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Guidance on Article 20a on sector integration of renewable electricity of Directive (EU) 2018/2001 on the promotion of energy from renewable sources, as amended by Directive (EU) 2023/2413

(C/2025/3699)

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1. Introduction

This document aims to provide guidance to Member States on the transposition of the provisions of Article 20a of Directive (EU) 2018/2001 ([1]) on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413 (hereafter referred to as "revised RED or the 'revised Directive'). Directive (EU) 2023/2413, which introduces Article 20a, was adopted by the European Parliament and the Council in October 2023 and entered into force on 20 November 2023.

The overall aim of the new Article 20a (and of the definitions contained in points (14c) to (14p) of Article 2) of the revised Directive is to facilitate energy system integration based on renewable electricity, and to ensure that the electricity system allows for a higher share of renewable electricity in a cost-optimal manner. Article 20a thus aims to achieve this by setting obligations regarding the access to data and market access. Specifically, it requires that:

— Transmission System Operators (TSOs) and, if possible, Distribution System Operators (DSOs) will have to make available information on the share of renewable energy and the greenhouse gas emissions content of the supplied electricity in their territory, in order to increase transparency and give more information to electricity market players, aggregators, consumers and end-users, including to electric vehicle users;

— Battery and electric vehicle (EV) manufacturers will have to enable access to information on battery management system to battery owners and users, as well as to third parties acting on their behalf;

— Member States will have to ensure smart recharging and, where appropriate, the interface with smart metering systems, if deployed by Member States, and bidirectional recharging functionalities for non-publicly accessible normal power recharging points;

— Member States will have to ensure non-discriminatory access for small and mobile storage assets to the balancing and flexibility services markets.

Member States will have to transpose Article 20a within 18 months after the entry into force of the amending Directive, namely by 21 May 2025. In that regard, the aim of this document is to provide guidance to Member States and their authorities on the application of these new provisions. It will help ensure timely transposition and implementation of Article 20a while ensuring consistency with the other EU legislation, thus reducing the administrative burden to the minimum.

In preparing this Communication, the Commission took into account recommendations derived from a dedicated technical assistance study on promoting energy system integration through the increased role of renewable electricity, decentralised assets and hydrogen ([2]).

This document is intended uniquely as a guidance. Only the text of EU legislation itself has legal force. The binding interpretation of EU legislation is the exclusive competence of the Court of Justice of the European Union. The views expressed in this guidance are without prejudice to the position that the Commission might take before the Court of Justice.

2. Legal and policy context

2.1. *Legal context*

The Commission introduced the new Article 20a as a follow up to the July 2020 Strategy for Energy System Integration ([3]) to promote a more energy efficient and circular system, adapted to higher shares of renewables and increased electrification.

([1]) Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (OJ L 328, 21.12.2018, p. 82).
([2]) Specific contract ENER/C1/2022-530 under Framework contract ENER/C1/2022-530.
([3]) COM(2020) 299 Final, communication on Powering a climate-neutral economy: An EU Strategy for Energy System Integration.

The new Article 20a is complementary to and/or directly interlinked with other pieces of Union legislation, in particular, the Alternative Fuels Infrastructure Regulation (EU) 2023/1804 (AFIR) ([4]), Batteries Regulation (EU) 2023/1542 ([5]), Type Approval Regulation (EU) 2018/858 (as amended) ([6]), Directive (EU) 2019/944 on common rules for the internal market for electricity (Electricity Directive) ([7]) and Regulation (EU) 2019/943 on the internal market for electricity (Electricity Regulation) ([8]), including the recently adopted amendments on flexibility ([9]). In addition, Article 20a has interlinks with the revised Energy Performance of Buildings Directive (EPBD) ([10]), which contains specific requirements on recharging points in buildings. Article 20a also has links with the Regulation on harmonised rules on fair access to and use of data (Data Act) ([11]), which contains basic principles for accessing and using data across the European economy (see Table 1 below).

Table 1

Overview of Article 20a provisions and interlinks with the EU legislation

Article 20a	Electricity Directive	Electricity Regulation	AFIR	EPBD	Battery Regulation	Data Act
Paragraph 1	Art. 23	Art. 6				Art. 33
Paragraph 2	Art. 23&24, 31, 40, 59	Art. 57				
Paragraph 3					Art. 14	Art. 5,7, 9 & 40(2)
Paragraph 4			Art. 15(3) & (4), Art. 20, Art. 5(7) & (8), Art. 22 and Annex II(2)	Art. 14, 15 and 16		
Paragraph 5	Art. 3, 11, 13, 15 – 17, 31, 32, 33 and 40	Art. 6, 18, 20, 22				

([4]) Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU (OJ L 234, 22.9.2023, p. 1).

([5]) Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC (OJ L 191, 28.7.2023, p. 1).

([6]) Regulation (EU) 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC (OJ L 151, 14.6.2018, p. 1).

([7]) Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (OJ L 158, 14.6.2019, p. 125).

([8]) Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (OJ L 158, 14.6.2019, p. 54).

([9]) Regulation (EU) 2024/1747 of the European Parliament and of the Council of 13 June 2024, amending Regulations (EU) 2019/942 and (EU) 2019/943 as regards improving the Union's electricity market design (OJ L, 2024/1747, 26.6.2024, ELI: http://data.europa.eu/eli/reg/2024/1747/oj).

([10]) Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (OJ L, 2024/1275, 8.5.2024, ELI: http://data.europa.eu/eli/dir/2024/1275/oj).

([11]) Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act) (OJ L, 2023/2854, 22.12.2023, ELI: http://data.europa.eu/eli/reg/2023/2854/oj).

2.2. ***Policy context***

The new EU target for renewables for 2030 is set at 42,5 %, with aspiration to achieve 45 % by 2030. Although renewable energy is set to expand across various sectors, its highest shares are expected to be reached in the power sector. The share of renewable energy in the electricity sector is projected to increase from 37,5 % in 2020 to around 69 % in 2030 ([12]). At the same time, electricity demand is expected to increase significantly, reaching 1/3 of the final energy consumption in 2030 from 22,1 % in 2022.

This increasing renewables-based electrification coupled with system integration provides an opportunity for a cost-effective pathway to decarbonise end-use sectors such as transport, heating and cooling and industry. This is already happening: 16 GW of new wind capacity and 41 GW of new solar capacity were installed in the EU in 2022, an increase of 45 % and 47 % respectively compared to 2021. Sales of heat pumps reached 3 million in 2022 (an increase by 40 % compared to 2021), and sales of EVs reached 1,2 million in 2022 (an increase by 14 % compared to 2021).

Energy system integration must progress more rapidly. To this end, the revised RED provides an enabling framework to promote electrification through renewables deployment across different demand sectors and integrating distributed energy resources such as electric vehicles (EVs), photovoltaic systems (PVs) and heat pumps. These measures will also facilitate electrification from renewables thanks to streamlined permit granting for renewable energy projects and removing barriers to power purchase agreements.

However, there is an urgent need to tackle the remaining barriers that still prevent a massive roll-out of renewable electricity. These include the need for expanding grid capacities at distribution and transmission levels and developing a more flexible and smarter grid infrastructure that can integrate an increased amount of variable renewable electricity, and distributed energy resources such as electric vehicles (EVs), PVs and heat pumps. The EU Action Plan on Grids ([13]) proposes concrete measures to accelerate investments in deployment and digitalisation of the grids.

In fact, flexibility in the EU electricity system needs to almost double by 2030 compared to 2022 ([14]). Demand response is an important source of flexibility and allows energy resources and consumers to change or adjust their consumption or production in response to price signals. Having information on the distributed energy generation and flexibility resources installed in their grids, such as EVs, batteries, heat pumps or solar panels, would allow distribution system operators to better plan and operate their networks. DSOs are also key actors to make the grid more flexible, smart and able to serve connected customers and avoid risk of congestion. The more granular and dynamic data DSOs will have on decentralised generation installations and from connected consumers, the better and more flexibly they will be able to plan and manage the grid.

In the context of energy system integration, EVs will play a key role in decarbonising Europe's economy and transport sector, in particular, and allow dependence on imported fossil fuels to be reduced, as well as in contributing to the uptake of renewable electricity. The sales of new EVs are expected to rise to around 40 million in 2030 and 152 million in 2040 ([15]), ([16]). Studies show that by 2030, EV batteries could fully meet the need for short-term electricity storage globally. This would bring substantial benefits in terms of grid efficiency and reduced energy bills for consumers, as EVs would be able to provide balancing and flexibility services through demand response and storage thanks to smart and bi-directional recharging in non-publicly accessible parking spaces (i.e., residential and office buildings where vehicles are usually parked for a longer duration).

The increasing number of EVs requires the optimisation and effective management of recharging operations for their swift integration into the electricity grid. To achieve this, it is crucial that Member States ensure full implementation of the revised RED and related pieces of legislation, and work together with the stakeholders and market actors to overcome the remaining barriers to smart and bi-directional recharging.

([12]) COM(2022) 230 final.
([13]) COM(2023) 757 final.
([14]) Joint report by the European Environment Agency (EEA) and the EU Agency for the Cooperation of Energy Regulators (ACER) (September 2023).
([15]) Impact Assessment accompanying the Climate Target Plan 2040, SWD(2024) 63 final.
([16]) Eurelectric estimates that the share of EVs will increase to some 57-58 % in 2040 and 79-80 % in 2050, with the share of electricity in energy consumption of passenger cars estimated to reach around 31-33 % by 2040 and 60-70 % by 2050 (An EV Explainer – Eurelectric – Powering People).

Finally, active engagement of consumers in electricity markets directly or through aggregators is key, through various forms of participation as self-consumers individually or via collective self-consumption schemes, or as part of energy communities. To achieve this, consumers need to have access to real-time data about the characteristics of energy supplied (such as renewable energy share, GHG emissions content), similarly to the information they already have about energy prices. This will enable them to make informed decisions to switch away from fossil energy use towards renewable energy sources.

3. **Implementation of obligations under Article 20a**

3.1. ***Access to information on the share of renewable electricity and greenhouse gas emissions content of supplied electricity and on demand response potential***

3.1.1. *General overview of obligations in Article 20a(1)*

Consumers need to have useful information on renewable based electricity penetration in the grid, in a transparent way and close to real time, to allow them to adjust their consumption accordingly. The provisions of Article 20a(1) aim to ensure this by increasing the granularity of information on the share of renewable electricity in the grid to the public, in an accessible way. This will allow consumers to take conscious consumption decisions and adapt their electricity use, for example EV users to charge or discharge their vehicle and provide flexibility services based on signals about renewable energy. This will also create incentives for investments into innovative business models, integrating renewable electricity and increasing the efficiency of the grid.

Specifically, paragraph (1) of Article 20a obliges Member States to:

— require TSO and, if available, also DSO to make available data on the share of renewable electricity and the greenhouse gas emissions content of the electricity supplied in each bidding zone;

— make this data available, as accurately as possible in intervals equal to the market settlement frequency but of no more than one hour, with forecasting where available;

— ensure that distribution system operators have access to the necessary data;

— provide incentives for upgrades for smart grids and

— ensure that distribution system operators make available, if technically available, anonymised and aggregated data on the demand response potential and the renewable electricity generated and injected to the grid by self-consumers and renewable energy communities.

The objective of Article 20a(1) is to ensure access to information on the available renewable electricity in the grid in real-time, so for example consumers can adjust their electricity consumption to hours with high renewable electricity share.

3.1.2. *Data sharing*

Based on the obligations of Article 20a(1), Member States must stipulate in their national legislation that system operators make available data on the share of renewable electricity and the greenhouse gas emissions content of the electricity supplied in each bidding zone, in intervals equal to the market settlement frequency and not exceeding one hour with a possibility to use forecasting.

Most TSOs, and in some Member States also DSOs, already provide close to real-time data on electricity generation and consumption, including the contribution of renewable energy sources, on their official websites, which serve as data platforms (either as Data Exchange Platforms or Data hubs) (see Box 1). Thus, using existing Data Exchange Platforms to publish the data on the share of renewable electricity and GHG emissions content close to real time (equal to market frequency interval) is an effective way to implement Article 20a(1). These platforms could also be useful for statistical purposes. The requirement on data availability implies access to those platforms in a simple manner. Member States' authorities will need to assess what additional data categories need to be added to existing Data Exchange Platforms to ensure the provision of information under Article 20a(1).

Box 1- Data platforms in the context of the electricity market legislation

Data exchange platforms (DEPs) or Data hubs could be seen as a single gateway for access to electricity market data at national level in line with electricity market legislation. Information on wholesale and balancing electricity prices and the renewable electricity share are already available in nearly real time ([17]). Electricity Directive provides basic requirements on data exchange and data availability to consumers in real time. In addition, electricity market technical regulations require data exchange between market participants.

Article 33 of Regulation (EU) 2023/2854 on harmonised rules on fair access to and use of data ('Data Act') provides the general rules for ensuring the availability of information on data sharing services or platforms via e.g., Application Programming Interfaces (API) ([18]) and where possible enabling the interoperability of tools for harmonised data exchange.

There are different methods to share data from Data Exchange Platforms with DSOs and other market actors, for instance via API, web services and file-based exchanges (e.g., XML, CSV, RDF, JSON). APIs allow efficient data retrieval and integration, and offer better flexibility compared to the other methods.

Data platforms in most cases are operated by TSOs and DSOs. For example, EDSN in the Netherlands is owned by seven DSOs and a TSO, with hereby DSOs actively involved in data management. The data platforms in Estonia and the Netherlands are more electricity end-customer oriented (consumers, prosumers), whereas the Belgian and the Italian data platforms focus on suppliers and balancing responsible parties to facilitate their business processes. Some of these data platforms publish combined ex-ante (forecasts) and ex-post (realised flows) data. The data granularity of those data platforms may vary between one minute and one hour.

The obligation to make data on the RES share and GHG emissions content available close to real time is in line with the rules under the Electricity Regulation. Article 8(4) of the Electricity Regulation requires that the imbalance settlement period must be 15 minutes in all scheduling areas by 1 January 2021, unless the regulatory authority has granted a derogation or an exemption ([19]).

To ensure consistency of implementing the obligation of Article 20a(1) to publish information on the RES share and GHG emissions content, it would be necessary to take into account imports and exports in order to reflect the consumption of electricity in a given bidding zone. For DSOs it would mean accounting for electricity flows between distribution and transmission networks. Specifically, as regards the data format:

— For the RES share, expressing it as a percentage of supplied electricity by accounting for imported and exported electricity flows is coherent with most TSOs already publishing RES data on their Data Exchange Platforms as percentages for every type of renewable generation (for example, Belgium and Germany);

— For GHG emissions content, expressing it in grams of CO_2 equivalent per kWh, calculated based on the weighted average of electricity injected into the grid by accounting for imported and exported electricity flows is recommended.

([17]) Electricity Regulation (EU) 2019/943 and Commission Regulation (EU) 2017/2195 on electricity balancing, Directive (EU) 2019/944 on the internal market for electricity.

([18]) An API is a set of rules or protocols that allow software applications communicate with each other to exchange data, features and functionality. For example, Energy labelling product registry (EPREL) also uses an API, which provides access to public data for products registered in EPREL.

([19]) Some Member States have obtained derogations and by 1 January 2025, the imbalance settlement period must be implemented in all scheduling areas.

An optimal way to make this data available in near real time would be using APIs to allow interested parties, especially consumers and end-users, to retrieve the information directly from a single data access point and to receive this data directly to their devices (e.g., energy or building management systems, mobile phones and EVs). For example, the data of ENTSO-E Transparency Platform is publicly available and can be accessed via an API. At a Member State level, Energieopwek data platform in the Netherlands ([20]) provides the information on renewable energy generation within 10 minutes timeframe and it is made available via an API.

To ensure consistency in accounting the RES share and the GHG emissions content, for the purposes of implementing of Article 20a(1), it is essential that Member States promote the use of a harmonised approach and methodology by system operators. Member States should encourage system operators to cooperate across Member States in the collaboration framework of the European Network of Systems Operators for electricity (ENTSO-E) and the association of European distribution system operators (EU DSO Entity) to ensure that cross-border flows are accounted for consistently across bidding zones.

3.1.3. *Access to information for distribution system operators*

In relation to the obligation for Member States to ensure that DSOs have the necessary information on the RES share and the GHG emissions content, Article 31 of the Electricity Directive already includes obligations on DSOs to provide system users with the information they need for efficient access to, including the use of, the electricity system and as regards the cooperation between TSOs and DSOs.

With the increasing number of active customers producing their own electricity, DSOs need to become more proactive service providers to ensure the optimal operation of the grid and serve customers cost-effectively. For this to happen, it is crucial that DSOs have the necessary information on the available renewable electricity in their electricity system to become able to use the services connected to distributed energy resources such as demand response and energy storage, based on market signals.

In Member States where smart metering systems are deployed, DSOs are usually responsible for the installation of smart meters, while they also participate in the data management process. Member States are responsible for setting the rules for the management and exchange of data (i.e., metering and consumption data as well as data required for customer switching, demand response and other services), in accordance with Articles 23 and 24 ([21]) of the Electricity Directive. In this framework, Member States assign specific roles and responsibilities to DSOs and other actors, on the basis of their data management model.

It is essential that Member States stipulate in their national framework how DSOs will be able to obtain the data from market actors such as aggregators, electricity suppliers and self-consumers, energy communities, metering companies, etc. on the renewable electricity. Where such data constitute personal data, it is crucial that the access and processing of this data is ensured in accordance with the general data protection rules ([22]). Given the large diversity of the DSOs across the EU and the different levels of development of data collection models deployed in the Member States, it is important that Member States put in place or adjust the existing mechanisms for ensuring effective cooperation arrangements amongst the DSOs and TSOs at national level for facilitating data collection for the purposes of implementing Article 20a(1). Those mechanisms should provide the way for DSOs to record the data close to real time on the share of renewable electricity and the GHG emissions content of the electricity supplied in the respective electricity distribution system by taking into account the exported and imported electricity flows, and the way how this information is made available via a centralised information channel at national level (as referred to above).

([20]) https://energieopwek.nl/en.

([21]) According to Article 24, the Commission shall adopt, by means of implementing acts, interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data as well as data required for customer switching, demand response and other services.

([22]) Article 23 of the Electricity Directive contains principles on data management activities and provides that Member States shallensure efficient and secure data access and exchange. In addition, it recalls that the processing of personal data shall be carried out in accordance with Regulation (EU) 2016/679.

Data Exchange Platforms in the Member States are usually a single gateway for access to data from data providers (such as data hubs, flexibility service providers, TSOs, DSOs) to data users (such as TSOs, DSOs, Balancing Responsible Parties, consumers, suppliers, energy service providers) and this makes them the primary channel of information.

To implement the obligations on access to information in an effective manner, Member States can enable access to data in data platforms by using APIs or can ensure the data exchange via available standards such as Inter-Control Centre Communications Protocol (ICCP, IEC 60870-6/TASE.2), Communication networks and systems for power utility automation (IEC 61850-7), RESTful ([23]) services using the DEP(s); however, those standards may not ensure the same level of efficiency for enabling access to data as using the APIs.

In case the DSOs do not have the data available on the RES share and the GHG emissions content of the electricity supplied in distribution grids, as an alternative Article 20a(1) provides a possibility to use the existing data reporting system under the ENTSO-E Transparency Platform ([24]). This Platform provides centralised data on generation, transportation and consumption of electricity at EU level with the granularity at a level of the bidding zone, collected from data providers, including TSOs and other qualified third parties.

At the moment, reporting to ENTSO-E Transparency Platform is limited to installations with generation capacities of 100 MW and above ([25]). Therefore, when opting to use this alternative for enabling access to data for DSOs, Member States should ensure that DSOs can provide the additional information on smaller generation capacities, to overcome this data limitation.

3.1.4. *Incentives for upgrades of smart grids*

As regards the obligation for Member States to provide incentives for upgrades for smart grids (see examples in Box 2), recital 51 of Directive (EU) 2023/2413 explains that the deployment of innovative business models and digital solutions have the capacity to link consumption to the level of renewable energy in the electricity grid and thus provide incentives for the right network investments.

The obligation to incentivise investments into smart grids complements the requirement in the Electricity Directive on the development of distribution systems to be based on network development plans to be conducted every two years by the DSOs, containing the smart grid deployment needs in each DSO's area.

The implementation of these obligations requires that Member States and national regulators ensure that DSOs establish adequate network development plans based on transparent and regular exchanges with the relevant stakeholders such as renewable energy producers and suppliers, aggregators including electromobility service providers and local authorities etc.

Member States with a high need for distribution grid modernisation and local smart grid deployment should consider available options to increase allocations under Cohesion policy funds for this sector. DSOs and TSOs, with support from the respective Member States, are encouraged to consider partnering for proposing candidate Projects of Common Interest on smart electricity grids, in accordance with the TEN-E Regulation ([26]) process.

([23]) RESTful APIs are commonly used in web and mobile applications to retrieve or modify resources and data on remote systems; e.g., social media sites use REST APIs to integrate with third-party applications and allow posting updates.

([24]) The ENTSO-E Transparency Platform.

([25]) In line with Article 16(1)a of Regulation (EU) 543/2013 on the submission and publication of data in electricity markets.

([26]) Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013 (OJ L 152, 3.6.2022, p. 45).

Box 2 – Actions on grids and on the digitalisation of the Energy System

The EU Action Plan for Grids ([27]) calls for enhancing distribution network development planning, encouraging anticipatory investments in certain grid projects, adapting network tariff structures to encourage network and system developments including on smart grids, ensuring access to finance, streamlining grid permitting and facilitating supply chain investments. The Action Plan supports the development of distribution network development plans and the uptake of smart, innovative and network efficiency technologies. In the framework of the EU Action Plan for Digitalising the Energy System ([28]), work is under way by the European Union Agency for the Cooperation of Energy Regulators (ACER), CEER and the national regulatory authorities (NRAs), in cooperation with ENTSO-E and EU DSO Entity, to define common smart grid indicators. NRAs monitor smart and digital investments in the electricity grid in line with the objectives of Article 20a.

The Smart Energy Expert Group ([29]) and its dedicated 'Data for Energy' (D4E) working group as announced in Action Plan for Digitalising the Energy System will bring together the Commission, Member States and the relevant public and private stakeholders to build the European framework for sharing energy-related data. D4E will help strengthen the coordination at EU level on data exchanges for the energy sector, defining the driving principles and ensuring consistency across different data-sharing priorities and initiatives ([30]).

3.1.5. *Data on demand response potential and electricity generated by self-consumers and renewable energy communities*

Demand response is pivotal for enabling distributed energy resources such as heat pumps, small storage assets and EVs to participate in the flexibility services, which will be crucial for energy system integration in general as stated in recital 55 of the revised RED. Recital 51 also explains that, in order to allow demand response and provide further incentives for the absorption of green electricity, data need to be based not only on dynamic prices but also on signals about the actual penetration of green electricity in the system.

Article 20a(1) contains an obligation for DSOs to provide anonymised and aggregated data, if technically available, on demand response potential and renewable electricity generated and injected into the grid by self-consumers and renewable energy communities. This obligation builds on Article 23 of the Electricity Directive, which requires access to data of final customers. The Implementing Regulation (EU) 2023/1162 ([31]) also contains complementary provisions for consumers to obtain access to their metering data and also give authorisation for data on their energy consumption or generation to be used by third parties.

The demand response potential in a distribution system depends to a large extent on the availability of flexible load, i.e., electricity consumption assets that can adjust their demand, either behind or in front of the meter. Such assets can be linked to industrial customers or processes and to commercial or residential customers, and can include heat pumps, residential or publicly accessible EV charging points, home and industrial batteries, etc.

The technical availability of collecting data on demand response potential largely depends on the processes whereby the DSO is informed of the flexible load assets installed in its system. More granular information on the existing and potential flexibility in an electricity system is also necessary in line with the revised Electricity Regulation.

To this end, Member States should set forward in their national legislation specific conditions to render the required data on demand response potential referred to in Article 20a(1) 'technically available'.

The key condition for DSOs to be able to collect data on demand response potential and renewable electricity generation and injection to the grid is that they are fully informed of the renewable energy generation and flexible load assets installed in their systems. The most common means for DSOs to collect this information is a permitting or notification procedure for a renewable energy installation (see Box 3). In cases where a permitting or notification procedure does not appear necessary, an obligation to inform the DSO can also be established and enforced in cooperation with installers.

([27]) eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023DC0757.
([28]) Digitalising the energy system - EU action plan (COM/2022/552).
([29]) The Smart Grids Task Force will be succeeded by the 'Smart Energy Expert Group'.
([30]) eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022SC0341.
([31]) Commission Implementing Regulation (EU) 2023/1162 of 6 June 2023 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data (OJ L 154, 15.6.2023, p. 10).

Another useful source of information for DSOs could be an identification or registration of all potential flexibility service providers in each Member State, as recommended by ACER in their framework guideline on a network code on demand-side flexibility ([32]). It would allow capturing those service providers that are potentially qualified to participate in flexibility services in demand response directly by shifting demand via the use of smart appliances or indirectly via a contract with an aggregator.

The collection and processing of personal data for the requirements of Article 20a(1) should be carried out in accordance with the Regulation (EU) 2016/679 on data protection. For this purpose, Member States shall ensure that in their transposition of the requirements of Article 20(a)(1) this right is clearly established in national law (legal basis for the collection and processing of personal data) and respects the EU data protection rules. Subsequently, Member States could require that national regulators, in consultation with competent authorities, including data protection authorities, adopt guidelines for DSOs on collecting the anonymised and aggregated data on demand response potential and renewable electricity generated and injected into the grid by self-consumers and renewable energy communities, and on making it available via digital means to the relevant actors. This data are important for the purpose of compiling official statistics at EU level, therefore access to this data is of essence to national statistical authorities.

The data management operations required by Article 20a should also be taken into account by national regulators regarding the DSOs' capital and operational expenditure, when deciding on a possible cost recovery through network tariffs, which will be required under the revised Electricity Market Regulation ([33]).

Box 3 – Data collection on the renewable electricity generated and injected into the grid by self-consumers and renewable energy communities

DSOs need to be informed about the installation of renewable generation equipment in their systems, which is generally the case in the EU through a grid connection permitting or notification procedure. As long as the renewable energy generation equipment is fitted with a dedicated metering device, the system operator can in principle establish the amount of electricity generated by that equipment. If accurate enough, this information will also contribute to fulfil the obligation to provide data on the share of renewable electricity.

To determine the amount of renewable electricity injected into the grid by self-consumers and renewable energy communities it is also necessary to establish the amount of self-consumed renewable electricity. When both generation and self-consumption take place behind the same meter, the electricity injected into the grid is the net result of the subtraction between generation and self-consumption. When generation and self-consumption take place behind different meters, e.g., because electricity is generated in one location and self-consumed in a different one (e.g., in energy sharing schemes), electricity consumed in the consumption point is considered as self-consumed, and needs to be subtracted from the electricity generated at the generation point.

3.2. ***Interoperability and harmonised approach for access to data***

3.2.1. *General overview of obligations in Article 20a(2)*

Paragraph (2) of Article 20a requires that Member States ensure that the data (referred to in paragraph one) are made available digitally in a manner that ensures interoperability based on harmonised data formats and standardised data sets. This effective and digital data exchange is a key enabler for the integration of renewable energy, the uptake of demand response and the overall flexibility of the electricity network.

([32]) Paragraphs 34 and 57, FG_DemandResponse.pdf (europa.eu), published by ACER on 20 December 2022.

([33]) Improved data management by DSOs will also be necessary, among other things for them to properly implement the energy sharing provisions of the revised Electricity Market Directive, according to which DSOs must 'monitor, collect, validate and communicate metering data related to the shared electricity with relevant final customers and market participants at least every month'.

The objective of this provision is that the relevant electricity market participants, including aggregators and consumers, can access and use the data in a simple way, via electronic communication devices such as smart meters, electric vehicle recharging points, heating and cooling systems and building energy management systems. This will benefit consumers, including EV users, aggregators and energy management companies, as they will be able to read and use in efficient and simple way the data that can be updated close to real time, using standardised data formats.

3.2.2. *Interoperability and harmonisation*

To limit administrative burden and facilitate the implementation of interoperability requirements for the purpose of Article 20a(2), Member States are advised to use already commonly agreed and compatible data exchange formats and standards based on the Common Information Model (CIM) developed by International Electrotechnical Commission (IEC) ([34]), which allows standardised data exchanges between energy system operators. The IEC 62325 series standards, (namely IEC 62325-351, CIM European market model exchange profile ([35]) and the set of IEC 62325-451 standards targeting core business processes of internal electricity market, such as scheduling, settlement, capacity allocation and nomination, acknowledgement, etc.) would be the most appropriate, as they provide necessary guidelines to exchange information among system operators ([36]).

In addition, the Member States, to deliver on the requirement which applies to them to ensure interoperability of data, can require and put in place measures to facilitate collaboration amongst the system operators to make the different data platforms and data hubs interoperable at least at national level in terms of applying the same standards for data exchange and format, and if possible using a standardised API methodology. Member States are encouraged to collaborate closely with the established European style market profile CIM (Common Information Model) governance structure (for example, the ENTSO-E CIM working group) for conformity testing, in order to improve compliance with the respective CIM standards.

In addition, Member States are encouraged to make use of the established fora in the field including the working group on D4E under the Smart Energy Expert Group, in order to facilitate the development and the use of harmonised data formats and standardised data sets to ensure interoperability for the purposes of implementing Article 20a(2).

In relation to cybersecurity safeguards, Member States are encouraged to use the existing rules and standards put in place and promote best practices, notably on cyber-hygiene, at every level of the concerned organisations (see Box 4 below).

Box 4 – Data availability and interoperability

Specific requirements for cooperation and data exchange between the system operators are already included in the Electricity Regulation (Article 57) and the Electricity Directive (Article 40), and related network codes. National regulatory authorities have an overseeing and monitoring role in the implementation of the electricity market legislation. The electricity market legislation also promotes cooperation on cross-border issues with the regulatory authorities of the Member States concerned and with ACER (Article 59 of the Electricity Directive).

Since 2009, the ENTSO-E fulfils a coordinated action at EU level to promote use of the Common Information Model (CIM), which enables standardised data exchanges. The International Electrotechnical Commission (IEC) Technical Committee in collaboration with ENTSO-E, is currently developing the IEC CIM 62325 standards for the exchange of data required by decentralised energy markets. The IEC 62325 series of standards could be considered as a default option for pan-European data exchange and have been also discussed in the context of the proposal of the network code on demand response and relevant projects.

The Smart Grids Task Force ([37]) proposed recommendations in this area, and the Smart Energy Expert Group and Working Group 'Data for Energy (D4E)' will advise the Commission on developing an interoperable framework and a governance structure for seamless data exchange.

([34]) Common Information Model (CIM) (entsoe.eu).
([35]) CIM Guidelines for the IEC 62325-351 European Style Market Profile Approved as a Technical Specification (entsoe.eu).
([36]) Common Information Model (CIM) for Energy Markets (entsoe.eu).
([37]) The Smart Grids Task Force will be succeeded by the 'Smart Energy Expert Group' pursuant to the decision of the Commission of 18.9.2023; 75247a4c-ac08-4884-b743-956b3e3cde8f_en (europa.eu).

The Implementing Regulation (EU) 2023/1162 lays down interoperability requirements and rules for non-discriminatory and transparent procedures for access to electricity metering and consumption data by final customers and eligible parties in accordance with the Electricity Directive. The Implementing Regulation establishes a reference model for metering and consumption data that sets out rules and procedures that Member States shall apply to enable interoperability.

The key principles for ensuring cybersecurity for data communication are regulated by Directive (EU) 2022/2555 on measures for a high common level of cybersecurity across the Union (NIS 2 Directive) ([38]). More relevant for the electricity market, the network code on sector-specific rules for cybersecurity aspects of cross-border electricity flows sets the necessary rules ([39]). The IEC 62351 series of standards also defines the cybersecurity requirements for implementing security technologies in the operational environment, including network and system management objects.

3.3. ***Requirement to enable access to basic battery information***

3.3.1. *General overview of obligations in Article 20a(3)*

Article 20a(3) seeks to allow owners or users of batteries, or the entities acting on their behalf ([40]), to have real-time access to basic battery information. It puts an obligation on Member States to ensure that manufacturers of domestic and industrial batteries, as well as vehicle manufacturers, enable real-time access to basic Battery Management System (BMS) information.

BMS information specifically covers four parameters: a) battery capacity, b) state of health (SoH), c) state of charge (SoC) and d) power set point. The three last parameters are defined in Article 2, points 14j, 14k and 14l of the revised RED. In relation to EV batteries (2nd subparagraph of Article 20a(3)), BMS information must also cover, where appropriate, the location of electric vehicles.

Enabling free and real-time access to BMS information is essential for renewables' integration, for promoting efficient charging services and practices, for saving cost, and ultimately for improving customer experience. It will also contribute to the development of flexibility and balancing services from the aggregation of distributed storage assets-. Fostering the development of interoperable BMSs with improved diagnostic and predictive capabilities will open up new business opportunities and facilitate energy system integration.

Stationary storage (using domestic and industrial batteries) enables to store energy for later use, helping to balance supply and demand, increase grid stability, and integrate renewable energy into the grid more effectively.

Regarding EVs, smart and bi-directional recharging mainly rely on open access to BMS data. Making data directly available to the relevant third parties acting on the owners' and users' behalf, such as electro-mobility service providers or aggregators, is needed to increase the uptake of these charging functionalities or to better plan charging operations. This is particularly relevant given that today, this information is not made widely available in a comprehensive and harmonised manner, which is burdensome.

— Scope of the obligation

The obligation in the first subparagraph of Article 20a(3) applies for all new domestic and industrial batteries placed on the internal market as from 21 May 2025.

([38]) Article 29 on on Cybersecurity information-sharing arrangements, NIS 2 Directive (nis-2-directive.com).

([39]) Commission Delegated Regulation (EU) 2024/1366 of 11 March 2024 supplementing Regulation (EU) 2019/943 of the European Parliament and of the Council by establishing a network code on sector-specific rules for cybersecurity aspects of cross-border electricity flows (OJ L, 2024/1366, 24.5.2024, ELI: http://data.europa.eu/eli/reg_del/2024/1366/oj).

([40]) Such as building energy system managers, mobility service providers and other electricity market participants.

The obligation in the second subparagraph of Article 20a(3) applies for all new EV batteries placed in the internal market as of 21 May 2025, unless there are technical limitations preventing it. In case there are technical limitations, the obligation in subparagraph 2 of Article 20a(3) applies for all new types of EVs approved under Regulation (EU) 2018/858 as of 21 May 2025. The obligation in subparagraph 2 of Article 20a(3) covers batteries used in both battery electric vehicles (BEVs) and Plug-in hybrid electric vehicles (PHEVs), of category L (if it does weigh more than 25 kg), or of categories M, N or O, according to the definition (14h) of Article 2 of the Directive.

Even though the obligations of 20a(3) apply for the manufacturers of domestic, industrial batteries and of EVs, they introduce in fact additional requirements on the products themselves, similarly to the Batteries Regulation. Therefore, these products (stationary batteries and EVs) need to comply with the requirements introduced by the revised RED when placed on the EU market, regardless of where they are produced, thereby including those being imported. Specifically, for subparagraph 2 of 20a(3), the obligation affects the EVs, which need to be in compliance with the requirements of the revised RED in order to be placed in the EU market. Therefore, this obligation also affects the entity that introduces the product on the EU market, i.e. the manufacturer, the distributor or the importer. Consequently, Member States must ensure in their national legislation that all products placed in the market are in line with the requirements set by Article 20a(3), ensuring consistency in the Internal Market.

— General requirement

The entry point for accessing the data mentioned in the obligation is the BMS. Existing BMSs often rely on proprietary software to define battery parameters, which limits interoperability. The transposition of Article 20a(3) will ensure access to the parameters mentioned in this paragraph through obligations on manufacturers of domestic and industrial batteries and on EV manufacturers.

Access to BMS data involves:

— A harmonised format for data points to avoid fragmentation. At this stage, some standards already exist or are being developed, but this does not cover all parameters mentioned in the revised RED (see Table 2).

— Using a same interface for the data exchange: some legislative texts are already asking for data exchange regarding certain parameters (see Table 2). On the basis of the revised RED, battery and electric vehicle manufacturers must ensure that the communication of the data happens in real time (see para 3.3.4).

The Commission will support Member States in implementing the Directive in line with this guidance and further specify the parameters and data that are not standardised yet, as necessary, via a dialogue, based on existing fora (such as the Working Group on Motor Vehicles, the Smart Energy Expert Group and the Sustainable Transport Forum ([41])), which will involve the Commission, Member States' representatives responsible for energy and transport, the industry and relevant stakeholders. This dialogue may provide recommendations in complementarity to the legislation and the guidance, on the implementation of this provision.

Table 2

Legislative texts or initiatives linked to the parameters mentioned in Article 20a(3)

Parameter	Static/ dynamic	Stationary batteries		EV	
		Standard for calculation	Requirement for sharing	Standard for calculation	Requirement for sharing
Battery capacity	Static	Standardised	Batteries Regulation ('rated capacity [1]' defined in Annex IV – Timeline: 18 Aug 2024 [2])	CEN/CENELEC (ongoing) [3] Timeline: May 2025	Batteries Regulation ('rated capacity' defined in Annex IV – Timeline: 18 Aug 2024 – see box 5) Data Act (see box 5)

([41]) https://transport.ec.europa.eu/transport-themes/clean-transport/sustainable-transport-forum-stf_en.

Parameter	Static/ dynamic	Stationary batteries		EV	
		Standard for calculation	Requirement for sharing	Standard for calculation	Requirement for sharing
State of health (SoH)	Dynamic, decreasing over lifetime of the battery	CEN/ CENELEC (ongoing): Methodology based on the 5 parameters listed in Annex VII of Battery Regulation.	Batteries Regulation (parameters for determining SoH, periodic basis -Timeline: 18 August 2024)	CEN/CENELEC (ongoing) ([4]) Timeline: May 2025	Batteries Regulation – Timeline: 18 August 2024 ([5]) (periodic basis – see box 5) Euro 7 Regulation and UN Global Technical Regulation No. 22 (via the OBD port and optionally over the air) (timeline: end 2026) Data Act (see box 5)
State of charge (SoC)	Dynamic	No standard Common definitions in revised RED and Batteries Regulation	Batteries Regulation (periodically recorded, timeline: 18 February 2027 – see box 5)	No standard Common definitions in revised RED and Batteries Regulation	Batteries Regulation (periodically recorded, timeline: 18 Feb 2027 – see box 5) Data Act (see box 5) ISO 15118-2 already enables its exchange every 500 ms or 1s between the vehicle and the charging point. ISO 15118-20 also enables its exchange.
Battery power set point	Dynamic	No standard	No requirement	No standard	Data Act (see box 5)
Location *(where appropriate)*	Dynamic	*Not requested*	*Not requested*	Standardised	Data Act (see box 5)

([1]) 'Rated capacity' (Annex IV) means the total number of ampere-hours (Ah) that can be withdrawn from a fully charged battery under reference conditions).

([2]) From 18 August 2024, rechargeable industrial batteries with a capacity greater than 2 kWh, LMT batteries and electric vehicle batteries shall be accompanied by a document containing values for the electrochemical performance and durability parameters set out in Part A of Annex IV.

([3]) prEN 18060 Road vehicles - Rechargeable batteries with internal energy storage - Performance of alkali-Ion (Li-Ion, Na-Ion), Pb, NiMH and combined chemistries EV modules and batteries.

([4]) prEN 18061 Road vehicles - Electrically propelled vehicles - Steps, conditions and protocols for the safe repair and re-use of modules and batteries originally designed for EV applications.

([5]) From 18 August 2024, up-to-date data for the parameters for determining the state of health and expected lifetime of batteries as set out in Annex VII shall be contained in the battery management system of stationary battery energy storage systems, LMT batteries and electric vehicle batteries.

Box 5 – Relevant elements of the current legislation

The Data Act ([42]) aims to ensure that users can access and use the data generated by their connected devices such as EVs. The Data Act provides for a general obligation to design and manufacture products in such a manner that data are directly accessible ([43]) to the user, where this is relevant and technically feasible (Article 3(1)).This obligation covers 'product data', i.e. data generated by the use of the vehicle that the manufacturer designed to be retrievable (via an electronic communications service, a physical connection or on-device access). Where data cannot be directly accessed by the user, the data holder has to make 'readily available data' (defined under Article 5(1)) accessible to the user by some other means. Where relevant and technically feasible, this data shall be made accessible continuously and in real time (Article 4(1)). Consequently, when system data points are defined in the legislation, the Data Act recognises the right of users to access and share these data with third parties that they choose, under fair, reasonable, non-discriminatory, and transparent terms and conditions. For example, location is a data point clearly defined and the Data Act allows the driver to share the location of his vehicle in line with the GDPR and the ePrivacy Directive. Likewise, the state of charge is a data point generated by the EV manufacturer, which is already shared in real time with the driver. However, for data holders, the Data Act provides for a compensation for making data available to third parties ([44]). The Data Act applies in addition to the EU and national laws on the protection of personal data and electronic communication.

The Batteries Regulation will require that some data of new stationary battery energy storage systems and new electric vehicle batteries are shared, but it does not address the need for real time access as the scope of data sharing provision in that Regulation focuses on helping the evaluation for a potential second life for batteries.

Battery capacity, as from 18 August 2024, has to be included in a document accompanying the battery. At a later stage, it will be shown on the battery label and as from 18 February 2027, it will also have to be available in the public access part of the battery passport.

For the state of health (SoH), as from 18 August 2024, parameters for determining the state of health shall be up to date and shared with the natural or legal person who has legally purchased the battery or a third party acting on their behalf.

For state of charge (SoC), from 18 February 2027, the battery passport requires this information in Annex XIII of the Batteries Regulation to be available to persons with a legitimate interest, but only periodically recorded information is required.

3.3.2. *Battery data format*

The requirement for access to battery data under Article 20a should be ensured by making use of the existing standardisation when it is available. Member States should not create their own standards at national level to avoid fragmentation.

When parameters are not yet standardised, Member States should recommend battery and vehicle manufacturers to ensure that measurements and calculations are made using reliable, accurate and reproducible methods which take into account the generally recognised state-of-the-art methods, and the results of which are deemed to be of low uncertainty, including methods set out in standards for which references have been published for those purposes in the *Official Journal of the European Union*. They should also ask them to document these methods in view of potential verification by competent authorities to allow for interoperability.

([42]) Article 3: 'Obligation to make data accessed from connected products or generated during the provision of related services accessible to the user. 1. Connected products shall be designed and manufactured, and related services shall be designed and provided, in such a manner that product data and related service data, including the relevant metadata necessary to interpret and use those data, are, by default, easily, securely, free of charge, in a comprehensive, structured, commonly used and machine-readable format, and, where relevant and technically feasible, directly accessible to the user'.

([43]) For example, accessible on the device or via a remote server to which the data is communicated.

([44]) Article 9 of Regulation (EU) 2023/2854: '1. Any compensation agreed upon between a data holder and a data recipient for making data available in business-to-business relations shall be non-discriminatory and reasonable and may include a margin'.

— State of health (SoH)

Member States should recommend manufacturers to use the outcomes of the standardisation currently being developed by CEN-CENELEC (see timeline in Table 2).

For EVs, the data point should be the State of health (in %).

For stationary batteries, the data point should stem from the calculation using the 5 parameters listed in Annex VII of Batteries Regulation ([45]), using state-of-the-art methods.

— Battery capacity

The definition of battery capacity should be the rated capacity, namely the capacity value of a battery, under specific conditions, such as temperature and relative humidity, and declared by the manufacturer.

— State of charge (SoC)

For the SoC, even if this data point is not yet standardised, it is already available (and for EVs, normally displayed by the vehicle manufacturer on the EV dashboard, and possibly on the user application). Therefore, it is recommended that car manufacturers share the current SoC in %.

— Battery power set point

The battery power set point is not standardised yet. It can cover for example the maximal power that the battery can support at a given moment (in kW), as this maximal power changes dynamically depending, for example, on battery temperature ([46]).

3.3.3. *Data access to owners, users and third parties 'acting, with explicit consent, on the owners' and users' behalf'*

— General requirement

Member States have to adopt measures to require that both vehicle manufacturers and domestic/industrial batteries manufacturers make available in real time those data and at no cost to battery and EV owners and users. Direct communication between the battery/vehicle and the third party acting on the owners' and users' behalf must be enabled.

Member States need to introduce the right of users and owners to access data through the transposition of the provision. In this legislation, they should also lay down the exact data point that is meant to be shared when not standardised yet (see point 3.3.2 above).

Moreover, the right of owners and users to share these data with third parties is established under the conditions of 'explicit consent'. This 'explicit consent' should be understood as authorisation of the owner/user for the data to be shared with the third party acting on their behalf, and not as a consent in the sense of the Regulation (EU) 2016/679 (GDPR). These conditions are included in the provision to ensure that battery and EVs owners and users are in control of these data, and that they are protected while sharing them. Therefore, Member States need to transpose the condition of accessing battery data, including the requirement of explicit /authorisation of battery and EV owners and/or users in their legislation in order for the sharing of the data to be lawful. In case the agreement for sharing the data is given by natural persons, the GDPR also applies regarding the access and subsequent processing of personal data of batteries and EV users.

For electric vehicles, even though not written expressly in the provision, the mention of the fact that third parties need to be acting on owners' and users' behalf, leads to the conclusion that the explicit authorisation by EV owners/users is also needed for access to data mentioned in the second subparagraph of 20a(3), mirroring the conditions of the first subparagraph. Owners and users of EVs can either be natural or legal persons (i.e. enterprises, leasing companies). In cases where the

([45]) ANNEX VII - PARAMETERS FOR DETERMINING THE STATE OF HEALTH AND EXPECTED LIFETIME OF BATTERIES - Part A: Parameters for determining the state of health of electric vehicle batteries, stationary battery energy storage systems and LMT batteries: […] For stationary battery energy storage systems and LMT batteries: 1. the remaining capacity; 2. where possible, the remaining power capability; 3. where possible, the remaining round trip efficiency; 4. the evolution of self-discharging rates; 5. where possible, the ohmic resistance.

([46]) As part of the data to be communicated between the charging point and the vehicle under ISO 15118, 'power set point' is a set of data types (dynamic information) prescribing the electric power settings at which the battery should optimally operate during a recharging or discharging operation.

owner and the user are different (for example in the case of leasing companies or of shared vehicles within a household), both should give their authorisation to make the data available. However, for the sake of streamlining and accelerating procedures, the owner may be requested to authorise the data access only once. It is also recommended that he does not restrict access as the user is the most concerned by this data sharing.

When transposing the provision, Member States should provide details on how the authorisation of the owner or user is given and the characteristics of this authorisation. It is recommended that the authorisation given by the owner/user is specific, informed and explicitly brought to attention of the owner/user. It must be done through a distinct authorisation for this specific purpose, in an intelligible and easily accessible form, using clear and plain language (for example by a written statement, including by electronic means). Member States are encouraged to provide specific authorisation forms. This could include ticking a box when visiting a smartphone application or internet website, choosing technical settings for information society services or another statement. Silence, pre-ticked boxes or inactivity should not constitute consent/authorisation.

The authorisation for the battery data should be revokable at any time in order for users who will be data subjects in the sense of data protection rules to remain always in control of the data flow.

— Case of location

As regards EV batteries, in addition to the four parameters indicated above, Article 20a(3) contains an obligation to share, where appropriate, the location of electric vehicles.

There are several reasons why sharing the location would contribute to energy system integration. By knowing the location of EVs, energy providers can better plan the distribution of charging loads across different locations to help balance the overall demand on the grid and minimise the need for expensive peak capacity. Sharing location of the vehicles may be also relevant for the aggregator's planning and anticipation of charging sessions. It informs the aggregator where the vehicles usually park, at what times and for how long. Moreover, coordination of EV charging over periods with high renewable energy generation allows for more sustainable charging practices. The data exchange that would take place prior to the charging event could also include exchanging information about availability of charging stations to efficiently route users to free charging stations, especially in peak events such as holidays.

Location sharing also enables vehicle-to-grid integration. Knowing the location of EVs equipped with bi-directional functionalities could incentivise using EVs as a storage asset where it is needed and feed energy back into the grid during peak demand. Consequently, energy providers can offer location-based incentives to encourage EV users to charge/discharge their vehicles at specific locations or times, helping to optimise energy consumption across the grid and reduce congestion.

Considering the need for ensuring data protection, Member States shall make sure that the location is always shared after the authorisation of the owner/user of the EV, as mentioned above, and in accordance with the data protection rules.

— Enforcement

Sanctions (including fines) should be adopted by Member States to enforce the new requirements laid down in the revised RED, but this should not result in the refusal of a type approval, or in the prohibition of the placing of the type approved vehicle on the market ([47]). Member States could carry out an audit to check that data are made available in real time, i.e. that manufacturers of domestic and industrial batteries and of electric vehicles are complying with the requirements of 20a(3).

3.3.4. *Ensuring access to battery data in 'real time', under 'non-discriminatory terms' and 'at no cost'*

As regards real time, the Electricity Regulation establishes that the settlement period of ancillary and flexibility markets is equal to 15 minutes. However, according to stakeholders and experts, in order to reflect significant changes of the parameters referred to in the revised RED and the usefulness of the data, the frequency can be in the range of a second for some parameters. Therefore, the recommended frequency of availability is below one minute.

([47]) The list of requirements necessary to obtain the approval of a new type is exclusively defined in the context of Regulation (EU) 2018/858 (Type Approval Regulation). Furthermore, as stated in article 6(5) of Type Approval Regulation, Member States shall not prohibit, restrict or impede the placing on the market, registration or entry into service of vehicles, systems, components or separate technical units which comply with that Regulation.

For EVs, it is important to distinguish between two use cases, namely sharing in real time data when the vehicle is not plugged in (namely parked or on the road) to optimize the next charging operation (which is the aim of Article 20a(3)), and sharing data when the EV is plugged to the charging station. The latter case should notably be enabled by the new standard ISO 15118-20. The mandatory implementation of this standard will be subject to upcoming secondary legislation under Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure ([48]) but that communication protocol can already be used on a voluntary basis before it is made mandatory.

In relation to non-discriminatory terms, Regulation (EU) 2023/2854 (recital 5) explains that users of a connected product or related service in the Union shall have access, in a timely manner, the data generated by the use of that connected product or related service and that those users can use the data, including by sharing them with third parties of their choice. It imposes the obligation on data holders to make data available to users and third parties of the user's choice in certain circumstances. It also ensures that data holders make data available to data recipients in the Union under fair, reasonable and non-discriminatory terms and conditions and in a transparent manner.

For the purposes of Article 20a(3), 'at no cost' should be understood as making the data available without cost to battery owners, users and third parties.

3.3.5. *Exchange interface*

Regarding the interface for the data to be exchanged, it is crucial to avoid incompatible implementation in Member States leading to a lack of cross-border interoperability.

In relation to EV batteries, in addition to the data collected by vehicle manufacturers or for maintenance purposes, the vehicle transmits data when connected to a charging station via the OBC (on-board charger). For charging purposes, charging stations and EVs predominately use the standard ISO 15118 for physical (wired) communication. In this situation, the data transfer takes place when the EV is connected. For forecasting purposes and planning of the next charging operation, data must be communicated over the air in order to enable real-time and remote communication with third parties.

Access to vehicle data has been regulated at EU level since 2007 for repair data and on-board diagnostics (OBD) to ensure fair competition on the repair and maintenance aftermarket. Since then, the market for connected vehicles has developed. It is estimated that in 2020, around 48 % of all new cars shipped that year had built-in connectivity ([49]). In 2030, 96 % of all new cars shipped worldwide are expected to be connected cars.

In order to harmonise the way Article 20a(3) is implemented across the EU, vehicle manufacturers should be encouraged to make available parameters mentioned in this provision through an harmonized interface that enable real time sharing. Today, some data points mentioned in the revised RED (state of charge, battery capacity, …) are already shared ad hoc with third parties through bilateral contracts. The obligation under Art. 20a(3) allows third parties to connect to the interface easily and at no cost, and ensures access to the data mentioned.

For the case of stationary batteries, data flows go from the Battery Management System to the Energy Management System (EMS) installed in the building as a standalone unit or as part of a building management system. From EMS, information can be shared with users and third parties using different standards.

In that regard, Member States should facilitate for owners/users of stationary batteries and third parties the direct access to EMS or BMS, in accordance with data protection regulation, and the Data and Cybersecurity Acts ([50]).

([48]) Pursuant to Art. 21 of Regulation (EU) 2023/1804, the Commission shall adopt delegated acts to amend Annex II by introducing technical specifications for the areas listed in Annex II (Technical specifications) to enable full technical interoperability of the recharging and refuelling infrastructure.

([49]) https://www.statista.com/statistics/1276018/share-of-connected-cars-in-total-new-car-sales-worldwide/

([50]) Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act) (OJ L 151, 7.6.2019, p. 15).

The nature of devices connected to the BMS and the connection architecture differ with the application and the system provider. It can be done either via an inverter or via a direct communication with the EMS. In general, many standardised options for communication with EMS and BMS are currently available in the market. Therefore, Member States should recommend manufacturers to implement, when available, the standardised protocols in order to achieve interoperability.

It is necessary to use existing standards for the data model and communication between the BMS and the EMS, and then from the EMS to the third parties ([51]). Communication with the owners or third parties could be enabled via standardised communication, or messaging standards and APIs (e.g. using web services), and building on underlying existing domain-specific data exchanges.

3.4. ***Obligation to ensure smart and where appropriate bi-directional recharging functionalities***

3.4.1. *General overview of obligations in 20a(4)*

Article 20a(4) puts an obligation on Member States or their designated competent authorities to ensure that, as of the transposition date, new and replaced non-publicly accessible normal power recharging points installed in their territory will support smart recharging functionalities. Article 14 of the EPBD has the same requirement.

New and replaced recharging points are considered to be all new charging points that are installed in charging stations or that replace existing charging points.

Article 5(8) of AFIR already has an obligation to ensure smart recharging capabilities on publicly accessible recharging points which is placed on the operators of publicly accessible recharging points. However, AFIR does not address smart recharging at non-publicly accessible recharging points.

Article 20a(4) of RED also stipulates that, where appropriate, new and replaced non–publicly accessible normal power recharging points with smart recharging functionalities must be able to support the interface with smart metering systems, provided that the latter are deployed in the Member States.

In addition, Article 20a(4) stipulates that, where appropriate, new and replaced non–publicly accessible normal power recharging points must be able to support bi-directional recharging functionalities, in connection with Article 15(3) and (4) of AFIR ([52]).

Smart recharging can provide benefits to the grid by shifting the load in time without acting as storage. It requires ensuring efficient and timely charging and balancing the load on the grid depending on the state of charge of the battery. Since bi-directional recharging allows EV batteries to behave like other batteries connected to the grid, it facilitates integration of variable renewable energy by allowing to store excess energy when prices are low and supplying this energy back to the grid when energy prices are high and the renewable generation is scarcer. Open access to battery management system (BMS) data allows for precise control of the bi-directional flow of energy, enabling grid integration strategies such as vehicle-to-grid (V2G) and vehicle-to-home (V2H) systems.

Article 20a(4) aims to enable a market for smart and bi-directional recharging of electric vehicles at non-publicly accessible recharging infrastructure. Smart and bi-directional recharging are especially relevant for private recharging infrastructure, in homes, offices, and for private fleets where cars are usually parked for longer periods of time. It can provide flexibility and balancing services to the grid. Only if the recharging infrastructure is bi-directional, EVs can serve as energy storage devices providing power during peak demand and thus provide stability to the electricity grid during peak hours or during emergencies.

Bi-directional recharging is still in an early stage of development and is only available in some European countries (and in pilot phases) due to several barriers such as unfavourable electricity grid tariffs, double taxation, lack of markets for distributed energy resources and conversion need from DC (battery) to an AC recharging point, which is the typical technology used in home/workplace recharging points. However, the recent finalisation of supporting standards (namely ISO 15118-20 ([53])) enables smart and bi-directional recharging and ensures interoperability of data communication between EVs and charging points.

([51]) Standards: IEC TC57 (Power systems management and associated information exchange) such as IEC 61850, OpenAdr and IEC 60870-5-104. Using IEC 6087-5-104 or IEC 61850 allows DSOs to connect directly to SCADA systems.
([52]) Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure.
([53]) Standard finalised: https://www.iso.org/standard/77845.html.

The implementation of the provisions of the revised RED on bi-directional recharging is closely linked with provisions in other legislative acts such as Article 15(3) and (4) of AFIR and Article 14 of the EPBD. It is therefore essential that Member States ensure close collaboration across their different government departments to achieve effective and coherent transposition and implementation of this Article at national level.

3.4.2. *Smart recharging*

The obligation of Article 20a(4) requires Member States to ensure that non-publicly accessible recharging points that are installed from the transposition date of the Directive as new ones or to replace existing ones can support smart recharging functionalities. They shall ensure that private charging points installed from the transposition date of the Directive are smart i.e., allow the intensity of the electricity delivered to the battery to be adjusted dynamically, on the basis of information received through electronic communication.

Member States should set up incentives for EV users to make use of smart recharging, namely support the emergence of smart recharging contracts in the market. They should ensure that dynamic price contracts are available to final customers, as stipulated in the Electricity Directive, and that distributed energy resources (such as car batteries) can participate in balancing services, notably for grid congestion management.

Member States' regulation should also encourage off-peak charging as a way to optimise the use of the grid. By incentivizing EV owners to charge their vehicles during off-peak hours, it would avoid excessive strain on the grid during peak demand times while promoting cost-effective charging for consumers. In that regard, charging points that operate off peak by default should be encouraged.

Today, EU legislation does not directly regulate direct connection of charging stations to renewable generation. Within the framework of energy system integration, taking electricity from the grid remains the most efficient way to optimize production from renewables and recharging operations.

— The revised Electricity Market Directive (EMD) has included measures to accelerate grid connections (notably (i) the framework to be provided by MS to facilitate the connection of recharging points to the distribution networks, (ii) the publication by DSO, within three months of the submission of the request, of information on the capacity available for new connections including the capacity under connection request, (iii) the possibility to request grid connection exclusively in digital form).

— The Grid Action Plan also announced important measures such as support to system operators by ENTSO-E and the EU DSO in digitalising and streamlining procedures for grid connection requests (guidance and recommendations to be issued by mid-2025) and sharing of data by network users to support DSOs in the planning of network needs.

— With the revision of the RED, the EU has also taken important measures to accelerate the permitting for grid connections of RES and co-located storage projects.

Consequently, Member States are encouraged to:

— ensure simpler streamlined procedures, when they exist, for connecting EV charging points to the grid by setting in relevant legislation concrete provisions so that DSOs have to respond in a reasonable amount of time to the request of new users requesting grid connection (e.g. EVs, storage, RES…);

— ensure that DSOs and TSOs regularly provide information on the available grid hosting capacities in their areas as well as pipeline of grid connection requests, with as much space and time granular information as possible, so that potential future networks users, including charging point operators, can consider them in their planning and investment decisions.

Member States should also ensure that relevant stakeholders involved in the planning for and development of electromobility infrastructure (e.g., municipalities, transport authorities, private entities) provide regular information to DSOs on future projects for e-charging infrastructure, ahead of the grid connection requests, to support DSOs' network development planning.

3.4.3. *Interface with smart meters, where appropriate*

Overall, smart meters can greatly facilitate demand response, by allowing consumers to increase awareness of their energy consumption and providing granular and accurate data in a timely manner to energy suppliers, that in combination with time-of-use tariffs and dynamic prices incentivise the charging at times when demand is low or the renewable share is high. In that regard, interfaces with smart metering systems are a necessary component of a smart recharging system where such systems are deployed by Member States.

The Electricity Directive ([54]) provides in its articles 19 and 20 detailed requirements regarding the deployment of smart metering systems. Where smart metering systems are systematically deployed after 4 July 2019, they should comply with the specific functionalities described in article 20 and Annex II, including the capability of providing to final customers information on accurate actual consumption and time of use. Customers should be able to have access to validated historical consumption data and to non-validated near real-time consumption data. Non-validated data should be accessible through a standardised interface or through remote access, in order to support automated energy efficiency programmes, demand response and other services (e.g. smart recharging). Consequently, for smart metering systems meeting the requirements of Article 20 and Annex II of the Electricity Directive, Member States should ensure that new and replaced non–publicly accessible normal power recharging points installed in their territory can support the interface with smart metering systems.

The Electricity Directive also states that smart metering systems that do not meet the requirements of Article 20 and Annex II, shall not remain in operation after 5 July 2031.

Member States should provide practical guidelines with certain criteria or technical specifications for ensuring the interface with smart metering systems.

Furthermore, according to Implementing Regulation (EU) 2023/1162 ([55]), for the provision of non-validated near real-time data through a standardised interface, where applicable, Member States shall have due regard for the use of relevant available standards, including standards that enable interoperability. Without prejudice to future developments, standards available and in use in national practices at the time of publication of the Implementing Regulation include the following (non-exhaustive) list:

— EN 50491-11

— EN 62056 series – DLMS/COSEM

— EN 13757 series – Wired and Wireless M-bus

— EN16836 – Zigbee SEP 1.1

3.4.4. *Bi-directional recharging, where appropriate*

Bi-directional recharging is defined as a smart recharging operation where the direction of the electricity flow can be reversed, allowing that electricity flows from the battery to the recharging point that it is connected to. It therefore encompasses the main V2X applications, namely Vehicle-to-Grid (V2G), Vehicle-to-Home (V2H), Vehicle-to-Building (V2B), etc.

Bi-directional recharging will help better integrate renewables in the energy system and make the grid more resilient, while providing financial benefits for consumers. EVs have a large potential to ensure flexibility and security of supply ([56]) that will result in a lower carbon intensity of the electricity system.

It is in the discretion of Member States or their designated competent authorities to define in which cases private recharging points must support bi-directional recharging functionalities. When defining this, Member States should take into account the provisions of Article 15(3) and (4) of AFIR, that apply to both public and private recharging points and require undertaking specific assessments related to bi-directional recharging by June 2024 and every three years, namely on:

— how the deployment and operation of recharging points could enable electric vehicles to further contribute to the flexibility of the energy system (Article 15(3));

([54]) Directive (EU) 2019/944.
([55]) In Annex, Table 3 – Procedure Conditions.
([56]) EC (2019), Effect of electromobility on the power system and the integration of RES.

— the potential contribution of bi-directional recharging to reducing user and system costs and increasing the renewable electricity share in the electricity system (Article 15(4)).

It is also required by Article 15(3) and (4) of AFIR that Member States take into account the results of the assessments mentioned above and make them publicly available, and if necessary, take appropriate measures as regards ensuring consistency of infrastructure planning with the corresponding grid planning and adjust the geographical availability and distribution of bi-directional recharging points in private areas.

Article 15(3) states that Member States may task the national regulatory authority to carry out the assessment, while for Article 15(4) it is required that the regulatory authority needs to undertake the assessment on the basis of input from transmission and distribution system operators.

To this end, Member States would need to take into account the recommendations stemming from those assessments under AFIR to elaborate on cases when bi-directional charging is feasible.

Cases where bi-directional charging might be the most relevant are:

— When expected private benefits exceed costs – The expected benefits of bi-directional recharging which would benefit the households/businesses owning the charging stations exceeds the additional costs of installing the charging infrastructure that allows for bi-directional recharging.

— When the size of the recharging infrastructure is large, for example in office spaces and large residential buildings.

— When there is a significant potential of renewables generation – Bi-directional charging can store excess renewable energy and release it back to the grid when needed.

— When flexibility is especially needed due to power grid congestion in a specific area – Bi-directional charging in congested areas can help to increase the production of renewables while reducing grid expansion needs.

— When there is a specific need to enhance grid stability and reliability - Bi-directional charging can support the grid by providing other services, such as voltage control and emergency services.

— When there are behind-the-meter storage or solar-PV in the building – Users could be encouraged to allow bi-directional recharging functionalities if they have storage or distributed renewables, as they would increase the benefits of bi-directional charging.

Fast charging points are not suitable for bi-directional charging operations.

Even though Article 20(4) does not set specific requirements on how to ensure smart and bi-directional recharging for non-publicly accessible charging points, in addition to the technical requirements, Member States could set up incentives for EV users to use bi-directional recharging such as:

— Provide financial (or other) incentives for installing bi-directional recharging points.

— Enable dynamic pricing (or simpler time of use pricing strategies) to encourage EV owners and users to adjust the charging behaviour according to the price signals. The Electricity Regulation and Electricity Directive (Art. 11) already contain certain provisions to address dynamic pricing. Introducing time-differentiated grid tariffs and ensuring that vulnerable consumers are protected via social policy, rather than price interventions (as per Article 5(2) of Electricity Directive) would be key.

Member States also have to avoid double charges, including network charges, for stored electricity remaining within the premises of active customers that own an energy storage facility, or when providing flexibility services to system operators, as requested in Article 15(5) ([57]) of the Electricity Directive.

([57]) Member States shall ensure that active customers that own an energy storage facility: (a) have the right to a grid connection within a reasonable time after the request, provided that all necessary conditions, such as balancing responsibility and adequate metering, are fulfilled; (b) are not subject to any double charges, including network charges, for stored electricity remaining within their premises or when providing flexibility services to system operators; (c) are not subject to disproportionate licensing requirements or fees; (d) are allowed to provide several services simultaneously, if technically feasible.

Member States should also enable a flexibility market for distributed energy resources (including storage) to improve coordination of bi-directional recharging initiatives and DSO activities.

When implementing provision on smart and bi-directional recharging, it is crucial that Member States abstain from adopting national standards or technical specifications and use instead the existing European standards or requirements stemming from the internal market legislation to enable a smooth European market of bi-directional charging. In particular, a communication standard between EVs and recharging infrastructure to enable bi-directional charging, but also facilitate smart recharging, was adopted in 2022 (ISO 15118-20). The mandatory implementation of this standard will be the subject of upcoming secondary legislation under Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure ([58]). It can already be implemented on a voluntary basis by car manufacturers. In that regard, when Member States deploy bi-directional recharging, EVs and recharging stations hardware should rely on ISO 15118-20.

3.4.5. *E-roaming*

Recital 56 of Directive (EU) 2023/2413 stresses that it is beneficial that EV users can use their subscription to e-mobility services at multiple recharging points ('e-roaming'). This possibility of e-roaming ensures consumer choice and facilitates charging operations for the user. Already today, e-roaming is widely established and available at the vast majority of publicly accessible recharging points throughout the Union. Further facilitating e-roaming at privately-owned, shared recharging points, such as those in the parking lots of hotels or offices, can also have several benefits. EV users can make use of their subscriptions with their mobility service provider, increasing the convenience of charging. Furthermore, it would reduce the need for EV users to carry multiple cards or smartphone apps to access different private recharging networks to which the EV user has access to. Therefore, Member States are encouraged to assess the possibilities to further promote roaming at private recharging points (except for own use), under the rules established in Article 5 of Regulation (EU) 2023/1804.

3.5. ***Non-discriminatory access for small and mobile storage assets to the electricity markets***

3.5.1. *General overview of obligations in 20a(5)*

Article 20a(5) requires that Member States ensure that the national regulatory framework allows small or mobile systems (for example, EVs, electric bikes, electric cargo bikes, heat pumps, solar panels, batteries and other small decentralised energy sources) to participate in the electricity markets, including for congestion management and for the provision of flexibility and balancing services, including through aggregation. In addition, it is required that Member States provide a level playing field and non-discriminatory participation in the electricity markets for small, decentralised energy assets or mobile systems.

Furthermore, Article 20a(5) requires that Member States, in close cooperation with all market participants and regulatory authorities, establish technical requirements for the participation of small or mobile systems in the electricity markets, on the basis of the technical characteristics of those systems.

The overall objective of this provision is to increase the role of distributed resources by enabling them to provide flexibility and balancing services to the grid with a view to increasing the overall efficiency of the electricity grid.

Exploiting the full potential of distributed energy resources (such as domestic and EV batteries, heat pumps or PV panels) will offer considerable flexibility to the grid, in order to balance supply and demand. Moreover, such resources limit investments for grid expansion due to increased electrification.

([58]) The Commission is planning, via a delegated act under AFIR to be adopted in 2024, to mandate that standard on publicly accessible and non-publicly accessible recharging points.

Recital 57 of the revised RED explains that in order to facilitate the development of flexibility services provided by distributed energy resources, the regulatory provisions, such as the ones related to tariffs, commitment times and connection specifications, should be designed in a way that does not hamper the potential of all storage assets, including small and mobile ones and of other devices for example, heat pumps, solar panels and thermal storage, to offer flexibility and balancing services to the system and to contribute to the further penetration of renewable electricity, in comparison with larger, stationary storage assets. In addition to the general provisions preventing market discrimination laid down in the Electricity Regulation and the Electricity Directive, specific requirements should be introduced to address holistically the participation of those assets and to remove any remaining barriers and obstacles to unleash the potential of such assets to help the decarbonisation of the electricity system and empower the consumers to actively participate in the energy transition.

More specifically, in relation to non-discriminatory participation of mobile storage systems and other small decentralised energy assets in the electricity markets, recital 58 of the revised RED states that this means that small assets are able to participate in all electricity markets, including congestion management and the provision of flexibility and balancing services in a non-discriminatory manner as compared to other electricity generation and storage systems, and without disproportionate administrative or regulatory burden.

3.5.2. *Detailed obligation*

In relation to the specific technical requirements referred to in Article 20a(5) for ensuring participation in the electricity markets, a number of technical rules under the Electricity Directive and the electricity Regulation are currently being put in place and will provide the basis also for transposing and implementing Article 20a(5). The most relevant is the forthcoming network code on demand response ([59]), which is expected to be adopted as a delegated act by the Commission in 2025, and will provide the harmonised rules and necessary clarifications on the outstanding issues, including on facilitating the role of independent aggregators and addressing the specific particularities of small storage assets such as EV batteries.

Member States are encouraged to promote the use of load management systems as they have benefits to distribute the load throughout time and between vehicles, and thereby avoid peaks when several EVs are charged at the same location.

The following specific aspects are of particular importance when transposing and implementing the above obligation:

1. Participation in capacity markets – Member States are recommended to ensure seamless participation in capacity mechanism markets for distributed assets, by lowering minimum bid sizes, lowering minimum lead times between concluding the allocation process and start of delivery, limiting the option for long-term contracts which favour conventional sources of capacity and larger assets over aggregators with newer sources (e.g., France practices certification of capacity up to 2 months before the year of delivery); limiting delivery periods (e.g., for specific seasons or hours of the year);

2. Local flexibility markets / services, including congestion management – Member States could mandate at national level common product definitions for other services procured by DSOs on basis of the technical requirements set at EU level. This can be achieved by market-based platforms for congestion management (e.g. GOPACS in the Netherlands), which verify re-dispatching and load curtailment bids at national level (by combining relevant congestion management actions with opposite market actions to balance the grid);

3. Retail market distortions – Member States should ensure that flexibility of small/mobile assets is explicitly mentioned in the price in a transparent manner. Therefore, flexibility would be unleashed by their owners and would become available for aggregators for various flexibility services.

([59]) Based on ACER Framework Guidelines on Demand Response, which be developed into a set of harmonised EU-wide rules governing various aspects of demand side flexibility.

Member States could already start simplifying prequalification procedures that will be addressed in the network code on demand response. It allows for a common national prequalification across all markets, applying ex-post verification for local services for congestion management and voltage control (by reducing the prequalification process to a communication test, data exchange, financial aspects and legal provisions, e.g. as already done in Estonia and France for some balancing products). It could also allow for different unit types to be aggregated within the same product and reducing requirements for similar assets of aggregated products, and reduce pre-prequalification requirements in the case of product changes. For example, in Spain, aggregator products are prequalified as a whole if individual assets have capacity below 1MW.

Box 6 – Relevant aspects under the Electricity Directive and the Electricity Regulation

The Electricity Directive puts in place the basic rules on non-discriminatory access to flexibility markets (Article 3), possibilities for (independent) aggregation (Article 13) and the role of active customers (Articles 15-17) participating in the electricity markets (that own an energy storage facility). It requires that Member States put in place appropriate measures to ensure that distribution system operators are able to procure flexibility services from providers of distributed generation, demand response or energy storage. It also puts in place the requirements for dynamic pricing availability (Article 11). Therefore, the full transposition of the existing Electricity Directive should address the main barriers to non-discriminatory market access for small and mobile systems and their aggregators to electricity markets and provide good basis for implementation of provisions of Article 20a(5).

In addition, the Electricity Regulation (EU) 2019/943 contains provisions for functioning of electricity markets in Article 6 (on the organisation of balancing markets), Article 18 (charges for network access), Article 20 (resource adequacy), and Article 22 (capacity mechanisms design principles).

The legal provisions will be complemented by a network code on demand response specifying conditions for small sources to be active in flexibility markets. It will set specific technical rules at EU level to enable non-discriminatory market entry and participation in flexibility services for various types of small and mobile systems including EVs and their aggregators. The network code will clarify the framework and technical requirements for aggregators to fulfil their role at EU level, e.g., defining different aggregation models, collecting and sharing methods to quantify the provided flexibility (baseline methodologies), and proposing simplified prequalification procedures and principles for the financial settlement of revenues generated by flexibility.

ANNEX I

Obligations under Article 20a

Article 20a – Facilitating system integration of renewable electricity

1. Member States shall require transmission system operators and, if the data are available to them, distribution system operators in their territory, to make available data on the share of renewable electricity and the greenhouse gas emissions content of the electricity supplied in each bidding zone, as accurately as possible in intervals equal to the market settlement frequency but of no more than one hour, with forecasting where available. Member States shall ensure that distribution system operators have access to the necessary data. If distribution system operators do not have access, pursuant to national law, to all the data needed, they shall apply the existing data reporting system under the European Network of Transmission System Operators for Electricity, in accordance with the provisions of Directive (EU) 2019/944. Member States shall provide incentives for upgrades of smart grids to better monitor grid balance and make available real time data.

   If technically available, distribution system operators shall also make available anonymised and aggregated data on the demand response potential and the renewable electricity generated and injected to the grid by self-consumers and renewable energy communities.

2. The data referred to in paragraph 1 shall be made available digitally in a manner that ensures interoperability on the basis of harmonised data formats and standardised data sets so that it can be used in a non-discriminatory manner by electricity market participants, aggregators, consumers and end-users, and that it can be read by electronic communication devices such as smart metering systems, electric vehicle recharging points, heating and cooling systems and building energy management systems.

3. In addition to the requirements laid down in Regulation (EU) 2023/1542, Member States shall ensure that manufacturers of domestic and industrial batteries enable real-time access to basic battery management system information, including battery capacity, state of health, state of charge and power set point, to battery owners and users, as well as to third parties acting, with explicit consent, on the owners' and users' behalf, such as building energy management undertakings and electricity market participants, under non-discriminatory terms, at no cost and in accordance with the data protection rules.

   Member States shall adopt measures to require that vehicle manufacturers make available, in real-time, in-vehicle data related to the battery state of health, battery state of charge, battery power set point, battery capacity, and, where appropriate, the location of electric vehicles, to electric vehicle owners and users, as well as to third parties acting on the owners' and users' behalf, such as electricity market participants and electromobility service providers, under non- discriminatory terms and at no cost, in accordance with the data protection rules, and in addition to further requirements with regard to type approval and market surveillance laid down in Regulation (EU) 2018/858 of the European Parliament and of the Council.

4. In addition to the requirements laid down in Regulation (EU) 2023/1804, Member States or their designated competent authorities shall ensure that new and replaced non–publicly accessible normal power recharging points installed in their territory can support smart recharging functionalities and, where appropriate, the interface with smart metering systems, when deployed by Member States, and bi-directional recharging functionalities in accordance with the requirements of Article 15(3) and (4) of that Regulation.

5. In addition to the requirements laid down in Regulation (EU) 2019/943 and Directive (EU) 2019/944, Member States shall ensure that the national regulatory framework allows small or mobile systems such as domestic batteries and electric vehicles and other small, decentralised energy sources to participate in the electricity markets, including congestion management and the provision of flexibility and balancing services, including through aggregation. To that end, Member States shall, in close cooperation with all market participants and regulatory authorities, establish technical requirements for participation in the electricity markets, on the basis of the technical characteristics of those systems.

   Member States shall provide a level playing field and non-discriminatory participation in the electricity markets for small, decentralised energy assets or mobile systems.

ANNEX II

Relevant definitions

Relevant definitions for Article 20a(1):

— **Distribution system operator** is defined in Article 2(29) of Directive (EU) 2019/944 as a natural or legal person who is responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity;

— **Transmission system operator** is defined in Article 2(35) of Directive (EU) 2019/944 as a natural or legal person who is responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity;

— **Bidding zone** is defined in Article 2(14a) of the Revised RED, and refers to the definition of Article 2(65) of Regulation (EU) 2019/943, namely the largest geographical area within which market participants are able to exchange energy without capacity allocation;

— **Near real-time** is defined in Article 2(26) of Directive (EU) 2019/944 in the context of smart metering as a short time period, usually down to seconds or up to the imbalance settlement period in the national market;

— **Market settlement frequency** is equal to 'imbalance settlement period', as Article 2(15) of Regulation (EU) 2019/943;

— **Demand response** is defined in Article 2(20) of Directive (EU) 2019/944 as the change of electricity load by final customers from their normal or current consumption patterns in response to market signals, including in response to time-variable electricity prices or incentive payments, or in response to the acceptance of the final customer's bid to sell demand reduction or increase at a price in an organised market as defined in point (4) of Article 2 of Commission Implementing Regulation (EU) No 1348/2014, whether alone or through aggregation;

— **Renewables self-consumers** is defined in Article 2(14) of Directive (EU) 2018/2001 as a final customer operating within its premises located within confined boundaries or, where permitted by a Member State, within other premises, who generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity, provided that, for a non-household renewables self-consumer, those activities do not constitute its primary commercial or professional activity;

— **Renewable energy communities** is defined in Article 2(16) of Directive (EU) 2018/2001 as a legal entity, which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity; (b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities; (c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits.

Relevant definitions for Article 20a(2):

— **Interoperability** is defined in Article 2(40) of Regulation (EU) 2023/2854 as the ability of two or more data spaces or communication networks, systems, connected products, applications, data processing services or components to exchange and use data in order to perform their functions;

— **Interoperability** in the context of smart metering is defined in Article 2(24) of Directive (EU) 2019/944 as the ability of two or more energy or communication networks, systems, devices, applications or components to interwork to exchange and use information in order to perform required functions.

Relevant definitions for Article 20a(3):

— **Domestic battery** is defined in Article 2(14g) of the revised RED as a stand-alone rechargeable battery of rated capacity greater than 2 kwh, which is suitable for installation and use in a domestic environment;

— **Electric vehicle battery** is defined in Article 2(14h) of the revised RED and is referring to Article 3(1), point (14) of Regulation (EU)2023/1542, namely a battery that is specifically designed to provide electric power for traction in hybrid or electric vehicles of category L as provided for in Regulation (EU) No 168/2013, that weighs more than 25 kg, or a battery that is specifically designed to provide electric power for traction in hybrid or electric vehicles of categories M, N or O as provided for in Regulation (EU) 2018/858;

— **Industrial battery** is defined in Article 2(14i) of the revised RED and is referring to Article 3(1), point (13) of Regulation (EU) 2023/1542, as a battery that is specifically designed for industrial uses, intended for industrial uses after having been subject to preparation for repurposing or repurposing, or any other battery that weighs more than 5 kg and that is neither an electric vehicle battery, an LMT battery, nor an SLI battery;

— **State of health** is defined in Article 2(14j) of the revised RED and is referring to Article 3(1), point (28) of Regulation (EU) 2023/1542, as a measure of the general condition of a rechargeable battery and its ability to deliver the specified performance compared with its initial condition;

— **State of charge is defined** in Article 2(14k) of the revised RED and is referring to Article 3(1), point (27), of Regulation (EU) 2023/1542, as the available energy in a battery expressed as a percentage of its rated capacity as declared by the manufacturer;

— **Power set point** is defined in Article 2(14l) of the revised RED as the dynamic information held in a battery's management system prescribing the electric power settings at which the battery optimally operates during a recharging or a discharging operation, so that its state of health and operational use are optimised;

— **Battery Management System** is defined in Article 3(25) of Regulation (EU) 2023/1542 as an electronic device that controls or manages the electric and thermal functions of a battery in order to ensure the battery's safety, performance and service life, manages and stores the data for the parameters for determining the battery's state of health and expected lifetime and communicates with the vehicle, light means of transport or appliance in which the battery is incorporated, or with a public or private charging infrastructure.

Relevant definitions for Article 20a(4):

— **Smart metering system** is defined in Article 2(14c) of the revised RED and is referring to Article 2, point (23), of Directive (EU) 2019/944; as an electronic system that is capable of measuring electricity fed into the grid or electricity consumed from the grid, providing more information than a conventional meter, and that is capable of transmitting and receiving data for information, monitoring and control purposes, using a form of electronic communication;

— **Recharging point is defined to in Article 2(14d) of the revised RED** and is referring to Article 2, point (48), of Regulation (EU) 2023/1804 as a fixed or mobile, on-grid or off-grid interface for the transfer of electricity to an electric vehicle which, although it may have one or more connectors to accommodate different connector types, is capable of recharging only one electric vehicle at a time, and which excludes devices with a power output less than or equal to 3,7 kW the primary purpose of which is not the recharging of electric vehicles;

— **Smart recharging** is defined in Article 2(14m) of the revised RED as a recharging operation in which the intensity of electricity delivered to the battery is adjusted dynamically, on the basis of information received through electronic communication;

— **Bi-directional recharging** is defined in Article 2(14o) of the revised RED and is referring to Article 2, point (11), of Regulation (EU) 2023/1804 as a smart recharging operation where the direction of the electricity flow can be reversed, allowing that electricity flows from the battery to the recharging point it is connected to;

— **Normal power recharging point** is defined in Article 2(14p) of the revised RED and is referring to Article 2, point (37), of Regulation (EU) 2023/1804 as a recharging point with a power output less than or equal to 22 kW for the transfer of electricity to an electric vehicle.

Relevant definitions for Article 20a(5):

— **Aggregation** is defined in Article 2(18) of Directive (EU) 2019/944 as a function performed by a natural or legal person who combines multiple customer loads or generated electricity for sale, purchase or auction in any electricity market;

— **Independent aggregator** is defined in Article 2(19) of Directive (EU) 2019/944 as a market participant engaged in aggregation who is not affiliated to the customer's supplier;

— **Distributed generation** is defined in Article 2(32) of Directive (EU) 2019/944 as generating installations connected to the distribution system;

— **Energy storage** is defined in Article 2(59) of Directive (EU) 2019/944 as, in the electricity system, deferring the final use of electricity to a moment later than when it was generated, or the conversion of electrical energy into a form of energy which can be stored, the storing of such energy, and the subsequent reconversion of such energy into electrical energy or use as another energy carrier;

— **Flexibility** is defined in Article 2(79) of the amended Regulation (EU) 2019/943 means the ability of an electricity system to adjust to the variability of generation and consumption patterns and grid availability, across relevant market timeframes.