

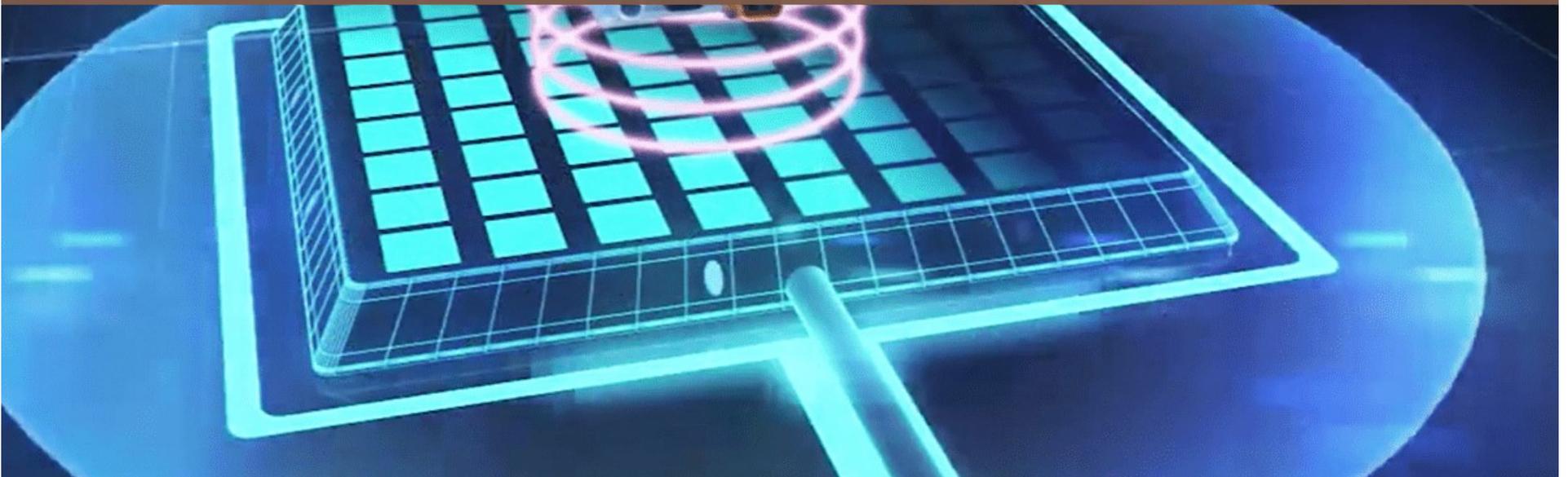


European
Copper Institute
Copper Alliance

E-mobility vision and role of wireless charging

July 1, 2020

AVERE. Webinar wireless charging





Copper Alliance and e-mobility

- ❑ **European Copper Institute, regional office of Copper Alliance, global association Copper producers (miners, refiners, fabricators).**
- ❑ **Missions: material stewardship, industry reputation and Copper applications.**
- ❑ **Regarding Copper applications, working on regulations and standards.**

- ❑ **On average, a battery electric vehicle (BEV) uses 3 times more Copper than a conventional one, around half in the battery pack (0.6 kg/kWh).**
- ❑ **Added to the demand from charging infrastructure and renewable generation to feed them.**

Climate emergency and clean road transport

- ❑ **Road transport, sector with the highest decarbonization potential:**
 - Road transport accounts for 20% EU CO₂ emissions (2015).
 - BEV emits 3 times less CO₂ than combustion (well-to-wheel, 2015 EU mix).
 - EU average ownership duration: 6 years (a rotation 3-5 times faster than heating & cooling assets).

- ❑ **Besides CO₂ and air quality, what makes BEV the best available technology is:**
 - Between 2.5 and 5 times more energy efficient than other clean technologies.
 - Already with a lower total cost of ownership than conventional in most cases in Europe.
 - Grid services (V1G and V2G) to integrate renewable generation.

Passenger car. Use case

- ❑ Last middle segment models with 400km range, suffice for everyday use. Overnight charging at low power (3.7kW to recharge on average in less than 3 hours the energy used during the day).
- ❑ With a high renewable mix, our vision is to keep the car always connected while parked, available anytime to take or provide electricity (V2X).
- ❑ e-Mobility Service Provider / Aggregator will manage state of charge to provide a great user experience, using artificial intelligence and authorized personal data.
- ❑ During long journeys, 150kW+ chargers to shorten the stop. At destination, low power again.

Convincing consumers through regulation on charging infrastructure

- ❑ **With the CO₂ standard regulation in place, now it's time to convince consumers.**
- ❑ **A key aspect is charging: from “more-convenient-to-use” to just “forget-about-it”.**
- ❑ **Our main policy asks:**
 - **Long journeys: at least 150 kW every 60km along TEN-T Core Network.**
 - **Urban, parking in buildings: Right to plug (just to inform community as unique requirement before installing).**
 - **Urban, parking on-street: Tenders already granted in 2025 for 20% of public parking spaces, with wireless charging infrastructure for cars and light commercial vehicles.**

Urban wireless charging will engage users and cities

- ❑ In Europe, two-thirds cars park overnight on the street or public car parks.
- ❑ Cities will prefer an invisible charging infrastructure (underground equipment).
- ❑ Drivers will love Park & Forget (about cables, apps/tokens and even charging):
 - The driver parks and aligns the vehicle (some will do by themselves).
 - Vehicle and charge point start authentication and data transfer (e-roaming).
 - If everything is OK, the charging session starts.
 - The session finishes when planned or when the driver unlocks the vehicle.
 - In case of detection of a living or foreign object, the session stops and a message is sent to the user.
- ❑ Also suitable for car-sharing and autonomous vehicles.

Wireless charging is ready

- ❑ **7.4 kW for cars and light commercial vehicles (gross vehicle weight < 2,500 kg).**
- ❑ **Same efficiency range than conductive in the market (battery - charge points mains).**
- ❑ **Cost of additional equipment (at mass production): around 500€ (vehicle) and 2,000€ (charge point).**
- ❑ **Wireless is already included in vehicle platforms of major OEMs (as VW, Daimler, Toyota).**
- ❑ **Available retrofit for vehicles and charge points.**
- ❑ **Vehicle to grid (V2G) also possible with wireless.**

All related standards will be available before mid 2021

- In China just published. in US new SAE J2954 in 2020. In Europe:

Theme	Code	Description	Available
Power transfer	ISO/DIS 19363	Field, safety & interoperability	2020-03
	IEC 61980-1	General requirements	Yes
	IEC TS 61980-2 IEC TS 61980-3	Communication EV– infrastructure Magnetic field	Yes Yes
	SAE J2954	WPT for light EVs and alignment	2020-12
Data transfer	ISO 15118-1	General information and use case	Yes
	ISO 15118-2	Network and application protocol	Yes
	ISO 15118-8	Physical and data link layers	Yes
	ISO 15118-9	P and DL layers conformance test	2021-07
Data interoperability	ISO/DIS 15118-20	2nd Gen network & app protocol	2020-06
	Ocpp	Open Charge Point Protocol	Yes
	OCPI (P2P, Hub)	OCP Interface Protocol	Yes
	OSCP	Open Smart Charging Protocol	Yes

Wireless charging strategy

- ❑ It seems that car manufacturers look at wireless as a premium optional feature or for commercial fleets (private charging infrastructure).
- ❑ However wireless charging is a powerful driver to accelerate EV uptake.
- ❑ Cities have the key to unlock the chicken-egg situation (who starts installing wireless: car manufacturers or charge point operators) and synchronize the market.
- ❑ Steps:
 - More cities running pilots to confirm the promise.
 - To share experiences with other cities.
 - To include wireless as a requirement for future tenders (before 2025).

Wireless charging pilots in progress

- ❑ 2016 Rotterdam. Technology test, lead by Engie.
- ❑ 2019 Cologne. Taxi rank, lead by University of Duisburg Essen.
- ❑ 2020 Oslo. Taxi rank, lead by Fortum.
- ❑ 2020 Nottingham. Taxi rank, lead by Cenex.
- ❑ 2020 London. Residential parking, lead by Connected Kerb.
- ❑ 2020 London, Milton Keynes and towns in Buckinghamshire. Residential parking, lead by Char.gy

Currently looking for cities interested on running wireless charging pilots.

Please contact me at diego.carvajal@copperalliance.eu

Thank you

For more information please contact
diego.carvajal@copperalliance.eu