - Electricity is stored, and used at peak hours.
  - V2G operation requires longer plug-in sessions



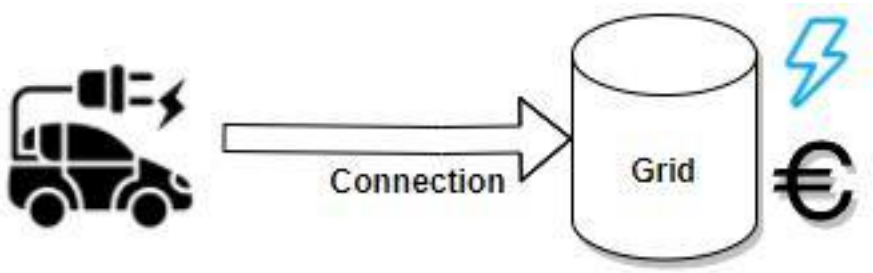
Charging Strategies

- Basic charging strategies
  - Uncontrolled charging strategy
    - The EVs charge whenever they are parked.
- Cost based charging strategies
  - External Charging Strategies
    - The charging is controlled by the electricity price
  - Individual Charging Strategies
    - Individual price incentives send to the user in order to postpone a charging session



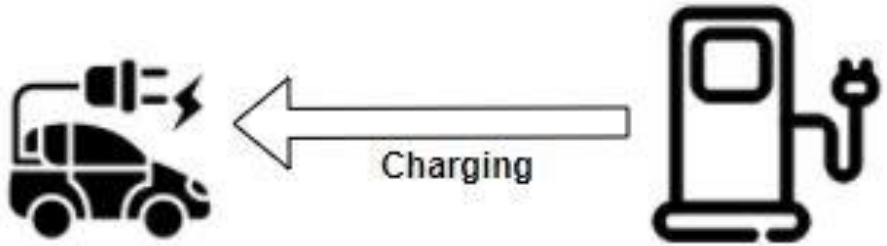
Interaction with the Grid

- EVs connect to the Grid for a specific duration.
- Charging and discharging sessions
- Electricity price varies throughout the day
- Load profile calculation (Power demand)



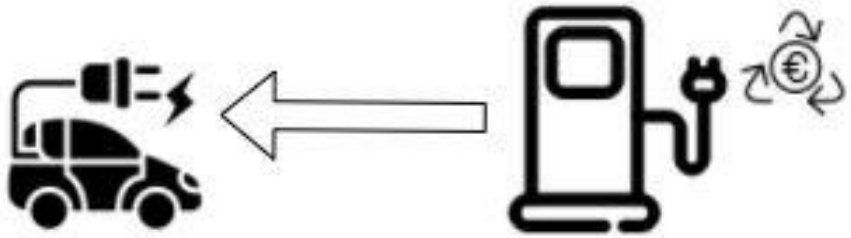
Charging Scenarios (1)

- Three different charging scenarios.
- Scenario 1
  - G2V operation based on Uncontrolled Charging.
  - EVs charge whenever they are parked.
  - Charging duration for the whole connection time.
  - High power demand.
  - Base scenario.



Charging Scenarios (2)

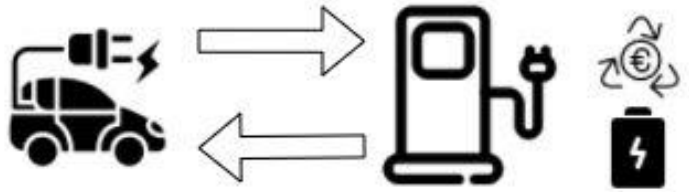
- Scenario 2
  - G2V operations based on External Charging Strategies.
  - Variable electricity price in order to postpone charging sessions.
  - It is determined if the electricity price is high or not.
  - Low price, the EVs charge.
  - High price, the EVs charge only if there is an absolute need (low SoC levels).



Charging with price incentives

Charging Scenarios (3)

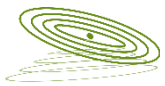
- Scenario 3
  - G2V and V2G operations
  - Both price incentives and the EV battery state of charge determine if the vehicle is going to charge or to discharge.
  - Low price, the EVs charge.
  - High price, the EVs
    - charge if their battery's state of charge is lower than 60% of its maximum capacity,
    - discharge if it is higher than 80%.



Charging / Discharging

Simulation

- Simulation for each charging scenario
- Day of simulation : Monday
- Costs for charging and fuel driving
- Monte Carlo simulation of EVs driving pattern throughout the day
- Data
  - EVs mobility pattern: Federal Highway Administration, “National Household Travel Survey,” US Department of Transportation, 2017. [Online]. Available: https://nhts.ornl.gov/)
  - Electricity price: "Nord Pool", *Nordpoolgroup.com*, 2020. [Online]. Available: https://www.nordpoolgroup.com/.

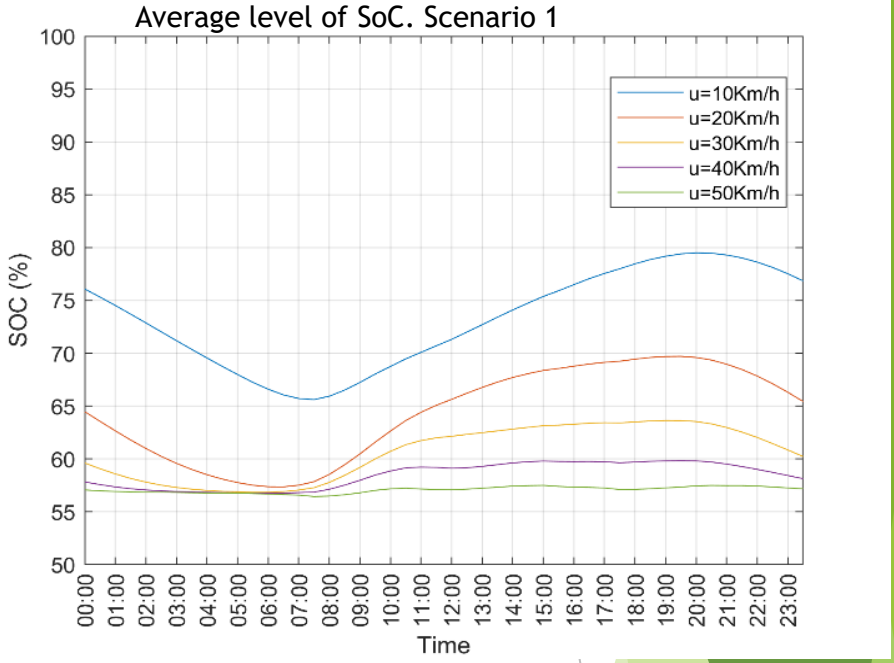


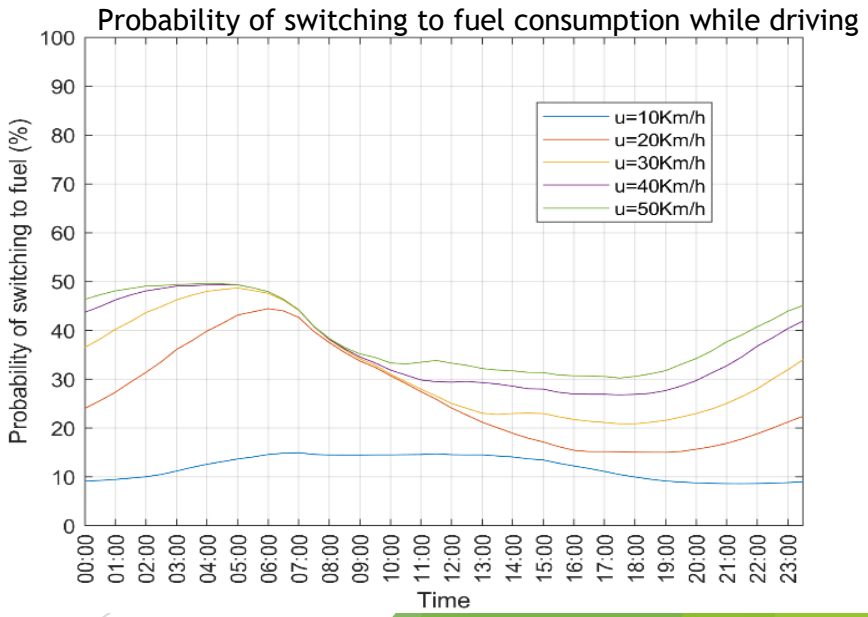
Input Parameters

Parameter	Value
Number of vehicles	2284 vehicles
Δt	0.5 hrs
Charging power	11 kW
Battery capacity (100%)	37.9 KWh
Vehicle consumption (battery)	16.5 kWh (100 km)
Vehicle consumption (fuel)	1.9 lt (100 km)
Battery level (minimum)	~1%
Number of days (simulation)	5
Fuel cost	1.34 euros/liter
Battery level for G2V flexibility	60%
Battery level for V2G flexibility	80%
Monte Carlo iterations	500

Results (1)

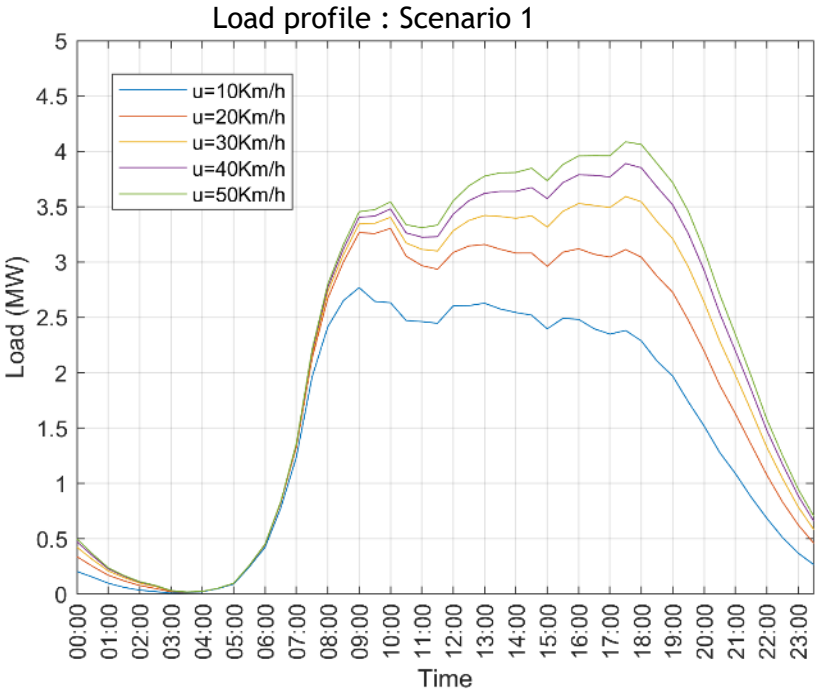
- Average level of SoC for scenario 1.
  - Driving speed increases, SoC decreases.
  - Peaking at 20:00
    - 80% for low driving speeds
    - <60% for higher
- Probability of switching to fuel
  - The probability increases with the EV's velocity
- As the SoC reaches the minimum values, the probability of switching to fuel consumption reaches the maximum values.

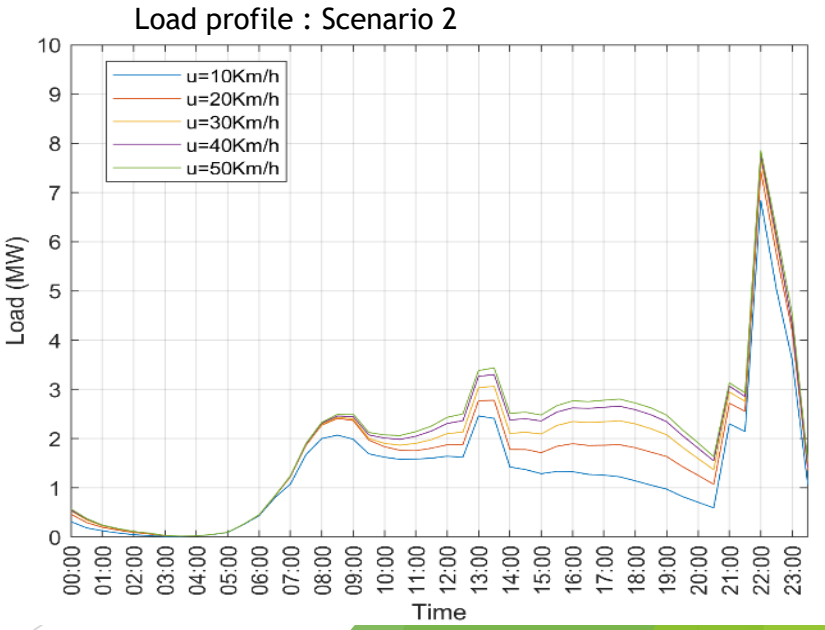




Results (2)

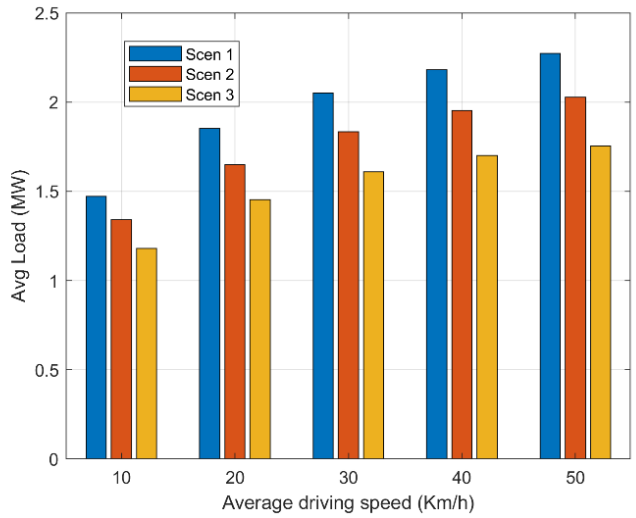
- Load profiles during the day (24hrs period) for scenario 1 and scenario 2.
- Different driving speeds from 10 km/h to 50 km/h.
- Simulation time from 00:00 to 23:00.
- Scenario 1
  - Peak time at 18:00 (4 MW).
  - Power demand fluctuates from 2.5 MW (10 km/h) to 4 MW (50 km/h).
- Scenario 2
  - Peak time at 22:00 (8 MW).
  - Power demand fluctuates from 2 MW (10 km/h) to 8 MW (50 km/h).
  - Before the peak power demand the minimum value drops below 1 MW.

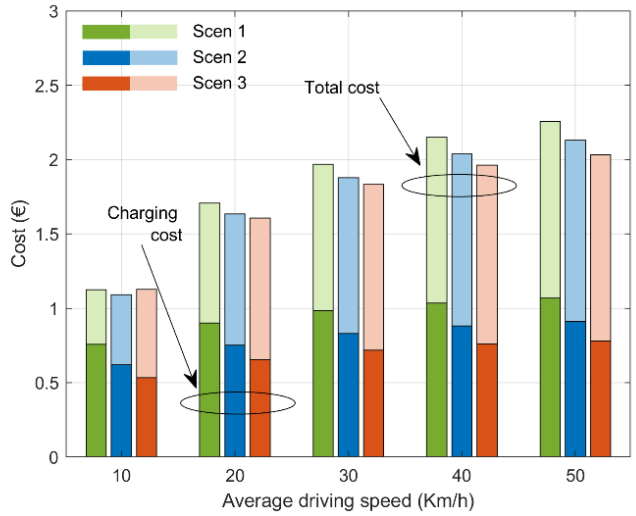




Results (3)

- Aggregated results for the entire day
- The average power demand for scenario 1 is higher than the other scenarios.
- Scenario 1 entails the highest total costs for the EV owner; scenario 3 which offers compensation for discharging back to the grid leads to lower total cost.



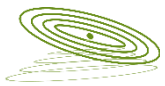


Conclusions

- Charging policies based on price incentives and constraints can be used to reshape power load profiles
- EV owners may benefit from lower charging expenses
- Increasing the average driving speed from 10-15 Km/h to 40-45 Km/h results at 20% reduction in the EV average SoC level

Work currently in progress:

- Modeling the relations between systemic parameters
  - Charging power
  - Average driving speed
  - Duration of a full charge



The work in this presentation is co-funded by the EU HORIZON 2020 program under Grant Agreement no 824386 (MERLON - Integrated Modular Energy Systems and Local Flexibility Trading for Neutral Energy Islands)

Thank you for your attention

Wireless and Mobile Communications Lab
University of the Peloponnese

Agenda

Start	End	Content
15:30	15:45	**Welcome and presentation of the agenda** MEISTER, Project Coordinator
15:45	16:05	**Mobility Environmentally-friendly, Integrated and economically Sustainable Through innovative Electromobility Recharging infrastructure and new business models** Patricia Bellver Muñoz, MEISTER Project Coordinator Senior project manager, ETRA I+D
16:05	16:25	**Innovative solutions for USER centric CHarging Infrastructure** María del Carmen Tomás, USERCHI Project Coordinator Senior project manager, ETRA I+D
16:25	16:45	**GreenCharge measures and impact evaluation framework** Marit Natvig Senior researcher, SINTEF Digital
16:45	17:05	**Analysis of Electric Vehicle (EV) cost-based charging load profiles** Sotiris Deligiannis, University of Peloponnese
17:05	17:35	**Electric Vehicle Charging Infrastructure for improved User Experience** Dr. Evangelos Karfopoulos Senior project Manager, I-SENSE/ICCS
17:35	17:50	**Roundtable & Questions**
17:50	18:00	**Conclusions**

Improving the EV charging experience within cities and for longer trips: the eCharge4Drivers project

Dr. Evangelos Karfopoulos
Senior Researcher
Institute of Communication and Computer Systems

User’s e-mobility concerns

eCHARGE 4DRIVERS

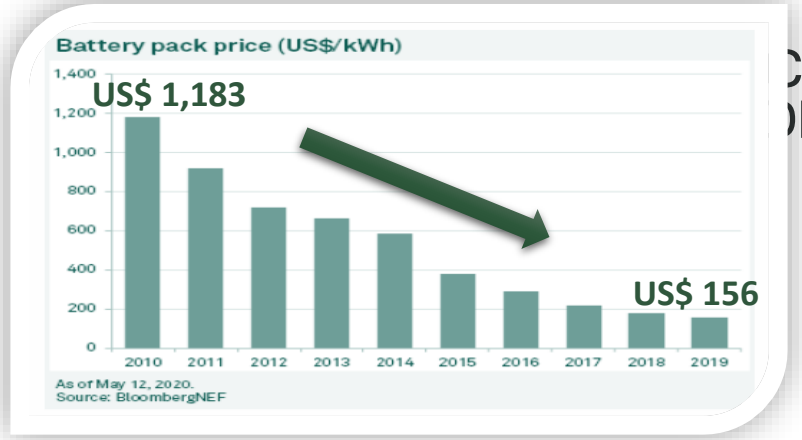
I need to pay more for an EV!

An EV will change my habits!

And where I will find a place to charge my EV?

Three major barriers for the deployment of EVs

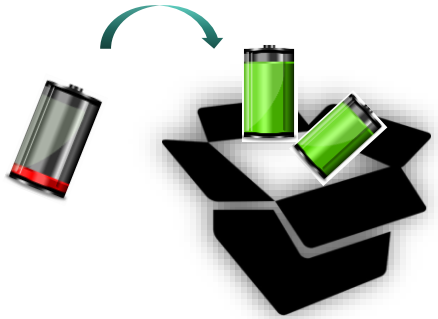
Battery cost reduction ≈ -90%



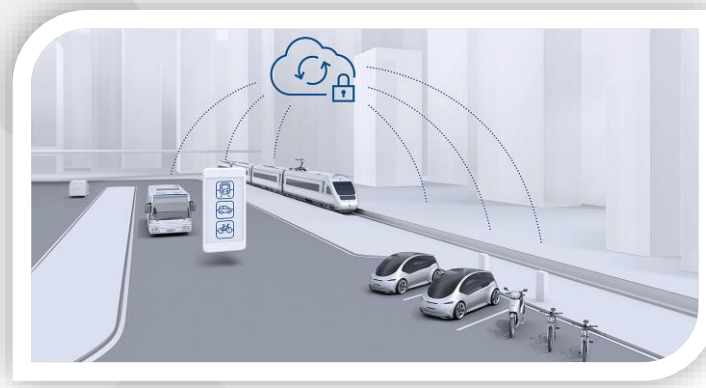
CHARGE DRIVERS

Car sharing Concept

Battery leasing – Battery swapping



Income from V2G services

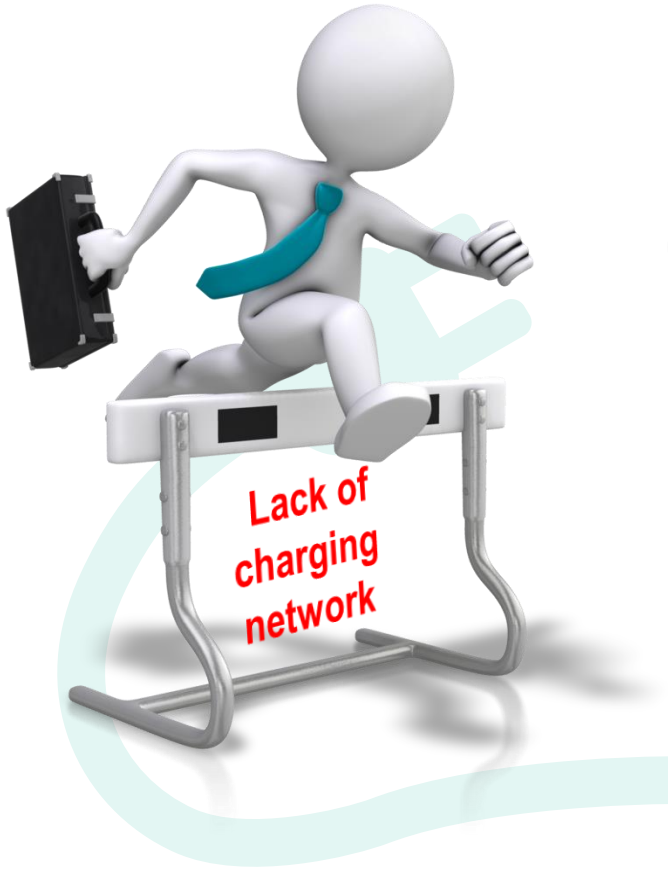


Source: https://www.electrive.com/2018/02/21/bosch-bundles-e-mobility-parts-services-systeme/

Three major barriers for the deployment of EVs

- User friendly charging stations with enhanced information to users
- Interoperability
- Advanced e-mobility service facilitating user's accessibility and charging experience
- Communicate e-mobility concept and its benefits especially in urban environments

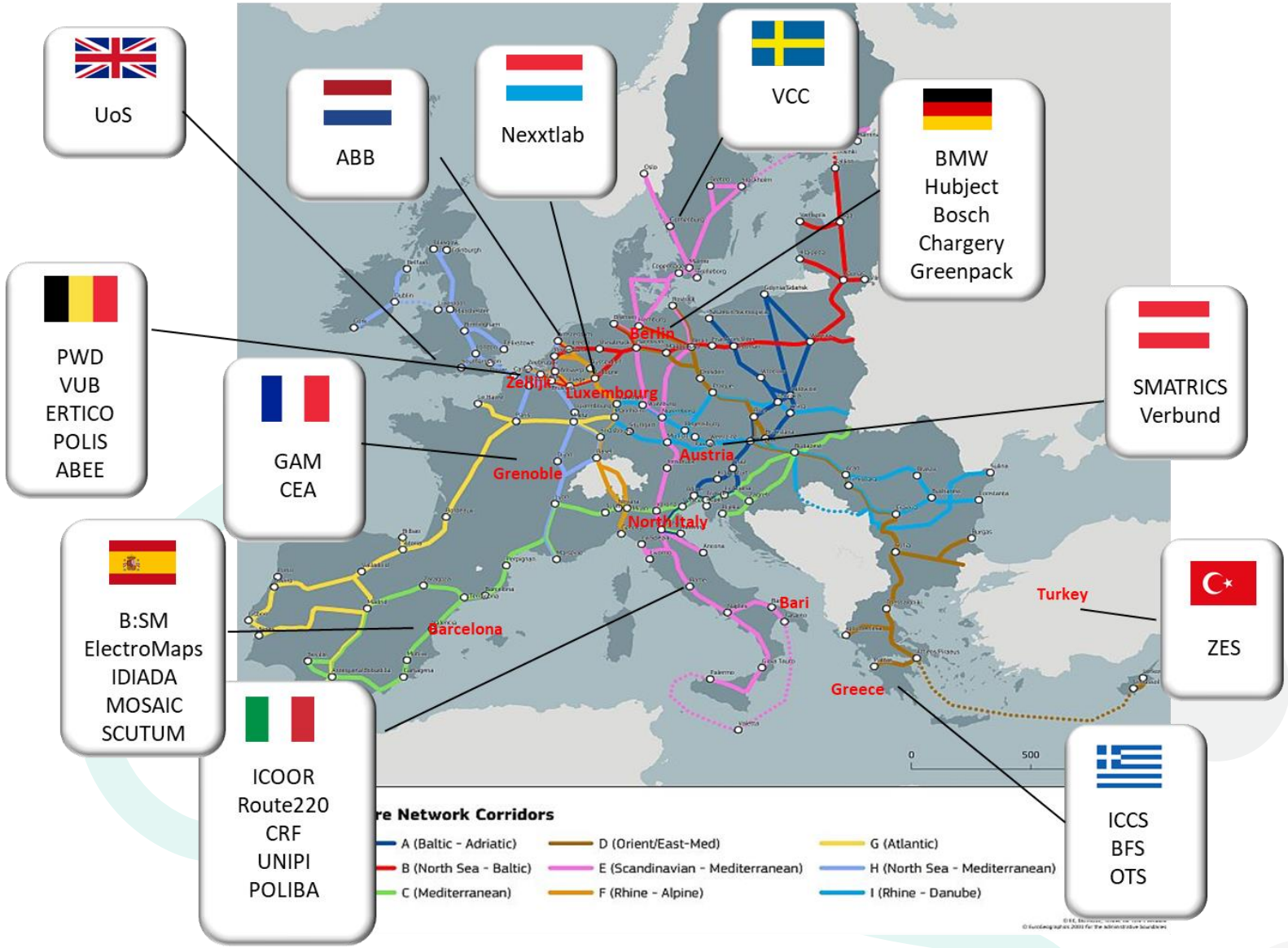
Three major barriers for the deployment of EVs



- Diverse charging technologies in respect to user's needs (public/private, AC/DC)
- Planning (public) the adequacy of the charging network
- Roaming maximising usability of existing charging network
- Incentives to support the wide deployment of charging infrastructure (i.e incentives)

eCHARGE 4DRIVERS

eCharge4Drivers at a glance



Call identifier: H2020-LC-GV-2018-2019-2020

Topic: GV-10-2017 “Demonstration (pilots) for integration of electrified L-category vehicles in the urban transport system”

EC funding: 14,424,526.39 €

Duration: June 2020 – May 2024

Demonstrations in **ten** areas to cover needs for urban and for longer trips

Strategic objectives

- O-1:Develop and demonstrate **user-friendly charging stations** and smart charging solutions for passenger vehicles and LEVs

- O-2: Enable and demonstrate **interoperability of end-to-end communication** and provision of **enhanced information to the EV users**, before, during and after a charging session

- O-3Maximise benefits (i.e. reduce costs) for the users via **efficient** charging stations and charging components, **smart power management modules and smart charging strategies**

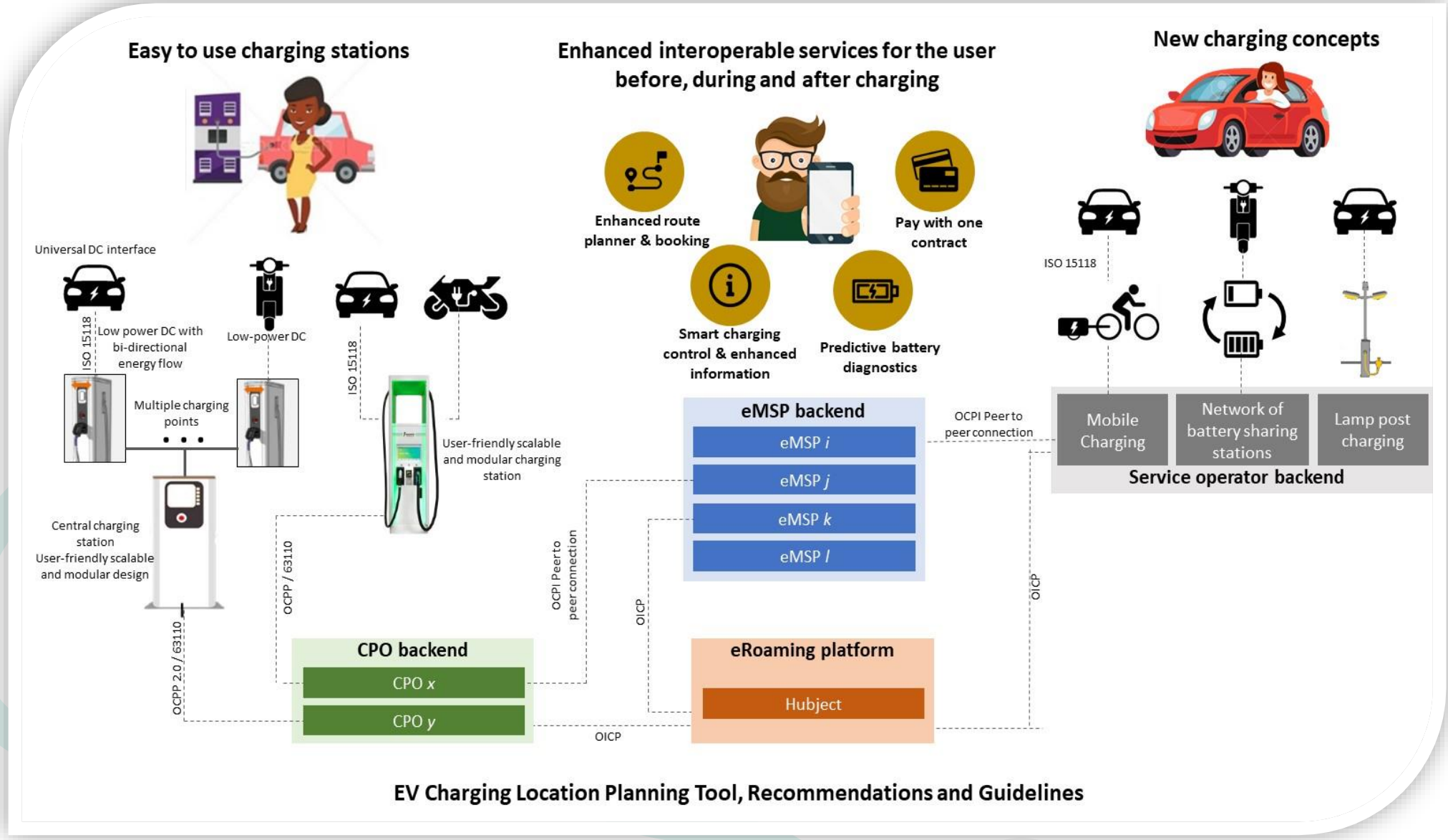
Strategic objectives

- O-4:Deploy and demonstrate **innovative charging solutions** for on-street residential charging for passenger vehicles (mobile charging service, charging points on lamp posts) and **standardised battery swapping stations** for LEVs

- O-5:Understand the user needs so that the project charging solutions and services substantially **improve the user charging experience**

- O-6:**Accelerate the deployment** of charging infrastructure and other charging services in a sustainable and user-centric way

Concept

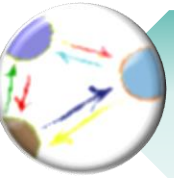

Easy to use charging stations
Universal DC interface
ISO 15118
Low power DC with bi-directional energy flow
Low-power DC
ISO 15118
Multiple charging points
User-friendly scalable and modular charging station
Central charging station
User-friendly scalable and modular design
OCPP / 63110
OCPP 2.0 / 63110
Enhanced interoperable services for the user before, during and after charging
Enhanced route planner & booking
Pay with one contract
Smart charging control & enhanced information
Predictive battery diagnostics
New charging concepts
ISO 15118
Mobile Charging
Network of battery sharing stations
Lamp post charging
Service operator backend
eMSP backend
eMSP i
eMSP j
eMSP k
eMSP l
OCPI Peer to peer connection
OCPI Peer to peer connection
OICP
OICP
CPO backend
CPO x
CPO y
eRoaming platform
Hubject
OICP
EV Charging Location Planning Tool, Recommendations and Guidelines

eC4D solutions towards Challenges

eCHARGE 4DRIVERS

Improve comfortability of charging

- User Analysis
- Innovative Interoperable charging solutions
- Enhanced Booking Service & Route Planner



Enable services interoperability and provide appropriate information to users

- ISO15118 P&C
- OCPP IEC 63110
- e-roaming services (OCPI, OICP)

- Enhanced Charging Information

Promote smart charging solutions

- Smart charging suite

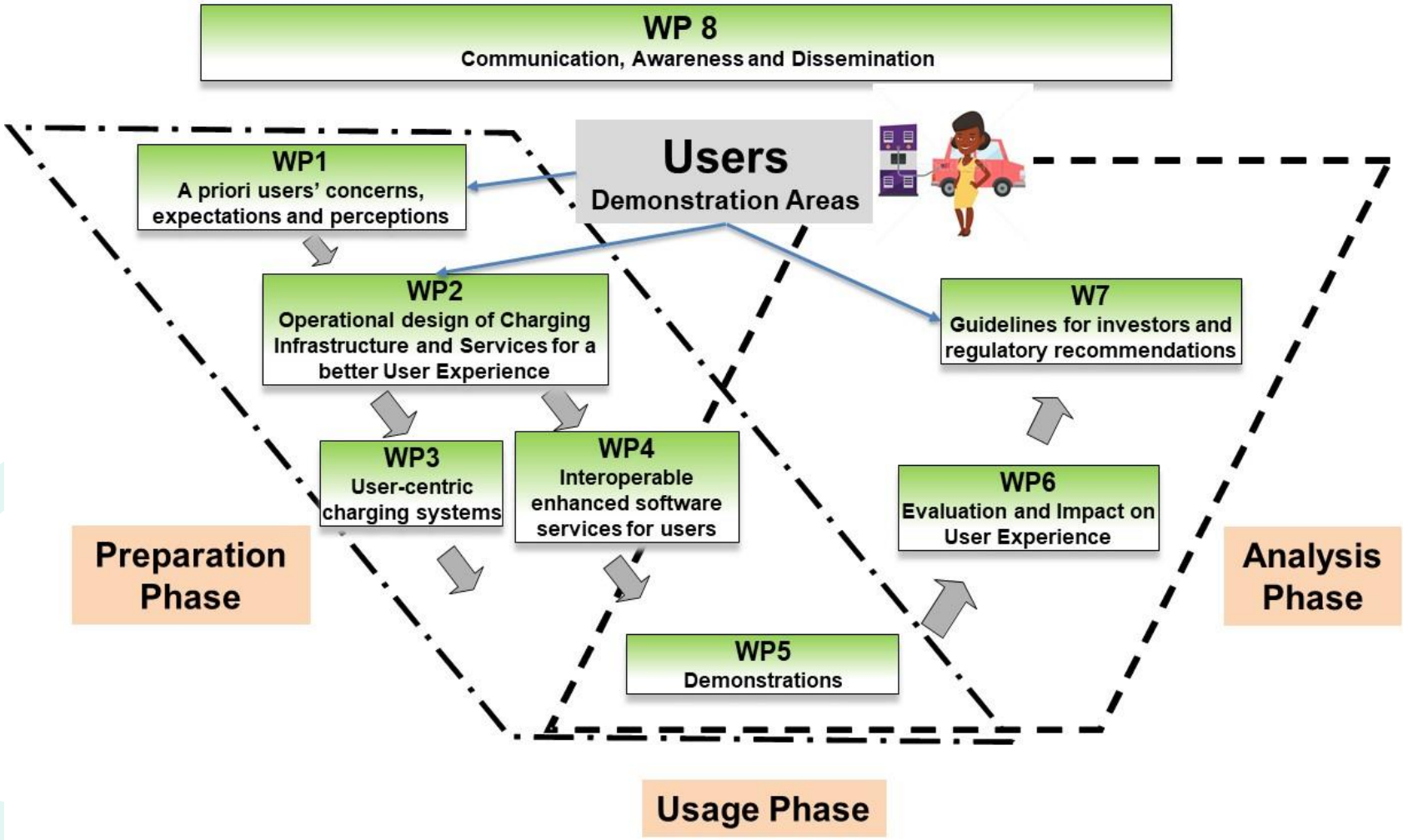
Propose standardised charging options for LEVs

- Modular Combined CS
- Battery Swapping Stations

Support the wide deployment of charging infrastructure

- Charging Location Planner
- Incentives & Tariff schemes
- Recommendations & Guidelines

Methodology



eC4D Charging technologies to be demonstrated

Advanced charging stations (ABB)

- Modular AC/DC CS (20 - >350kW)
- ISO 15118/OCPP/IEC63110
- Supporting CSS/CHAdeMO plugs
- Site power manager optimising power distribution to multiple outlets
- User-friendly, interactive screens

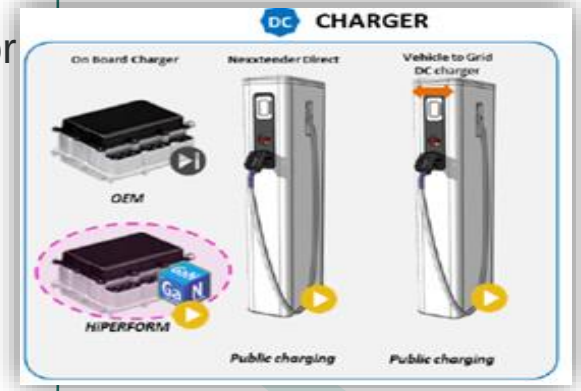
Mobile charging stations (Chargery)

- System already operational for fleet owners and managers in Berlin
- Project advancements:
  - private customers
  - Enhanced information
  - Booking service
  - More payment options
  - Integration with other services (ex. Route planner)

eCHARGE 4DRIVERS

Low Cost DC Charging Stations (PowerDale)

- Low cost bi-directional (11kW) and uni-directional (15-45kW) DC CS for passenger vehicles
- Low power DC CS (1.5kW) for L1e vehicles
- ISO 15118/OCPP/IEC63110
- Central charging station serving multiple connected CS
- User friendly interfaces/multiple payment methods



Battery swapping stations (Greenpack)

- System already operational for private LEV users
- Interoperability: battery vendor agnostic
- Aims:
  - a dense hub with a full battery in a range of 3-5 km (Berlin)
  - Battery swapping duration < 2 minutes.

Interoperable user-centric services

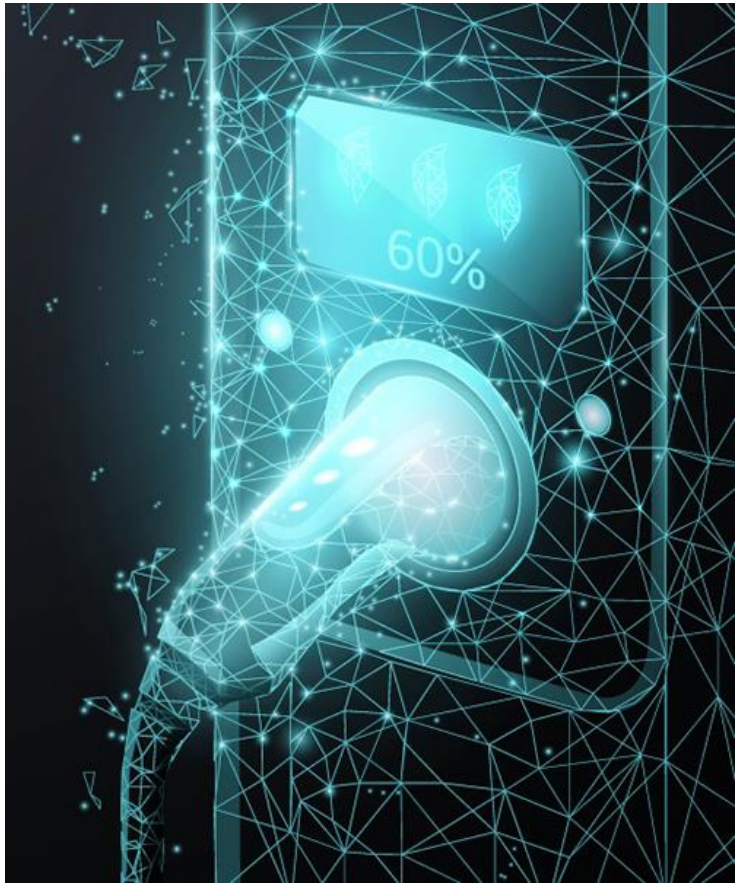
- Guidelines on implementing the ISO 15118 Plug & Charge feature and to secure the user data and the billing transaction

- Enhanced route planner:

  - ✓ *Calculating and proposing different plans based on user profile and preferences and real-time availability of charging stations and parking bays*

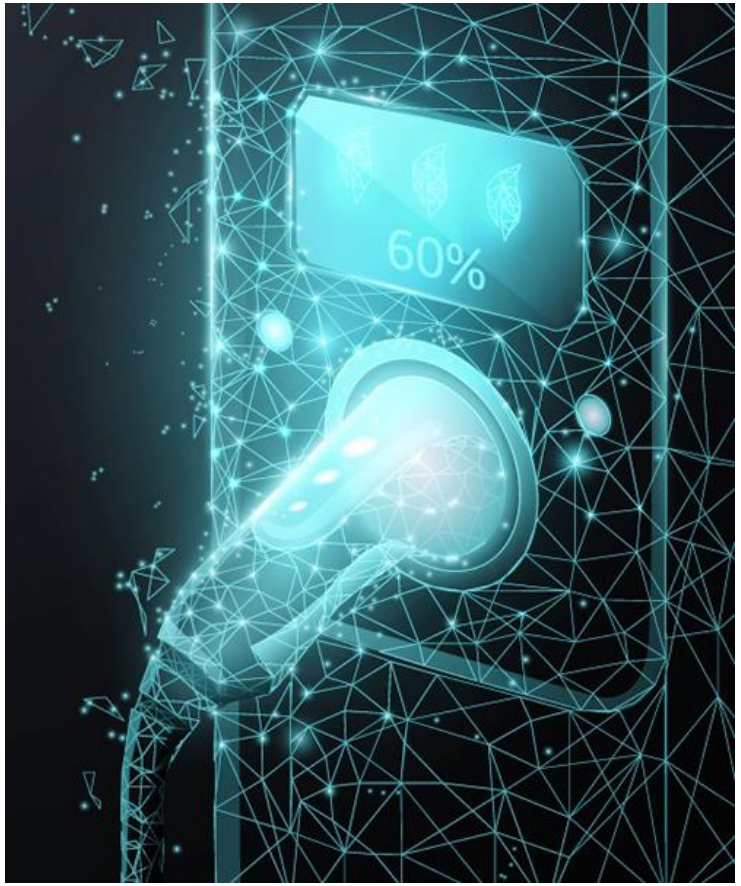
  - ✓ *Multi-user planner to optimise multiple charging requests with available charging stations and minimise the waiting times for all users*

- Enhanced booking service, using real-time and predicted availability of charging stations and parking bays, real-time and estimated tariffs, and enhanced information (e.g. presence of restaurants, shops or other facilities, RES in the mix, waiting time).



Interoperable user-centric services

- Smart charging services:
  - ✓ *Market based smart charging (dynamic prices, multi-tariffs, etc)*
  - ✓ *Power constrained smart charging*
  - ✓ *EV/RES synergy*
  - ✓ *Integrating electric vehicles into microgrid concept*
  - ✓ *Battery aging prevention*
- Predictive diagnostics service to continuously monitor the status of the vehicle battery, provide an optimized charging profile to the charging station and inform the user in advance of any problems with the battery



Location planning tool

- Stakeholders: public administrations and private players (investors)
- A tool enabling the efficient planning and development of a sustainable charging network considering diverse charging solutions.
- The tool outputs an optimum mix of charging options and their respective location to satisfy the charging demand considering user needs and habits
- User-friendly web interface with interactive maps for input/output
- Easy creation of scenarios, representing different penetration levels of EVs and LEVs, for scalable planning

Data collection

- Aim: capture users' perceptions about the demonstrated systems and services and users' and citizens' attitudes towards electromobility
- Usage data and wide surveys
- At least 800 questionnaires per each of the 10 demonstration areas
- Interviews with at least 10 investors and authorities per area

Analysis

- Study the impact of the project developments on the user charging behavior and experience.
- Formulate guidelines for future superfast charging systems considering their grid impact
- Conformance guidelines and testing towards ISO15118 and e-roaming
- Analyse market models in each demonstration area
- Prepare recommendations to harmonise regulation and legislation among regions
- Prepare guidelines for investors and authorities as regards tariffs schemes and alternative revenues

Expected impact

- **Wide user acceptance** beyond early adopters, urban users and garage parkers
- **Foster investors to invest** in charging infrastructure
- **Determine legal gaps** which slow down infrastructure expansion and propose solutions
- **Improve interoperability** of vehicle-to-charger and charger-to-infrastructure **communication**
- **Better grid integration of high-power chargers**
- **Standardized charging solutions and payment systems for LEVs** for price reduction and higher market acceptance in urban environments

Demonstrations overview

Topic Demonstrated	Metropolitan areas						Nationwide long-distance trips			
	Barcelona	Grenoble	Berlin	Luxemburg	Zellik	Bari	Austria	Northern Italy	Greece	Turkey
User-friendly, low- and high-power charging stations for passenger vehicles and motorcycles supporting ISO 15118 Plug & Charge	X	X			X	X		X		X
Upgrades of high-power charging stations to support ISO 15118 Plug & Charge and OCPP							X		X	
Back-ends supporting ISO 15118 Plug & Charge	X		X		X		X	X	X	X
Low-power DC charging stations supporting ISO 15118 Plug & Charge					X					
Enhanced route planners	X					X		X	X	X
Enhanced booking service	X	X	X	X	X	X		X	X	X
Enhanced information during charging	X				X	X		X	X	X
Smart charging services	X	X		X	X					
Mobile charging service		X	X							
Charging points on lamp posts		X								
Battery swapping stations for LEVs	X		X							
New tariff schemes	X	X	X		X	X		X		
Incentives	X		X	X	X	X		X		

eCHARGE 4DRIVERS

@Charge4E

eCharge4Drivers

v.portouli@iccs.gr

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)

Agenda

Start	End	Content
15:30	15:45	**Welcome and presentation of the agenda** MEISTER, Project Coordinator
15:45	16:05	**Mobility Environmentally-friendly, Integrated and economically Sustainable Through innovative Electromobility Recharging infrastructure and new business models** Patricia Bellver Muñoz, MEISTER Project Coordinator Senior project manager, ETRA I+D
16:05	16:25	**Innovative solutions for USER centric CHarging Infrastructure** María del Carmen Tomás, USERCHI Project Coordinator Senior project manager, ETRA I+D
16:25	16:45	**GreenCharge measures and impact evaluation framework** Marit Natvig Senior researcher, SINTEF Digital
16:45	17:05	**Analysis of Electric Vehicle (EV) cost-based charging load profiles** Sotiris Deligiannis, University of Peloponnese
17:05	17:35	**Electric Vehicle Charging Infrastructure for improved User Experience** Dr. Evangelos Karfopoulos Senior project Manager, I-SENSE/ICCS
17:35	17:50	**Roundtable & Questions**
17:50	18:00	**Conclusions**


THANK YOU
merci
spasiba
kam ouen
gratzias
tak
manana
mahalo
kitos
hvala
cheers
toda
gracias
welalin
grassie
thank you
danki
grazie
mahalo
danki
gracias
thanks
takk
domo arrigato
merci
dankon
talofa
miigwetch
danke
grattitude
thanks
na gode
mesi
modupe
kitos
takk
dziekuje