



Grant Agreement number 101192657

Project presentation

Charging ahead Webinar – 30 May 2025

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Funded by
the European Union

Facts and figures

- **Project full name:** Flexible Megawatt Charging Systems, open software architectures, and planning modules creating multi-charger hubs for the European electric mobility system
- **Topic:** HORIZON-CL5-2024-D5-01-04
- **Start date:** 1 January 2025 – **42 months**
- **Type of action:** HORIZON Innovation Actions (TRL 6 → TRL 8)
- **Total eligible costs:** 9,69 M€
- **Funding from the EC:** 7,67 M€

Consortium

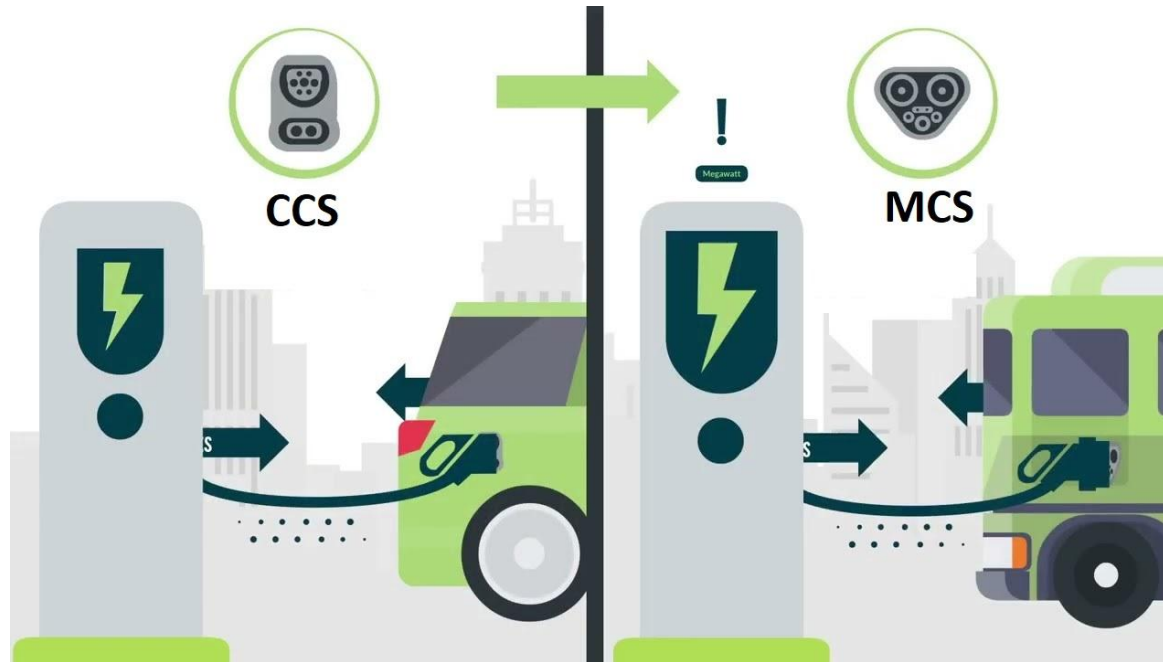
- **Coordinator:** Vrije Universiteit Brussel (VUB)
- **14** Beneficiaries from **9** different countries
- **4** Affiliated Entities
- **1** Associated Partner

Value Chain	FLEXMCS Partners
Hardware Suppliers	  
CPOs	
DSO/TSOs	
Truck manufacturers	 
Logistics companies	 
University, RTOs, Regulatory and Standardizing Bodies	     

Context – CCS vs MCS

CCS

- ❑ **Technology:** Charging power upto 500 kW
- ❑ **Application:** Passenger car and some light EV
- ❑ **Communication:** Power Line Communication (PLC)
- ❑ **Footprint:** Small < 1m²



MCS

- ❑ **Technology:** Charging power upto 3.5 MW
- ❑ **Application:** Heavy duty road EVs and Ships.
- ❑ **Communication:** Automotive ethernet (ISO)
- ❑ **Footprint:** Large > 3-5 m²

Challenges of MW charging

Charging System

- ❑ Need approximately 3 times more **space** than ordinary DC fast charging station
- ❑ Convention PE converter technology and BESS with poor **thermal performance**
- ❑ Harder handling capacity of **charging cable**
- ❑ No **access** for passenger car with CCS charger
- ❑ **Grid capacity** constrains for MW charging

Commercial MCS Hub



Vehicle

- ❑ Handling strategy of MW **charging rate**
- ❑ The efficient battery **thermal management** during MW charging
- ❑ **Preconditioning** of the battery during MW charging
- ❑ The guideline of vehicle **safety requirements** for short-circuit or touch potential hazards.

Objectives

The overall objective of the project is to design and demonstrate a **highly energy efficient MW-charging hub** concept with **multipoint** MW chargers for **HDVs** and **light vehicles**, offering logistic companies a **reliable, well-located** and **affordable** charge during the 45 minutes break of the driver.



Obj. 1: Improve **charging hardware** and **architecture ready** for mass deployment all over Europe whilst maximizing the utilisation of the infrastructure



Obj. 2: Optimise **charger usage** for efficiency and user convenience with an **Open Charging Framework architecture** and operational tools and data connections



Obj. 3: Streamline and accelerate the planning and installation of **new charging hubs**



Obj. 4: Demonstration and assessment of FLEXMCS megawatt-charging hub concept and **upscaling strategy**

Key results & innovations

KR1 - Upgraded flexible **MCS hardware** with 5 x MCS outlet and 18 x CCS outlet

TRL 6 → TRL 8

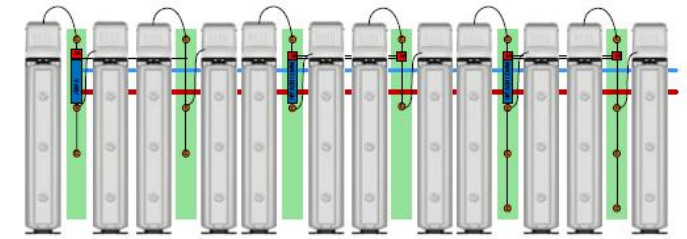
KR2 – **Open Charging Framework software architecture** for real-time data exchange and other tools for operation

TRL 6 → TRL 8

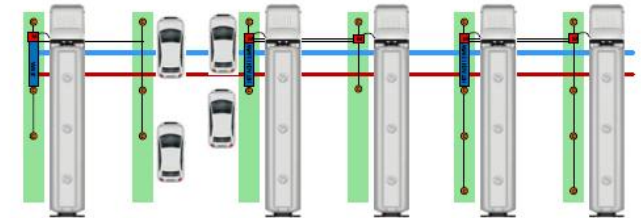
KR3 – Automatic **co-design optimiser**, charging site E/E architecture layout optimizer

TRL 6 → TRL 8

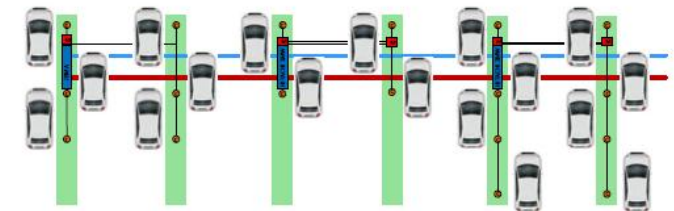
NIGHT
12 HDVs
charging in 6
hours



DAYTIME
5 HDVs charging
in ≤ 45 minutes



HOLIDAYS/SUNDAYS
18 light vehicles
charging in ≤ 10
minutes



*Example operation of
multi-outlet charging station*

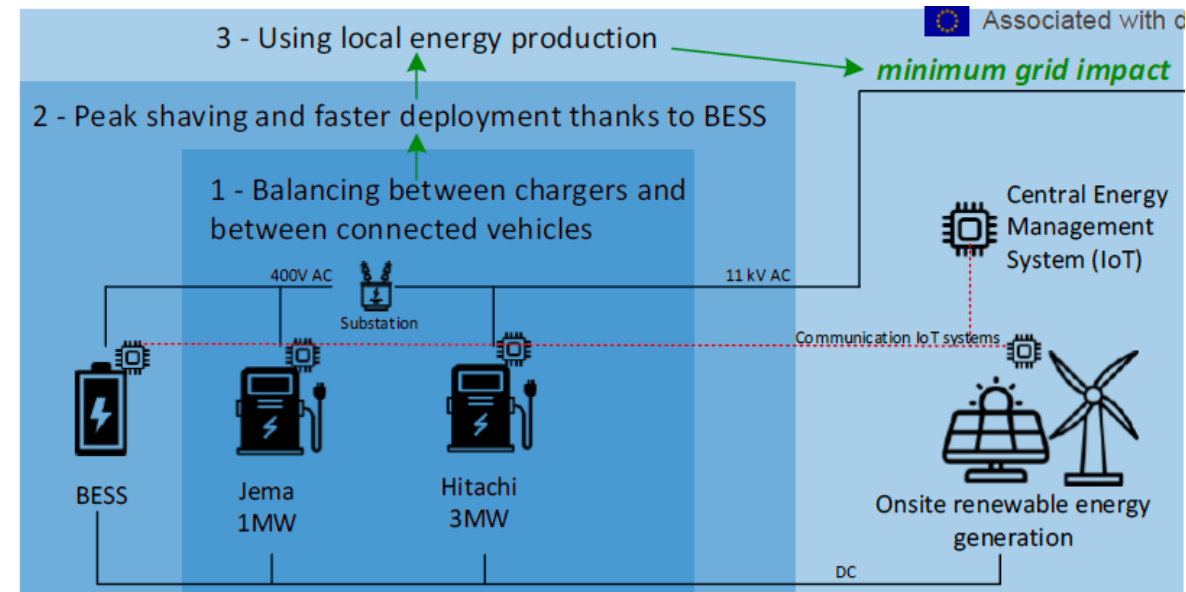
Key results & innovations

KR4 – Central and interoperable **energy management system (iEMS)**

TRL 6 → TRL 8

KR5 – Package for mass deployment, incl. Planning and mapping tools, guidelines and handbooks

TRL 6 → TRL 8



Modular IoT system to connect and control all chargers/ESS

Demonstration

The FLEXMCS megawatt charging hub concept will be tested in **Karlsruhe**, Germany, assessing:

- Charging efficiency & energy savings
- Scalability of multiport megawatt charging systems
- Cost-effectiveness for logistics operators
- Integration with RESs (incl. PV)



Coordination team



Prof. Dr. Omar Hegazy

- Professor & Head of EPOWERS RG
- FLEXMCS Coordinator



Dr. Thomas Geury

- Senior researcher
- FLEXMCS Manager



Eva Flora Varga

- Senior project manager
- FLEXMCS Admin lead

Disclaimer



**Funded by
the European Union**

Project funded by



Schweizerische Eidgenossenschaft
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Federal Department of Economic Affairs,
Education and Research EAER
**State Secretariat for Education,
Research and Innovation SERI**

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This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI)