UNLEASHING THE FLEXIBILITY OF ELECTRIC VEHICLES

Targets and policy recommendations for the AFID and EPBD revisions

The opportunity to integrate Electric Vehicles in the power system as a Decentralised Energy Resource

While mobility is ultimately the primary purpose of road vehicles, the energy system is becoming an increasingly relevant factor.
The electrification of the transport sector - a crucial step towards climate neutrality - requires the integration of transport and energy, as confirmed in the Impact Assessment accompanying the 2030 Climate Target Plan by the European Commission.

The electricity system cannot cope with the increased uptake of electric vehicles (EVs) unless their use of the electricity system is smartly managed.
If charging is not managed smartly, EVs could be a burden to the energy system, particularly in congested zones and during peak hours.
If charging is done smartly, EVs become Decentralised Energy Resources which:

- extensively interact with homes, buildings, the grid,
- align with variable renewable electricity generation patterns,
- provide a full range of flexibility services to the benefit of end-users and the entire energy system[1].

Three fundamental conditions should be respected to enable the integration of EVs in the power system and activate their demand-side flexibility potential:

- EVs should allow smart charging,
- Charging and network infrastructure should not prevent it,
- Both TSOs and DSOs should procure flex services from EVs along with other decentralised energy resources.

By unlocking the demand-side flexibility of EVs, both consumer empowerment and the efficiency of the overall energy system increase to achieve climate neutrality in the most cost-effective way.

Already back in 2016, while accompanying its proposal for the Electricity Market Design to eliminate barriers to demand-side flexibility, the European Commission itself calculated that 5.6 bn Euros could be saved annually by avoiding investments in unnecessary grid reinforcements, back-up generation capacity and fuel costs.
A correct and timely implementation of the Electricity Market Design by 2020 in all Member States is essential to unlock the demand-side flexibility potential in Europe and foster innovative business models such as the aggregation of EVs along with other decentralised energy resources.

To ensure consistency with the Electricity Market Design and the recent Energy System Integration Strategy of the European Commission, we call the European Commission to take into account our recommendations to enable smart charging in the forthcoming revisions of the Alternative Fuels Infrastructure Directive (AFID) and the Energy Performance of Buildings Directive (EPBD).

When shaping these revisions, EU policy-makers should realise that all forthcoming EU legislative revisions would be implemented around 2025[2] in a different context for e-mobility than today. EV production is expected to rise six-fold between 2019 and 2025[3] and the development of e-mobility technologies and services will be much more advanced.

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[1] For more information: BloombergNEF, EATON, Statkraft "Sector Coupling in Europe: Powering Decarbonisation – Potential and Policy Implications of Electrifying the Economy", February 2020 (section 7)
[2] If the Commission proposes the AFID revision in Q2 2021, the EU co-decision process could end by 2022/early 2023, the publication on the OJEU could happen in 2023 and the deadline for national transposition could be set by 2025.
[3] Transport & Environment, Electric Surge, 2019, https://www.transportenvironment.org/publications/electric-surgecarmakers-electric-car-plans-across-europe-2019-2025

To unlock the demand-side flexibility of EVs, the co-signatories call the Commission to enshrine the following set of targets and provisions in forthcoming EU legislations:

- **Revision of the Alternative Fuels Infrastructure Directive (AFID)**

The AFID revision should be the *lex generalis* for smart charging. It should be supported by a clear definition, a simple target, a logical scope and a mix of specific policy measures.

DEFINITION
A clear definition should be enshrined to overcome the current misunderstandings among e-mobility players. Specific provisions and target formulations for smart charging in AFID and other EU legislative frameworks, e.g. EPBD revision, should refer to this definition set at EU level.

We recommend defining "smart charging" when the charge of an EV can be remotely measured and controlled.

Two types of smart charging are contemplated:
- V1X: When the charging of the vehicle can be controlled, slowed, accelerated, stopped, or postponed. V1X services stop once the battery is full. It can be performed either by a vehicle, a charger or an Energy Management System.
- V2X (Vehicle-to-home/building/grid): When the vehicle can exchange energy with the connected home, building or grid in two directions, charging or discharging, as long as it is plugged-in.

In this light, "smart charging" capabilities covers both V1X and V2X. Charging technology should not lock-in V1G and allow for a future-proof innovation path to V2X capability.
This definition should apply to both public and private charging, the smart capability being independent to the ownership of assets.

TARGET
All chargers should be smart-ready to enable the integration of potentially all EVs in the power system as Decentralised Energy Resources.

This simple target has multiple benefits:
- Clarity - easier to communicate,
- Increase public interest - easier to remember and engage society than regulatory frameworks and incentives for viable business models,
- Increase private interest – it provides a strong investment signal to investors, manufacturers and operators,
- Strategic direction – specific policy measures would support the achievement of this clear target.

For an optimum update of smart charging and achievement of this target, it would be essential to:
- consider the evolution in EV uptake,
- differentiate between new and existing parking slots,
- ensure an alignment of this target with requirements set for buildings to unlock a full energy system integration,
- consider the status of the electricity system (i.e. possible congestion areas, digitalisation and flexibility of the grid),
- align the smart charging deployment with emerging local flexibility markets and availability of renewable resources,
- support this target with incentives to foster the smooth integration of EV in the energy system,
- allow a certain degree of flexibility in national target setting to reflex national contexts,
- define intermediary milestones to support a roadmap to increase the "smartness" of charging.

SCOPE

All EV owners should be offered an option to unleash the full flexibility of their EVs by 2030.

The clean energy transition will be a success if all end-users benefit from playing an active part in it. Along with other prosumer business models, EV drivers should be enabled and rewarded for using their vehicles as a Decentralised Energy Resource that can flexibly adapt its electricity flows in response to prices and incentives and by doing so, optimising their energy use while supporting a cost-effective penetration of variable renewables in the system and avoiding unnecessary grid investments.

SPECIFIC POLICY MEASURES

- The existing principles set in art. 32[4] and 33[5] of the Electricity Directive should be complemented and reinforced in the AFID revision to require DSOs to systematically consider EVs, smart charging and the broad nature of services they can provide among the possible alternatives to grid reinforcement.
  In addition, as EVs should be integrated into the electricity system by market participation rather than by DSO control, by 2027 DSOs should adapt all technical procedures to allow smart charging market access to procure flexibility services and avoid unnecessary grid reinforcement.

  To favour the procurement of flexibility services from EVs and other Decentralised Energy Resources, DSO should move away from using standard profiles towards a dynamic system that relays on intelligent power monitoring on the low voltage level and the smart interpretation of such values. By enabling this visibility of load profiles, DSO will be able to measure the overall benefits of smart charging.

- To increase the penetration of renewable electricity in the e-mobility sector, avoid renewables curtailment and ensure that EVs consume mainly renewable electricity when it is abundant thanks to smart charging, the AFID revision should complement the Renewables Directive by requiring each Member State to set a target based on the ratio of "Total installed smart charging power" (both public and private) over "Peak capacity of installed renewables". "Total installed smart charging power" would equal the number of smart chargers and smart charging capable EVs weighted by the maximum power they are capable to adjust. The national target should be at least 60%[6], it could be differentiated for each Member State (considering both energy mix and size of EVs fleet) and could evolve to take into account the increase of renewable share in the generation mix.

- To speed up deployment of smart charging, require the revision of relevant national rules set by competent authorities to complete 50% of the grid connection and approval process under a week and 100% within a month whether it is a new grid connection for a charging station or a modification to an existing grid connection to allow EV charging or make it bidirectional for V2X charging.

- 100% of electric vehicles owned by public entities should be able to charge smartly, with public procurement rules for vehicles and public charging infrastructure purchase by central, regional and local authorities favouring the acquisition of bidirectional capabilities that can benefit society as a whole when they are parked.

- To set a uniform regulatory framework from a taxation point of view and allow for the optimum use of V2X capabilities, complement art. 15.5 of the Electricity Directive by requiring that V2X (charging and discharging) operations, just like energy storage facilities, should not be subject to any double taxation or levies.
  Today V2G activities are either undefined or classified as consumption from a taxation perspective in certain Member States. This undermines the development of bidirectional charging.

[4] Incentives for the use of flexibility in distribution networks
[5] Integration of electromobility into the electricity network
[6] For example, a country with 1 million smart chargers installed, of which 50% 7kW and 50% 22kW, plus 300,000 EVs with 11kW on-board smart charging, and 30GWp of installed renewables, would have a ratio of 59.33%. ((0.5x1x7)+(0.5x1x22)+(0.3x11))/30). Bidirectional capable chargers (on-board or off-board) could count double if they can charge or discharge at the same power. For example, the current French NECP aims for 113GWp of renewables and French TSO RTE modelled scenario for 8 million EV. With the assumption of only 7kW smart charging capability per vehicle, it would translate into a ratio of 49.5% ((8mio*7kW/113GWp) which would fall short of a target of 60%. Thus there would be an incentive to foster bidirectional charging or higher power smart charging capability to bridge the gap.

- When available, international and European smart charging standards should be implemented to support the regulatory and technical requirements to integrate EVs as flexible assets and ensure an interoperable, seamless and secure charging system.

- **Revision of the Energy Performance of Buildings Directive (EPBD)**

The existing requirements set in art. 8 EPBD should be complemented by mandating smart charging capabilities integrated in the Building Automation and Control System for all common new and renovated charging infrastructure in multi-family and non-residential buildings. This would entail only little additional costs to end-users as in 2025 the marginal difference in investment costs between normal and smart charging would be less than €50[7].

In view of the development of actual performance quantifications on the carbon footprint of buildings[8], wherever parking spaces are present on-site, require that the share of building flexibility achieved with smart charging is proportionate to the share of EV chargers in the building's total load. This would mitigate the fact that the biggest energy load in buildings will soon be in parking lots: charging an EV to drive a daily distance of 40km would increase by 80% the daily demand of average EU household consumers[9].

[7] Estimates calculated by smartEn members

[8] smartEn backs the evolution of the Smart Readiness Indicator (SRI) for buildings from a qualitative to a quantitative tool as well as the development in 2023 of a Building Digital Logbook which provides dynamic data on the actual carbon performance of buildings, including their actual flexibility performance. In smartEn Position Paper "Towards a Quantification of the Demand-side Flexibility of Buildings" (October 2020) we propose to measure the actual flexibility performance of a building based on a set of metrics: kWh of dispatched volume/time period to the market, kWh of offered volume/time period to the market and max kW capacity offered.

[9] www.smarten.eu/wp-content/uploads/2017/05/SEDC-Background-Paper-Smart-Charging-April-2017.pdf