Needs for future policy and regulatory actions:

The eCharge4Drivers recommendations and guidelines towards sustainable charging investments and user-friendly electromobility

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Approach

3 main approaches

1. European **interview survey** of public authorities and charge point operators

- Covering:
  - Legal and best practice
  - Payment
  - Deployment rules and incentives
  - EV parking/charging spaces, reservations and enforcement
- 26 interviews conducted:
  - Covering 12 countries
  - 13 cities, 1 national government, 2 public agencies
  - 7 charge point operators
  - 3 consultancies / universities

2. Desk study gathering main **regulatory frameworks**

- Sample of 6 European countries and EU level

3. **Feedback from project partners** developing / demonstrating services in eCharge4Drivers

- Insights and recommendations based on experiences in the project, covering:
  - Challenges and deviations from the initial plans
  - Effectiveness of solutions and reasons
  - Insights and lessons learnt
  - Suggested best practices and recommendations for optimisation
  - Scaling up challenges and opportunities for future deployment
- Feedback on 11 solutions

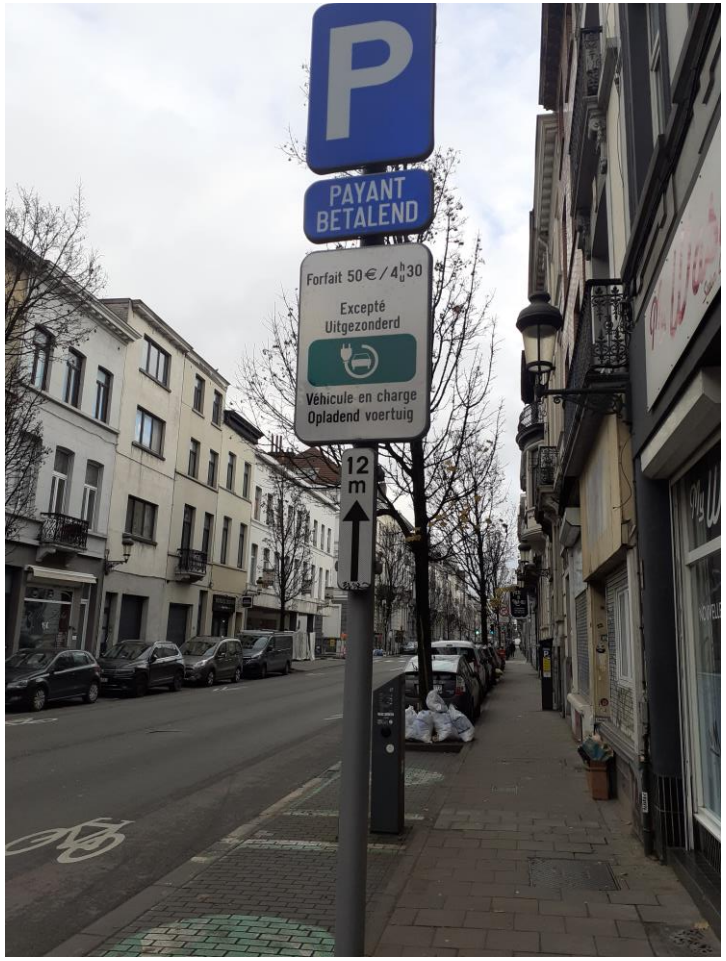
Perspectives and outcomes

Planning regulations

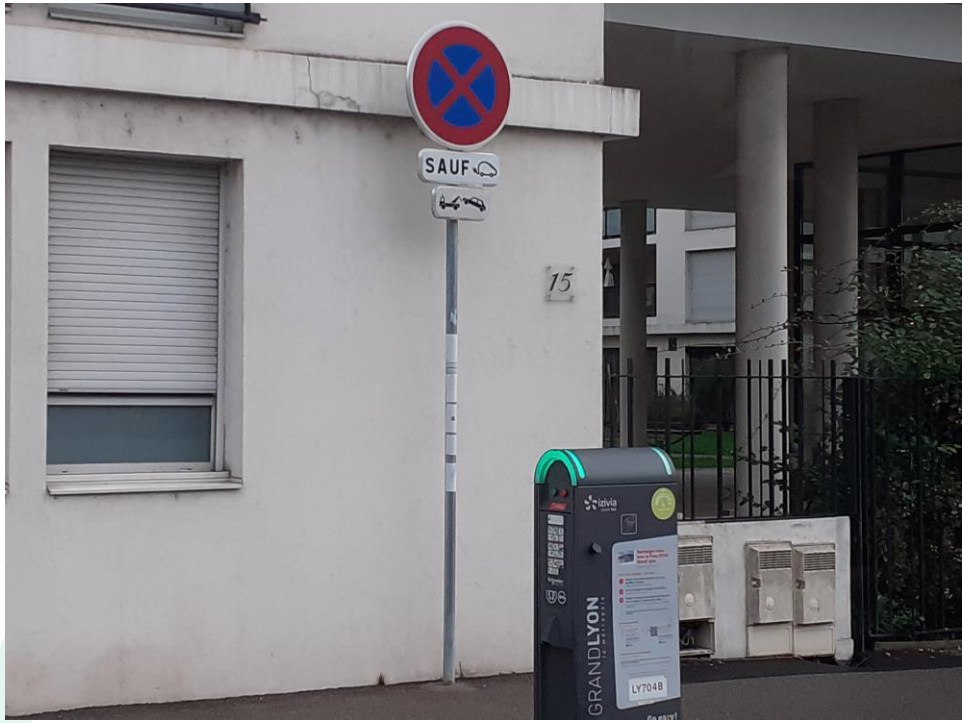
Most planning regulations apply to on-street parking/charging only

Examples:

- Minimum pavement width needed for on-street charging, e.g. 1.5m. Parking bay length (7-9m)
- Often parking laws can stipulate a space is for EVs, but cannot oblige that they are charging
- CP Operators sometimes have a contract with the city. City sets technical, design and operational standards



Electrical requirements



Examples:

- Socket / cable needs generally arranged via programme requirements in tenders, complying OCPP (Open Charge Point Protocol)
- Sometimes, authorities / operators had to replace chargers, as older models were not capable of smart charging and energy management

Operational regulations

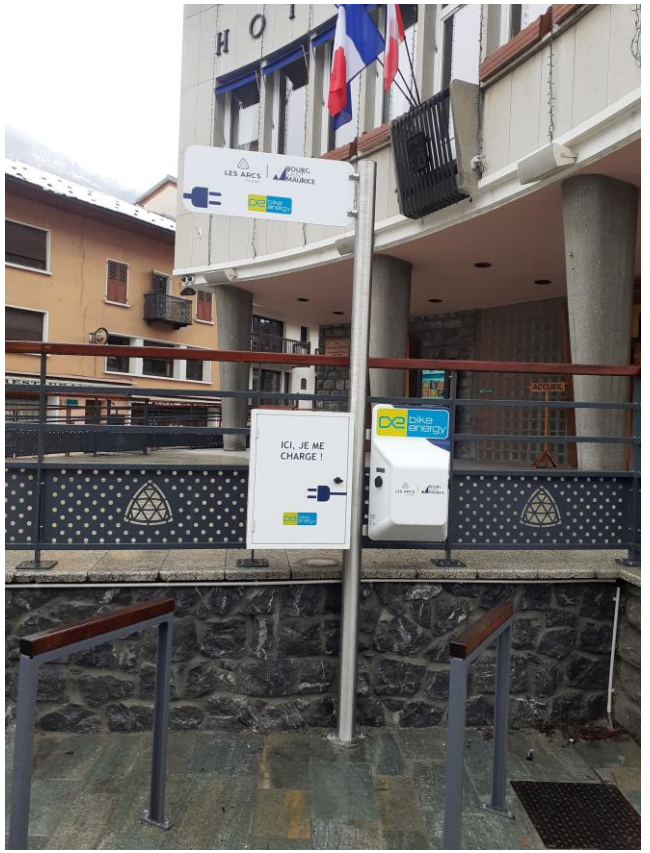
Examples:

- Safety, cyber-security, accessibility regulations, etc. usually defined at national level
- Often a national data platform or obligation to share data with city through API
- Often a requirement for regional / local authorities to manage the delivery of EV charge points. Risk that private sector may only concentrate in the high demand locations
- Instances of criminal gangs putting stickers on CPs with fake QR codes for payment
- Maintenance standards for operators

Public subsidies for installing Charge Points

Current situation

- **Home charging**
  - Yes in most cases (national level)
  - Discontinued nationally in Germany
  - Up to 80% of the purchase cost for private homes in Italy (€1500 max for houses, €8000 EUR for apartments)
- **Public charging**
  - Mixed responses. Grants or local funds in some areas, nothing in others
  - Service concession with a power company (Lille, France)
- **Charging at commercial and business premises, educational sites, etc.**
  - Also mixed. Up to 40% of purchase and installation (Italy). National scheme suspended in France
  - Grants in some countries. Others consider it unlawful aid to the private sector



Selected partner feedback on effectiveness of solutions

User-friendly Charging Stations

Effective

- Longer and weight-supported charging cables
- Physical accessibility (including for wheelchair users)
- Connector identification with unified labels
- Reliable, accurate metering of energy delivered to the EV

Less effective

- Plug & Charge (unclear standardisation)
- Large displays (from 7 inch up to a 32 inch)
- Reservation (unclear business model for CPOs)

Selected partner feedback on effectiveness of solutions

Battery swapping

Effective

- Designing stations to host different battery tech to mitigate lack of standardised batteries across manufacturers, serving more vehicles
- Securing suitable sites through location scouting and early stakeholder engagement, minimising installation delays

Less effective

- Relying on existing public transport infrastructure for integration with e-scooter sharing

Selected partner feedback on effectiveness of solutions

Charging on lamp posts

Effective

- Connecting to the electrical cabinet directly instead of the lamp post itself to get 24 hr power supply

Less effective

- Remote management is too expensive to control power supply to leave network powered 24 hours a day.
- Passing a 2nd cable through the sheaths but cluttered even after using a specific vacuum cleaner

Selected partner feedback on effectiveness of solutions

Enhanced booking service

Effective

- Implementing business rules to the reservation system > greater flexibility in managing reservations and adapting
- Designing reminder and notification processes > enhanced UX, communicating reservation status to customers
- Involve external CPO with wall-box enabling reservation

Less effective

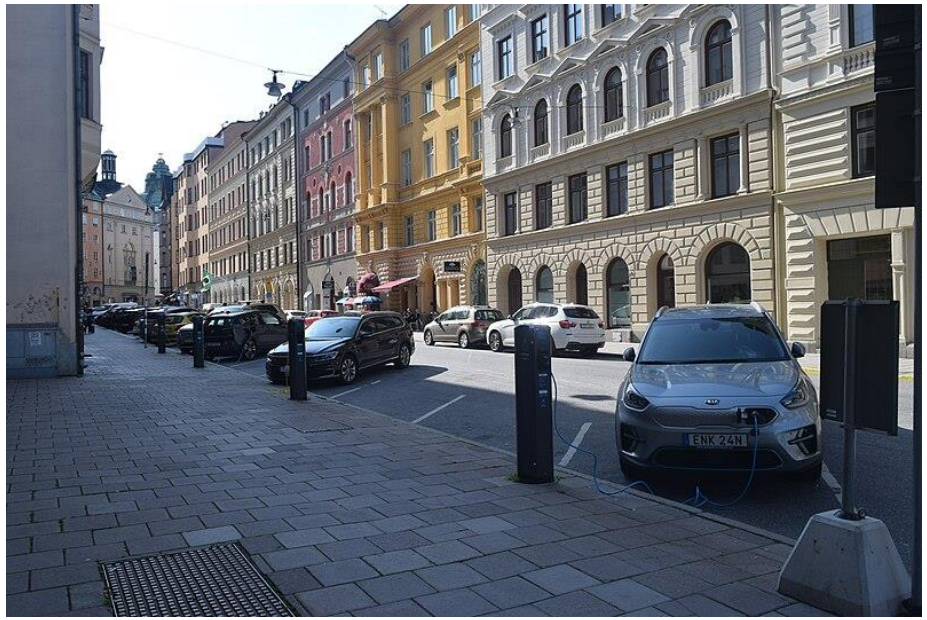
- Penalty for occupied sockets: proved ineffective and potentially detrimental to customer satisfaction. Created frustration for customers and did not effectively resolve issue of socket occupancy.
- Reliance on SMS notifications: not an efficient solution. Some customers turned off app notifications.

Recommendations and guidelines

Core recommendations

Planning:

- Design guidance, including for specific zones like heritage areas
- Clearer differentiation in regulations between public street charging and off-street
- More fast charging infrastructure along highways & at destinations to reduce need for slow charging infrastructure on city streets



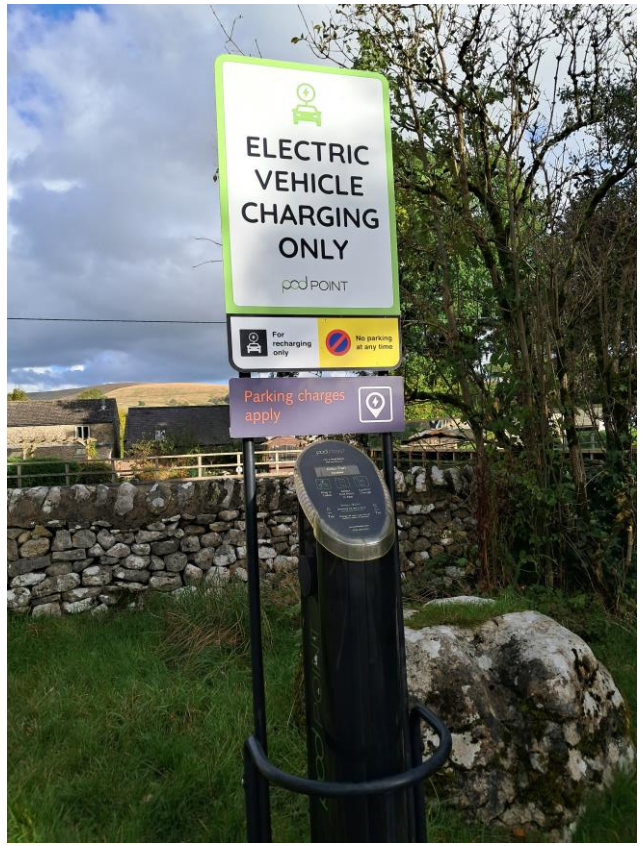
Electrical:

- Plan for increased need for grid connections
- Achieve harmonisation on requirements for a new grid connection between all DSOs (Distribution System Operators): >800 DSOs in Germany operating a low voltage grid; many have their own requirements/ processes: Complex for CP Operators

Core recommendations

Operational:

- Permit/ licensing system to ensure even/fair cover of charging infrastructure
- Streamline location planning for Charge Point Operators
- Future integration with public transport and Mobility as a Service (MaaS); company mobility managers
- Dynamic information on availability, price, accessibility
- Involve interest groups in the project and pricing structures



Guidelines on charging technologies

User-friendly charging stations

- Ensure interoperability between all EVs and chargers
- Need for Protocol standardisation
- Close cooperation of players in the e-mobility ecosystem is needed

Charging points on lamp posts

- Need political support from public authorities
- Need of anticipation, long preparatory work with involvement of the cities (services in charge of public lightning)

Guidelines on charging technologies

Battery sharing for light electric vehicles

- Upfront planning, particularly in location selection, to ensure accessibility, internet connectivity, and power sources are available
- Battery standardisation and interoperability is crucial for scaling up
- Modular and scalable infrastructure to support different battery types
- Implement robust training programmes for staff and users:
  - For smooth operation and maintenance
  - Enhancing the overall user experience and service adoption
- To ensure consistency and quality, Standard Operating Procedures should be developed and enforced across all stages of deployment, from site selection to installation and maintenance

Guidelines on charging services (examples)

Advanced charging authentication - ISO15118 PnC (Plug & Charge)

- Need regulation of interoperability
- Invest in internal testing tools and capabilities, prioritising interoperability with industry-standard protocols, and establishing clear protocols for communication and collaboration with partners
- Need for a dedicated person/ team expert in ISO and ecosystem
- Cross-company collaboration necessary: dependency on other companies for testing, etc. can delay deployment process

Enhanced booking service enabling better exploitation of the public charging network

- Partners: early and clear communication and collaboration to successful integration and service implementation
- Booking service easy to deploy short-term. Long-term, CP Operator should manage it and inform users
- Invest in training for end-users, providing accessible support channels for troubleshooting, regularly evaluating, and updating deployment strategies based on feedback and lessons learnt
- Standardised procedures, regular quality assurance checks, and continuous improvement and accountability

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