

How to develop smart EV charging infrastructure

A guide for public authorities

With the [Alternative Fuels Infrastructure Regulation \(AFIR\)](#) now in force, national, regional and local authorities need to get EV grid integration right from the outset.

Below we present the building blocks to ensure public EV charging is accessible, transparent, and affordable for all users, contributes to greater flexibility in the energy

system and helps public authorities meet decarbonisation targets.

Smart charging can help integrate more renewables, use existing grid infrastructure more efficiently to connect more grid users, and reduce system costs. By shifting EV charging load that is flexible (and most of it is), every electricity user benefits from lower overall system costs.

Pricing

The guiding signal for adapting charging.

Make user costs and benefits transparent

- **Time-varying prices are needed** to signal grid and system needs and provide consumers reliant on public charging infrastructure with lower-cost charging options.
- By shifting EV charging, users save on charging costs, help alleviate pressure on the grid and support the integration of renewables. **This reduces costs for all electricity system users.**



Planning

Plan with the grid and users in mind for quicker rollout, better experience and more cost-efficient operation.

Include smart charging in planning

- Ensure the right type of EV charging infrastructure is built **based on current and future user needs, feasibility, and benefits** for the grid, transport, energy, and users. Especially locations where cars typically park for longer periods of time, allowing for flexible charging.
- Consider **smart charging in planning by addressing flexibility** to include new chargers in limited capacity areas and to make local grids smart charging-ready.



User at the centre

Putting the user in control.

Focus on the user

- Look at different needs for different users, such as professional drivers, and ensure coverage in underserved areas.
- Give users information and control over smart charging, so that users can choose and be informed about options.



Market access

Taken together, EVs are like a large power plant. Give them equal market access.

Ensure equal market participation for EVs

- Distributed energy resources (DERs) such as **EVs should be allowed to participate in all energy markets** — also ideally for local flexibility — as they're a readily available and highly responsive flexible resource to the grid.





Pricing

Electricity market prices and grid tariffs are powerful signals to match demand with available (renewable) energy supply and (local) grid capacity. Most EV charging is flexible. Getting the price signals right — as well as ensuring price signals are available to users and the service they use to manage their charging flexibility — can facilitate shifting that charging to more favourable times for both the grid and the user.

Time-varying pricing could be made available as upsides-only offers or dynamic pricing. It should be offered in line with AFIR provisions, which are non-discriminatory to users charging ad-hoc. Time-varying pricing should also be accessible to Mobility Service Providers that can offer a range of smart charging models, allowing consumers who prefer stable prices to benefit from overall cheaper rates as well as users open to using dynamic pricing.

See: [Flex and the city: Cities need dynamic pricing for public charging](#)



Planning

Aligning charging infrastructure planning with available grid capacity will reduce costs and increase speed. A good understanding of EV drivers' (future) mobility behaviour helps build a cost-effective charging infrastructure that meets user needs. Taking into account the flexibility potential of EVs can ensure better utilisation of existing grid infrastructure.

With better visibility of forecasted demand and planned charging infrastructure, grid operators should take that into account in their network planning. Transparency on the planned rollout also ensures a speedier permitting and grid connection procedure. Cooperation with all relevant stakeholders, such as charging point operators offering private or public charging infrastructure on private ground, can improve planning.

See: [Distribution grid planning for a successful energy transition - Focus on electromobility](#)



User at the centre

Addressing the needs of users in the planning and operation phase of public charging infrastructure enables more citizens to switch to EVs. Increasingly, EVs become available for wider user groups. This means that demand for public charging will evolve over time. Public authorities should ensure coverage especially in underserved areas and be responsive to increasing demand (or signals on shortage of charging accessibility). Professional drivers, such as those with taxi, ride-hailing or delivery vehicles, as well as carsharing vehicles, sometimes also need public charging infrastructure for overnight recharging.

Other users, however, need fast recharging options to allow multi-shift usage of the same vehicle.

Informing users about charging prices — as well as the availability of renewable energy on the system — and grid capacity at different times, helps them optimise. With the right tools, such as apps from Mobility Service Providers and other flexibility operators, flexible charging can be automated within user preferences. Giving users the freedom of choice is important to making public charging infrastructure work for everyone.

See: [The time is now: smart charging of electric vehicles](#)



Market access

Batteries-on-wheels have an important role to play in meeting climate goals: their flexibility allows the electricity system to decarbonise faster and at a lower cost for all. Just like users of private infrastructure already can, users of public charging infrastructure — especially when they park for longer— should be able to use their EV batteries to access electricity markets and provide grid services in the same way as large traditional power plants. This applies both to smart as well as to bidirectional charging. Within local energy communities, EVs can also play a role in providing wider access to low-cost renewable energy and creating local value.

See: [Enabling two-way communication: Principles for bidirectional charging of electric vehicles](#)

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