EXPLORING THE POTENTIAL OF INDUCTIVE CHARGING

USER-CHI technical webinar – 19 OCTOBER 2023

9:30 – 11:00

AGENDA

- Introduction – USER-CHI project - Ángel Moya, ETRA I+D
- Setting the scene – Marion Pignel, Eurocities
- Welcome to the world of inductive charging: concept, benefits, potential, challenges and future prospects - Sergio Perez, ENERX Group
- Inductive charging in practice: INDUCAR use case in Barcelona - Silvia Valero, AMB
- Inductive charging in practice: INCIT-EV - Miguel Zarzuela, CIRCE
- Roundtable discussion and Q&A

USER-CHI
CHARGING YOUR E-MOBILITY FUTURE

USER-CHI

Innovative solutions for user centric charging infrastructure

October 19th 2023
Ángel Moya - ETRA I+D
amoya.etraid@grupoetra.com

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

etra I+D VISIT **userchi.eu**

The Project

Feb 2020 to July 2024

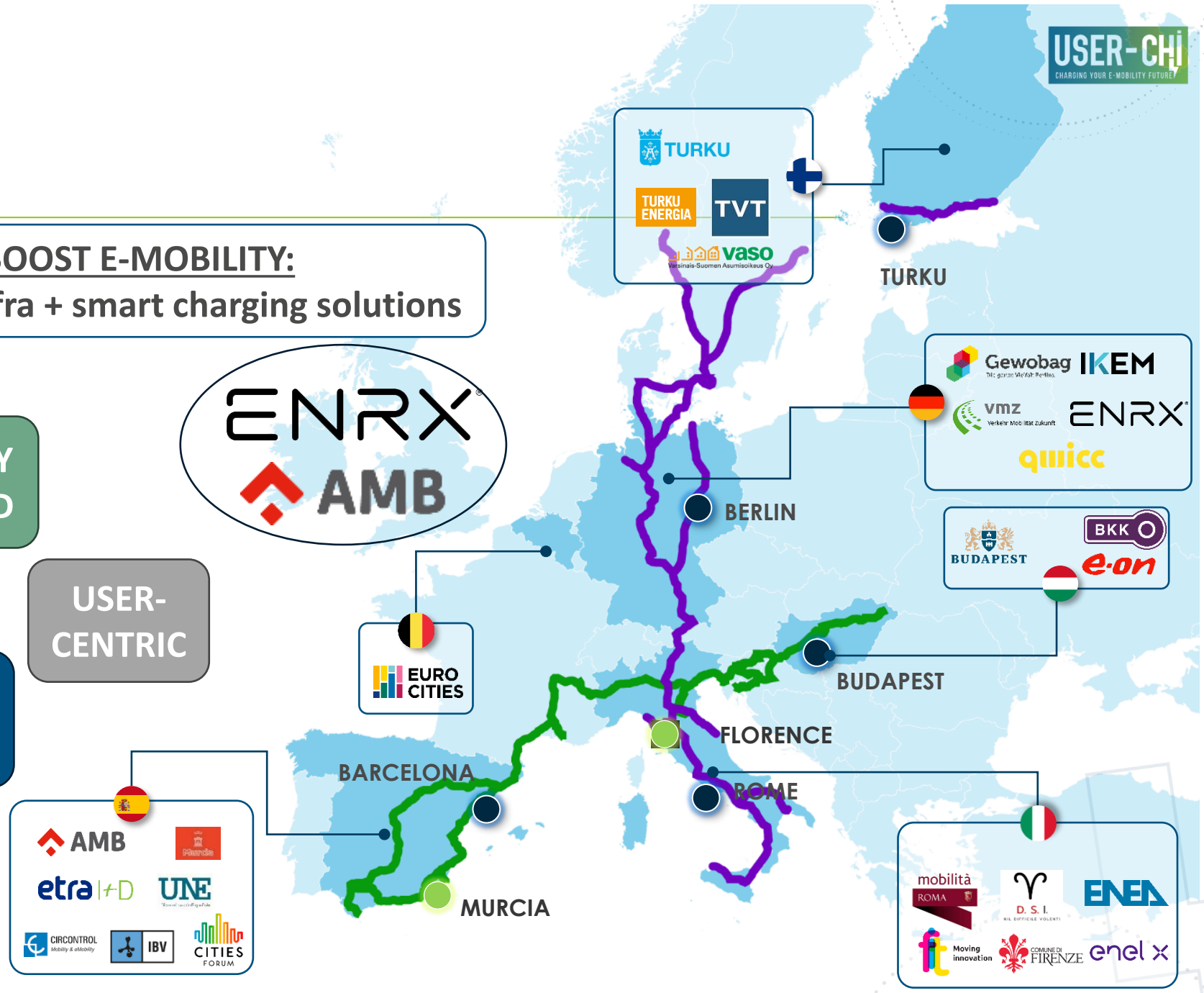
BOOST E-MOBILITY:
Charging infra + smart charging solutions

- 26 Partners
- 5+2 Demos
- 4,5 Years
- 17M€ Budget

INDUSTRY POWERED

USER-CENTRIC

CITY DRIVEN



The STRATEGIC Project Objectives

1. DESIGN OPTIMISATION OF CHARGING NETWORKS WITH A USER-CENTRIC APPROACH

2. DEPLOYMENT OF AN INTEROPERABILITY FRAMEWORK AND PLATFORM

3. SCALABLE INFRASTRUCTURE ROLL-OUT BY MEANS OF SMART GRID INTEGRATION

4. DEVELOPMENT OF INNOVATIVE AND HIGHLY CONVENIENT CHARGING SYSTEMS

INDUCAR – Inductive charging for e-cars

5. DEMONSTRATION OF NOVEL BUSINESS AND MARKET MODELS

6. LEGAL AND REGULATORY RECOMMENDATIONS FOR MASSIVE EV DEPLOYMENT

THE USER-CHI products

CLICK- Charging location and holistic planning kit

INCAR – Interoperability, charging and parking platform

SMAC – Smart Charging tool

Software

Stations of the future handbook

eMoBest – e-Mobility replication and best practice cluster

INFRA – Interoperability framework

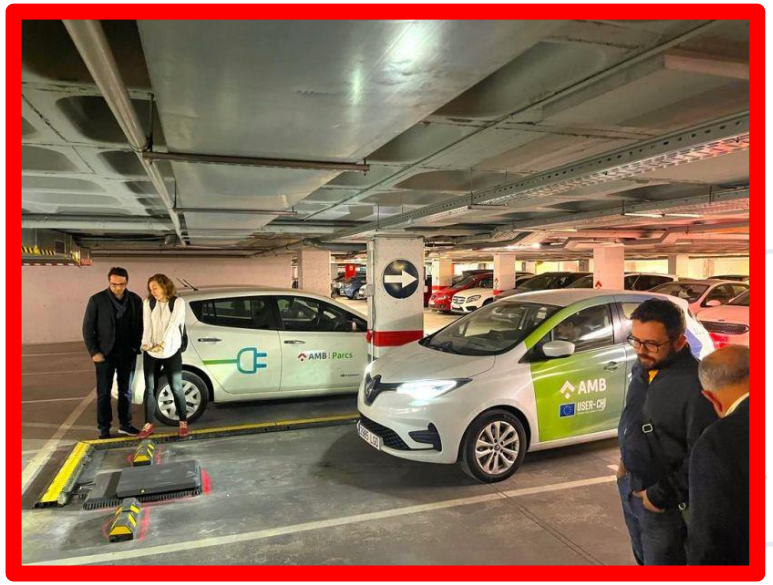
Handbook + transferability cluster + framework…

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

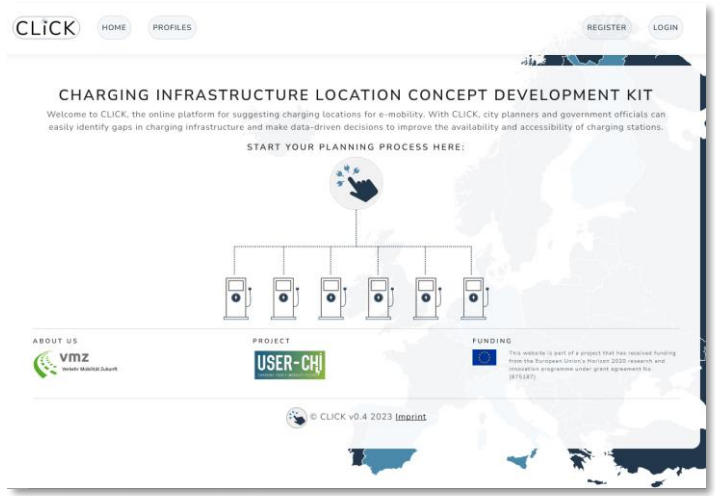
INDUCAR – Inductive charging for e-cars

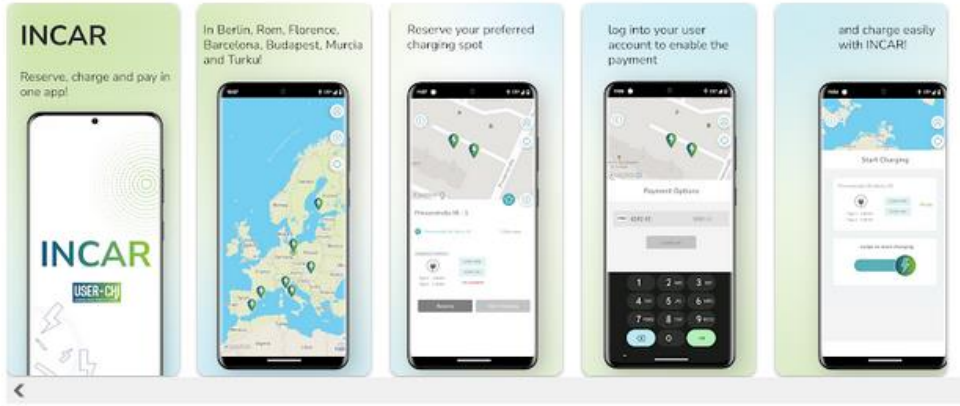
Hardware + soft

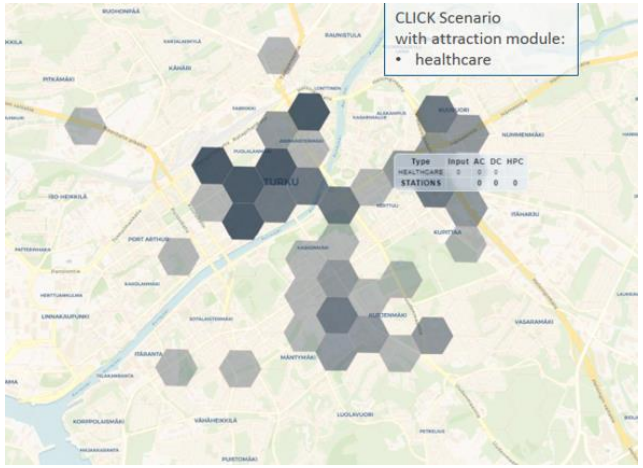
Charging points in the demos

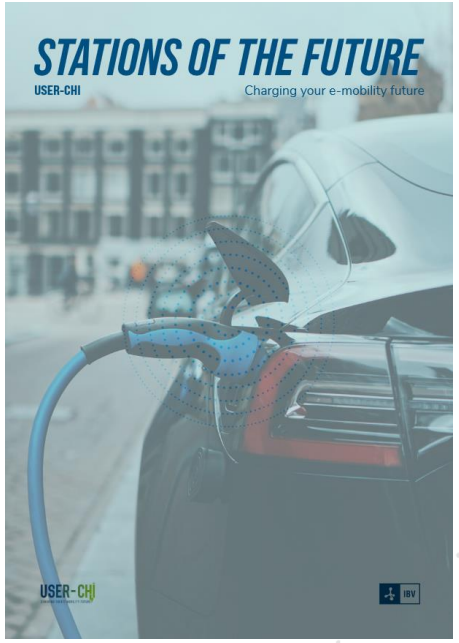


THE USER-CHI PRODUCTS









https://www.user chi.eu/wp-content/uploads/2022/12/SotF_USER-CHI_final.pdf

WELCOME TO THE WORLD OF INDUCTIVE CHARGING: CONCEPT, BENEFITS, POTENTIAL, CHALLENGES AND FUTURE PROSPECTS

Dr. Sergio Perez, ENRX Group

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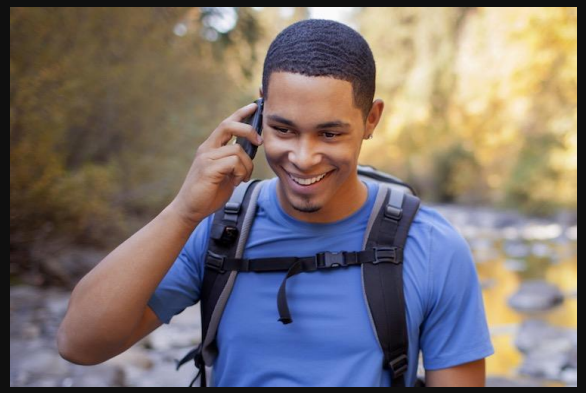
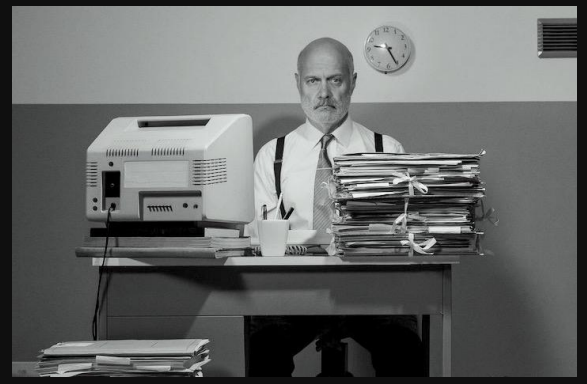
The World is going Wireless





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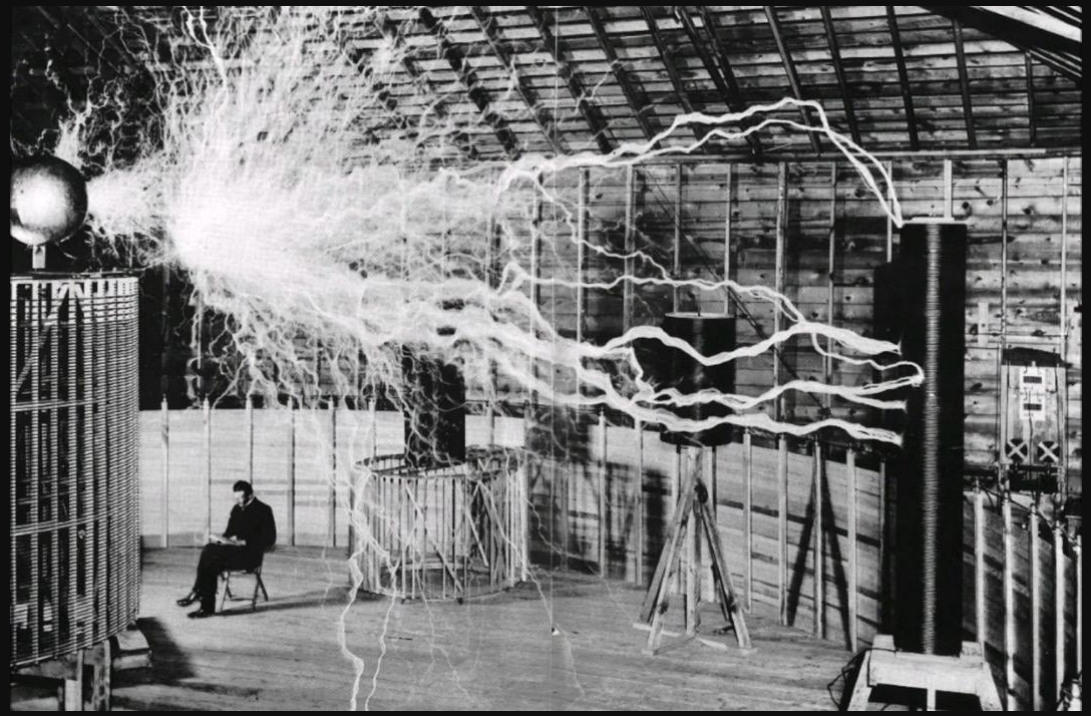
The idea of wireless power is not new



In the 1890's, Nikola Tesla experimented with wireless power distribution."

About ENRX

EFD Induction and IPT Technology are joining forces as ENRX. With an offer ranging from induction heating to wireless inductive charging and contactless power supply, ENRX becomes an international GREEN TECH powerhouse for equipment and systems based on induction.

- Turnover: 135 MEUR
- Number of employees: 1,100
- Heat: 25,000+ installations in 80+ countries
- Charge: 30+ million km of wireless charging
- Power: 150+ km of industrial tracks worldwide
- Patents: More than 1,200 for induction technology

ENRX

History - 26 years active in WPT

1996

Start Inductive Power solutions

Whakarewarewa Rotorua park - New Zealand

1998

Electric shuttle vehicles

Whakarewarewa Rotorua park - New Zealand

2000

Elevator solution Trade Fair Tower

Wireless solution for the trade fair tower in Hannover, Germany

2003

Large fleet Turin Public Transport

- 23 buses
- 4 x 60 kW charger
- 63 kWh battery

2005

Nemo Disneyland Underwater Ride

- 8 Submarines
- 2 Pickups
- 2 Rectifiers each

2014

IPT Technology independent

A department within Conductix Wampfler becomes IPT Technology

2015

London & Bristol Public Transport

5 DoubleDecker buses
2 charge systems 100 kW
61 kWh battery

2017

Milestone Buses Public Transport

70 Buses in Europe equipped with wireless charging systems

2018

First WPT Electric Ferry

Fredrikstad Norway
4 Ferries (2018 - 2022)
4 Charge systems 100 kW

2019

100 KM Dynamic Power Track Supply

Airports, Logistic, Postal, Manufacturing plants
Serving 15,000 Vehicles

2021

Bombardier's PRIMOVE acquired by IPT Group

primove
Wireless eMobility

2023

ARENDALS FOSSEKOMPANI

IPT TECHNOLOGY

EFD INDUCTION

ENRX

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Explore Over 150 km of ENRX High-Power Dynamic Tracks in Daily Use

In operation worldwide in all types of industries:

Automotive, Manufacturing, Warehousing, Airports, Harbours, Postal logistics, and Entertainment parks.

Automated Guided Vehicles (AGV)

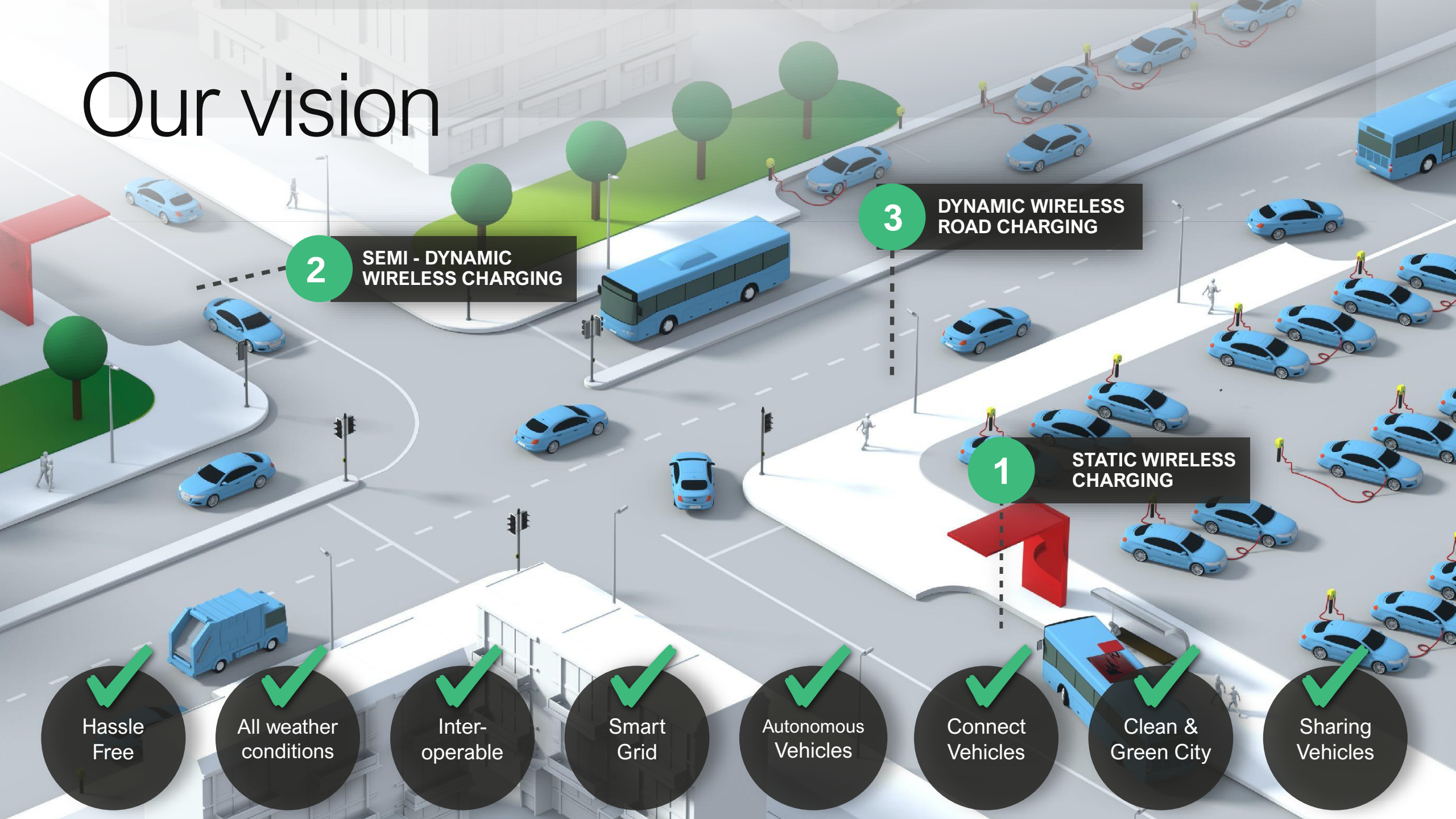
Sorters systems

Electrified Monorail Systems (EMS)

Skillet Conveyor systems

Charge Robotics & Vehicles

Our vision

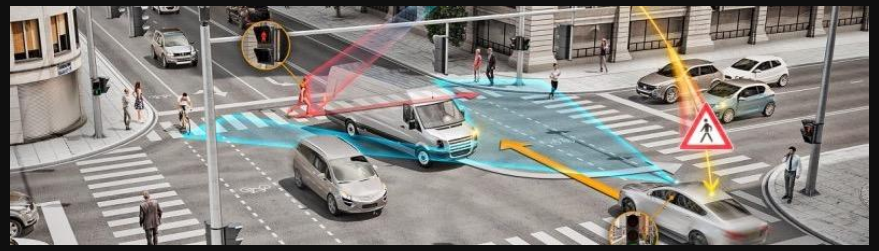

2
SEMI - DYNAMIC WIRELESS CHARGING
3
DYNAMIC WIRELESS ROAD CHARGING
1
STATIC WIRELESS CHARGING
Hassle Free
All weather conditions
Inter-operable
Smart Grid
Autonomous Vehicles
Connect Vehicles
Clean & Green City
Sharing Vehicles

E-Mobility: From “Vehicle to Charge” towards “Charge to Vehicle”

1 ELECTRIFICATION OF ALL TRANSPORT

2 SMART CITIES

3 AUTONOMOUS DRIVING



4 LAST MILE SOLUTION

5 FLEETS & CAR SHARING

6 LONG HAUL TRUCKS

E-Mobility Charging solutions

LIGHT-DUTY
FLEETS & TAXIS

12 personal car projects
of wireless charged energy

25 Cars in Europe
uses wireless charging energy

16 wireless charging stations 3 kW > 20 kW

HEAVY-DUTY
TRUCKS & BUSES

> 30 million kilometers
of wireless charged energy

70 Buses in Europe
uses wireless charging energy

30 wireless charging
stations (60 kW > 200 kW)

DYNAMIC ROADWAY
E-MOBILITY

8 Dynamic road projects
of wireless dynamic charging

4 Buses and 1 Truck
uses wireless charging energy

- Speed of 80 km/h
- Charging 180 kW
- >90% efficiency

HEAVY-DUTY
MARITIME

> 150.000 kilometers
of wireless charged energy

4 Ferries Norway
uses wireless charging energy

4 x 100 kW wireless
charging stations

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Light-Duty WPT Cars & Fleets

More than 10 years Wireless Light Duty Pilots, full in process

Research OEM project
Daimler | 2012

1 eCar
3 kW Wireless
Berlin - GER

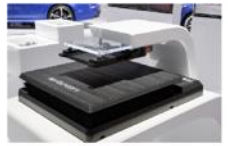
2012

Research OEM project
Daimler | 2014

1 eVan
22 kW Wireless
Mannheim - GER

2013 — 2014

Research OEM project
Audi | 2017



1 eCar
3,6 kW Wireless
Stuttgart - GER

2016 — 2017

Project USER-CHI
Fleet | 2020 - 2024

multiple eCars
multiple 3 kW
Barcelona - ES

2017 — 2020 — 2020

Research OEM project
Porsche | 2013 - 2016

1 eCar
22 kW Wireless
Berlin - GER

Research OEM project
StreetScooter | 2016

7 StreetScooters
3 kW Wireless
Aachen - GER

Research EON project
BMW i3 | 2017

1 BMW i3
3 kW Wireless
Essen - GER

Public Charging
London | 2020-2021

14 eCars
(different brands)
12 x 3 kW
London - UK

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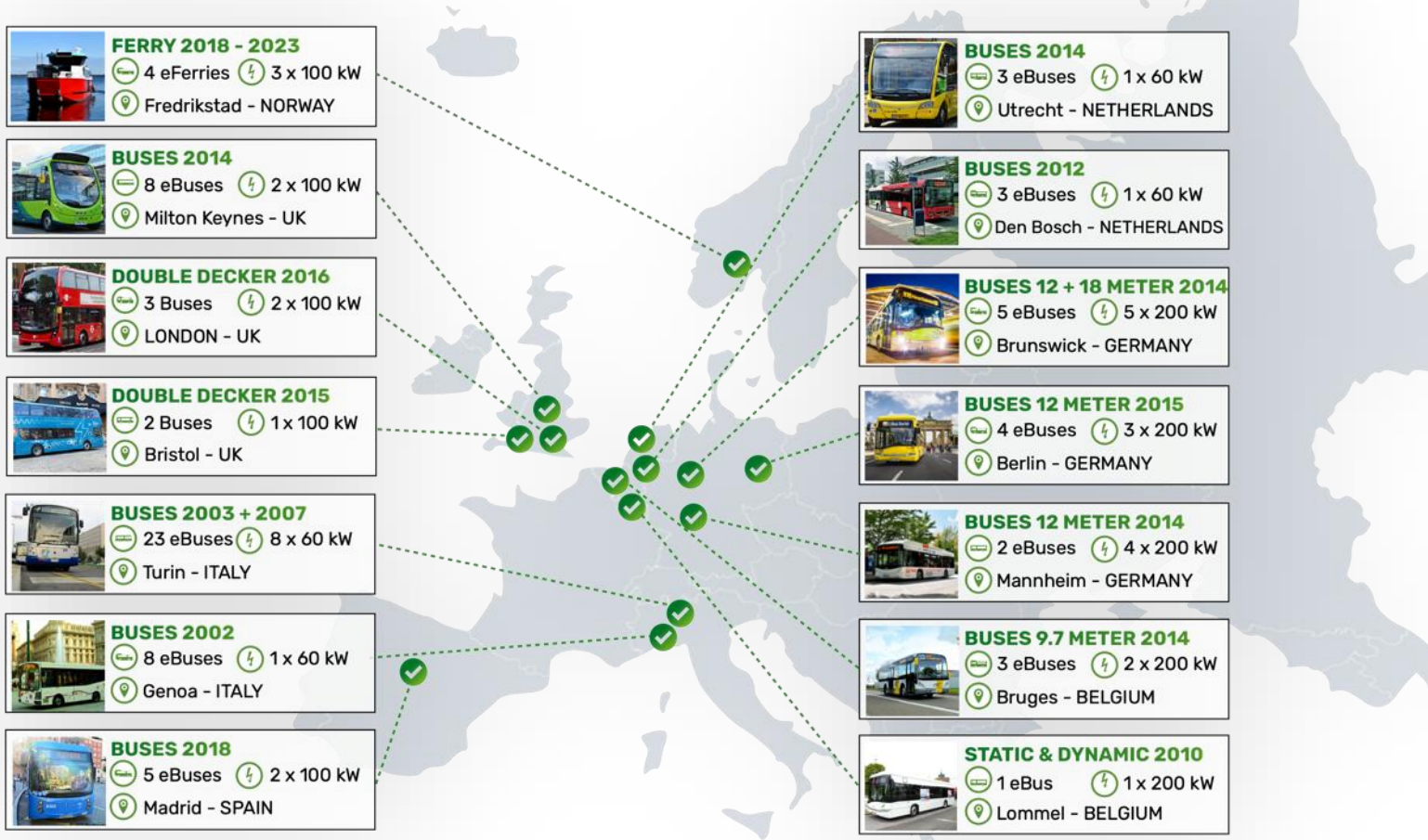
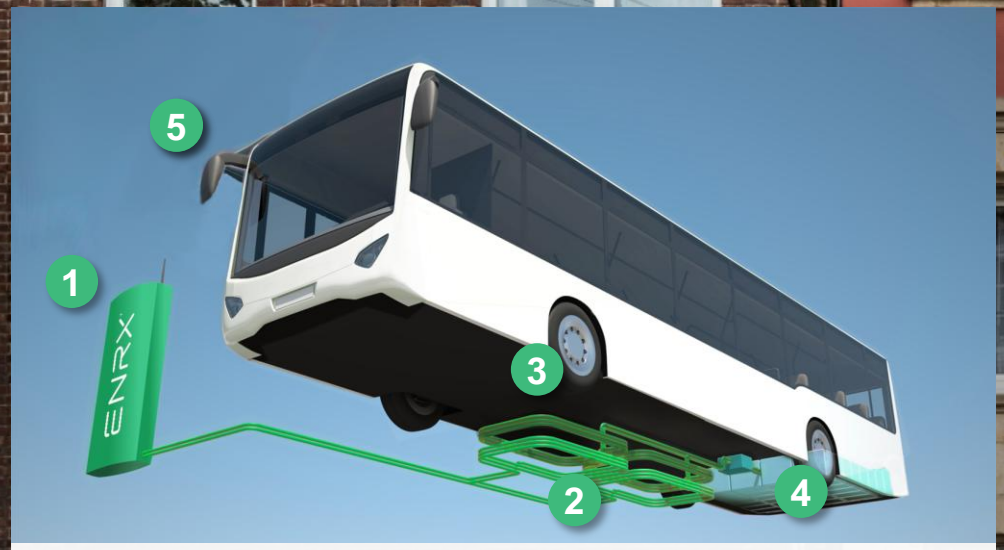
Heavy-Duty WPT Buses & Ships

- 18 years on the road, all WPT buses in Europe by ENRX **>25 Million wireless kilometres**
- More than 5 years on the water, all WPT E-Ferries by ENRX **>150.000 wireless kilometres**



Heavy-duty static Platform



1. Track Supply
2. Primary Winding
3. Secondary Winding and Rectifier (PicRec)
4. Battery
5. SCADA Wireless Module
6. Cooling Unit

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Heavy-duty Static Integration

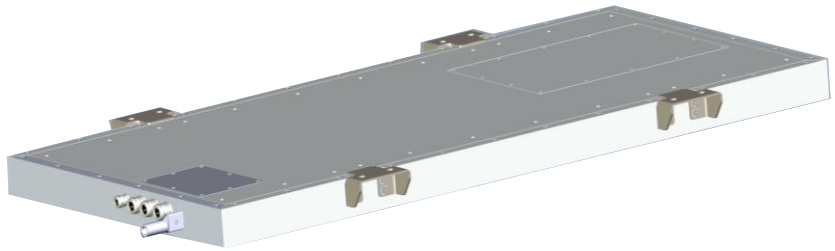
Stationary Components

Primary Coil 200 kW

Ground Module
200 kW - 400 V

Cooling Unit

Vehicle Components



PicRec

SCADA Wireless Module

Wireless en-route charging

Let’s move passengers, no batteries

save more than 50% cost on batteries

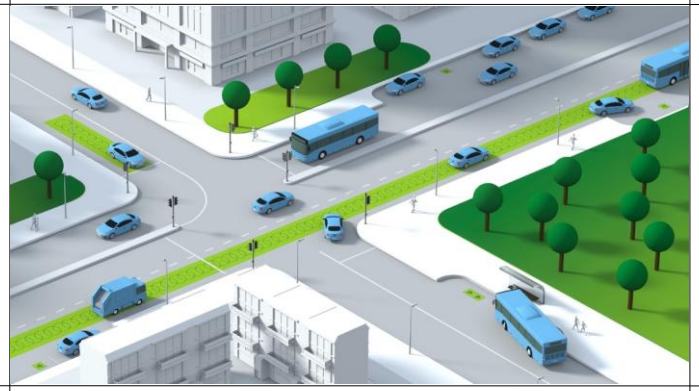
Increase the lifetime of battery

keeps the SOC between 30-80% which extends the lifetime significantly

lower your weight of the battery more than 60%

lower consumption

lower wear and tear



minimize your maintenance cost

no moving parts, remote diagnostics and management tools

save waiting time of drivers

cost driver versus waiting or driving off route

become 24/7 operational

Become more green with less battery and weight

lower your cost of grid connection

minimize numbers of busses

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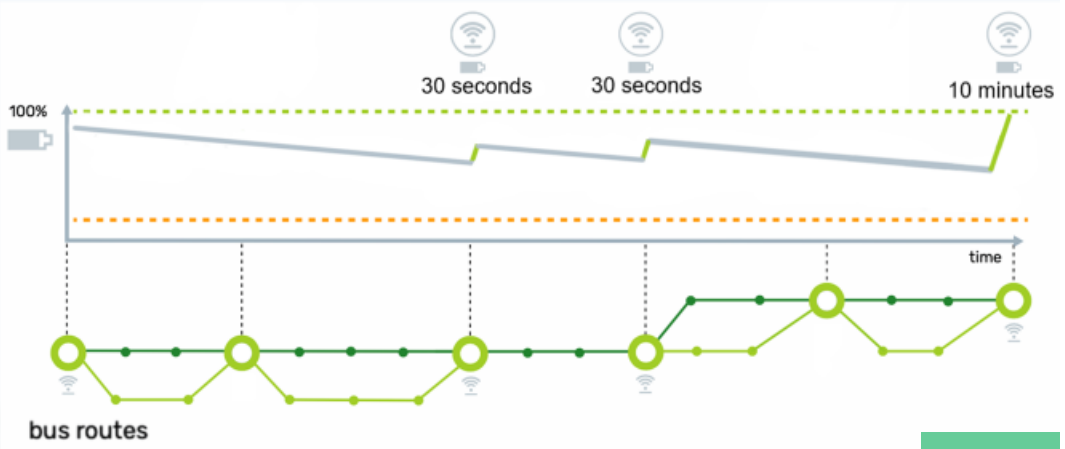
Example of Bus Line Operation

Braunschweig case

Bus line M19	**12 km**
Journey time	39 minutes
Journey time in %	80 %
Headway	10 minutes (weekday) 15 minutes (weekend)
Charging stations	**2**
Charging time	30 seconds
End stops	**2**
Charging time	up to 11 minutes
Depot	1
Bus stops (total)	**26**
Number of e-buses	**5**
12-metre	1
18-metre	4

12 km round route provided with a 200 kW charger can recharge the 18 m and 12 m buses consumption of a single trip using the charger during 10 minutes at the end station and 30 secs in two stops on the route.



Wireless Charging for Ships and Ferries

- High reliability and availability
- High safety solution
- Excellent weather protection
- No galvanic cable connections ship to shore
- A broad margin for movement ship versus shore
- Immune to water, salt, ice or snow
- Versatile applicability

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Facts Ferry Fredrikstad, Norway

200 meter

Distance sailing route from A to B. Charging attempt after a distance of 400 meters

150 kW

Main electric engine

145 x

Charging processes per day - 6 times per hour - when boarding and arriving

112 sec

Average charging time per stop

72%

Average State of Charge (SOC) of the battery

24/7

Operating hours per year

2,8 kWh

Average charge amount per stop

4 x 24 kWh

Energy storage: Litium battery

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ENRX Next Generation Electric Roadway

Benefits at a glance:

- High-power 200 kW
- Unique protection of the battery from peaks
- Highest protection against EMC radiation
- Optimized for the civil engineering
- Maintenance-free and long lifetime

Unique interoperability: › Power Output Levels for Different Types of Vehicles and Batteries › Custom Distance (Air Gap): ground and vehicle › Dynamic & Static charging Combined › Interoperable with all different coil typologies (Continuous Homogeneous Field)

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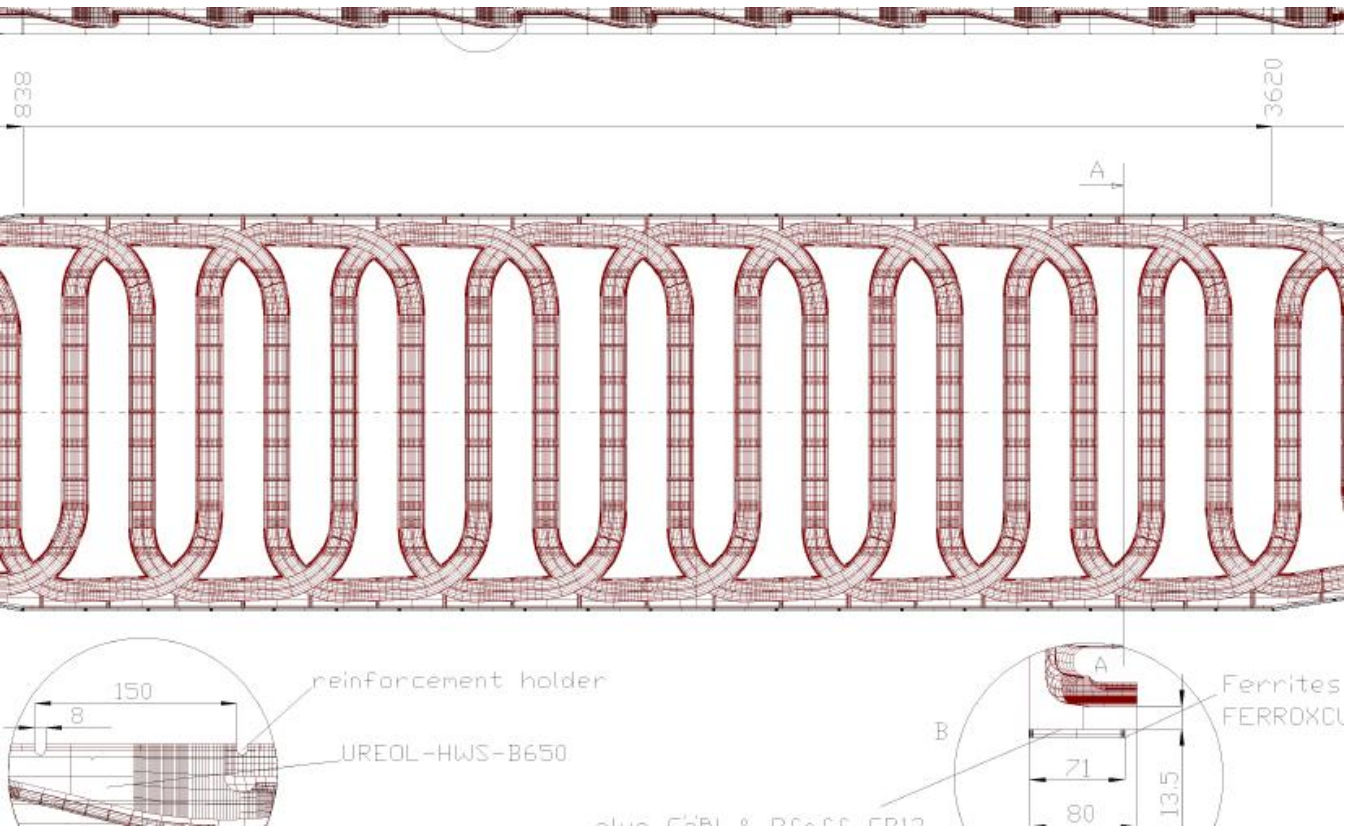
Best Wireless Concept for **Static and Dynamic** Charge

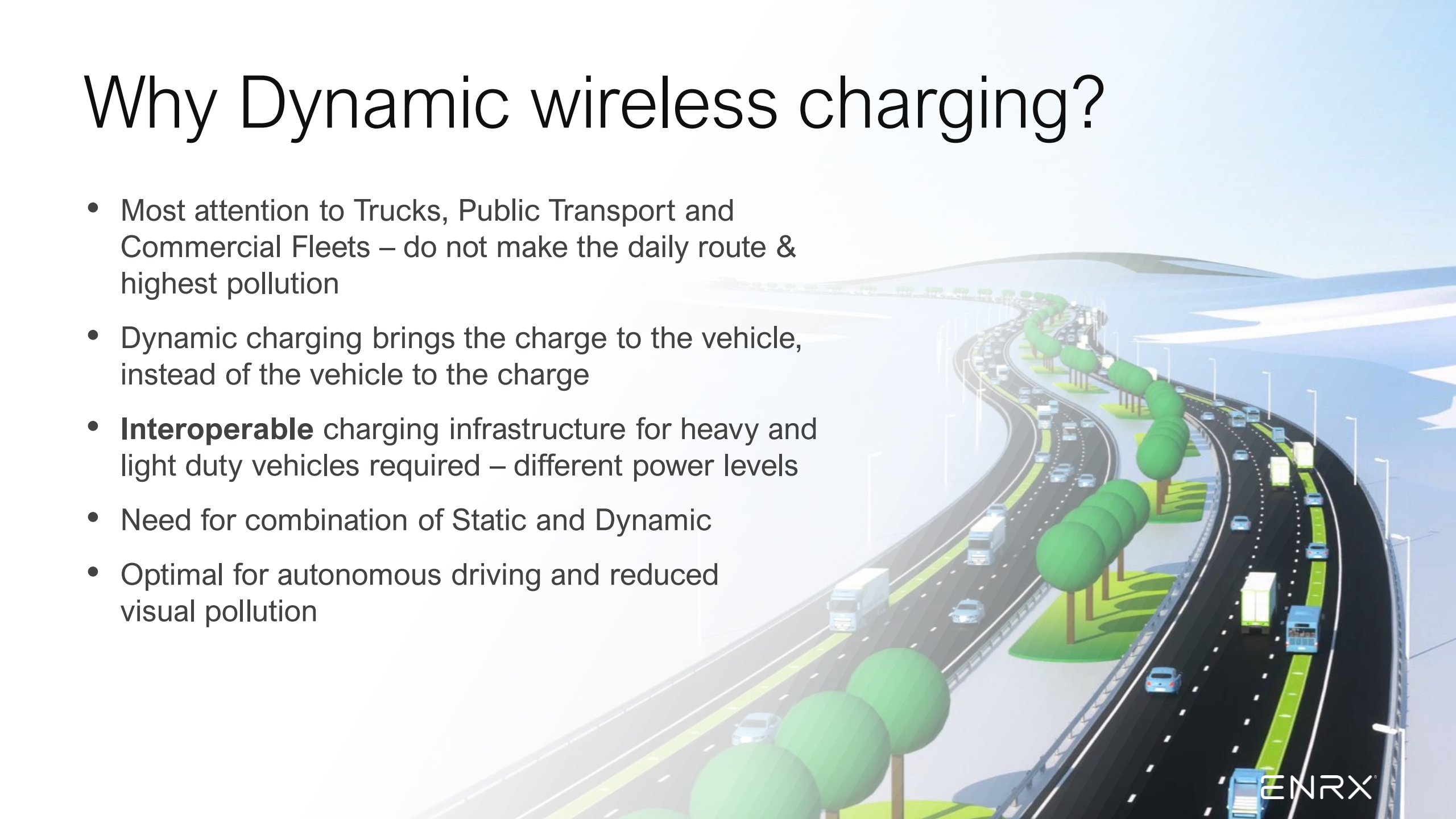
Optimal

- From the electric/ magnetic point of view
- From the mechanical / constructive point of view



Why Dynamic wireless charging?

- Most attention to Trucks, Public Transport and Commercial Fleets – do not make the daily route & highest pollution
- Dynamic charging brings the charge to the vehicle, instead of the vehicle to the charge
- **Interoperable** charging infrastructure for heavy and light duty vehicles required – different power levels
- Need for combination of Static and Dynamic
- Optimal for autonomous driving and reduced visual pollution



Dynamic Wireless Electric Roadways

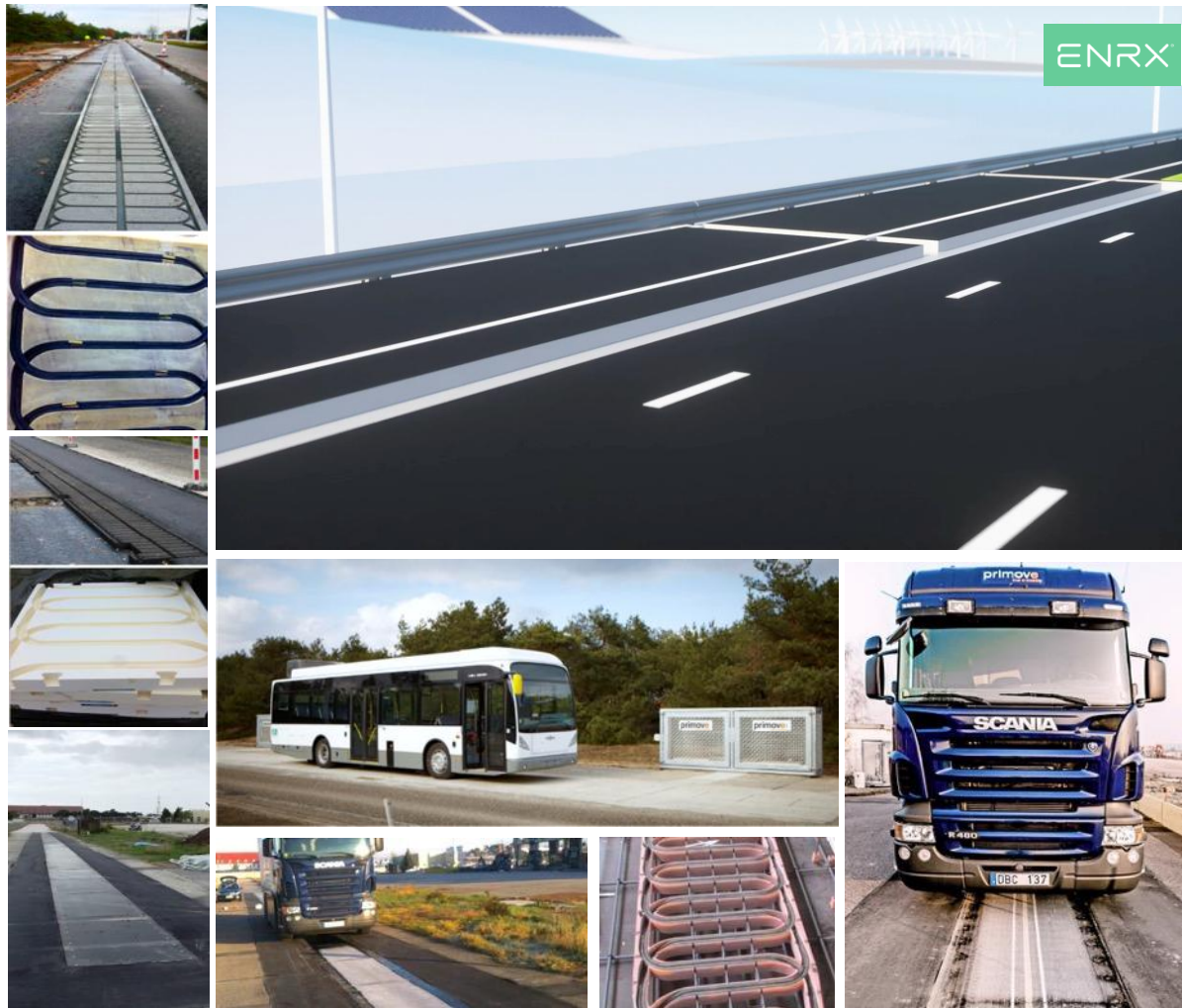
ENRX proven track record in real-world applications:

- **2011:** First pilot with a bus in Augsburg, Germany
- **2014:** Two Pilots with a bus in Lommel, Belgium, Concrete and Asphalt pavement
- **2016:** Two pilots with Scania Truck in Mannheim, Germany
- **2022:** Next GEN Project InductInfra in Aachen, Germany
- **2024:** **Next GEN: ASPIRE NSF Engineering Research Center - Demonstrator Center in Utah, USA**
- **2026:** **Project CFX - Implements 1,2 km 'Next GEN' electric roadway in State Route 516, Florida**

180 kW
power

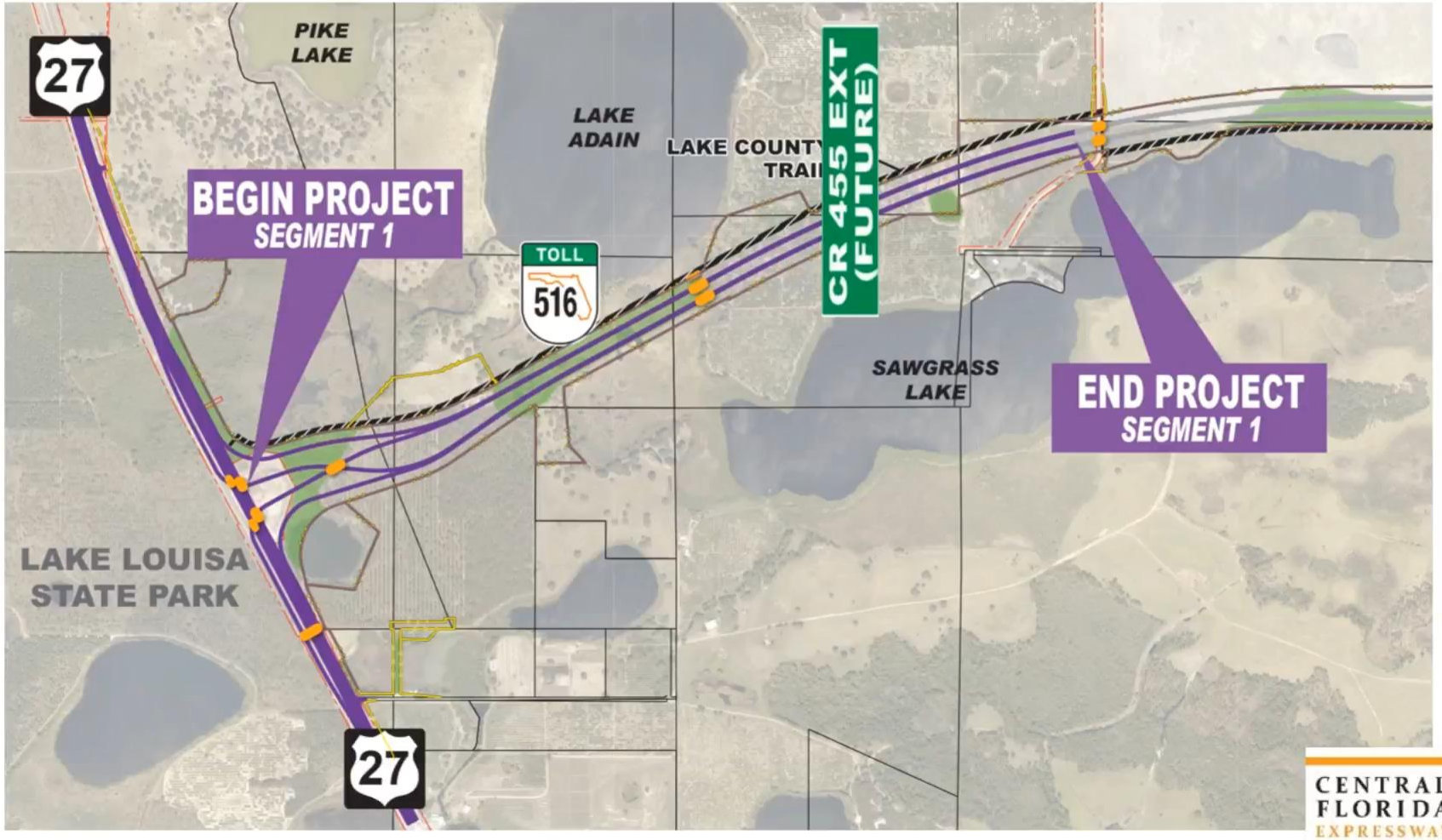
80 km/h
speed

>90 %
efficiency

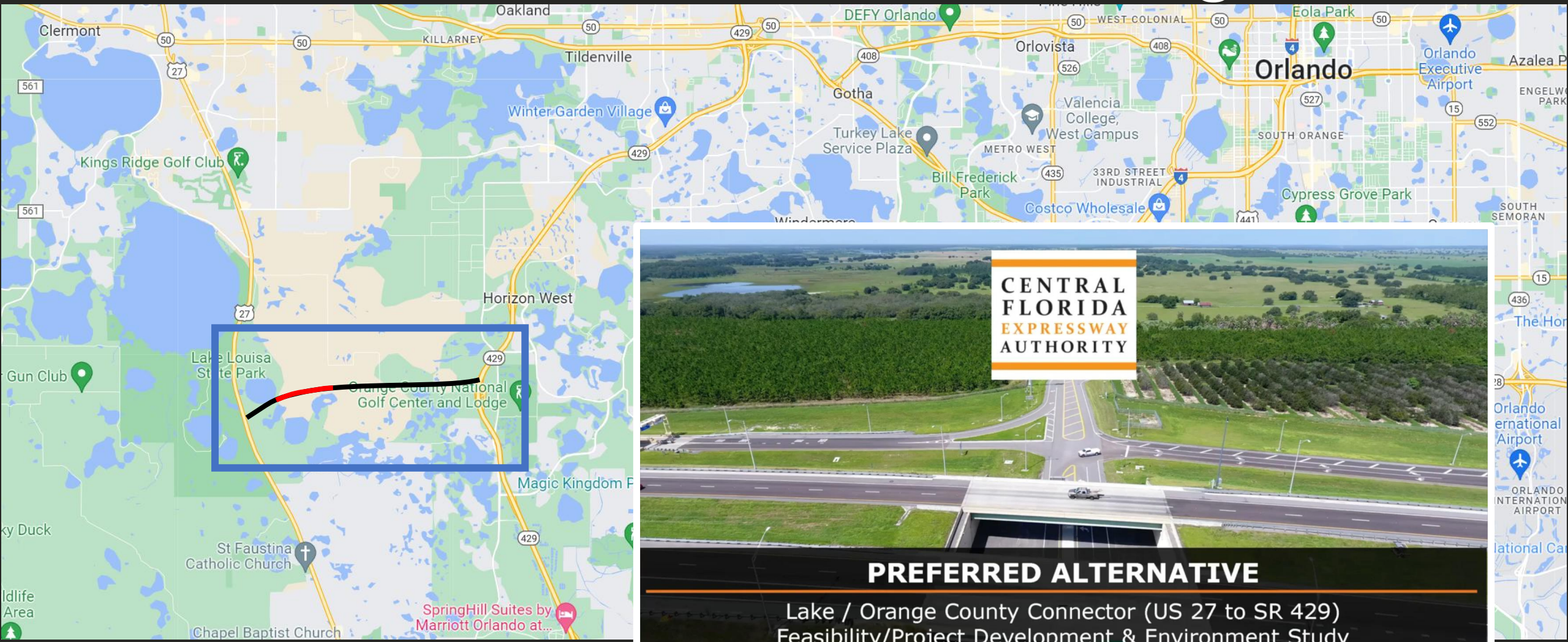


Segment 1: US 27 to Cook Road

- New interchange at US 27
- Realignment of US 27 to avoid impacts to Lake Louisa State Park
- Access for Lake County Trail
- In-lane charging pilot



State Route 516 new construction on green field



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Lake Louisa State Park
Lake Louisa Sta Campground - L
Orlando Health Horizon West Hospital
Avalon Rd
5 Mile Road
Lake / Orange County Line
Schofield Road
Proposed Valencia Parkway
Lake Trout
Lake Island
Cook Road
Proposed
455
Lake Needham
Lake Pike
Lake Adain
Old YMCA Road
Lake / Orange County Line
Lake Sawgrass
Lake Hickorynut
TOLL
429
TOLL
429
3D

Product overview

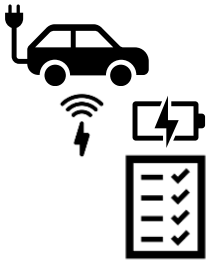
P8: INDUCAR
INDUctive Charging for e-**CAR**s

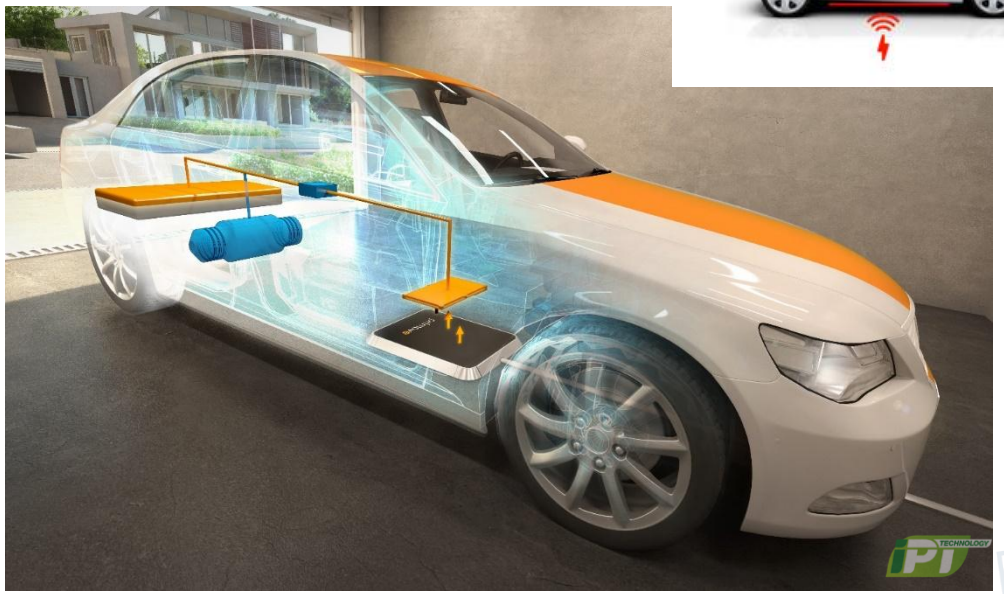
Inductive Charging for e-Cars: inductive charging system for electric cars, designed to better fit the users' charging preferences and maximize their convenience, i.e. avoid the frequent handling of heavy cables.

Wireless charging will be implemented for user-friendly charging for private use, professional use and car sharing services.

DEMO SITE 2. Inductive charge AMB Infrastructure

INDUCAR





Product overview

Vehicle unit (ORU) and charging infrastructure (PAD)

Electrical Data	Value Unit
Input Voltage, nominal	230 V
Input frequency	50/60 Hz
Input Current, max	16A
Input Power, max	3,6 kW

Mechanical Data	Value Unit
Ingress Protection	IP67 / IP69k
Weight	40 kg
Surface load, max*	1000/200 kg/cm²
Dimension (LxWxH)	914 x 642 x 72mm

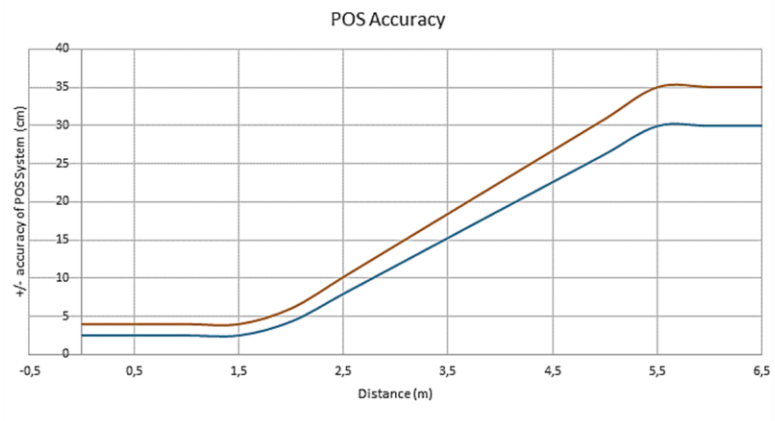
Electrical Data	Value Unit
Max. Transient Overvoltage	500 V for 1ms
Output Power, max	3,3 kW
Output Current, max	12 A
Operating voltage, min	250 V
Operating voltage, max	465 V
Current consumption, Sleep Mode	200 µA

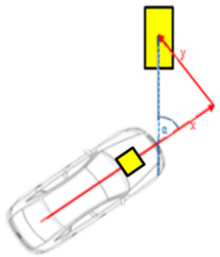
Mechanical Data	Value Unit
Ingress Protection	IP67 / IP69k
Weight	3,7 kg
Dimension (LxWxH)	273 x 433 x 18mm

FEATURES

Positioning is an elementary function of wireless charging

- End customer experience in form of assisted parking function
- Preparation for autonomous parking
- Robust operation in different environmental conditions
- Use cases (in order of occurrence)
- Range 6,5m
- Sufficient accuracy to meet use cases
- No components external to vehicle and infrastructure component
- Minimal interference with other vehicle systems (e.g. keyless entry)
- Stay below 6.25uT (ICNIRP98) in accessible areas

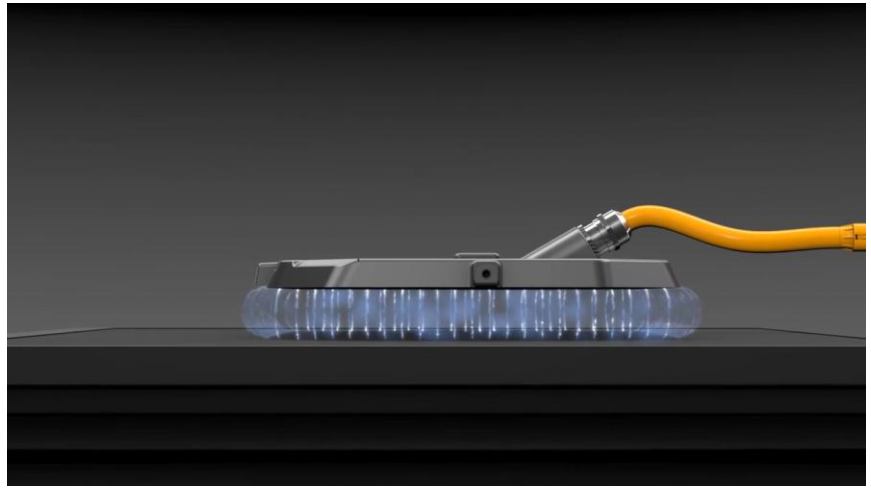


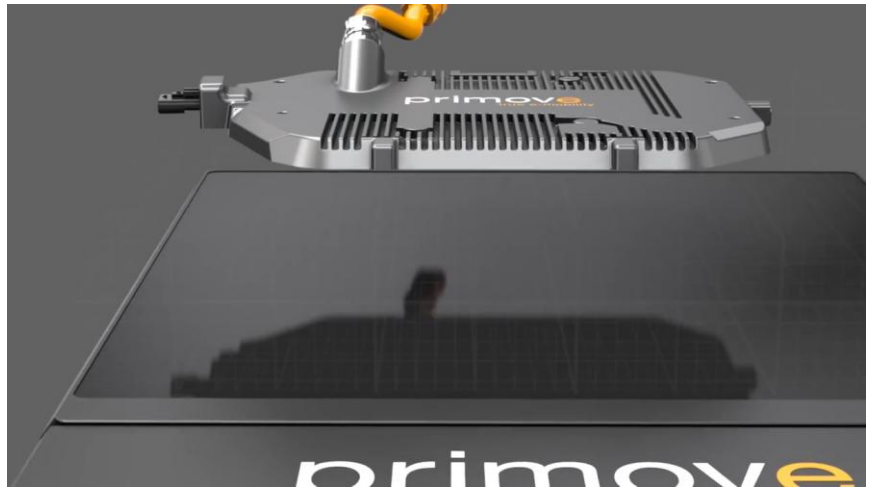


FEATURES

FOD Vehicle with specific teach-in process

- FOD-System suppresses metallic signature of car and vehicle coil
- Only additional metal will trigger the FOD shut-down
- No re-calibration / no delay or blind times
- Targets present before charge starts will be detected
- Continuous supervision for FOD during charging





Pinch protection

Avoids potential hazards harming animal life (particularly pets / domestic animals)

THANK YOU!

CONNECT WITH US

@Userchi_H2020

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INTEGRATION OF THE WIRELESS CHARGER IN THE RENAULT ZOE THROUGH SOME IMAGES

Sergio Perez, ENERX Group

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INDUCAR Development

PICKUP (ORU)

PICKUP (ORU)

INDUCAR Development

INDUCAR Development


7882 LBD
3466 LBF
LEAF
100% eléctric


RESERVAT
7882 LBD
AMB
USER-CHI
151
ZOE
2985 LGD


2985 LGD
2112 LJB


2985 LGD
2112 LJB

THANK YOU!

CONNECT WITH US

@Userchi_H2020

www.linkedin.com/in/user-chi-project

www.userchi.eu

info@userchi.eu

USE-CASE 1 – INDUCAR

Silvia Valero
AMB

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

INDEX

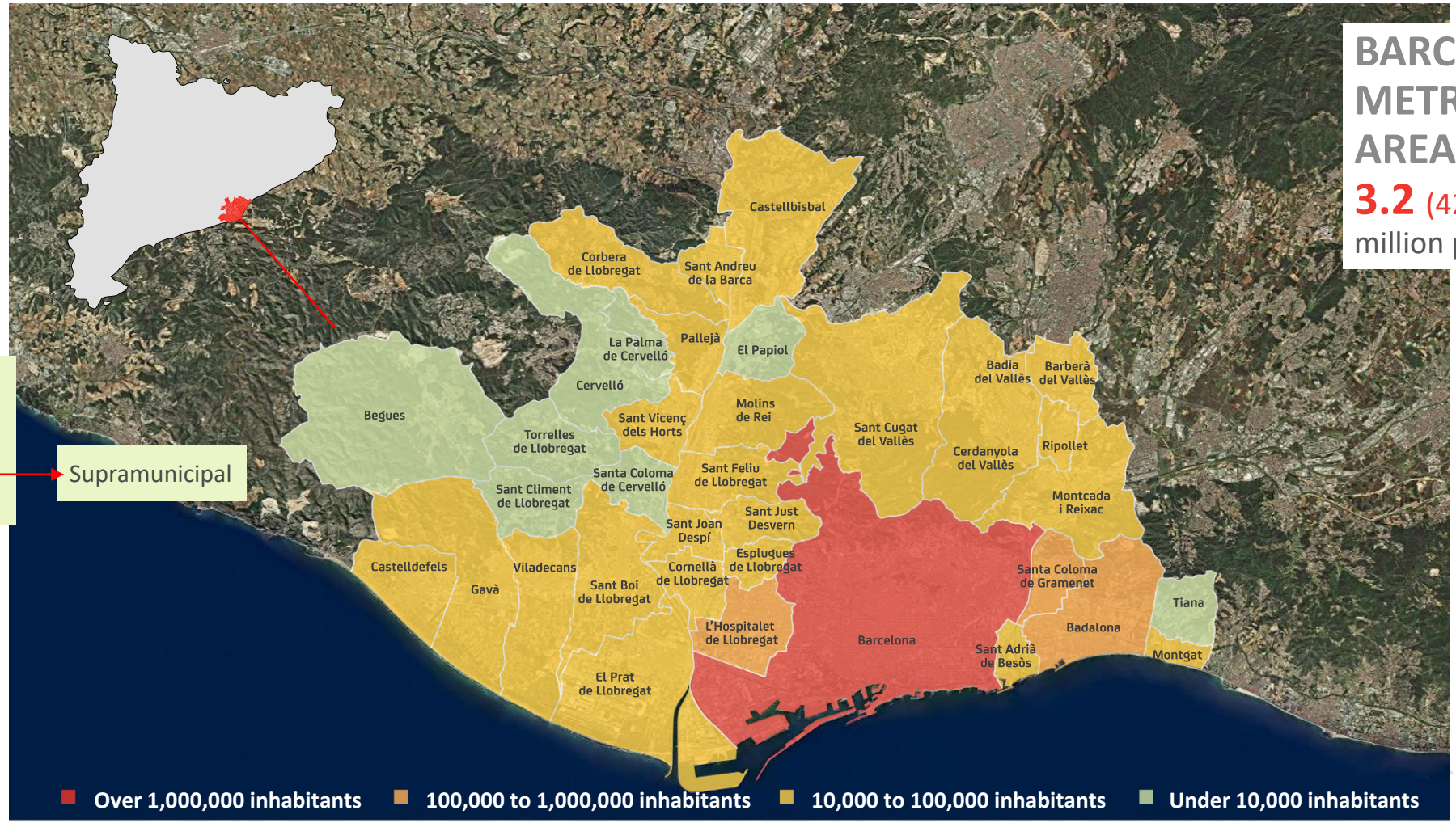
AMB - Metropolitan Area of Barcelona

CATALONIA

7.5
million people

Governance structure
1. Country
2. Regional
3. Municipal

Supramunicipal

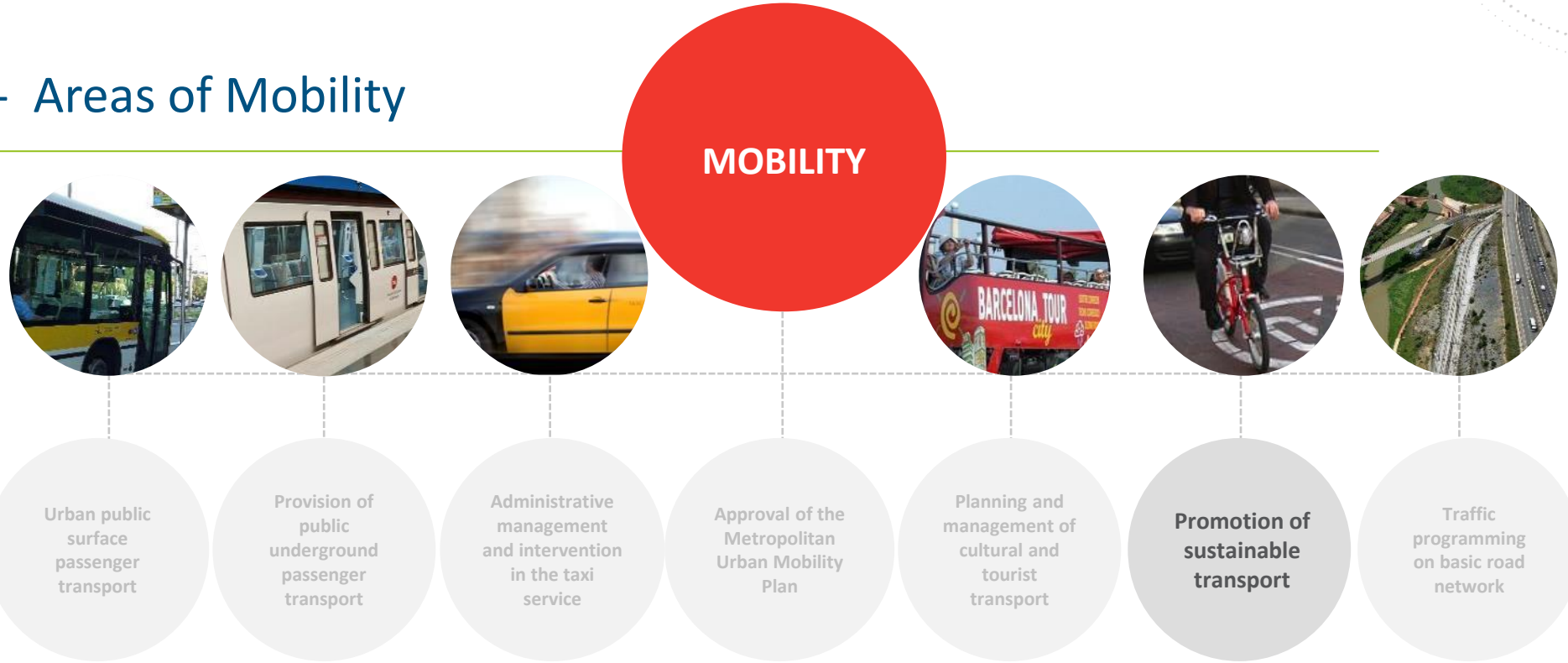


BARCELONA METROPOLITAN AREA

3.2 (42,6%)
million people

AMB - Areas of responsibility

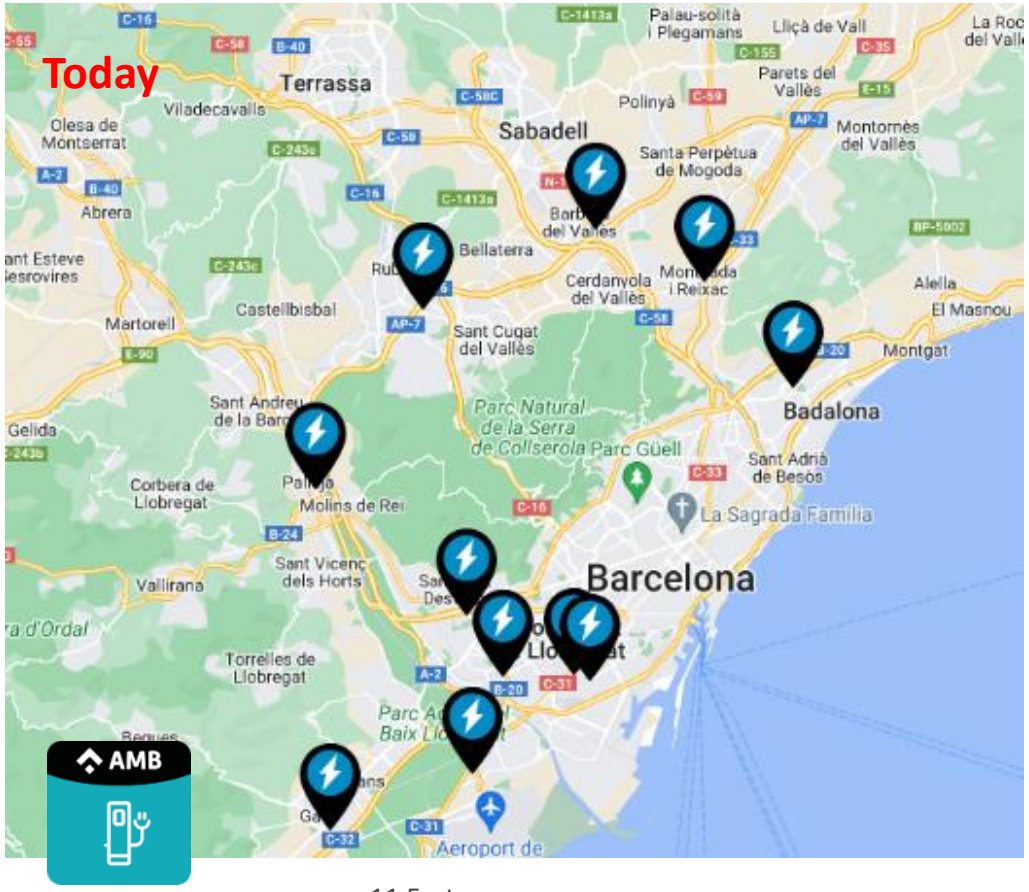
AMB - Areas of Mobility

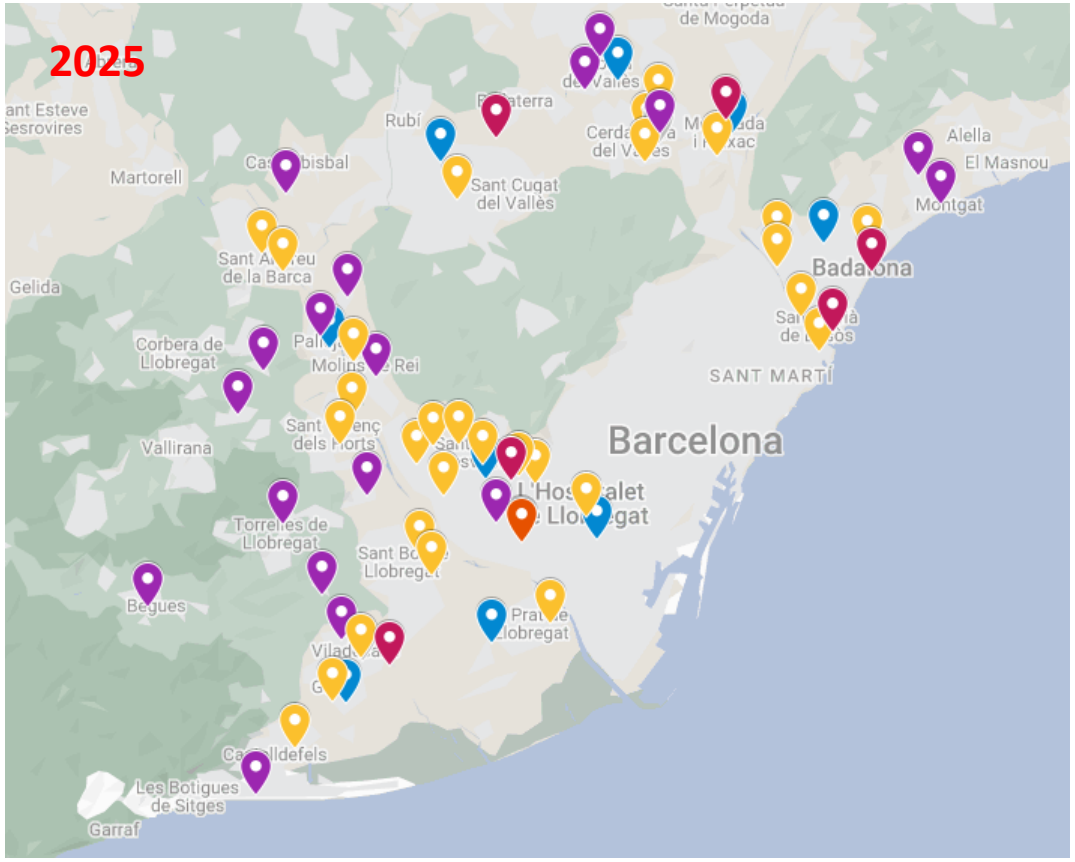


Regulation and municipal support:
- Low Emissions Zone regulation & signalization & statistics
- Sharing motorcycle system regulation (license)
- Grants for bike lines & construction support or execution
- Demosites - European Projects

Services:
- Safe bike parking - Bicibox
- Charging EV Network – AMB Electrolineres
- Sharing bike system - AMBICI

AMB – Charging network





11 Fast
1 Superfast
10 Normal
7.000 charging / month
Free service 140.000 kwh/month

35 Fast
9 Superfast
53 Normal
Paid service

AMB Electrolineres

AMB – Charging network

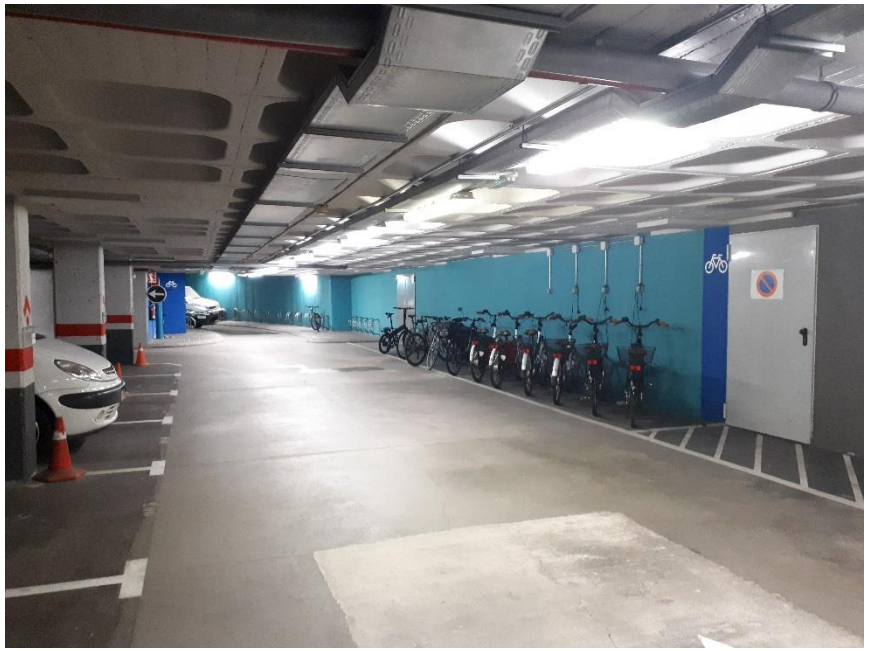
Our interest

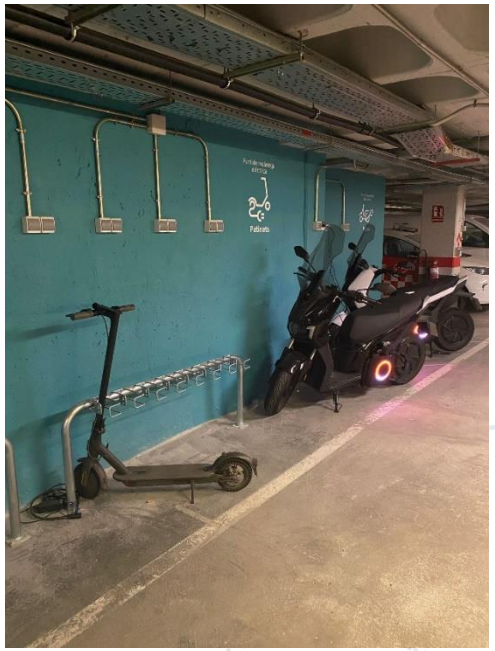
AMB electrified fleet

- E-cars fleet of different manufacturers, mainly Renault Zoe
- Existing electrified parking
- Interest to improve solutions more user-friendly

Need of promotion of electromobility between the staff

Special electrified parking places for: bikes, scooters, e-kickscooters





Our interest

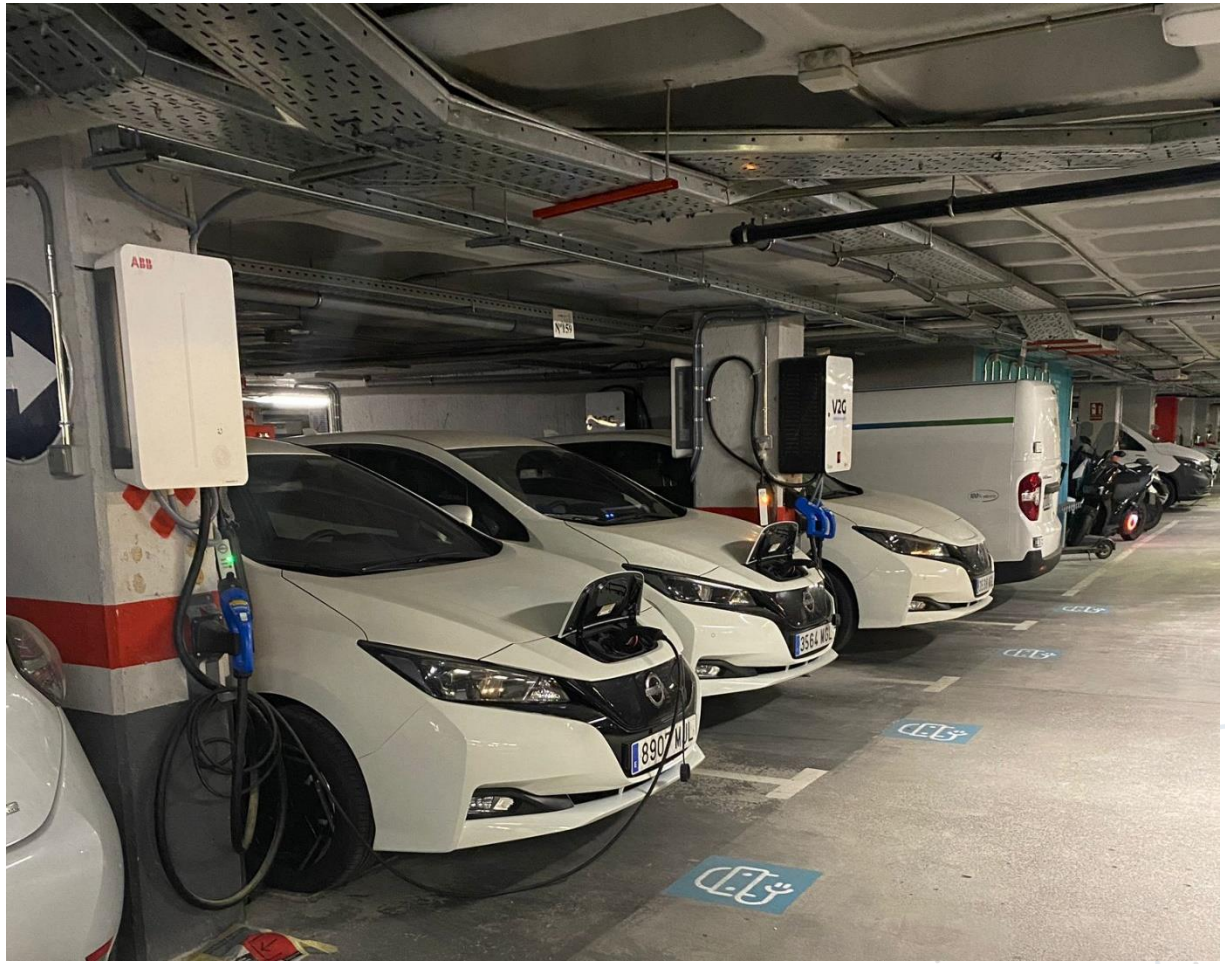
Innovation lab-test

AMB as part of development of the economy and the territory.

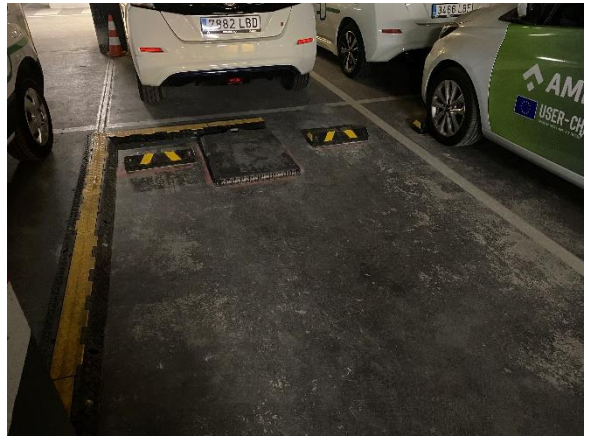
Participates in innovative projects to boost changes.

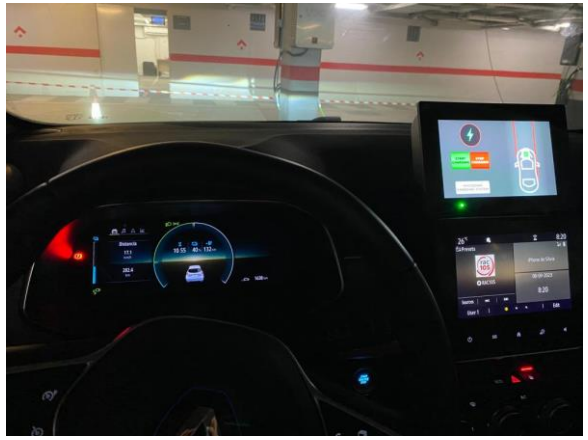
F.E.

There’s another demo going on in V2G with Nissan Leaf cars of AMB fleet.



INDUCAR demosite: Firsts results, feedbacks & challenges





Firsts results

- Internal test 3 people of the mobility department
- Easy to park with the monitor
- Visually cleaner (no cables)

Problems

- Does not stop the charge → empties the battery
- Slow procedure of pairing and start charging
- Detects one plate or the other without any preference
- Compatibility between cars, parking places

Challenges

- Solve tech problem – Sergio explains the car retrofit
- Improve charging speed
- Popularize the use (feeling of safety?)

Future use cases

Can we imagine?

- Taxi stops (BCN policy – taxi only in dedicated stops)
- Parking lots
- Company fleets
- City freight stops

INDUCAR as USB-C universal charger?

USE-CASE 2 – INCIT-EV

Miguel Zarzuela,
CIRCE

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

INCIT-EV

LARGE DEMONSTRATION OF USER CENTRIC URBAN AND LONG-RANGE CHARGING SOLUTIONS TO BOOST AN ENGAGING DEPLOYMENT OF ELECTRIC VEHICLES IN EUROPE

External Meetings

INCIT-EV Project Highlights

General presentation of the project

Zaragoza, 2023

Miguel Zarzuela
mzarzuela@fcirce.es

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875683.

Follow us on: https://www.incit-ev.eu/

Overall Project Introduction

INCIT-EV is a European project **led by CIRCE** in which **electric vehicle charging technologies** will be developed and validated in **five European countries**, thus improving the user's perception of electric mobility.

REFERENCE CITIES IN EUROPE

INCIT-EV PROJECT

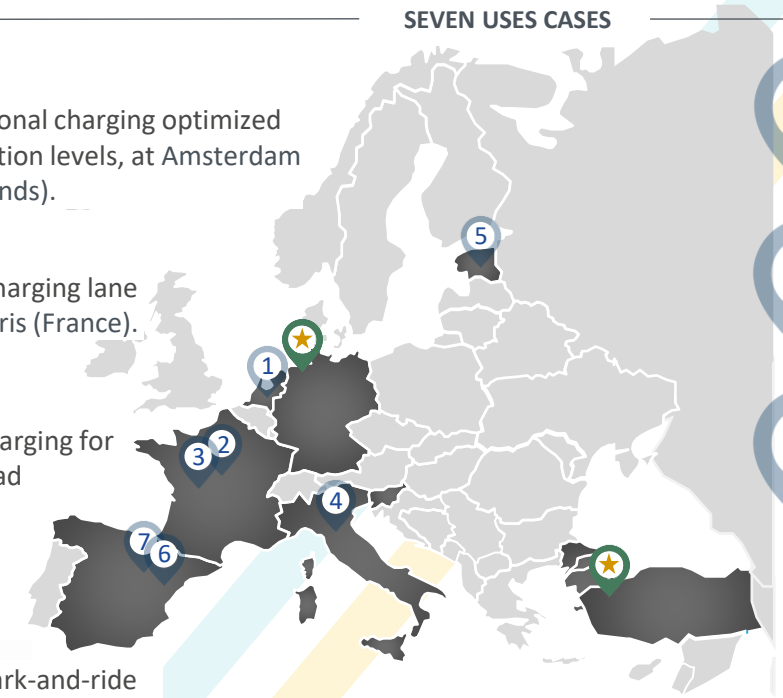
SEVEN USES CASES

UC1 Smart and bi-directional charging optimized at different aggregation levels, at Amsterdam & Utrecht (Netherlands).

UC2 Dynamic wireless charging lane in urban area, at Paris (France).

UC3 Dynamic wireless charging for long distance – e-road prototype, at Satory (Versailles, France).

UC4 Charging hub in a park-and-ride facility, at Turin periphery (Italy).



UC5 Superfast charging with VPP, at Tallinn periphery (Estonia).

UC6 Low power DC bidirectional charging infrastructure for EV, including two-wheelers, at Saragossa (Spain).

UC7 Opportunity wireless charging for taxi queue lanes in airports/central stations, at Saragossa (Spain).

TWO FOLLOWER LOCATIONS

- Bursa (Turkey)
- Norderney (Germany)

INCIT-EV in figures

18,6M€ budget
15M€ funded by the European Commission
32 partners are directy involved in the project
52 months long. January 2020 - June 2024
More than **7** innovative solutions

INCIT-EV Consortium

CIIRCE coordinates the INCIT-EV project, to improve the experience of electric vehicle (EV) driving with a consortium of 32 partners from eight countries

Project Objectives

INCIT-EV aims to demonstrate, at five demonstration environments, an innovative set of **charging infrastructures**, **technologies and its associated business models**, ready to improve **the EV users experience** with the ultimate goal of **fostering the EV market share** in the EU.

EV users preferences and expectations

3,475 EV drivers engaged

V2G ready
30 kW modules

Up to 130 km/h

Wireless Charging
90 kW Static and Dynamic

Low cost scalable V2G AC and DC chargers
3,7 to 200 kW

Decision Support System for mobility planners

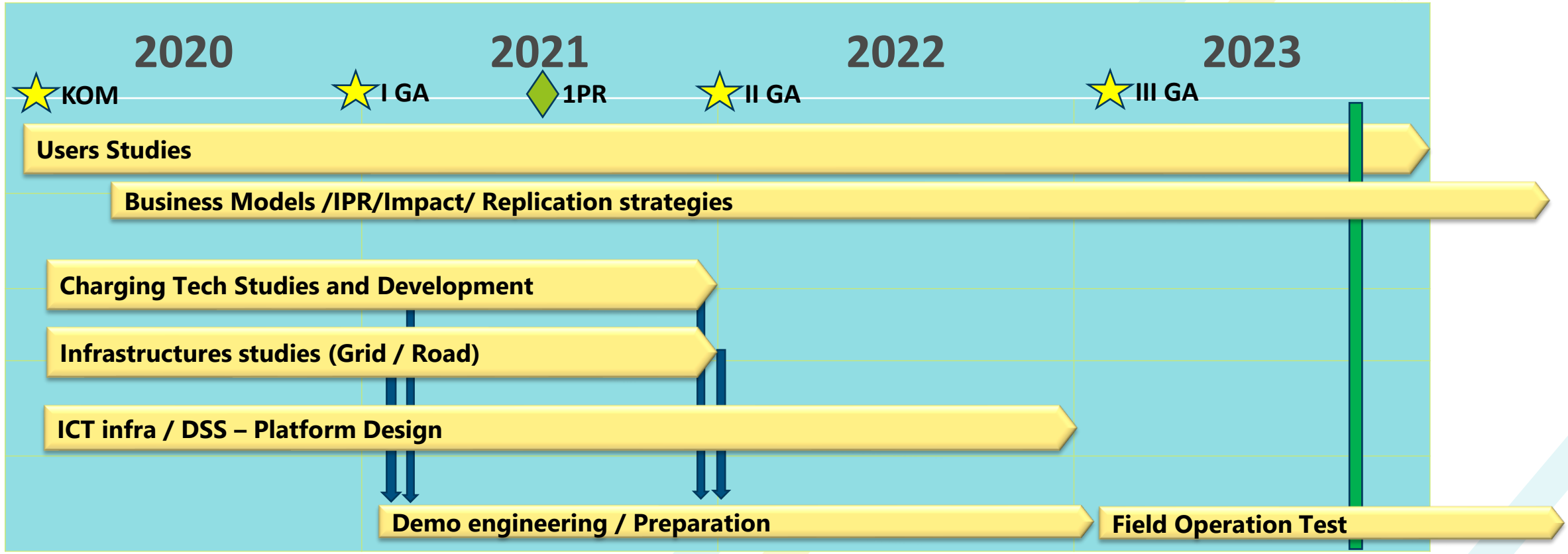
Grid Congestion
Smart Energy / Charging
Interoperable payment

Wireless Interoperability In all demos

Promote investment in charging infr **Attractive Business Models**

8.87 M€ investment on the Use Cases
Regulation and standard
Based on Project devep

General Introduction
2021 Achievements



- WP3/4 Charging and infrastructure studies finished
- Demos on enginering phase, preparation for comissioning → Ready for demonstration phase by Q4 2023
- User Studies performed. Next step evaluation of Use Cases
- ICT Infrastructure and DSS activities completed
- First IPR analysis done. Exploitation of results pending of demonstration results.

2 – Needs of users and adaptation of electric vehicles

Pains and gains of the users

EV USERS

- **Seamless** and **reliable** charging
- Fast and interoperable charging for travels
- Charge at home/work
- Integration of EV battery in smart grids
  - EV batteries for solar charging
  - EV batteries as energy back-up

GRID OPERATORS

- EVs as storage for RESs
- V2G / Smart charging for ancillary services
  - Frequency, voltage and reactive regulation
  - Smart charging – Power optimization
  - Load balancing

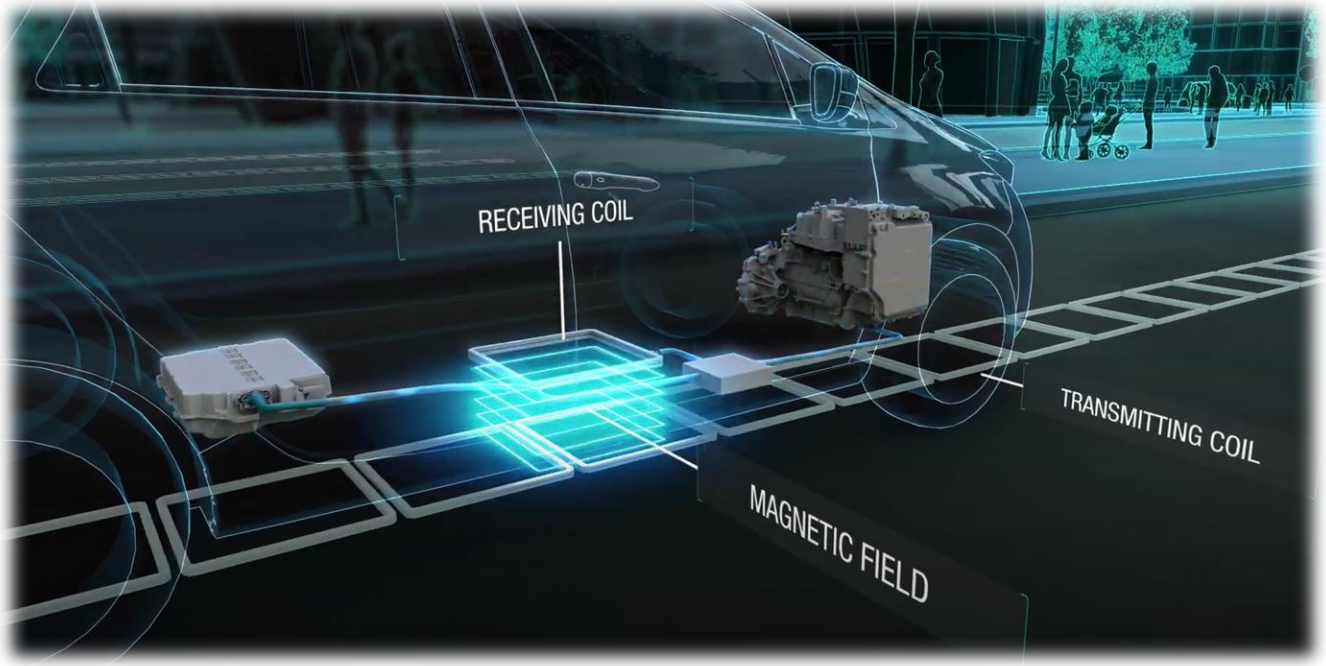
Smart Charging and V2G demonstrators

- Smart Charging algorithms in operation in 110 charge stations of Total in Netherlands joined Congestion Markets
- Local shared smart charging in building block
- Communication works with ISO 15118-20 for V2G for AC and DC
- 25 kW V2G charger with grid support services
- 200 kW Superfast charger with Grid Support

Wireless Innovative Solutions

- 3 dynamic and static wireless charging system interoperable

- Optimal design of coil and shielding for all cases
- Misalignment tolerance and stability of the system
- Modular 30 kW secondary coil for all vehicles



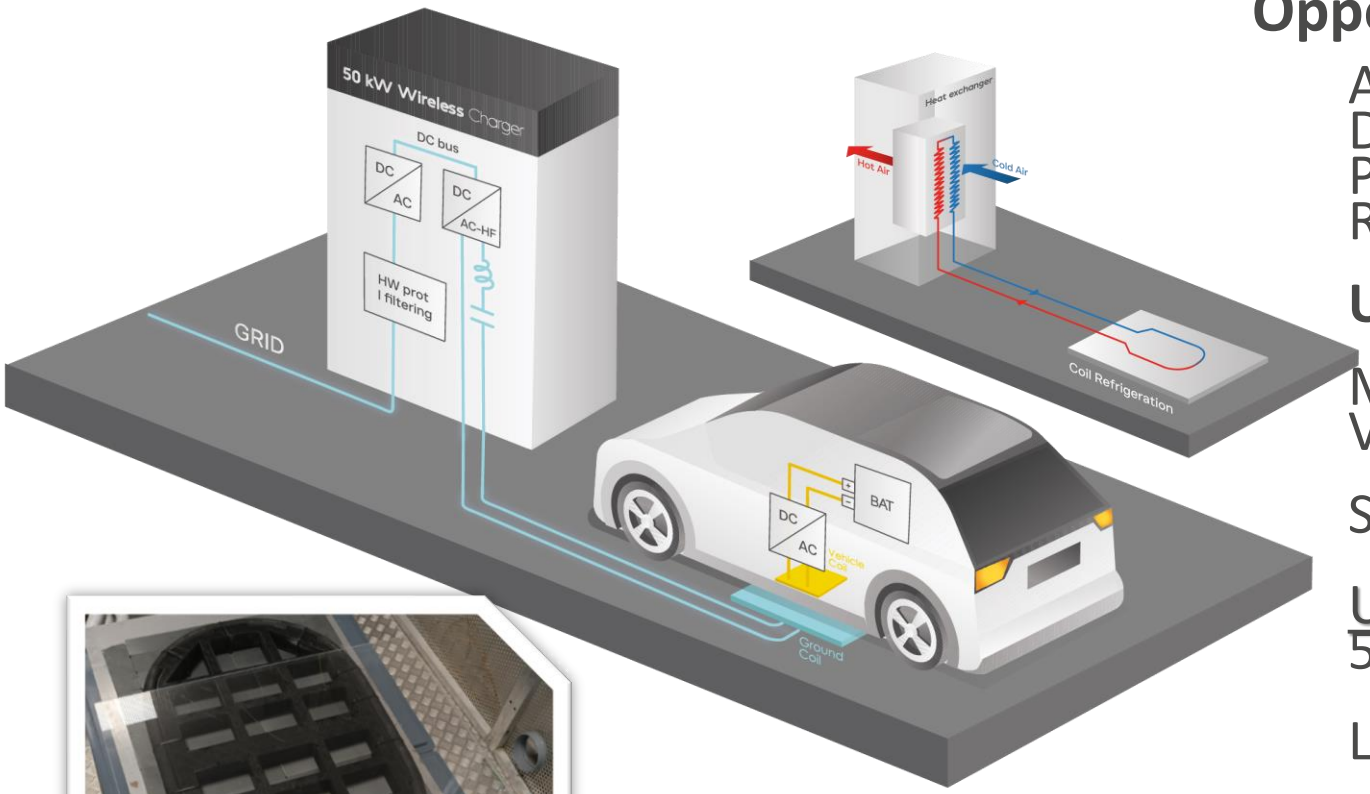
3 differen
integ
4 retrofit
wire

kW

WP07 Use cases deployment and demostration in areas.

UC7: 50 kW opportunity charger in Zaragoza

3.1 – Static 50 kW Wireless Charging in Zaragoza



Opportunity wireless charging system:

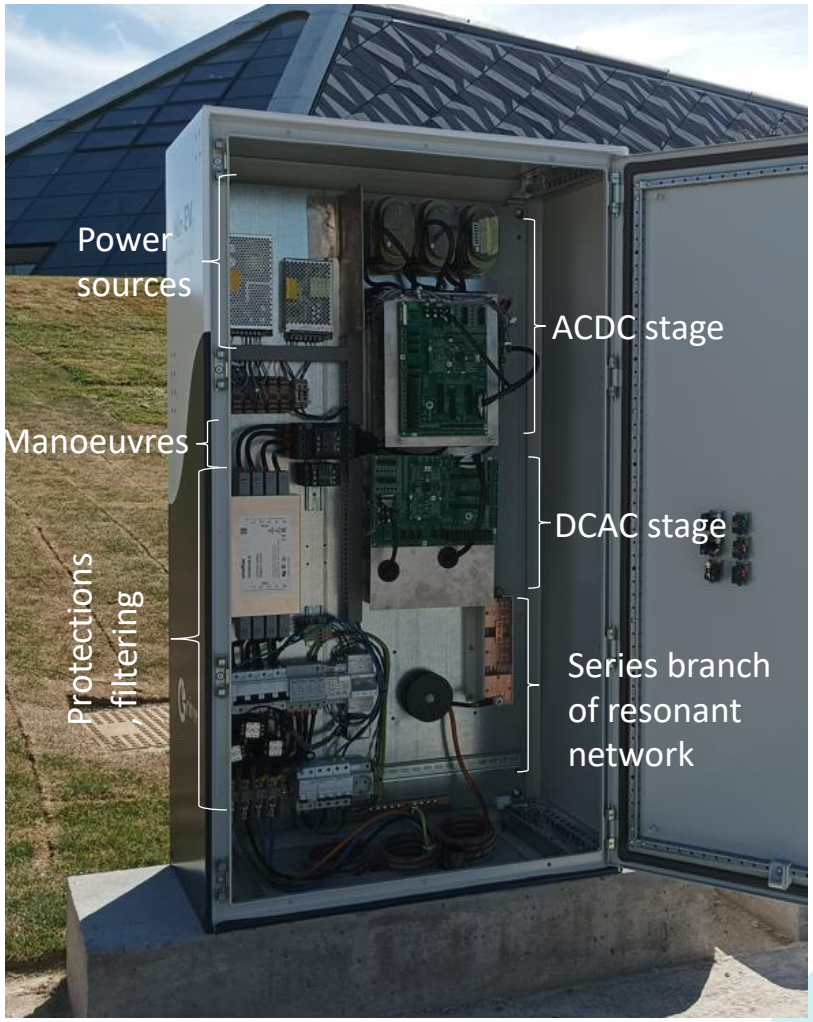
- A highly replicable model
- Designed for static wireless 50 kW
- Pavement integration
- Refrigeration needs for continuous operation
- **Up to 95% charge efficiency** vs conductive charging (testing pending)
- Misalignment accepted **up to 25%**
- Vehicle detection, communication and energy billing
- Seamless user charging experience

<u>UC designed for Taxi Queue</u>
50 km charged every 10 min

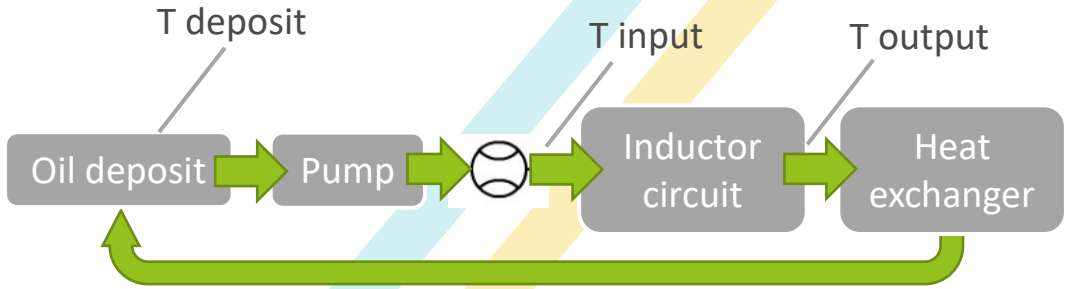
Lower power can be used for <u>premium charging experience</u> at home

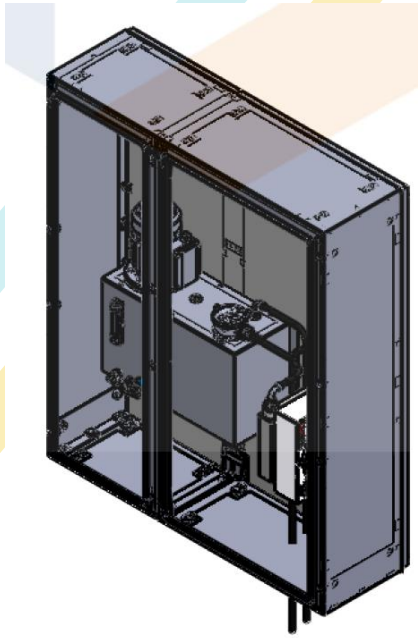
WP07 Use cases deployment and demonstration in areas.
Task 7.4: UC7 – Work carried out

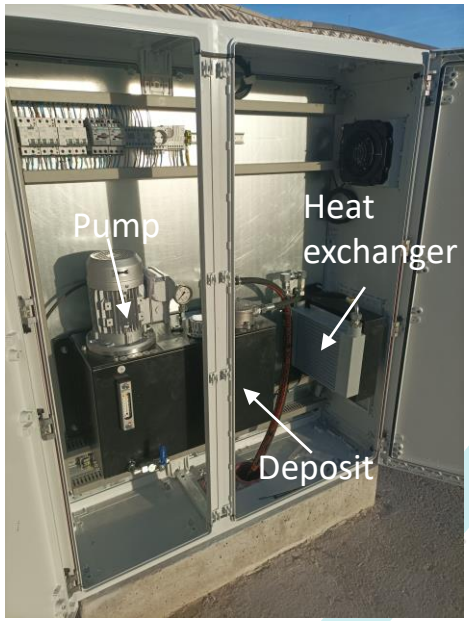
Power electronics stages (CIRCE)



Cooling system (TRIA)



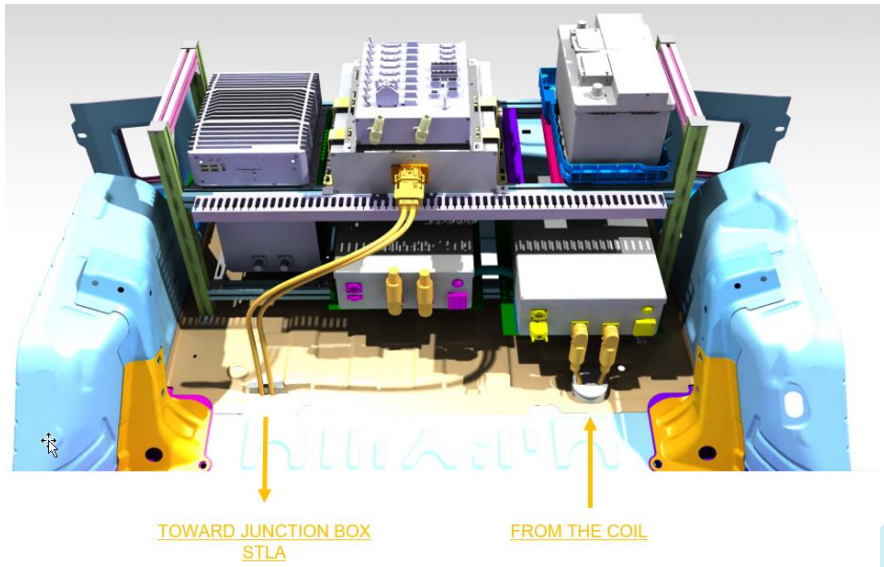




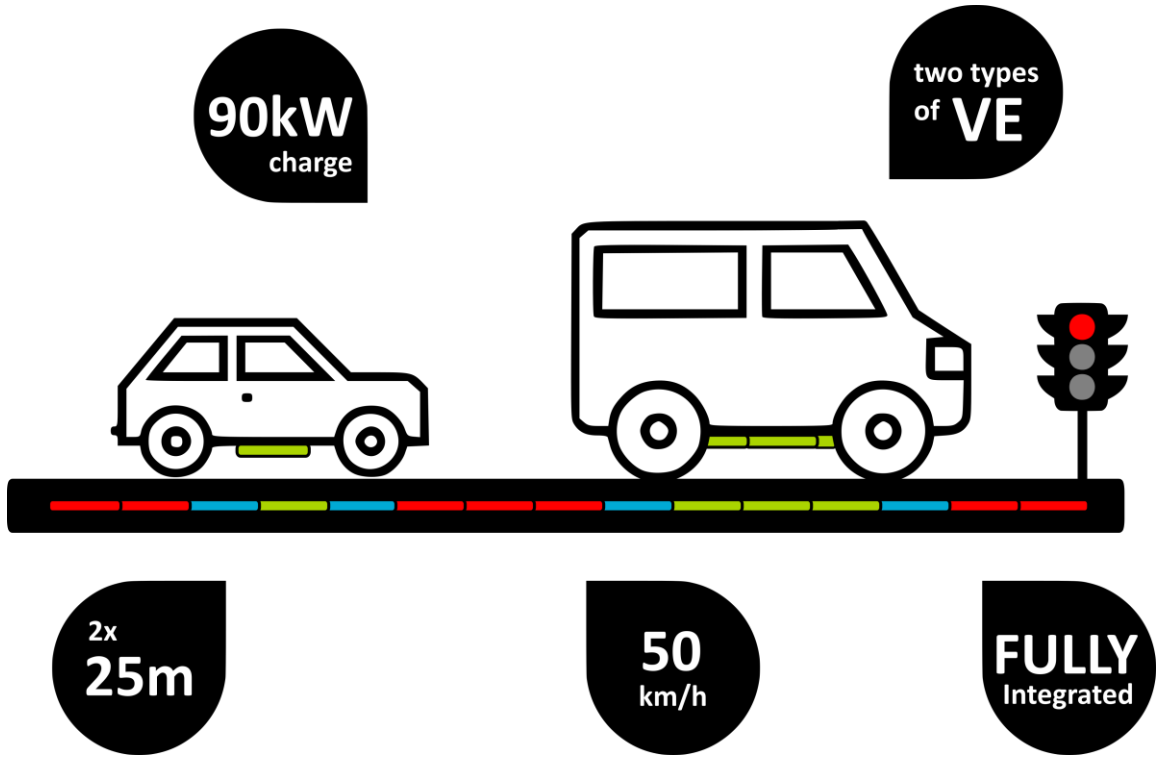
Vehicle retrofitting

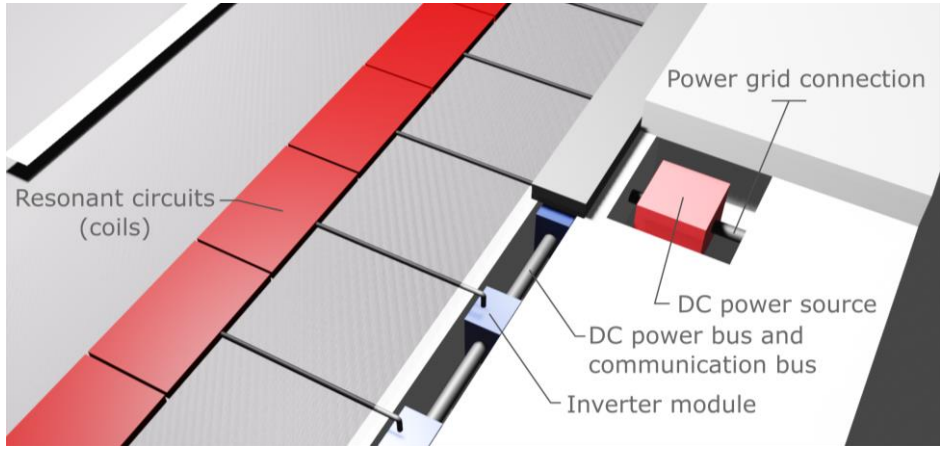
3 vehicles retrofitted

- 2x Renault Zoe
- 1x DS3
- 1x Renault Master



UC2 – Dynamic 90 kW Wireless Charging in Paris

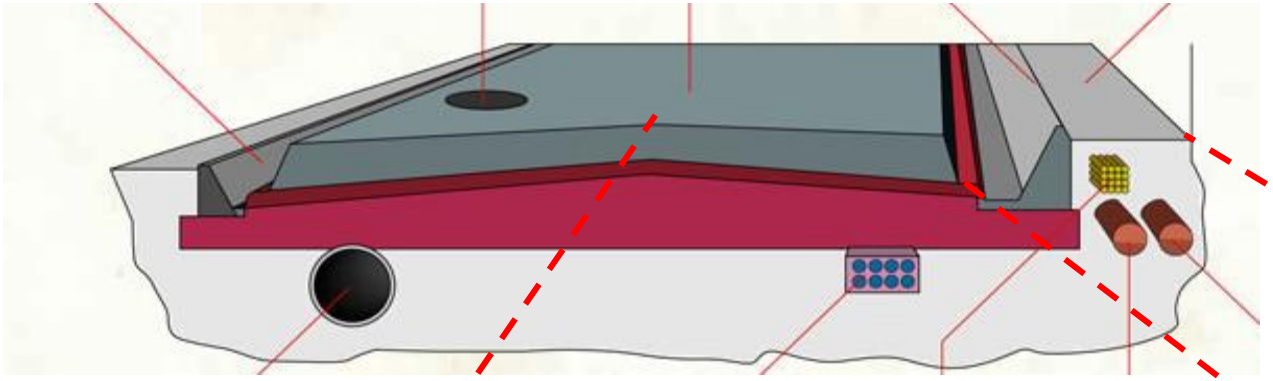




Urban dynamic wireless charging system:

- A highly replicable model
- Urban scenario and specifications
- Two charging power – 30kW or 90kW
- Two kinds of VE – van and conventional
- Traffic lights zones to improve the charge
- Ground integration of the system – coils and inverters
- Communication system – V2I

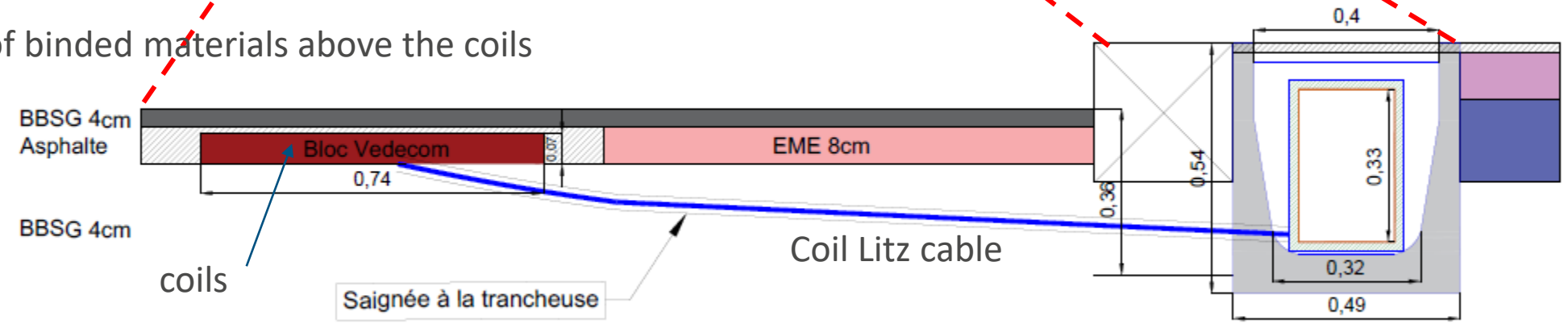
Task 7.3.1 : Road structure design



Regular road in a city

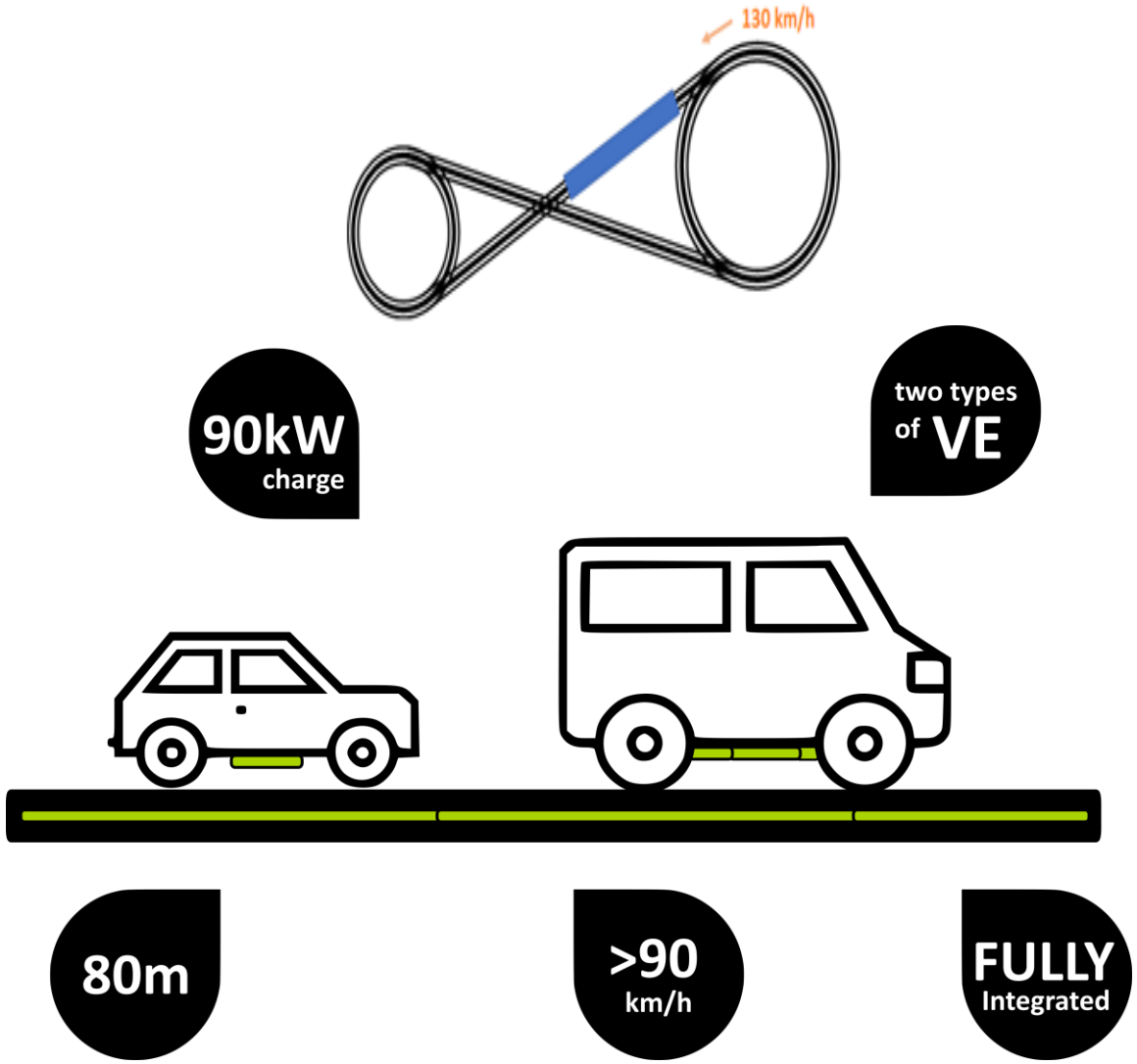
Incit-EV road equiped with coils

5 cm of binded materials above the coils



Technical conduit and inverters

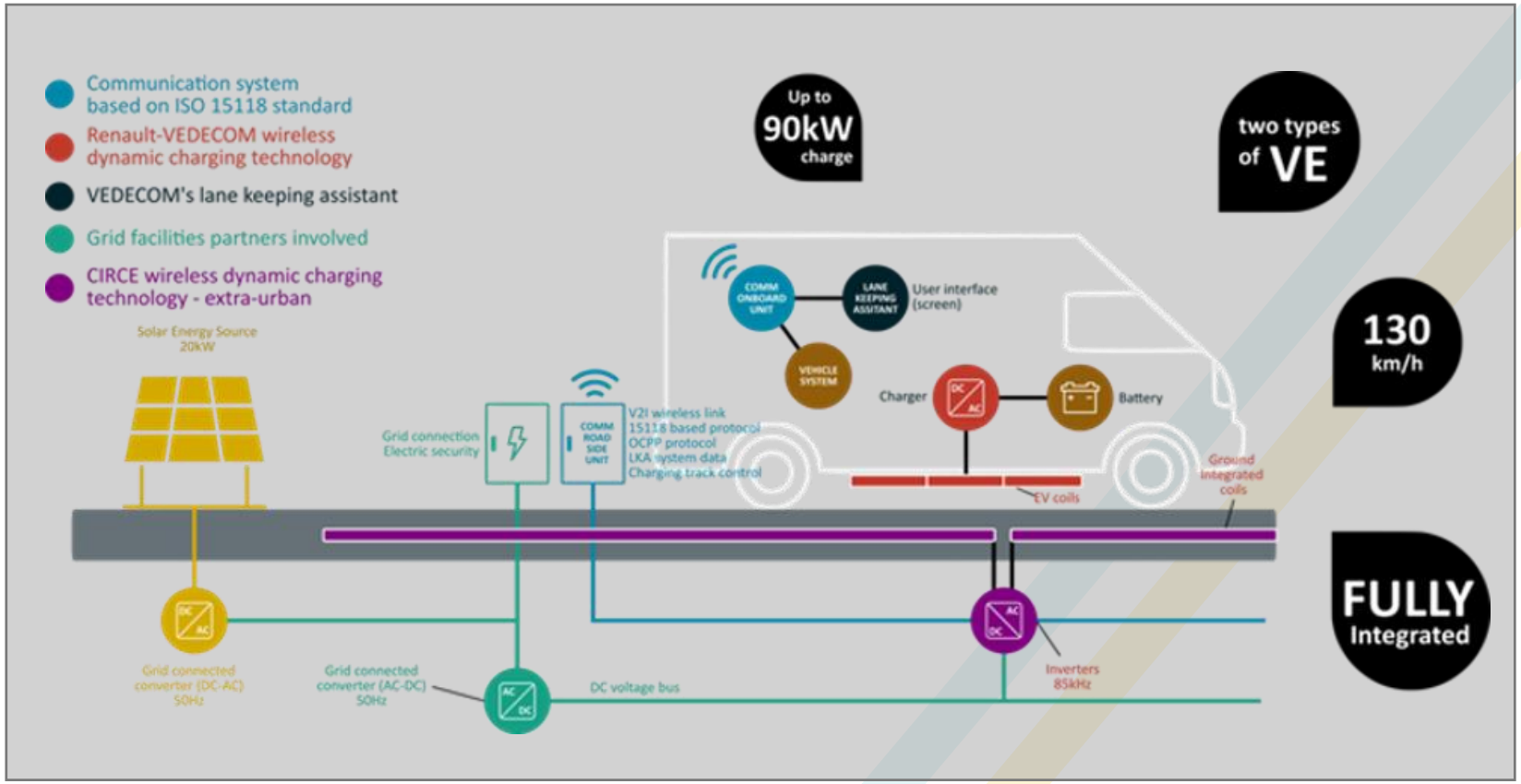
3.3 – Dynamic 90 kW Wireless Charging in Versailles



Long range charging system:

- Local renewable energy source (20kW)
- High speed conditions (>90km/h)
- Two charging power – 30kW or 90kW
- Two kinds of VE – van and conventional
- Ground integration of the system – inverters and long coils
- Communication system – V2I

UC3 description and objectives



UC3 :

- This use case will demonstrate the DWPT for different kinds of electric vehicles;
- Different power rating will be used for different vehicles;
- The milestone of this use-case is the interoperability of the technology and its ability to adapt for the speed and for the different power ratings.

6 – Contribution to future standards

- **INCIT-EV is paving the standards**

INDUCTIVE

- Interoperability of all cars and tracks
- Up to 3 coils per vehicle
- High frequency operation for high power
- Large misalignment operation
- Reference for high power inductive charge

CONDUCTIVE

- V2G tests in CHAdeMO and CCS
- V2G AC Tests – ISO 15118-20
- Ancillary services provided by EV charging
  - Frequency, voltage and reactive regulation
  - Smart charging – Power optimization
  - Load balancing

ISO 19363:2020 - Electrically propelled road vehicles -- Magnetic field wireless power transfer -- Safety and interoperability requirements

ISO 15118 Road vehicles -- Vehicle to grid communication interface

IEC TS 61980-2:2019 - Electric vehicle wireless power transfer (WPT) systems - Part 2: Specific requirements for communication between electric road vehicle (EV) and infrastructure

IEC TS 61980-3:2019 - Electric vehicle wireless power transfer (WPT) systems - Part 3: Specific requirements for the magnetic field wireless power transfer systems.

SAE J2954 - Wireless Power Transfer for Light-Duty Plug-in/Electric Vehicles and Alignment Methodology

Synergy Club: Collaboration with sister projects

- **19 projects were identified with INCIT-EV synergies**
  - **In 2021 we create the Synergy Club: between “the sister projects” of the same H2020 call: INCIT-EV, USER-CHI, eC4D, and E-smart.**
  - **regular exchange on results (2 times a year)**
  - **Work on common recommendations**

Thanks for your attention!

Miguel Zarzuela / mzarzuela@fcirce.es

https://www.incit-ev.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875683.

THANK YOU!

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