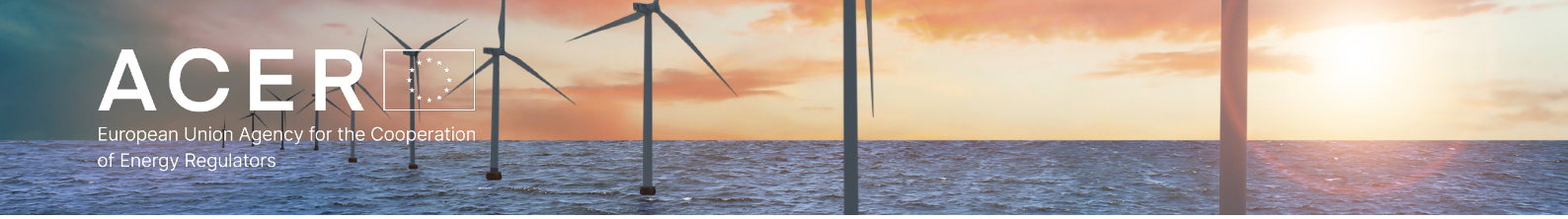

Roundtable on 27 November 2023 in Berlin on bi-directional charging

Remarks by the ACER Director

As the European Union (EU) strives for a decarbonised and resilient energy future, electric vehicles (EVs) with bi-directional charging capabilities emerge as a pivotal solution in that transition. The following outlines some of the benefits and challenges of bi-directional charging and the need for action by governments, regulators, system operators, and businesses.

The challenge ahead: rapidly rising flexibility needs

By 2030, flexibility needs will double in a European electricity system dominated by renewables (see e.g. the recent joint ACER-EEA report on flexibility solutions). It is therefore imperative to adapt the energy system at scale to provide adequate flexibility resources such as those provided by EVs with bi-directional charging.

Integrating EVs with bi-directional charging in the electricity systems is a multi-facetted challenge, encompassing technical, market and legal elements.

Integrating EVs with bi-directional charging at large scale is complex.

- First, its integration should not endanger system stability, for which harmonised grid connection requirements are a pre-requisite. TSOs, ENTSO-E, ACER and other stakeholders are driving the process **to update the EU grid connection codes** governing such pre-requisites.
- Second, EV batteries have the potential to provide flexibility services, ranging from congestion management to system balancing. Markets need to evolve accordingly to ensure that innovative technologies such as EV batteries can effectively participate in the provision of such services. The EU DSO Entity, ENTSO-E, ACER and other stakeholders are driving the process for a **new EU network code on demand response** to enable such participation.
- Finally, Member States must put in place **a legal framework clearly defining the roles, responsibilities, and rules for new and small players**, including EV batteries, to participate in the market.

New entrants and small players, however, still face various obstacles that act as substantial barriers to use the flexibility potential they can offer. **ACER's upcoming report in mid-December on barriers to demand response and other new entrants and small actors** assesses a wide range of aspects hindering such participation. Besides these challenges, the preliminary findings of the report confirm that ensuring proper incentives through price signalling and full access to competitive retail markets remain key.

Opportunity for the EU electricity system and for business offerings

Considering that at least 3 million public recharging points serving 30 million zero-emission vehicles on European roads will be available by 2030, bi-directional charging represents a unique opportunity for the EU electricity system.

As a solution, it is well placed to contribute to system stability and to flexibility in a cost-efficient manner; it opens avenues for European businesses to offer innovative solutions at scale across multiple markets; it constitutes a key opportunity for consumers to be part of the energy transition. Currently, these opportunities remain largely untapped.

The need to address speedily and holistically legal, incentive-related, and market challenges

Addressing the challenges and the opportunities to unlock the full potential of bi-directional EV charging requires a collective and coordinated approach from governments, regulators, system operators, and businesses. The legal, regulatory and market framework around EV bi-directional charging needs to evolve at a comparable speed as the technological advances in this area. This means we all have to step up.

More specifically:

- **Governments** should enable supportive policy frameworks (including defining roles, responsibilities, and market access), tackle incentives, awareness, and infrastructure for widespread bi-directional charging adoption.
- **Regulators** should establish regulatory frameworks that facilitate market participation, ensure fair competition, and provide transparency on the needs and obstacles along the way.
- **System operators** should enhance grid connectivity and lift restrictions on balancing and congestion management services, allowing bi-directional charging to contribute effectively to those services. Equally important, they need to ensure that remuneration mechanisms remain market-based with robust price-signalling.

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ANNEX – Further technical background

INTRODUCTION

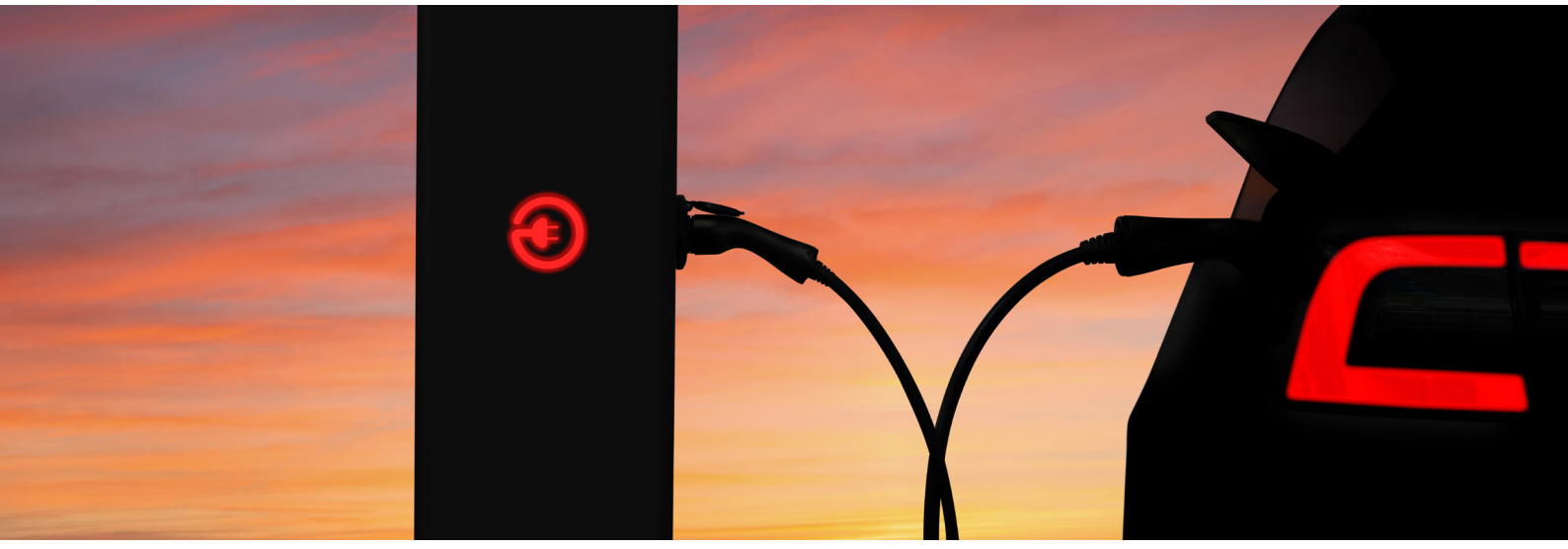
Bi-directional charging is a key priority for the future yet sits within a broader set of challenges to be tackled at both national and EU level.

There could be at least 3 million public recharging points serving 30 million zero-emission vehicles on European roads by 2030[1] and energy demand from e-mobility is likely to account for some 6 percent of Europe's total energy demand[2]. This represents a considerable challenge for ensuring both adequate infrastructure and the overall stability of the electricity system.

The problem of ensuring system stability can be split into two parts depending on the observation time: firstly, the electricity system design aspect where the behaviour of system users (e.g. autonomous reactions by generators and demand units) shortly after the occurrence of a wide scale incident (e.g. a system split) impact the system's dynamic behaviour e.g. frequency and voltage excursions. Without appropriate technical capabilities of system users, the system becomes unstable and the risk of a total blackout increases.

Secondly, system operators need to control the system parameters (frequency and voltage) and manage congestions in their networks in real-time continuously to maintain the normal system state. For the system operators to do that, they need to always have some resources available (reserves), with the capability to provide the required services (either frequency or voltage control related). Services were offered by the conventional power units, sometimes even under a mandatory and/or cost-based approach in the past. However, with increased penetration of renewable generation even at distribution level, the system needs have been changed, and the system operators are required to address them differently, including between TSOs and DSOs, especially for managing local congestions.

Moreover, the new resources, including electric vehicles, should also be allowed to provide such services to system operators. Hence, the set-up of market-based procurement of such services following EU-wide principles is also important.

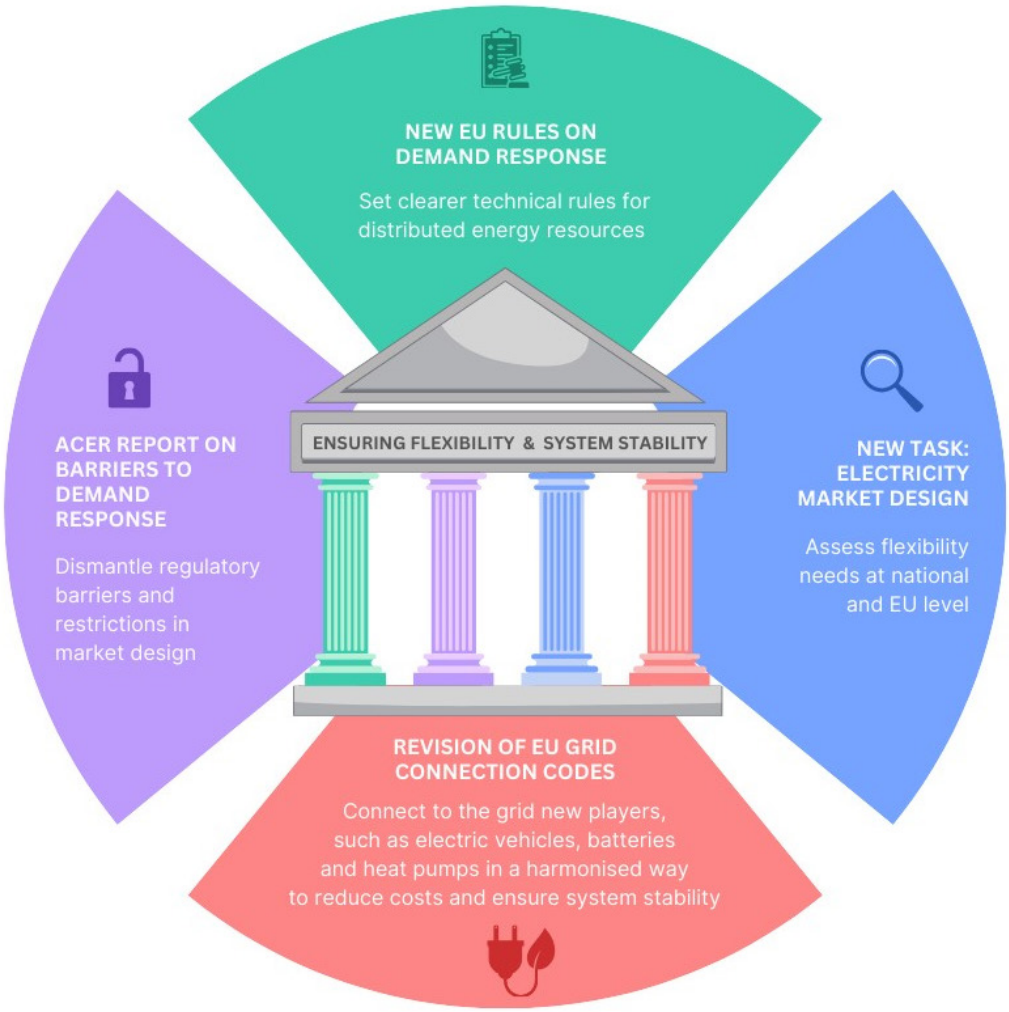


1 https://eur-lex.europa.eu/resource.html?uri=cellar:5e601657-3b06-11eb-b27b-01aa75ed71a1.0001.02/DOC_1&format=PDF

2 https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/europes-ev-opportunity-and-the-charging-infrastructure-needed-to-meet-it

Figure 1 represents the many ongoing efforts within the EU to get to a situation where the flexibility potential in the power system is massively increased – and for such potential to be utilised, drawing also on efforts to connect new system users such as electric vehicles to the grid, not least via revising the existing grid connection network codes.

Figure 1: Ongoing efforts to enhance flexibility & ensure system stability in the EU power system *(Source: ACER)*



To split these complimentary priority areas into separate components:

- The new **EU network code on demand response** aims to have clearer technical rules allowing all distributed energy resources to effectively participate in electricity markets.
- The upcoming **reform of the EU's wholesale electricity market design framework** is expected to introduce flexibility needs assessments, both at national and EU-side level, thus enabling better visibility of such needs and the means to procure them.
- **ACER's upcoming report on the barriers to demand response** to be published mid-December shows how Member States should target existing policy and regulatory barriers to enhance the uptake of demand response solutions.

Each effort is crucial to enhance flexibility and ensure the stability of the electric power system.

Possibly even more relevant for the purpose of the current bi-directional roundtable is the imminent revision of the EU Grid Connection codes.

EU GRID CONNECTION CODES

Early 2022, ACER initiated and worked closely together with stakeholders on the process for amending the existing grid connection network codes (GC NC). These target connection requirements for uni-directional (V1G) and bi-directional (V2G) electric vehicles (EVs) and charging assets (i.e. EVs and associated EVs supply equipment) providing system supporting functions without significant cost implications.

Stakeholders have broadly supported and contributed to the inclusion of such requirements at various steps of the process laid down in Figure 2 (ACER Policy Paper, 2022 full-fledged public consultation, electromobility public workshop).

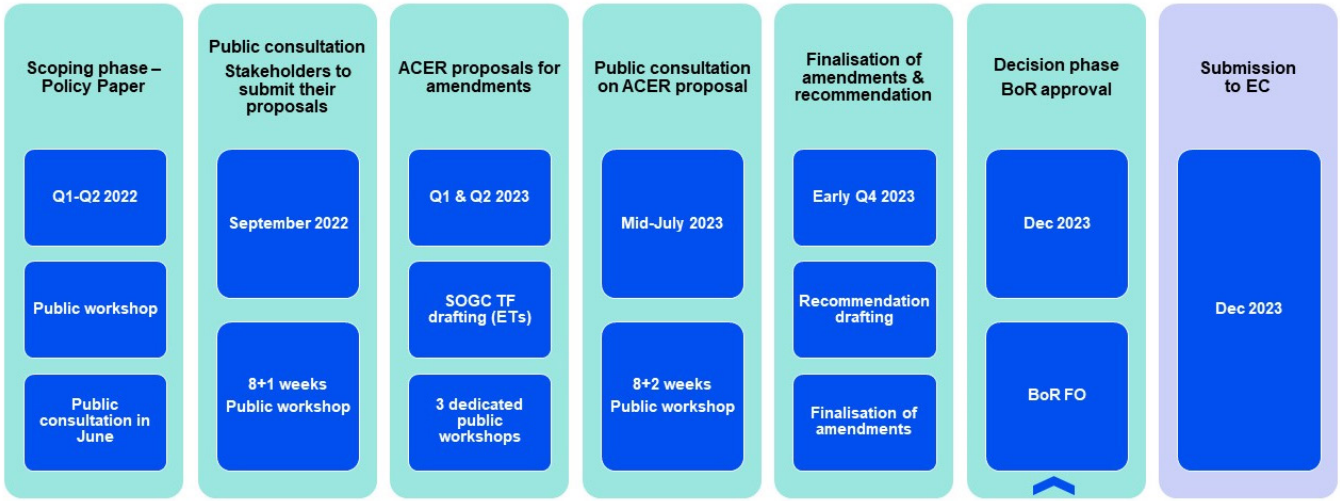
In the publicly consulted amendments of the GC NCs, ACER proposed harmonised requirements for V1G and V2G Evs as well as for associated EVs supply equipment below 1 MW capacity, targeting their autonomous behaviour shortly after a large-scale system incidents such as for example a system-split (ACER notes that the market related aspects are out of scope of the GC NCs).

The exhaustive requirements are proposed for the V2G EVs and associated V2G EVs supply equipment in the following main areas: frequency and voltage ranges, rate of change of frequency withstand capability, data interface for charging infrastructure, autonomous connection/reconnection, limited frequency sensitive mode at under/over frequency, voltage robustness and fault ride through capabilities. Similarly, the exhaustive requirements are proposed for the V1G EVs and associated V1G EVs supply equipment in the following main areas: frequency and voltage ranges, rate of change of frequency withstand capability, limited frequency sensitive mode at under frequency, and fault ride through capabilities[3].

The exhaustive, harmonised requirements for E-mobility actors will ensure:

- Unrestricted cross-border mobility and secondary market for EVs across the EU;
- Level-playing field and simplified demonstration of compliance which in turn will help bring down costs for the decarbonisation of energy and transport sectors;
- Stability of the electric power system while progressing to the climate-neutral society.

Figure 2: GC NCs amendment process *(Source: ACER)*



ACER has used stakeholder responses to inform its recommendation for the amendments to the GC NCs planned for the submission to the European Commission by the end of 2023, shortly concluding its internal procedures to this effect.

3 Please note that this is a high-level summary of the ACER amendment proposals whereas details can be accessed here.

FLEXIBILITY

Once the bi-directional charging is technically connected to the grid, rules and market access are needed so the flexibility[4] services of bi-directional charging can be used efficiently.

Current price volatility[5] and congestion costs[6] are clear signals for the value in having more flexibility in the market, for example through enhanced bi-directional charging. However, ACER has identified many barriers holding back the development (as well as good use cases) of bi-directional charging. Such barriers include[7]:

- The lack of a proper legal framework to allow distributed energy resources such as vehicles with bi-directional charging to access electricity markets and provide services to system operators.
- Unavailability or lack of incentives (e.g., price signal or reward) to provide flexibility. This includes the absence of smart meters that allow to participate in the market.
- Restrictions of any kind to provide balancing and congestion management services or to participate in capacity mechanisms. For example, it is difficult for any storage technology, such as bi-directional charging, to offer services when the remuneration is not market-based.
- Limited competitive pressure in the retail market or public interventions in the retail electricity prices.

DEMAND RESPONSE

Regarding the lack of a proper legal framework for allowing distributed energy resources to access electricity markets, ACER has been working on a new European regulatory framework since 2021, by submitting to the EC the Framework Guideline for a Network Code on Demand Response in December 2022. The framework guideline contributes to lifting the barriers for the participation of distributed resources to wholesale electricity markets, including:

- Requirements to be further specified and clarified at European level, including aggregation models, baseline and measurements, to facilitate EVs' participation among other resources, and ensure a level playing field for the participation in the electricity wholesale markets.
- European principles for the prequalification in order to simplify the processes, avoid duplications (either for different services, or for different system operators), and smoothen the process for standardised and mass-produced devices, such as EVs.
- Principles for the coordination of markets for local services (and their interaction with other markets), and between TSOs/DSOs, including harmonised requirements on data exchange.
- Requirements for the market-based procurement of congestion management and voltage control services, including harmonisation of products, procurement and pricing principles.

Based on this framework guideline, the EU DSO Entity alongside ENTSO-E is drafting the proposal for a new network code, to be submitted to ACER in the spring of 2024. ACER has six months to revise the proposal before submitting it to the EC. During this period ACER will consult the stakeholders on the draft proposal.

4 Flexibility is the ability of energy resources and consumers to change or adjust their consumption or production in response to price signals or to provide services to system operators.

5 A good illustration of a market opportunity of very high price volatility is the high number of hours with negative wholesale prices. The volatile shift between negative and high wholesale prices exacerbate such opportunity.

6 The significant rise in congestion rents and cost of remedial actions illustrate the increasing congestions. See ACER report on the Progress of EU electricity wholesale market integration.

7 ACER will publish a report on the barriers to demand response in mid-December.