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ANNEX 9

ANNEX

to the

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**Approval of the content of the draft Commission Notice providing guidance on new or
substantially modified provisions of the recast Energy Performance of Buildings
Directive (EU) 2024/1275**

Infrastructure for sustainable mobility (Article 14)

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Commission Notice providing guidance on new or substantially modified provisions of the recast Energy Performance of Buildings Directive (EU) 2024/1275

Infrastructure for sustainable mobility (Article 14)

1. POLICY AND LEGAL CONTEXT

A shortage of recharging points in private buildings can be a barrier to the take-up of electric vehicles in the EU. The overall aim of Article 14 of the the recast Energy Performance of Buildings Directive ('the recast EPBD')¹ on infrastructure for sustainable mobility is to accelerate the deployment of recharging infrastructure in or adjacent to buildings. The EPBD complements Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure (also known by its short form 'alternative fuels infrastructure Regulation', AFIR)².

Electric vehicles are expected to play a crucial role in the decarbonisation of transport and can contribute to the decarbonisation and efficiency of the electricity system, namely through the provision of flexibility, balancing and storage services, especially through aggregation. This potential of electric vehicles to integrate with the electricity system and contribute to system efficiency and further absorption of renewable electricity should be fully exploited. Recharging in relation to buildings such as offices and multi-family buildings is particularly important, since this is where electric vehicles park regularly and for long periods of time. In line with the Renewable Energy Directive³, the recast EPBD includes requirements on smart and, where appropriate, bi-directional recharging.

Promoting zero-emission vehicles and sustainable travel is a key part of the European Green Deal, and buildings will play an important role in providing the necessary recharging points for both electric vehicles and electric bicycles.

Article 14 also provides for better parking infrastructure for bicycles, in line with the European Green Deal and the new EU urban mobility framework, as a shift towards active modes of transport such as cycling can significantly reduce greenhouse gas emissions from transport.

1.1. Legal context

1.1.1. Alternative Fuels Infrastructure Regulation

The Alternative Fuels Infrastructure Regulation⁴, which applies since 13 April 2024, sets interoperability standards for recharging points, deployment targets, and requirements for publicly accessible recharging infrastructure.

¹ [Directive \(EU\) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings \(recast\)](#)

² [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.](#)

³ [Directive \(EU\) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive \(EU\) 2018/2001, Regulation \(EU\) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive \(EU\) 2015/652.](#)

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.](#)

Questions and answers on this Regulation are available on the European Commission's [Mobility and Transport website](#)⁵.

1.1.2. Renewable Energy Directive

The revised Renewable Energy Directive entered into force on 20 November 2023 with a main transposition deadline of 21 May 2025. Its goal is to facilitate the transition to a decarbonised economy by increasing the share of renewable energy to at least 42.5% by 2030 - with a goal of 45% by 2040.

A document providing guidance on Article 20a on energy system integration (⁶) is relevant for the implementation of Article 14 of the recast EPBD.

2. SUMMARY OF OBLIGATIONS

Article 14 builds upon the provisions on electromobility in Article 8, which were added by Directive (EU) 2018/844. The provisions related to bicycle parking spaces were, however, not part of the previous EPBD. They are new to the recast EPBD.

An overview of the obligations in Article 14 is presented in the table below.

Table 1. Summary of obligations under Article 14

Scope		MS obligation
New buildings and buildings undergoing major renovation, where the car park is either inside the building or physically adjacent to it and the major renovations include the car park.	Non-residential > 5 parking spaces Art. 14(1)	- At least one recharging point for every five parking spaces. - Office buildings: at least one recharging point for every two parking spaces. - Pre-cabling for at least 50% of parking spaces, ducting for the remaining parking spaces. - Load management system where feasible. - Bicycle parking spaces representing at least 15% of average or 10% of total user capacity.
	Residential > 3 parking spaces Art. 14(4)	- Pre-cabling of at least 50% of parking spaces, ducting for the remaining parking spaces. - At least two bicycle parking spaces for every residential building unit.
New buildings	Residential > 3 parking spaces Art. 14(4)	The requirements above, plus at least one recharging point.

⁵ https://transport.ec.europa.eu/transport-themes/clean-transport/alternative-fuels-sustainable-mobility-europe/alternative-fuels-infrastructure_en.

⁶ [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\(2024\) 5041 final.](#)

Existing buildings	Non-residential > 20 parking spaces Art. 14(2)	By 1 January 2027: - At least one recharging point for every 10 car parking spaces or ducting for at least 50% of all car parking spaces. - Bicycle parking spaces must account for at least 15% of average or 10% of total user capacity. By 1 January 2033: - Buildings owned or occupied by public bodies: pre-cabling for at least 50% of car parking spaces.
All new and existing buildings	All buildings Art. 14(8)	Simplifying, streamlining and accelerating the procedure for installing recharging points in new and existing residential and non-residential buildings.

For new buildings there is a link to Article 11(1), which requires zero-emission buildings to offer the capacity to react to external signals and adapt its energy use, generation or storage where economically and technically feasible. Charging of electric vehicles can benefit from this capacity.

Furthermore, under Article 3 and Annex II, policies and measures adopted by the Member States to deploy infrastructure for electric vehicle charging in buildings must be included in their National Building Renovation Plans.

3. RELEVANT DEFINITIONS

The following definitions in Article 2 are relevant for Article 14:

Article 2(5): ‘public bodies’ means public bodies as defined in Article 2, point (12), of Directive (EU) 2023/1791.

Article 2(18): ‘residential building or building unit’ means a room or suite of rooms in a permanent building or a structurally separated part of a building which is designed for all-year habitation by one private household.

Article 2(22): ‘**major renovation**’ means the renovation of a building where: (a) the total cost of the renovation relating to the building envelope or the technical building systems is higher than 25% of the value of the building, excluding the value of the land upon which the building is situated; or (b) more than 25% of the surface of the building envelope undergoes renovation. Member States may choose to apply point (a) or (b).

Article 2(33): ‘**recharging point**’ means a recharging point as defined in Article 2, point (48), of Regulation (EU) 2023/1804 of the European Parliament and of the Council (i.e. the Alternative Fuels Infrastructure Regulation, where it is defined 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’).

Article 2(34): ‘**pre-cabling**’ means all measures that are necessary to enable the installation of recharging points, including data transmission, cables, cable routes and, where necessary, electricity meters.

Article 2(37): ‘**smart recharging**’ means smart recharging as defined in Article 2, second paragraph, point (14m), of Directive (EU) 2018/2001 of the European Parliament and of the Council (i.e. the revised Renewable Energy Directive, where it is defined 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).

Article 2(38): ‘**bi-directional recharging**’ means bi-directional recharging as defined in Article 2, point (11), of Regulation (EU) 2023/1804 (i.e. the Alternative Fuels Infrastructure Regulation, where it 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 it is connected to).

Article 2(64): ‘**bicycle parking space**’ means a designated space for parking at least one bicycle.

Article 2(65): ‘**car park physically adjacent to a building**’ means a car park which is intended for the use of residents, visitors or workers of a building and which is located within the property area of the building or is in the direct vicinity of the building.

The following definitions laid down in the Alternative Fuels Infrastructure Regulation are also relevant for Article 14:

High-power recharging point is defined in Article 2(31) as a recharging point with a power output of more than 22 kW for the transfer of electricity to an electric vehicle.

Normal-power recharging point is defined in Article 2(37) as a recharging point with a power output less than or equal to 22 kW for the transfer of electricity to an electric vehicle.

Several other terms that are not legally defined are also relevant:

Car park: No definition is provided, but for the purposes of the recast EPBD, ‘car park’ would exclude on-street parking on public roads, for example.

Ducting infrastructure means ‘conduits for electric cables’. This should be broadly interpreted to include cable ducting fixed to walls and cable pass-through walls.

Electrical infrastructure (of a building or a car park): No definition is provided in the recast EPBD. However, it should be understood to mean the electrical installation (either the whole installation or any part of it) of a building or car park, including electrical wiring, apparatus and associated equipment such as switchboards, transformers, etc.

Non-residential buildings are buildings that are used for a purpose other than residential (i.e. office buildings, healthcare buildings, wholesale and retail shops, schools, hotels and restaurants, etc.).

Office buildings: No definition is provided, but this category refers to buildings whose primary function is to provide space for administrative, financial, professional or customer services. The office area must cover most of the building’s total area, but the building may also have other rooms such as meeting rooms, classrooms, staff facilities or technical rooms.

4. IMPLEMENTATION OF OBLIGATIONS

Member States must bring into force the laws, regulations and administrative provisions necessary to comply with Article 14 by the transposition deadline of 29 May 2026.

The obligations to install recharging points, pre-cabling, ducting (i.e. conduits for electric cables) and bicycle parking spaces differ for new buildings, buildings undergoing major renovation and existing buildings.

The recast EPBD does not specify how the sustainable mobility requirements are to be applied to buildings that have both a residential and a non-residential function (e.g. a

residential building with commercial spaces on the ground floor). It is therefore up to the Member States to identify the most appropriate approach for such cases. This is clearly stated in Recital (34): *With regard to mixed-used buildings that include both residential and non-residential building units, Member States may continue to choose whether to treat them as residential or non-residential buildings.*

In transposing the provisions of Article 14, the Member States have the discretion to determine (or not to determine) whether the recharging points to be deployed should be normal or high-power recharging points.

4.1. Recharging infrastructure in new and renovated non-residential buildings

Article 14(1) requires the Member States to ensure that recharging points, pre-cabling and ducting are installed in new non-residential buildings, and non-residential buildings undergoing major renovation, that have more than five car parking spaces.

The requirements of Article 14(1) of the recast EPBD are broadly similar to those of Article 8(2) of the previous EPBD, the main differences being that the threshold has been lowered to from 10 to 5 parking spaces and that at least **one recharging point is required for every five car parking spaces** as compared to one for the entire car park previously.

Also, a new requirement has been introduced specifically for office buildings, where there must be **one recharging point for every two parking spaces**. To identify the buildings that fall under the requirement for office buildings, Member States can use the classification of buildings for the purpose of calculating energy performance, as set out in point 6 of Annex I to the recast EPBD.

Where there is a major renovation, the requirement only applies if the renovation work includes the car park or the electrical installation of the building or car park.

According to Article 14(1), at least one recharging point must be installed for every five car parking spaces, and pre-cabling must be installed for at least 50% of car parking spaces and ducting for the remainder.

To determine the number of car parking spaces that must have recharging points, pre-cabling or ducting installed, see the following example:

For a car park with 20 car parking spaces, 10 parking spaces, i.e. 50%, would have to be pre-cabled, while the remaining 10 parking spaces would need ducting.

In addition, there must be at least one recharging point per five parking spaces, i.e. at least four recharging points in this example. These four recharging points would need to be installed on four out of the 10 pre-cabled parking spaces.

In the case of an office building, where the requirement is at least one recharging point for every two parking spaces, in the above example with 20 car parking spaces, 10 pre-cabled parking spaces and 10 parking spaces with ducting would be required. All the pre-cabled parking spaces would need to have a recharging point installed, as the requirement would be 10 recharging points in total.

For buildings that have parking spaces for both customers and staff, for instance supermarkets, the national rules can allow building owners to take account of the difference in expected parking time when distributing the recharging points.

For instance, in a supermarket with 100 parking spaces, of which 10 are reserved for staff, 20 recharging points would be required in total. These could then be distributed between, for instance, five normal recharging points at parking spaces for staff and 15 recharging points for

customers. Any number of the recharging points for customers could be high-power recharging points. Article 14 does not specify the installed power of recharging points.

The time that a vehicle is parked can vary significantly between building categories. In large non-residential building (with more than 20 car parking spaces) such as wholesale and retail trade services buildings where visitors typically park for short times, i.e. less than one to two hours, the installation of high-power recharging points might meet the needs of visitors better than normal-power recharging points. Member States may therefore consider providing some flexibility when designing their requirements on recharging points for this category of buildings as long as they ensure the availability of the required number of recharging points taking into account the needs of the users of the car park.

The notion of **physically adjacent**, as defined in Article 2(65), is relevant where a car park is not located inside a building but is clearly linked to it in other ways. In particular, there may be situations where the car park is not strictly speaking physically adjacent to the building (e.g. located on the other side of the street or separated from it by a green area), but is nevertheless clearly linked to it due to habitual use by residents, visitors or workers. This would make it relevant and appropriate to apply the obligations. Parking spaces used by the occupants of a multi-family building would be one such example.

When implementing the definition of “car park physically adjacent to building” Member States can choose to include car parks within the property area of the building or in the direct vicinity of the building. Member States can also choose to include both car parks within the property area and in the vicinity.

4.2. Recharging infrastructure in existing non-residential buildings

Article 14(2) requires the Member States to ensure that recharging points or ducting are installed in existing non-residential buildings with more than 20 car parking spaces by 1 January 2027.

This requirement applies to all non-residential buildings which, as of 1 January 2027, have an existing car park of more than 20 parking spaces.

The new requirements must be transposed by 29 May 2026.

The transposition could be based on the existing rules implementing Article 8(3) of the previous EPBD, which required a minimum number of recharging points to be installed in all non-residential buildings with more than 20 car parking spaces by 1 January 2025.

The requirements of Article 14(2) may be postponed until 2029 for buildings renovated in the two years prior to 28 May 2024, to comply with national requirements laid down under Article 8(3) of the previous EPBD.

For buildings owned or occupied by public bodies, at least 50% of car parking spaces must have pre-cabling installed by 1 January 2033. Public bodies are defined in Article 2(5).

4.2.1. Interpretation of ducting

‘Ducting infrastructure’ means conduits for electric cables. If ducting already exists in the car park, i.e. for lighting or other purposes, in many cases the existing ducting can be used to fulfil the requirement.

For outdoor car parks, where the charging stations may be directly connected to an outdoor electric box or cupboard, all spaces that can be directly and safely connected (according to national legislation) to the box or cupboard would be considered as ducted. For example, if

national legislation indicates that the maximum distance between charging point (or equivalent electric installation) and the electric cupboard is 10 meters, then all spaces that are located within 10 meters of a location suitable for an electric cupboard would be considered as ducted.

In the case of indoor car parks where the cables are fixed to the walls, ducting would mainly be needed when the cables need to pass through a wall.

Member States can specify further technical details as regards ducting if needed.

4.2.2. *Combination of recharging points and ducting*

Article 14(2) requires all non-residential buildings with more than 20 car parking spaces to have at least one recharging point installed for every 10 car parking spaces, or ducting for at least 50% of car parking spaces, by 1 January 2027.

This means that Member States can choose the installation of either recharging points or ducting.

A combination of charging points and ducting is also possible as long as the minimum requirements are fulfilled. As an example, if an existing non-residential building meets the ducting requirements, for instance through existing ducting, the recommended solution could be to install different kinds of recharging points to fulfil the needs of customers, visitors, and employees.

When they draw up such recommendations, the Member States could consider how many registered electric vehicles they expect to have by the end of 2026 (just before the requirements of Article 14(2) of the EPBD come into effect).

In line with the recommendations set out in the previous EPBD⁷, they could also take account of the following to ensure that the deployment of recharging points is proportionate and appropriate:

- (a) relevant national, regional and local conditions; and
- (b) possible diversified needs and circumstances based on area, building typology, public transport coverage and other relevant criteria.

In addition, Member States can take into account the differences in estimated parking times for different categories of non-residential buildings when choosing between recharging points or ducting, or a combination.

As clarified in Section 4.1, Member States may consider providing some flexibility when designing their requirements under Article 14(1) and 14(2).

Table 2: Examples of considerations for recharging infrastructure in different types of building

Parking duration	Type of building	Recharging infrastructure
Short (<1h)	Supermarket, gym, library, etc.	High-power recharging points for customers, normal-power recharging points for staff. (Customer parking times too short for normal-power recharging or smart/bi-directional charging.)

⁷ [Commission Recommendation \(EU\) 2019/1019 of 7 June 2019 on building modernisation.](#)

		Alternatively in case the parking is open outside the opening hours of the supermarket or similar: sufficient number of normal-power recharging points for people living nearby to charge in the evening and at night, also allowing users to benefit from smart charging. Example: https://www.redactie24.be/shopping/drastische-verandering-op-parkings-van-colruyt-en-ook-buiten-de-openingsuren-174462
Medium (1-3h)	Large retail centres, furniture stores, etc.	A combination of high-power recharging points and normal-power recharging points for parking of longer duration. More normal-power recharging points with smart charging than high-power recharging points can be an advantage for the grid. If a facility is in the city centre, the building owner could offer people living nearby evening/night charging.
Long (>3h)	Parking towers, etc.	A large number of normal-power recharging points to allow load balancing, smart charging and grid support (plus a few high-power recharging points to provide backup).

Member States can also take into account the difference between customer and staff parking spaces. Parking spaces for staff are more suitable for smart charging because cars are parked for much longer, allowing the time of charging to be adapted to take advantage of off-peak electricity prices, the share of renewable electricity in the grid, etc.

Grid concerns can be taken into account for the transposition in Member States when determining whether the installation of recharging points or of ducting is most appropriate.

4.3. Recharging infrastructure in new and renovated residential buildings

Article 14(4) requires the Member States to ensure that pre-cabling and ducting are installed in new residential buildings, and residential buildings undergoing major renovation, that have more than three car parking spaces. In new residential buildings with more than three car parking spaces, at least one recharging point must be installed in addition to the pre-cabling and ducting.

There are many similarities with the requirements for non-residential buildings in Article 14(1) and the requirements laid down in Article 8(5) of the previous EPBD. The main difference compared to the previous EPBD is that the threshold has been lowered from 10 to 3 parking spaces. Moreover, 50% of the parking spaces must be pre-cabled, and new residential buildings must have at least one recharging point.

The intention is to cover multi-family buildings, not single-family homes as they typically do not have more than 3 car parking spaces, and barriers to the installation of recharging points are likely to be few.

4.4. Pre-cabling and ducting

Article 2(34) defines pre-cabling as all measures that are necessary to enable the installation of recharging points, specifying that it includes cables, cable routes, data transmission, etc.

However, the technical details of the installation can vary from case to case, also depending on the expected power output of the recharging points. This is something the Member States could take into consideration when transposing the rules into national law.

Ducting is not defined, but it is clear from Article 14(1)(b), (2)(a) and (4)(a) that it is to be understood as conduits for electric cables. Conduits for electric cables could, for instance, be buried under the ground in outdoor car parks, or laid in the floor or fixed to the walls in indoor car parks. Conduits are typically used for several purposes, and there is no need to make new ducting if the necessary cables can be fitted into conduits that are already in place and cover the planned parking spaces.

Also, in indoor car parks where the cables are to be fixed to a wall, the roof or a cable tray, ducting would only be needed where the cables need to pass through a wall (for instance a fire compartmentation wall).

Pre-cabling must be ‘dimensioned so as to enable the simultaneous and efficient use of the required number of recharging points’. Here, ‘required number of recharging points’ should be understood as the expected number of parking spaces for which recharging points will have to be installed to respond to future demand. Also, the transformer substation plans and the electrical single line diagrams (SLD) for wiring and circuit protection should be drafted and at least the circuit breakers installed at the transformer substation and/or the primary distribution/fuse box (if any). This will make upgrading and installation of recharging points later on straightforward and cost effective.

Where there are severe grid constraints, or it is difficult to estimate the cabling needs at the time of construction or major renovation, Member States could consider allowing the replacement of pre-cabling with ducting with a pulling cord, cable trays in indoor car parks and/or straight unpaved areas and charger point supports in outdoor car parks, in order to avoid installing cables that will eventually not be used.

To make it easier for local authorities to check that pre-cabling and ducting requirements have been met, building owners could present a floorplan showing the exact location of switches and power outlets and a schematic plan of the wiring diagram.

This documentation could serve as proof that they have thought out the details of a future recharging installation as well as making it easier to verify compliance with the EPBD pre-cabling requirements. It is therefore recommended that the Member States make such documentation a requirement.

4.5. Features of recharging points

4.5.1. Smart and bi-directional recharging

Article 14(6) requires the Member States to ensure that the recharging points referred to in paragraphs 1, 2, and 4 are capable of smart recharging and, where appropriate, bi-directional recharging.

Smart recharging allows users of electric vehicles to plan the time of charging according to the cost of electricity, the share of renewable energy and their own needs. It also benefits the grid as it helps shift load times and therefore reduce peak loads.

Bi-directional recharging allows electric vehicle batteries to behave like stationary batteries connected to the grid. It also contributes to the uptake of variable renewable energy by allowing excess energy to be stored when energy prices are low, and to be fed back to the grid when prices are high and less renewable energy is being generated.

However, there is still some way to go to before we are able to exploit the full potential of bi-directional charging. Article 14 does not set specific requirements for bi-directional recharging precisely because the technology is developing at a rapid pace.

Article 14(6) is in line with Article 20a(4) of the Renewable Energy Directive, which requires 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 support smart recharging functionalities and, where appropriate, the interface with smart metering systems.

Also, under that Article, in conjunction with Article 15(3) and (4) of the Alternative Fuels Infrastructure Regulation, new and replaced non-publicly accessible normal-power recharging points should be able to support bi-directional recharging functionalities where appropriate.

The guidance for Article 20a of the Renewable Energy Directive provides clarifications for Member States which are also relevant for the implementation of Article 14 EPBD⁸.

Article 20a(5) of the Renewable Energy Directive states that in addition to the requirements of Regulation (EU) 2019/943⁹ and Directive (EU) 2019/944¹⁰ laying down common rules for the internal market for electricity, the Member States must ensure that the national regulatory framework allows electric vehicles to participate in the electricity markets, including congestion management and the provision of flexibility and balancing services, including through aggregation.

To that end, the Member States should lay down technical requirements for participation in the electricity markets on the basis of the technical characteristics of those systems, in close cooperation with all market participants and regulatory authorities.

In addition, Article 5(8) of the Alternative Infrastructure Regulation requires publicly accessible recharging points to have smart recharging capabilities. This obligation applies to operators of publicly accessible recharging points; there is no reference to smart recharging at recharging points to which the public does not have access.

Smart recharging and bi-directional recharging are defined in the Renewable Energy Directive and the Alternative Fuels Infrastructure Regulation (see the section on relevant definitions). In 2022 a standard was adopted that, among others, enables bidirectional recharging and also facilitates smart recharging (ISO 15118.20). It can be implemented on a voluntary basis.

Several recharging station manufacturers offer products that comply with ISO 15118.20 either by default or as an option. This means that the necessary hardware is either built in or can be retrofitted to support bi-directional charging.

⁸ [Paragraphs 3.4.2 and 3.4.4 of the Guidance on Article 20a on sector integration of renewable electricity of Directive \(EU\) 2018/2001 on the promotion of energy from renewable sources.](#)

⁹ [Regulation \(EU\) 2019/943](#)

¹⁰ [Directive \(EU\) 2019/944](#)

It is recommended that recharging points installed under Article 14 comply with or have plug-in modules and/or firmware that can be updated to comply with ISO 15118.20. An upcoming delegated act under AFIR will mandate the standard on new recharging points as of 2027.

4.5.2. *Clarification of where bi-directional charging is considered appropriate*

According to the guidance on Article 20a of the Renewable Energy Directive, cases where bi-directional recharging 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 recharging points exceed the additional costs of installing the recharging 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 recharging 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 recharging can support the grid by providing other services, such as voltage control and emergency services.

In addition, it can be relevant where energy sharing is foreseen.

Also, parking duration is a factor that influences the suitability of bi-directional charging and the potential grid benefits that can be obtained. Member States can take this into account when considering where bi-directional recharging is appropriate.

4.5.3. *Power output of recharging points*

There are no requirements as regards the power output of the recharging point in the recast EPBD. For their implementation, Member States are therefore free to require normal power recharging points or high-power recharging points, or a combination of the two, according to what is most appropriate in their specific situation.

For the benefits for the energy system and for the grid, in many cases smart recharging at normal recharging points can be beneficial. Also, cars, in particular private cars, typically remain parked for the best part of the day (up to 23 hours), which makes them well suited for smart recharging at normal-power recharging points.

Because technology is evolving and the EPBD requirements need to be future-proof, Article 14 does not specify the output power of recharging points. It is therefore up to the Member States to determine the combination of fast and normal recharging points that works best for them. Member States should take into account that private cars often stay parked most of the time, either at home or at the workplace, making access to normal recharging points in homes and at workplaces important. Normal-power recharging has many advantages because it can also be combined with smart recharging.

4.5.4. *Operation of recharging points*

Under Article 14(6), recharging points must be operated on the basis of non-proprietary and non-discriminatory communication protocols and standards, in an interoperable manner. They

must also comply with any European standards adopted under Article 21(2) or delegated acts adopted under Article 21(3) of the Alternative Fuels Infrastructure Regulation.

Under Article 21(2), in conjunction with Article 10 of Regulation (EU) No 1025/2012¹¹, the Commission may ask European standardisation organisations to draft European standards that set technical specifications for areas referred to in Annex II to the Alternative Infrastructure Regulation for which no common technical specifications have been adopted by the Commission.

Article 21(3) requires the Commission to adopt delegated acts. Relevant in this context are in particular technical specifications for communication exchange for electric vehicle recharging (see Annex II to the Regulation).

4.6. Load management systems

Load or recharging management systems allow demand from electric vehicles to be managed so that several vehicles can charge at the same time and at the same location.

Under Article 14(1), Member States should support the installation of a **load or recharging management system** in new and renovated non-residential buildings with more than five parking spaces, where appropriate and to the extent this is technically and economically feasible and justifiable.

Load management of charging points can help minimise their impact on the electrical infrastructure while distributing the available energy between all connected loads. In general, there are three main levels of load management:

- Static load management limits the power drawn by the EV charging loads to a fixed power level;
- Dynamic load management optimises energy use and allocates available power to EV charging loads in a building;
- Smart load management optimises energy use and costs based on EV planning, energy tariffs, local power generation and energy consumption forecasts.

Smart load management can have several functions which can be measured based on the following indicators:

- Renewable energy curtailment;
- Peak demand reduction;
- CO₂ emissions reduction;
- Average electricity cost.

Reducing the peak power demand is the main load management function to be considered when designing electric vehicle recharging in a car park, because it can help reduce the total rated power of the electrical installation (cabling, transformer, grid connection) and therefore bring down the investment or upfront costs.

Best practice:

¹¹ [Regulation \(EU\) 1025/2024](#)

In the Netherlands, the installation of load management and/or smart charging is explicitly referred to as a measure designed to counter grid congestion. Flexible charging of electric cars will become a permanent part of the contracts that the government makes with municipalities to address grid concerns¹².

4.7. Possible exemptions

4.7.1. Micro-isolated systems and outermost regions

Under Article 14(5)(a), the Member States may decide not to apply the requirements of Article 14(1), (2) and (4) to specific categories of building if the necessary recharging installation would rely on micro-isolated systems, or if the buildings are situated in the outermost regions within the meaning of Article 349 of the Treaty on the Functioning of the European Union (TFEU) and this would lead to substantial problems for the operation of the local energy system and endanger the stability of the local grid.

This is not a new provision in the recast EPBD; the same rule applied under the EPBD of 2010, as amended in 2018.

Article 2(36) defines micro-isolated system as ‘any system with consumption less than 500 GWh in the year 2022, where there is no connection with other systems’.

As regards the outermost regions, Article 349 TFEU recognises the specific constraints faced by certain regions, including Guadeloupe, French Guiana, Martinique, Réunion, the Azores, Madeira, and the Canary Islands. These regions, due to their remoteness, island nature, small size, difficult topography, climate, and economic dependence on a few products, are eligible for specific measures and provisions in EU legislation to address their challenges.

This exemption is only intended to be used where there is a risk that recharging facilities cause network instability and issues with power system operability in isolated microgrids. Remote regions should be included in the green transition as far as possible and be allowed to benefit from the development of recharging infrastructure.

4.7.2. Cost exemption

Under Article 14(5)(b), Member States may decide not to apply the requirements of Article 14(1), (2) and (4) to specific categories of building where the cost of the recharging and ducting installations exceeds at least 10% of the total cost of a major renovation of the building.

This provision was introduced by the 2018 EPBD; the only change in the recast EPBD is that the **threshold has been raised from 7% to 10%**.

In this context, it is important to recall the definition of major renovation, which is included in the section on relevant definitions.

Existing practice

The following example of existing practice relates to Article 8(6). The only difference from Article 14(5)(b) is that the threshold has been raised to 10%:

In **Greece**, the owner of an existing residential or non-residential building undergoing major renovation may be exempted from the obligations provided that the engineer responsible for the issuance of the building permit declares on honour to the municipality’s urban planning

¹² <https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/kabinet-neemt-maatregelen-tegen-vol-elektriciteitsnetcongestie>

office that the cost of a recharging and ducting installation would exceed 7%¹³ of the total cost of renovating the building.

4.8. Bicycle parking spaces

A shortage of bicycle parking spaces, both in residential and non-residential buildings, is a major barrier to the uptake of cycling, a very energy-efficient, pollution-free and climate-friendly mode of transport. Article 14 of the recast EPBD sets requirements for a minimum number of bicycle parking spaces in different categories of buildings.

Table 3: Summary of obligations for bicycle parking spaces

Scope		MS obligation
New buildings and buildings undergoing major renovation where the car park is either inside the building or physically adjacent to it and the major renovations include the car park	Non-residential > 5 parking spaces	• Parking spaces for bikes corresponding to at least 15% of average or 10% of total user capacity. • Enough space for bikes that are larger than the standard size. • Pre-cabling and ducting to enable the installation at a later stage of recharging points for electrically powered bikes. • The required number of parking spaces may be adjusted for certain types of non-residential building not typically accessed by bikes.
	Residential > 3 parking spaces	• At least two parking spaces for every residential unit. • Member States may, subject to an assessment by local authorities and taking into account local characteristics, including demographical, geographical and climate conditions, adjust requirements for the number of bicycle parking spaces. • Where, in the case of major renovation, ensuring two bicycle parking spaces for every residential building unit is not feasible, Member States must ensure as many bicycle parking spaces as appropriate.
Existing buildings	Non-residential > 20 parking spaces	By 1 January 2027: • Parking spaces for bikes corresponding to at least 15% of average or 10% of total user capacity. • Enough space for bikes that are larger size than the standard size. • Pre-cabling and ducting to enable the installation at a later stage of recharging points for electrically powered bikes. • The required number of parking spaces may be adjusted for certain types of non-residential building not typically accessed by bikes.

4.8.1. Determination of the number of bicycle parking spaces in non-residential buildings

Article 14(1) and (2) require non-residential buildings to have parking spaces for bikes corresponding to at least 15% of average or 10% of total user capacity.

Average user capacity and **total user capacity** are not defined in the EPBD; the way these terms are generally used in building practices or building permits can be used as a guide.

For example, total user capacity is to be understood as the **maximum number of people who can safely and comfortably occupy or use a building**. This number is an upper limit of occupants according to building codes and fire and safety regulations.

¹³ The threshold is 10% in the recast EPBD.

Average user capacity is to be understood as the **usual or expected number of occupants or users of a building under normal operating conditions**, rather than maximum occupancy. This can vary depending on the type of building and how it is used¹⁴.

The following are a few examples of how average user capacity can be determined.

- Based on building type and usage: the specific use of the building (offices, retail shops, school) plays a major role in determining average capacity;
- Based on historical data: in many cases, average capacity is based on historical data such as average daily foot traffic or occupancy trends;
- Based on space allocation: both maximum capacity and average capacity can be calculated on the basis of floor space per user, but average capacity is based on a more realistic estimate of usage, not just the maximum.

For the purpose of Article 14, **Member States are free to choose either total or average user capacity** as the metric on which to base the requirement for bicycle parking spaces. They can for example choose the metric that is the most readily available and places the smallest possible administrative burden on building owners.

One advantage of ‘total user capacity’ could be that this information is often readily available for buildings, for instance in relation to fire safety. In cases where ‘average user capacity’ is considered more suitable, data on typical use would need to be gathered.

The intention is that, independently of the metric used, a similar number of parking spaces for bikes should be obtained, at least for buildings such as offices and schools that have relatively stable occupation. This is the reason the required share of parking spaces for bikes is 10% if the metric is ‘total user capacity’ and 15% if the metric is ‘average user capacity’ (total user capacity being larger than average user capacity).

Example: Office building

An office building with a total user capacity of 100 would require parking spaces for bikes corresponding to 10% of total user capacity, i.e. at least 10 parking spaces.

Assuming that the office building has an average user capacity of 2/3 the total user capacity (67 people), the building would require parking spaces for bikes corresponding to 15% of the average user capacity, i.e. at least 10 parking spaces.

It is also possible for Member States to implement the obligation in the Article through metrics based on typical number of users per square meters for different categories of buildings. For example, the Brussels Region¹⁵ has laid down requirements based on floor area which vary per building type. For example, one parking space for bikes is required per 200 m² floor area in office buildings, as compared to 1.5 parking spaces per 100 m² floor area in shops.

¹⁴ In an office, average user capacity might be based on the typical number of people working in the building on a regular day. For retail stores or shopping malls, average user capacity might be based on observational studies of the number of customers. For libraries, museums or schools, average user capacity could refer to the number of visitors, students or staff present on an average day, bearing in mind that peak times may vary.

¹⁵ <https://environnement.brussels/pro/reglementation/obligations-et-autorisations/stationnement-et-livraison-les-obligations-concernant-velos-motos-et-autos>.

As regards space for bikes that are a **larger than the standard size**, the intention is that the building owner should also provide parking spaces that are large enough for e.g. cargo bikes, long bikes, bikes with trailers, tricycles or bikes for people with disabilities. There is no requirement as to the exact share of bicycle parking spaces to be reserved for larger bicycles.

Article 14 does not mention security specifically, but Member States are recommended to take protection against theft into consideration by ensuring that there is a possibility for bicycles to be locked conveniently¹⁶ to a secure point at the parking space.

4.8.2. Possible exemption for bicycle parking spaces in non-residential buildings

According to Article 14(3) Member States may adjust requirements for the number of bicycle parking spaces in accordance with paragraphs 1 and 2 for specific types of non-residential building not typically accessed by bikes.

This includes non-residential buildings that are very difficult to access by bike, for example a store, a supermarket or an office located on a highway without bicycle access.

Another example of buildings that are not typically accessed by bicycle are buildings where the share of visitors that are accessing it by bike is very low compared to the total number of visitors, for example a store selling large objects that are difficult to transport by bike. The Member States should bear in mind, however, that providing parking spaces for bikes in areas with little bike traffic could be an incentive for increased use.

4.8.3. Possible exemptions for bicycle parking spaces in residential buildings

The requirements on bicycle parking spaces apply to residential buildings with more than three car parking spaces, with the intention of covering multi-family buildings and not single-family homes (which rarely have more than three parking spaces for cars).

According to Article 14(4), Member States have the possibility to adjust the number of bicycle parking spaces in new residential buildings and residential buildings undergoing major renovation subject to an assessment by local authorities and taking into account local characteristics, including demographical, geographical and climate conditions.

Also, Article 14(4) requires ‘as many parking spaces as appropriate’ to be provided in residential buildings undergoing major renovation if ensuring two bicycle parking spaces for every residential building unit is not feasible.

4.8.4. Ducting and pre-cabling for electrically powered bikes

Article 14 of the recast EPBD does not require specific recharging points to be installed for electric bicycles. However, to ensure that new and renovated residential and non-residential buildings can accommodate electric bikes, their pre-cabling and ducting installation should also take into account the needs to supply electricity to bicycle parking spaces for the future installation of sockets for recharging electric bikes.

There are no specific requirements as regards the specific number of pre-cabled bicycle parking spaces. This would be up to the Member States to decide in relation to the uptake of electric bicycles.

¹⁶ I.e. using good to access and difficult to cut (rectangular profiles are safer than round profiles) “inverted U-arcs”. Too low bike parking frames (for holding only wheels) should be avoided as inconvenient and constituting a risk to the wheels when the bike is pushed laterally).

There is a difference between the recharging of electric vehicles and electrical bicycles in the sense that no specific recharging point is needed to recharge an electric bike; a standard household socket is sufficient.

4.8.5. *Existing practices relating to parking spaces for bikes*

Belgium requires any new car park to have parking spaces for bikes in ‘sufficient numbers’ in relation to the activity of the site. Renewal of the environmental permit of an existing car park is conditional on a quantitative and qualitative analysis of whether there are sufficient parking spaces available for bikes.

Bulgaria sets a minimum number of parking spaces for bikes for different types of building, specifying the share of parking spaces to be reserved for bikes parking for more than two hours and bikes parking for less than two hours.

Lithuania has legislation with specific requirements for parking spaces for bikes, including their size and their distance from the entrance of the building.

The province of Vorarlberg in **Austria** has specific rules for e-bikes, including the obligation to install parking spaces with appropriate ducting in new buildings or residential buildings with three or more apartments undergoing major renovation, if the parking spaces are located inside or in the direct vicinity of the building and are roofed or enclosed by walls or other constructions.

In addition to these best practices, Member States are recommended to seek guidance on quality bike parking from cyclists’ organisations, including on accessibility of the bike parking spaces.

4.9. **Simplifying, streamlining and accelerating the installation of recharging points**

Article 14(8) requires the Member States to take measures to **simplify, streamline and accelerate** procedures, especially those of **co-owners’ associations**, for installing recharging points in new and existing residential and non-residential buildings, and to **remove regulatory barriers**, including the permitting and approval procedures of public authorities, without prejudice to the property and tenancy law of the Member States.

This requirement is similar to that of Article 8(7) of the previous EPBD, which required the Member States to take measures to simplify the deployment of recharging points in new and existing residential and non-residential buildings and to address possible regulatory barriers, including permitting and approval procedures, without prejudice to the property and tenancy law of the Member States.

The Member States could therefore build on what has already been implemented, taking further steps to promote the installation of recharging infrastructure in all buildings.

They should look into the policies in place relating to the installation of recharging points to see if they might lead to undesired costs and/or delays or to an excessive administrative burden.

The following are examples of regulatory, technical/practical and financial barriers to the deployment of recharging infrastructure in buildings¹⁷:

Regulatory barriers

- Complex and/or lengthy authorisation and permitting procedures;

¹⁷ [Promotion of e-mobility through buildings policy - Report from the Commission to the European Parliament and Council, COM\(2023\) 76 final.](#)

- Separate building permits;
- Lack of uniform requirements across regions or municipalities;
- Multiple responsible authorities;
- Lengthy administrative processes for obtaining power increases;
- Lack of information on legal requirements;
- Financial aspects of recharging (e.g. the need to clarify the business model for sharing recharging points);
- Excessive fire safety requirements in underground car parks;
- Prohibition on installing type-2 recharging points in buildings with public access.

Technical/practical barriers

- Shortage of qualified providers;
- Municipal technical services overwhelmed;
- Shortage of available technicians;
- Lack of data on parking spaces.

Member States could consider the examples above when analysing any barriers that need to be addressed.

Member States could also take inspiration from the following good practice, based on an analysis of existing policies¹⁸:

Good practice:

- introducing policies which ensure that a recharging point installation:
- is at the expense of the person making the request;
- requires notification rather than approval;
- facilitating co-owner decisions on shared recharging points, mainly by allowing decisions to be made by simple majority instead of absolute majority;
- simplifying planning and permitting procedures, mainly by exempting recharging infrastructure from planning permission;
- providing guidance, information and model agreements to the relevant parties;
- providing training for real estate professionals;
- pre-financing collective infrastructure.

See the table below for existing national initiatives to promote recharging infrastructure.

Table 4: National initiatives to promote recharging infrastructure.

MS	National initiatives to promote recharging infrastructure
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¹⁸ [Promotion of e-mobility through buildings policy - Report from the Commission to the European Parliament and the Council, COM\(2023\) 76 final.](#)

NL	The nation-wide initiative ‘National Agenda for Charging Infrastructure’ (NAL)¹⁹ is based on cooperation between several parties²⁰ organised into working groups which aims to promote laws and regulations to speed up the roll-out of charging infrastructure. Based on input from NAL, a guide has been drawn up for owner associations²¹ outlining all the necessary steps for installing recharging infrastructure in multi-ownership buildings. To facilitate for the Association of Owners to make decisions, detailed information is included in the guide. A few examples: • Different approaches with regard to individual and common ownership of parking spaces; • Suggestions on required grid capacity extension: 2.9kW per vehicle; • Cost estimates for maintenance and management; • Diagram indicating the possible benefits of load balancing and solar energy integration; • Explanation of financing models. In addition, a legal toolkit is provided as an Annex.
DE	On behalf of the German Federal Ministry for Digital and Transport²², the National Centre for Charging Infrastructure coordinates and manages activities aimed at expanding the charging infrastructure in Germany. The centre provides support in connection with planning, implementing and funding charging infrastructure and collects relevant data to gain a better understanding of the need for charging stations. They do this by networking with all the key stakeholders, share knowledge and present to the users²³.
IE	Electric Vehicle Charging Infrastructure Strategy 2022-2025²⁴. The focus of the strategy is to provide publicly funded charging infrastructure for electric cars and light-duty vehicles, the demand for which will grow as EV uptake increases. To support individual needs, the strategy lays out four main categories of charging infrastructure to be developed: • home/apartment charging;

¹⁹ <https://www.agendalaadinfractuoor.nl/english/>.

²⁰ Ministry of Infrastructure and Water Management, Ministry of Economic Affairs and Climate, the ‘Rijksdienst voor Ondernemend Nederland’ (RVO), the Formule E-Team, the Association of Dutch Municipalities, het Interprovinciaal Overleg, the grid operators (ElaadNL) and the National Knowledge Platform Recharging Infrastructure (NKL).

²¹ https://vveladen.nl/wp-content/uploads/2022/04/NAL-BROCHURE_TOEGANKELIJK.pdf.

²² BMDV – Bundesministerium für Digitales und Verkehr.

²³ <https://nationale-leitstelle.de/en/>.

²⁴ gov.ie - EV Infrastructure Strategy 2022-2025.

	• residential neighbourhood charging; • destination charging; • motorway/en-route charging.
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4.9.1. Technical inspections

Some Member States require a technical inspection ('verification') before an installed recharging point can be used, which adds costs and leads to delays, whereas other Member States have no such technical inspection requirement²⁵.

Those Member States that have inspections in place are recommended to reassess the need for them or consider whether they can be simplified, while keeping in mind aspects related to fire safety.

4.9.2. Consent from the landlord or co-owners

Under Article 14(8), Member States are required to remove barriers to the installation of recharging points in residential buildings with parking spaces, **in particular the need to obtain consent from the landlord or co-owners** for a private recharging point for own use.

A request by tenants or co-owners to be allowed to install recharging points in a parking space may be refused only if there are serious and legitimate grounds for doing so.

An example of an existing practice is presented below.

In **France**, the owner of a building with secure-access parking spaces for private use or, in the case of co-owned buildings, the condominium association, represented by the managing agent, may not refuse a request from a tenant or occupant acting in good faith and at their own expense to fit parking spaces with an electric recharging point for electric or hybrid rechargeable vehicles that allow individualised metering of consumption, unless they have serious and legitimate grounds for doing so.

Examples of serious and legitimate grounds are when recharging points are already in place, when it is impossible to carry out the works, or when the owner or syndicate of co-owners cannot make a decision to allow the installation within a reasonable period.

Also, the owner or the managing agent of a co-owned building must allow the service provider chosen by the tenant or occupant acting in good faith to access the technical premises of the building. The owner of the collective housing building and the provider of the installation must sign an agreement before works begin, stipulating the conditions of access to and operation of the common areas and specifications for fitting, managing and maintaining the installation.

These rules are further specified in Articles R113-7 to R113-9 of the Code of Construction and Housing, setting out the notification obligation and procedure, the procedure for owners to oppose the installation, and the procedure for concluding the agreement between the owner and the provider of the installation.

In addition, amendments were introduced to the legislation governing decisions of the assembly of co-owners to enable decisions on the installation of recharging points to be taken by simple majority rather than by absolute majority.

²⁵ <https://feedsnet.org/wp-content/uploads/2024/01/FEEDS-mapping-Electrical-inspections-regimes-in-the-EU-2024.pdf>.

4.10. Technical assistance and support schemes

Under the third and fourth subparagraphs of Article 14(8), the Member States must ensure the availability of technical assistance for building owners and tenants wishing to install recharging points and bicycle parking spaces.

With regard to residential buildings, they should consider introducing support schemes for the installation of recharging points, pre-cabling or ducting of parking spaces in line with the number of battery electric light-duty vehicles registered in their territory.

See the table below for examples of existing support schemes.

Table 5: Examples of support schemes

MS	Subsidy and support schemes
NL	https://elaad.nl/ [Technical Support Scheme] eLaadNL conducts tests and research on the sustainable charging of electric vehicles.
	https://www.rvo.nl/subsidies-financiering/svve/oplaadpuntenadvies-basislaadinfrastructuur-2024 <i>Subsidy for providing advice on recharging points</i> ‘Recharging station advice’ is provided by certified advisors registered with the Dutch Chamber of Commerce (KVK). The advisors perform on-site inspections and describe how recharging stations can be installed in a future-proof way. If required, a non-technical explanation can be given to members of owners’ associations. Several conditions apply: • At least one owner/inhabitant in the building; • Date requirement; • The charging needs for the next 10 years should be covered; • Fire safety; • Rules on cost division between users; • Electrical requirements: • Best current distribution and charging times; • Load management advice; • Physical security and cybersecurity; • List of legal requirements concerning fire safety and installation practices. Amount of subsidies: 15% of advice costs, up to EUR 1 500. <i>Subsidy for base recharging infrastructure</i> Conditions:

	• At least one owner/inhabitant in the building; • An offer must be submitted with a technical description, including of the following technical details: • Ducts and/or cabling; • Additional breaker boards; • Smart charging equipment; • Central safety switch to disable all recharging points in case of fire; • Data network for internet access; • Number of parking spaces covered; • Details on how inhabitants can use the charging points. Amount: Subsidy of EUR 100 per parking space with recharging points.
FR	https://advenir.mobi/ French national funding scheme for recharging installations for private individuals, professionals and owners' associations. https://logivolt.fr/ Residential recharging funding scheme. https://www.zeplug.com/ Private companies providing support to owners' associations in connection with the installation of recharging points.
FI	The construction of recharging points in housing associations has been supported since 2018. From the beginning of 2022, subsidies began to be granted not only to housing associations, but also for electric car charging devices installed at workplaces. A total of EUR 32.5 million was allocated to charging subsidies for housing associations and workplaces for 2022–2023. https://commission.europa.eu/publications/finland-final-updated-necp-2021-2030-submitted-2024_en
ES	https://www.idae.es/ayudas-y-financiacion/para-movilidad-y-vehiculos/programa-moves-iii Action 2: Deployment of electric vehicle recharging stations.
CY	Recharging station sponsorship scheme 'Electromobility with 1000'
IT	Charging station bonus for businesses and professionals Ministry of the Environment and Energy Security
PT	Support for Chargers in Condominiums - Mobi.e

4.11. Accessibility of recharging points

Recital 51 states that the Member States should ensure access to recharging points for people with disabilities. This is also addressed in Article 14(2) of the Alternative Fuels Infrastructure Regulation, which requires Member states to report, in the context of their National Policy Frameworks, on measures they have taken to ensure that publicly accessible recharging and refuelling points for alternative fuels are accessible to older persons, persons with reduced mobility and persons with disabilities in accordance with the accessibility requirements of Directive (EU) 2019/882.

Guidelines on the accessibility of electric recharging infrastructure are currently being developed by the Sustainable Transport Forum.

5. FIRE SAFETY IN CAR PARKS

The following guidelines on fire safety have been adopted as required by Article 14(10). More information can be found in the guidance issued by the Sustainable Transport Forum on fire safety for electric vehicles and charging infrastructure in covered parking spaces²⁶.

5.1. Challenges and risks

Recharging infrastructure for battery electric vehicles (BEVs) poses a number of risks in the following scenarios:

- installation is not performed in compliance with the applicable safety regulations;
- the installer lacks the proper qualifications to install BEV charging infrastructure;
- the electrical equipment used is unsuitable or unsafe;
- maintenance or inspections are not conducted properly;
- the charging infrastructure is vandalised.

5.1.1. Challenges and risks for parking operators and building owners

As BEVs become increasingly common on European roads, car park operators and building owners must prioritise fire safety when providing services such as parking facilities and recharging infrastructure for BEVs. A key concern for stakeholders is ensuring that both BEVs and internal combustion engine vehicles (ICEVs) can park safely, particularly in enclosed spaces beneath or adjacent to buildings. This is vital to ensuring public safety. Accommodating BEVs presents new challenges for parking operators and building owners, especially given the diversity in building construction and design. Establishing consistent fire safety standards for both new and existing structures is difficult, as some preventive measures are not feasible in existing buildings. The increasing size of both ICEVs and BEVs further exacerbates the issue, reducing available space and increasing the risk of fire spread and structural damage. Moreover, the use of proper recharging infrastructure is critical. In the absence of designated recharging stations, BEV drivers may resort to non-compliant equipment, which can significantly elevate fire risks²⁷. Addressing these challenges, along

²⁶ European Commission: Directorate-General for Mobility and Transport, *Guidance of fire safety for electric vehicles parked and charging infrastructure in covered parking spaces*, Publications Office of the European Union, 2025, <https://data.europa.eu/doi/10.2832/6681178>

²⁷ (Hynnen et al., 2023).

with implementing necessary fire prevention measures, places a financial burden on operators and building owners as they adapt to the evolving automotive landscape.

5.2. Maintaining high fire safety standards for BEVs in covered car parks

Maintaining fire safety in covered car parks is not simply a matter of selecting specific measures and equipment. Rather, it requires a combination of strategies to ensure an adequate level of safety. This section explores guidance for both preventing fires and managing them if they occur. It is important to emphasise that the measures required will differ between buildings designed for residential or public use and those intended solely for parking vehicles.

This section is structured around five key pillars, which represent the fundamental aspects to consider in relation to BEV safety when developing a fire safety strategy for covered car parks:

- prevention of fires;
- detection of fires;
- evacuation;
- propagation control;
- fire extinguishing.

In addition to these pillars, it is crucial for any building accommodating BEVs to conduct its own risk assessment. That assessment should take account of the specific types of vehicles, the recharging infrastructure in place, and the materials used within the parking area. Particular attention must be given to existing parking facilities, as it is existing facilities, rather than newly constructed ones, that account for the majority of current infrastructure. Local and regional authorities are therefore strongly encouraged to implement comprehensive fire risk assessments for existing covered parking facilities as these assessments play a vital role in ensuring user safety and minimising fire risks. By providing a detailed and objective analysis of current infrastructure, these assessments offer actionable recommendations for improving safety. They can also be used to help develop phased action plans tailored to the constraints of individual operators, enabling a systematic and effective approach to enhancing fire safety standards.

5.2.1. Fire prevention

Fire prevention measures are critical to reduce the risk of ignition. When addressing fire prevention, three key aspects should be considered: access conditions to covered car parks, the design of recharging infrastructure and the materials used in car park construction.

5.2.1.1. BEV access to covered car parks

According to research findings²⁸, BEV fires do not occur more frequently than fires involving ICEVs. Therefore, restricting BEV access to covered parking facilities because of fire risk is neither logical nor beneficial. Such restrictions could hinder the uptake of BEVs. For these reasons, it is advisable to allow BEVs to park in covered parking areas. However, it is

²⁸ Fire safety – electric vehicles and charging infrastructure, Sustainable Transport Forum.

important to recognise that, like other vehicles, damaged BEVs pose a fire risk. To minimise potential hazards, it is advisable to prohibit severely damaged vehicles from parking in covered car parks.

In the event of flooding, especially when salt water is involved, BEVs should be evacuated from covered parking areas and stored outdoors for a few days. Owners and emergency responders should remain vigilant for signs of battery fires, such as vapour clouds resembling smoke (either dark or light) and unusual sounds such as hissing or hooting.

In the EU, harmonised product standards cover all safety requirements, including requirements for protection against fire risk, such as the use of non-flame propagating products for cable management systems.

In general, all recharging infrastructure must be safeguarded against mechanical damage caused by vehicles. This could be done by positioning it above ground level on a raised platform or protecting it with curbs, bollards or metal barriers, while ensuring the accessibility of recharging points. Additionally, the use of extension cables for BEV recharging in public areas should not be allowed.

5.2.1.2. Fire-safe materials

Fire-resistant construction materials should be used in covered car parks to enhance fire safety while garages should be kept free of all combustible materials and all general construction materials and must be sufficiently stable and mechanically strong. The French Building Code requires walls to be compartmentalised, with a fire-stop rating of one hour²⁹. Communications between the car park and other activities must be via a firewall with E30 doors³⁰.

5.2.2. Fire detection

Robust fire detection measures in car parks, including detectors, thermal cameras and video surveillance systems, significantly enhance fire safety. They enable early detection and identification of fires, thereby facilitating swift evacuation, limiting fire spread and helping firefighters to locate and extinguish fires effectively. Fire detectors, strategically placed throughout the car park, promptly detect smoke, heat or flames, initiating evacuation protocols and intervention measures. Thermal cameras detect temperature changes, identifying potential fire hotspots, while video surveillance systems provide visual confirmation of fire incidents, helping to verify the presence and location of fires quickly. Upon detection, automated alarm systems alert occupants, facilitating safe and efficient evacuation. Early detection and response help contain and suppress fire spread, mitigating damage and reducing the risk of secondary fires. Real-time monitoring and surveillance capabilities provided by video cameras enable firefighters to assess the situation remotely and plan their response accordingly. Thermal imaging technology assists in pinpointing the fire source and identifying potential hazards, helping to develop effective firefighting strategies.

²⁹ French Building code: order of 25 June, 1980 completed by order of May 9, 2006.

³⁰ French Building code: order of 25 June, 1980.

In short, fire detection measures in car parks are indispensable for enhancing safety. By enabling early detection and response, these measures facilitate evacuation, limit fire spread and provide crucial support to firefighters, safeguarding lives and property.

5.2.3. Evacuation

In covered car parks, the presence of various ventilation systems is paramount for evacuating smoke in the event of a vehicle fire. These systems are a critical element in providing individuals present in the car park with essential time to evacuate safely and enabling firefighters to intervene effectively at the scene of the fire. Different types of ventilation systems are utilised in covered car parks, each with its own unique capabilities and functionalities that are effective against BEV fires:

- (a) Natural ventilation. Natural ventilation systems rely on passive airflow through openings such as vents, windows, or shafts to remove smoke and heat from the parking area. These systems leverage natural forces such as wind and thermal buoyancy to facilitate the movement of air, helping to dissipate smoke and maintain breathable conditions. These ventilation systems are common worldwide. They are typically designed to have an opening area of a specified size, for example 35% in Poland, and 1/20 of the floor area in the United Kingdom. For small fires (approximately 1,4 MW), open ventilation worked well in 86,31% of cases. For larger fires (4 MW or 6 MW), this percentage fell to 38,79% and 33,31% respectively. In case of a fire representing the 95th percentile of vehicle fires (8,80 MW), the open ventilation produced a satisfactory outcome in 14,24% of cases³¹.
- (b) Mechanical ventilation. Mechanical ventilation systems utilise fans or blowers to actively circulate air within the car park, facilitating the removal of smoke and pollutants. These systems can be configured with ductwork and exhaust fans strategically positioned throughout the parking area to ensure effective ventilation and smoke extraction.
- (c) Smoke control systems. Smoke control systems are specifically designed to manage smoke in the event of a fire, typically incorporating both natural and mechanical ventilation components. These systems may include smoke detectors, smoke exhaust fans, and smoke barriers to contain and disperse smoke, preventing its accumulation in critical areas and aiding the safe evacuation of occupants.

In the event of a BEV fire, prompt activation of ventilation systems is crucial. These systems play a pivotal role in evacuating smoke from the covered car park, creating clear pathways for occupants to exit safely and providing visibility for emergency responders. By evacuating smoke and heat, ventilation systems buy precious time for evacuation procedures to unfold smoothly. They also enable firefighters to locate and address the fire swiftly, reducing the risk of further escalation and facilitating more effective fire suppression efforts.

In addition to the evacuation of smoke and heat, it is essential that safety lighting and signs are put in place in covered car parks to guide individuals to evacuation routes and to enable firefighters to combat the fire effectively. Instructions providing occupants and users with information adapted to their needs must be posted in sufficient numbers and in places where

³¹ Research project OPUS19 No 2020/37/B/ST8/03839 “Wind effects on building fires in a multiparametric risk assessment with numerical modelling” funded by the Poland National Science Centre.

they are easy to read. These notices should include guidance for responding to fire emergencies. The instructions should also enable individuals to recognise the alarm signal and understand practical evacuation protocols and routes.

5.2.4. Propagation control

In enclosed car parks, maintaining fire safety for BEVs necessitates specific considerations. According to reports from the Research Institutes of Sweden (RISE)³², key good practices to enhance fire safety include:

- increasing the distance between parked vehicles by having wider parking spaces;
- increasing the ceiling height of parking garages.

In multi-level open car parks, there is the potential for fire to spread to another floor through the drainage system, particularly in liquid pool fires. These fires can arise from ruptures in petrol or diesel tanks due to external heating, and their extent depends on factors such as the amount of fuel, the incline of the flooring, and adjacent drains. The probability of fire spread in enclosed spaces is influenced by three primary factors³³:

- the distance between parked vehicles;
- the materials used in vehicle manufacturing;
- the ceiling height of the enclosed space - lower ceilings heighten the risk of fire spread by increasing radiation from the ceiling towards vehicles and decrease the time available for evacuation, as that depends on smoke layering remaining above occupant head level for a certain period of time.

5.2.4.1. Structural fire protection measures to limit propagation

Using fire-resistant walls, doors and gates to separate fire compartments or fire dampers and bulkheads to separate BEVs from each other is essential to limit fire propagation, as it helps to protect ICEVs from the fire³⁴. Separation means that the entire envelope of the vehicle or group of vehicles is located at a distance of at least 3 meters (outdoors) or 4.5 meters (indoors) from other vehicles or combustible materials, or is separated from them by E60 primary barriers extending from the floor to the ceiling, or a combination of both³⁵. Moreover, covered car parks should ensure access for removal of BEVs in case of fire. To reduce the chance of the battery reigniting, the BEV that caught fire may need to be moved outside the covered car park for monitoring and further extinguishing³⁶. Removing the vehicle is not the duty of the local fire and rescue service, so it might be necessary to arrange a contract with a

³² (Hynynen et al., 2023).

³³ (Hynynen et al.).

³⁴ Technical guide "Electric vehicle recharging installations" of the firemen of Barcelona.

³⁵ Technical guide "Electric vehicle recharging installations" of the firemen of Barcelona.

³⁶ Technical guide "Electric vehicle recharging installations" of the firemen of Barcelona.

car removal company. If this approach is chosen, the clear headroom of the car park must be considered, as it could restrict the types of recovery vehicles that can access the area³⁷.

5.2.4.2. Technical fire protection measures to limit propagation

Automatic fire protection systems play a crucial role in limiting the propagation of BEV fires in covered car parks. Sprinkler or mist systems are the main technologies considered by the existing EU regulation and recommendations to mitigate the potential impact of such fires.

Sprinkler

Sprinkler systems in covered car parks utilise heat-activated sprinkler heads connected to pressurised water pipes. Upon detecting elevated temperatures, the system releases water onto the heat source to suppress or extinguish the fire. Such systems are widely used for fire protection in enclosed car parks and can often be supplied directly from the water main. Sprinkler systems are also accepted by insurers as a mean to enable risk transfer.

Water mist

Another technical fire protection measure to limit propagation is water mist. Although it uses less water than a sprinkler system, it is usually more expensive for this purpose than sprinklers because it always needs a dedicated pump and tank. Water mist systems provide advanced fire suppression by dispersing fine water droplets at high pressure around a detected heat source. These droplets rapidly cool the fire, displace the oxygen and efficiently suppress the flames. The system can be triggered either by heat-sensitive nozzles or by other electronic detection apparatus such as smoke or temperature detectors. It is a suitable alternative to sprinkler systems, especially in existing garages where there may not be enough space for a sprinkler tank, as it involves less water and smaller pipe diameters.

Impact of automatic systems on fire [fire protection?]

- Rapid fire suppression. Sprinkler and mist systems are designed to detect and respond to fires swiftly and are triggered by heat-sensitive nozzles or other electronic detection apparatus, such as smoke or temperature detectors. These systems will act to provide early warning to occupants and alert emergency responders to the incident. When activated, the system releases water directly onto the fire source, helping to suppress the flames and prevent the fire from spreading further. These systems cannot extinguish battery fires but could reduce or mitigate fire propagation.
- Cooling effect. BEV fires often involve high temperatures generated by the vehicle battery packs. Sprinklers and mist systems can provide a cooling effect by dispersing water onto the heat source, thereby reducing its surface temperature. At the same time, the dispersion of water droplets in the atmosphere surrounding the heat source contains the thermal radiation around the car on fire. Hence, automatic extinguishing systems can prevent fire spread from the first vehicle to other vehicles and reduce the overall heat increase in the garage. A single car on fire, burning in a controlled manner and without damage to the car park structure, is much more manageable for the fire service.

³⁷

Technical guide "Electric vehicle recharging installations" of the firemen of Barcelona.

- Protection of surrounding areas. Sprinkler or water mist systems are typically installed throughout a building or facility, including in areas adjacent to car parks or garages. By suppressing fires in their early stages, these systems help prevent fires in other areas from spreading to vehicles, structures, or other combustible materials in the car park.
- Reducing toxic fumes. BEV fires can release toxic fumes and gases, posing risks to occupants and emergency responders. By quickly extinguishing the fire, automatic systems help mitigate the release of harmful substances, while the water droplets dispersed in the area around the fire source are able to capture water-soluble gases. These systems therefore improve safety for individuals in the vicinity and for emergency personnel.

Automatic extinguishing systems are highly effective fire protection measures that can significantly reduce the impact of all types of vehicle fires by swiftly suppressing flames, cooling heat sources, and limiting the spread of fire and smoke. Their ability to operate automatically and provide continuous protection makes them invaluable assets in safeguarding property and preserving life in the event of an emergency.

5.2.5. *Fire extinguishing*

It is important for emergency responders to develop a firefighting strategy, whether offensive or defensive, immediately upon arrival. According to the “Guidelines for fire and rescue services” published by the Norwegian Directorate for Civil Protection in 2021, there are four levels of risk for fires in lithium-ion batteries. BEV fires in covered parking areas correspond to level 3 ‘medium to high risk’. Extinguishing, containing and suppressing such a fire will require appropriate expertise in the form of training in battery fires.

Another important aspect when it comes to determining how to combat a BEV fire is the risk of a hydrogen gas cloud explosion. The total amount of vent gas formed during battery thermal runaway can be estimated at from 0,6 to around 3,5 l/Ah. The gaseous hydrogen concentration in the gas mixture could be around 25% of the total gas released. If the hydrogen content explodes in a confined space, the peak blast wave overpressure would end up being between 14 and 20 kPa at 20-50 m distance and is a function of the distance from the cloud centre for various quantities of hydrogen mixed with air. Liquid fuels such as petrol and diesel are more likely than alternative fuels to initiate a fire or contribute to it at an early stage, for example liquid pool fires.

As regards possible reignition of a battery, if a high-voltage battery is damaged, energy may remain inside any undamaged battery modules and cells, with no path to discharge it. That stranded energy can cause a high-voltage battery to reignite multiple times after firefighters extinguish an electric vehicle fire. Emergency responders have no way of measuring how much energy remains in a damaged battery, and no way of draining that energy, other than time-consuming methods such as allowing a battery fire to burn itself out. Engineers or other specialists can use the battery management system to check for remaining voltage if the system is operational, and some batteries have built-in discharge ports, which can also be used

by specialists. However, the high-voltage battery system may be damaged, preventing access to the battery management system or to the discharge ports³⁸.

A (non-exhaustive) list of the methods currently used by firefighters is provided below.

- (1) Different kinds of blankets are used to cover a fire source in order to stop the fire spreading to surrounding vehicles or infrastructure.
- (2) Water or other standard agents are used for electric vehicle fires. Water does not pose an electrical hazard to firefighters in a BEV fire, but recharging equipment does.
- (3) Sprinkler systems are used to help limit the spread of the fire, reduce its temperature, reduce the amount of smoke and slow the development of the fire until the fire department can intervene. Moreover, if the fire started somewhere other than the battery, the sprinkler system might even extinguish it.

When handling BEV fires, firefighters must always use full safety clothing with respirators. For firefighters, skin absorption will therefore be the only way that they can be exposed to hydrogen fluoride (HF). If the gas mixture from a BEV fire is below the lower explosive limit, there will not be a sufficient concentration of HF to pose a significant risk to firefighters. If firefighters have the gas mixture under control below the lower explosive limit, then the HF gases are also likely to be under control. Normal firefighting clothing will in most cases offer good protection against HF. In the event of an extended exposure in spaces with poor ventilation, a splash suit can be used as an extra barrier³⁹.

5.3. Recommendations for industry and business stakeholders

- **Emergency planning.** Businesses should implement comprehensive fire emergency plans for all covered parking facilities.
- **Signage.** Recharging station areas in car parks must have visible and appropriate signage.
- **Staff training and emergency response.** Security personnel and other staff should be informed of the location of recharging areas, power isolation procedures, and alarm activation steps. Staff must be trained to safely operate vehicle chargers and must report damaged equipment promptly. Defective chargers should be isolated, marked with warning notices and updated as "offline" in the relevant apps.
- **Fire risk management.** Car parks should not store combustible materials or flammable products or allow refuelling of vehicles, smoking or open flames.
- **Measures to consider when installing recharging infrastructure.**
 - **Location.** Install recharging stations near the entrance or exit of underground garages to facilitate quick access for emergency responders.
 - **Qualified installation.** To comply with legal and technical standards, only specialised, registered electricians should install charging devices and

³⁸ (Hynynen et al., 2023).

³⁹ (*Guidelines for Fire and Rescue Services: Risk Assessment and Handling of Fire in Lithium-Ion Batteries*, 2021)

associated power supplies. Non-compliant installation may void insurance coverage.

- **Protection and safety.**
 - Protect charging stations from collisions or mechanical damage.
 - Ensure compliance with the following minimum standards:
 - power supply via a central distribution unit, with overcurrent protection and residual current circuit breakers for each charging point;
 - emergency shutdown buttons installed in secure, accessible locations;
 - surge protection;
 - chargers mounted on non-combustible surfaces;
 - clearly labelled kill switches and circuit breakers.
- **Measures to consider for damage prevention**
 - **Fire alarms and sprinklers.** Install automatic fire alarms and sprinkler or water mist systems to enhance safety, particularly given the flammability of modern vehicle materials.
 - **Emergency shutdowns.** Equip parking facilities with automatic and manual emergency shutdown systems for all chargers, operable from a central location such as a fire alarm centre.
 - **Minimise combustible materials.** Limit flammable materials or critical infrastructure near charging stations. Walls should have adequate fire resistance (minimum two hours), and passive barriers should be installed to contain fire.
 - **Risk modelling.** Recharging infrastructure manufacturers should enhance risk modelling and battery performance monitoring to mitigate potential hazards.
- **Measures concerning standardisation and certification**
 - **Infrastructure standardisation.** Increased standardisation can improve accessibility and reliability of EV recharging infrastructure.
 - **Equipment certification.** Certification of recharging equipment can enhance reliability and safety for public use.

5.4. Recommendations for BEV users

- Users of BEVs have a responsibility as well, and they can play their part by treating the devices and cables with care and preventing damage by not crushing, shearing, or driving over cables.
- Users should consult the user manual for instructions on battery charging (voltage, current, maximum charging times, etc.).
- Users should also frequently check the charging cables and charging devices for damage, for instance by carrying out a visual inspection each time before charging. Defective connectors and cables should be replaced immediately.

- Only charging cables approved by the manufacturers and specifically intended for charging electric vehicles may be used. Standard household extension cables, multiple socket strips, or charging adapters cannot be used for recharging BEVs.
- Electric vehicles which have been damaged, exposed to fire or submerged or which are under recall or may have a damaged battery could pose a particular fire hazard and should therefore never be parked in any parking structure.
- Having a system in place that alerts in case of overload of the power cable connected to the wall-charger could help prevent fires.

5.5. Recommendations for firefighters

- When fighting a vehicle fire, firefighters may use different kinds of blankets to cover the fire source to mitigate fire propagation.
- Firefighters may use towing equipment to move a vehicle into the open air to monitor it in case of thermal runaway. However, potential re-ignition of high voltage batteries cannot be excluded.
- Maintaining a safe distance, using 1 000-volt gloves near batteries and high-voltage circuits, is crucial because physical damage and fires can lead to the potential exposure of live components.
- Water or other standard agents may be used for BEV fires. Using a high volume of water is one of the solutions for cooling down high-voltage batteries. Water does not pose an electrical hazard to firefighters in an electric vehicle fire. In a safe scenario and after a risk assessment, a vehicle may be moved outside a parking area and possibly submerged in a big (portable) container of water (cooling is the best way to control a fire) if other extinguishing methods were not effective.

5.6. Recommendations for public authorities

- It is recommended that local and regional authorities strongly encourage fire risk assessments for existing infrastructure to ensure a high level of safety for users and minimise the risk of fire.
- These assessments provide an in-depth, objective analysis of existing facilities and make recommendations for improving safety. They make it possible to draw up progressive action plans tailored to operators' constraints, in order to raise safety levels in a structured and effective way.
- Public authorities can help ensure that there are enough fully qualified individuals capable of correctly installing charging points. They can invest in training unemployed workers to be able to meet the booming demand or they can invest in and promote the traditional education system and seek to attract more students.
- Public authorities should better regulate and enforce the fire safety requirements for enclosures, plugs, and sockets used in BEV recharging infrastructure by raising the minimum fire safety/flammability standards. They should also introduce fire safety requirements and tests to address new fire safety challenges for electric powertrains and Li-ion batteries.