

TAPPING THE VALUE OF SMART CHARGING

Electro-mobility Platform recommendations on the EPBD review Guidance Note and the Electricity Market Design

- **The impact of electric vehicles' deployment on the power system**

With a market penetration of 2% in Europe in 2018¹ and a total cost of ownership of Electric Vehicles (EVs) outperforming the total cost of ownership of internal combustion engine cars before the end of the year², the take-up of EVs is expected to speed up significantly in the coming years. The penetration of EVs is foreseen to grow to 4% of new car sales in 2020 and reach 63% of the new car sales in 2040³. Such an increase in electrification of transport will bring many benefits in terms of air quality but will also lead to many challenges.

A critical mass of EVs on the market will impact electricity consumption patterns and lead to **an increase of overall electricity demand**, particularly during peak times. As most of the charging is expected to occur at home, in parking lots at the office and in electro fuel-stations, **a rapid increase in decentralized and local loads, if not managed properly**, can challenge the current low-voltage distribution grids notably in residential or commercial areas⁴. Ultra-fast smart charging, which will increase the access to EVs by allowing long distance trips, anticipates challenges for Transmission System Operators (TSOs) and Distribution System Operators (DSOs).

- **What is smart charging?**

“Smart charging of an EV is when the charging cycle can be altered by external events, allowing for adaptive charging habits, providing the EV with the ability to integrate into the whole power system in a grid- and user-friendly way”⁵. Smart charging facilitates the security (reliability) of electricity supply while meeting the mobility needs of the user. Different levels of smartness are possible, depending on business solutions and the level of involvement of the consumer: EV charging can be planned to remove the additional EV load during peak hours, smart charging habits can be incentivized by price signals (e.g. with flexible tariffs, or dynamic pricing). The EV battery could also release electricity and feed it back to the grid at peak times of the day with bi-directional charging and vehicle to grid technologies (V2G).

- **Benefits for the power system and beyond**

Smart charging is an important asset to energy management in the energy system of the future. By shifting the electricity demand, smart charging can lower the load pressure and consequently enable a more efficient integration of EVs in the power system as well as renewable power. EV batteries can also help balance the grid in times of peak demand and provide valuable flexibility services to network operators, thus reducing households' electricity bills and EV user's total costs of ownership while facilitating the integration of renewable energy into the system.

Managing EV charging will help optimize the use of existing transmission and distribution network and will provide an alternative to the reinforcements of the grid, leading to both lower grid tariffs per unit usage⁶

¹ <http://www.ev-volumes.com/country/total-euefta-plug-in-vehicle-volumes-2/>

² USB Bank report cited in the Telegraph, <https://www.telegraph.co.uk/business/2017/05/19/electric-vehicles-cost-conventional-cars-2018/>

³ BNEF, “Long term electric vehicle outlook 2018”, 2017

⁴ Smart charging: integrating a large widespread of electric cars in electricity distribution grids – EDSO, 2018

⁵ CEN-CENELEC-ETSI Smart Grid Coordination Group: Smart Charging of electric vehicles in relation to smart grid, 2015

⁶ kWh or kW or a mixture of both, depending how the grid tariffs are charged

and a higher global social welfare. Calculations made by Enedis (the French DSO) show that low voltage grids reinforcement will be largely offset thanks to smart charging, enabling about 770 million euros savings in France compared to infrastructure reinforcement needs without smart charging and only assuming an average of 1 million EVs. At the TSO level, the French generation adequacy report produced by RTE (the French TSO) shows that if 60% of the EV fleet is able to “smart charge”, it would capture significant and sufficient benefits for the system⁷.

Furthermore, depending on the EV driver’s preferences and provided that the electricity market is well designed, **smart charging will allow the consumer to financially profit from variable charging tariffs**, which could optimize the cost of charging, **or from its participation in all electricity markets**⁸.

Smart charging could support the integration of renewable electricity into the power system. By making the load more flexible, smart charging technologies can reduce the constraints of intermittent renewable energies for system operators. At the distribution level, they enable a reduction of the congestion, and at the transmission level, they participate to the balancing of the whole system. By absorbing excess renewable energy, smart charging could also avoid curtailment of renewable energy. Smart charging allows to maximize self-consumption, when the EV driver is a prosumer and disposes of e.g. his own PV installation. Smart charging will therefore constitute a key enabler to strengthen future synergies between transport, digital, and energy sectors, supporting Europe’s energy transition and fostering technological innovation.

- **Supporting the deployment of smart charging**

The Platform for Electro-Mobility recommends that **EU and Member States’ policy-makers encourage and develop policies in support of smart charging** to unlock all the benefits it can deliver to the electricity system and to society at large. In this sense, two legislative opportunities should be grasped: the implementation of the revised Energy Performance of Buildings Directive (EPBD) and the review of the Electricity Market Design as part of the Clean Energy Package.

IMPLEMENTATION OF THE REVISED ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE

Member States shall soon bring into force the laws, regulations and administrative provisions necessary to comply with the EPBD review which foresees, in article 8, some timid provisions supporting the development of e-mobility.

Some binding requirements are set for the installation of charging points and ducting infrastructures in buildings, but there is no reference nor obligation for charging points to be capable of “smart charging”.

The Platform for Electro-Mobility calls on the European Commission to include in its Guidance Note for the implementation of the revised EPBD the following recommendations to Member States:

- **Set ambitious requirements in public as well as private charging infrastructures, beyond the minimum provisions** outlined in the EPBD revision to promote the uptake of smart charging. The potential of equipping public and private charging points with the necessary technical and communication devices to manage the smart charging process should be assessed through a cost-benefit analysis, in particular at the low-voltage level where most of the charging is taking place. Clear national rules should be set to achieve this goal.

⁷ RTE’s Generation Adequacy Report 2017 (“Bilan Prévisionnel 2017”) shows that if 40% of the EV charging is natural, 30% obeys to a tariffs signal (as time-differentiated tariffs) and 30% is done using more advanced optimisation of the charging, the additional load to the national load and in particular peak load is more manageable for the TSO.

⁸ For instance, it is estimated that V2G could offer net benefits up to €650 per EV per annum in the UK and France for a 7kW charger (source: Fuelling Europe’s Future, How the transition from oil strengthens the economy. Cambridge Econometrics 2018)

- **Revise building codes** to be more e-mobility friendly and ensure the “right to charge” for condo owners and tenants to help overcome non-financial barriers.
- **Ensure customers are well informed and incentivized** to become more engaged and participate with fair reward in smart charging schemes. It is equally important that customers have the necessary tools.
- **Ensure interoperability, harmonized standards and protocols among the infrastructures and systems** to enable seamless communication between all actors: consumers, system operators, service providers and aggregators.

REVIEW OF THE ELECTRICITY MARKET REGULATION AND DIRECTIVE

Buildings are not isolated energy infrastructures but shall be connected to and interact with the grid: smart charging should be put in this perspective. Therefore, in addition to the above-mentioned recommendations related to the implementation of the revised EPBD, the provisions of the Electricity Market Design should fully eliminate the existing regulatory barriers preventing smart charging to become a real demand-side flexibility tool and to enable a further integration of renewable energy.

E-mobility must indeed be contextualized in the EU’s broad energy policy agenda to increase renewable energy integration, providing new technological opportunities for consumers that can actively participate in electricity markets through demand response, self-consumption and storage. These objectives equate to support the decarbonization of the energy system, to increase system efficiency and to provide value for money to end-users and bill payers.

As the legislative proposals move along triologue negotiations, it is key that this framework maintains such positive principles while it improves on other aspects.

The Platform for Electro-Mobility calls on the triologue negotiators on the Electricity Market Design to take in due account the following recommendations:

- **Tariffs and pricing structures should be smart and enable smart charging:** proper pricing of the charging service that EV users pay, as time-differentiated tariffs, is essential to promote energy efficient behaviors and to extract value from smart charging strategies. Dynamic pricing for the energy part of the bill is a necessary first step to provide effective price signals and level the playing field for electricity to compete with other fuels for transport. Network tariffs should also be designed to incentivize EVs to recharge when it is most efficient for the system; this may require, depending on local conditions, an adequate mix between fixed, capacity and volumetric components of the charges and a time-differentiated approach to be defined by NRAs at local level. In addition, Member States should consider the possibility to set a dedicated tariff to be applied just to charge points to enable competitive recharge service prices that will not hamper the deployment of EVs, especially in the early adoption phase.
- **Double-charging of taxes and levies on electricity generated from storage facilities should be avoided** as it adds an unnecessary burden: owners pay once when charging their storage asset (EV battery) and may pay again when they feed electricity back into the grid (V2G). Regulation should make sure that every kWh can be traced and is only taxed and “consumed” once.
- As a general rule, **TSO/DSOs shall not be allowed to own, develop, manage or operate new charging points for EVs**, except in the case of market failures which should allow for derogations: **system operators shall remain neutral actors** that safeguard the efficient functioning of the electricity market and leave this business opportunity to market parties.
- **Aggregated EVs should be able to participate in all electricity markets**, including balancing and capacity markets where technically feasible. To remove potential entry barriers, they should be subject to proportionate administrative processes. The design of trading products should take into account the specific capabilities that EVs can offer. In addition, **new standardized products should be developed** at least at national level and in a transparent way to capture the value of flexibility from EV charging points’.

New and open markets should also be developed for non-frequency ancillary services, as services that until now have been provided on a mandatory basis, such as voltage control, or new services that will be needed in the future, such as synthetic inertia. These services can provide further revenue for aggregated EVs sources and enhance the value for EV users. They also provide a competitive supply of services that are bound to become critical for the electricity system.

- **Ensure access to energy consumption data.** Availability of charging patterns to the EV energy supplier or EV aggregator is crucial for consumers to be offered the right tariffs needed to incentivize smart charging and for the system to be offered the most efficient services to participate to its balancing. This should include protection of consumer privacy and security and the consumers' access to their own data, notably in case of switching of service provider.