ECF

EUROPEAN CYCLISTS' FEDERATION

Making buildings fit for cycling
by revising the Energy Performance of Buildings Directive

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Executive Summary

The European Cyclists' Federation (ECF) welcomes the revision of the Energy Performance of Buildings Directive (EPBD) (EU) 2018/844 as part of the "Renovation Wave" strategy and the "Fit for 55" legislative package.

The last EPBD revision in 2018[1] established the link between the building and mobility sector by providing requirements for charging infrastructure for electric vehicles. ECF strongly supports this link as mobility related design and equipment in buildings impact modal choice and hence energy consumption, yet we regret that this directive effectively applies to electric cars only.

Beyond charging infrastructure, parking is a major determinant of an individual's mobility choices; this is true for bicycles, cars and other personal transport modes. Put simply, if there is easy and convenient parking available at the beginning and end of a person's journey for a specific mode of transport, this person is far more likely to choose that transport mode over another one on a regular basis.

The bicycle earns its place in the revision of this directive for at least three reasons.

- The bicycle is the most energy-efficient transport mode. An electric bicycle consumes at least five times less energy (per passenger-km) than an electric car (see Annex 1).
- A bicycle is also more space efficient than a car. Off-street bicycle parking as total space consumption per unit (ie the parking spot + access lanes) is up to 20 times lower compared to car parking.[2] Providing more bike parking at the expense of car parking would help to keep increasing construction costs under control. The European Green Deal needs to go hand in hand with social balance.
- Consequently, bicycle parking per unit has a much lower carbon footprint compared to car parking. Less material resources are needed which has a positive impact on the overall life-cycle energy consumption of such buildings.

ECF therefore recommends to legislate these provisions in the forthcoming EPBD revision.

1. To introduce minimum requirements for bicycle parking.
2. To introduce minimum requirements for electric-bicycle charging infrastructure.
3. To improve the social, environmental and mobility performance of buildings by better regulating requirements for car parking.

The detailed policy recommendations are spelled out in chapter 2.

Contents

1. Cycling in the 2018 EPBD

While the EPBD (EU) 2018/844 (2018 EPBD) introduced specific legal requirements for charging infrastructure for electric cars in new residential and non-residential buildings and those undergoing major renovations, references to cycling and wider mobility considerations are of a non-binding legal nature.

Recital 28 says: “When applying the requirements for electromobility infrastructure provided for in the amendments to Directive 2010/31/EU, as set out in this Directive, Member States should consider the need for holistic and coherent urban planning as well as the promotion of alternative, safe and sustainable modes of transport and their supporting infrastructure, for example through dedicated parking infrastructure for electric bicycles and for the vehicles of people of reduced mobility.”

Article 8.8 adds: “Member States shall consider the need for coherent policies for buildings, soft and green mobility and urban planning.”

The guidance document issued by the European Commission in its advice to member states on how to transpose the directive into national law builds on these references by recommending:

“Member States without requirements or guidelines on bicycle parking should develop as a minimum, guidelines to local authorities on the inclusion of bicycle parking requirements in building regulations and urban planning policies. These guidelines should include both quantitative (i.e. number of parking spaces) as well as qualitative elements.”[3]

Early research of ECF from August 2020 had shown that only two out of 18 transpositions into national law had included a specific reference to cycling (Austria and Romania).

In conclusion: While cycling and wider mobility considerations have been acknowledged by the co-legislators as an issue in the 2018 EPBD, these provisions are too weak in order to introduce meaningful changes in member states’ laws. This legal shortcoming needs to be fixed in the upcoming revision by introducing mandatory requirements.

2. Cycling in the EPBD revision 2021

2.1. Introduce minimum requirements for bicycle parking

2.1.1. Why bicycle parking?

The presence of bicycle parking, the convenience and security of the location, its quality and potential cost facilitate or create a barrier to cycling:

- Bicycle parking supply is an important determinant of cycling. A systematic review on bicycle parking research conducted by Heinen & Buehler (2019) proves that convenient/high-quality bicycle parking is associated with more cycling;
- Conversely, a lack of bicycle parking and/or inadequate bicycle parking discourages cycling.[4]

To stimulate regular bicycle use, easily accessible, safe and secure parking facility of high quality are just as important as charging infrastructure is for electric cars.

2.1.2. National and regional requirements regarding bicycle parking

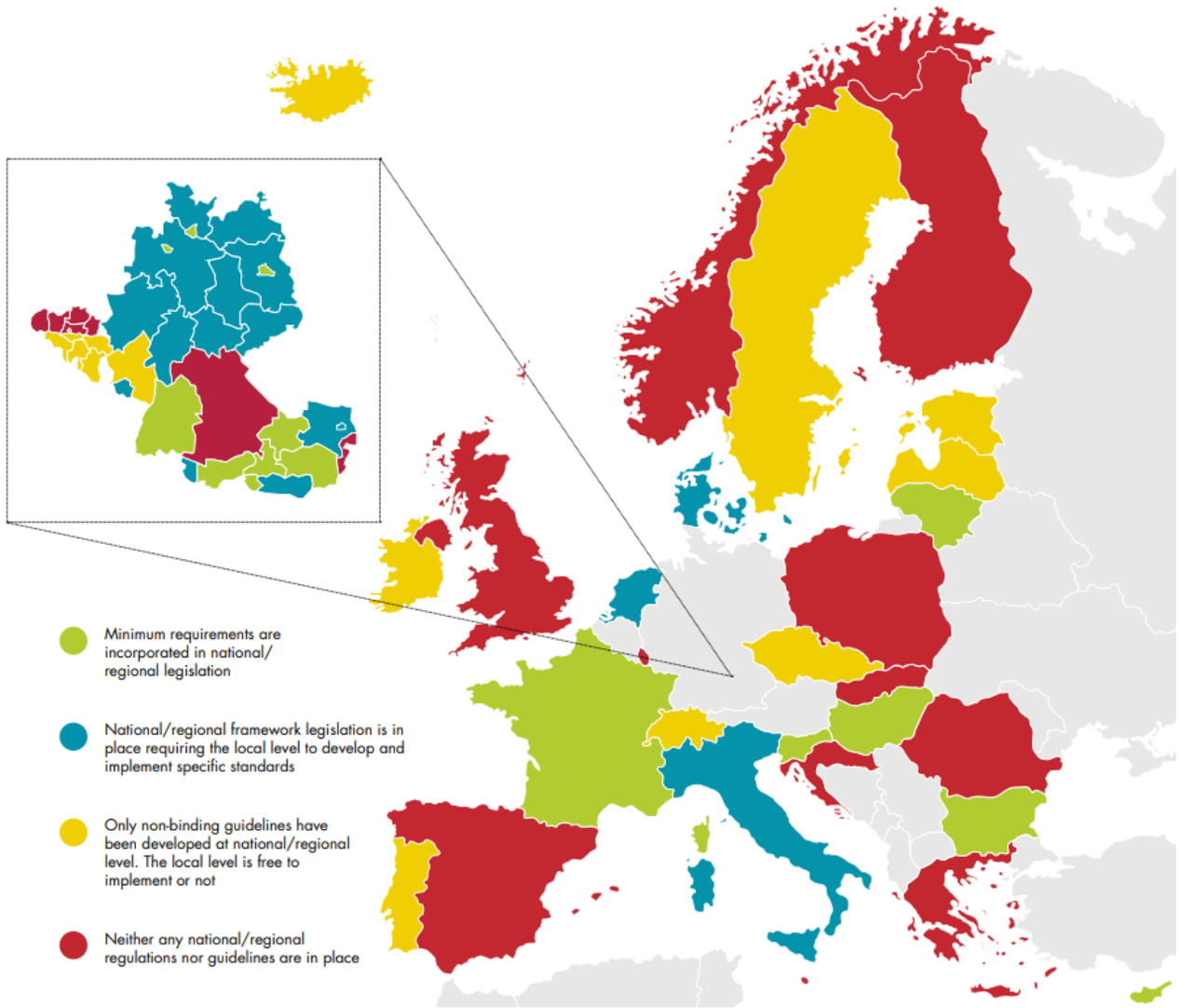
An ECF comparative analysis of parking requirements for bicycles in apartment buildings at national and regional level across the EU concluded that such requirements at national level exist in only nine countries (see overview map in Annex), including in Slovenia (0.6 spots per person), Hungary (one spot per apartment), France (0.75 m^2 for apartments with 1-2 rooms, 1.5 m^2 for apartments with two or more rooms) and Bulgaria. Bulgaria, a country without a strong cycling tradition, adopted a law in 2016 mandating 1.5 bicycle-parking spots per residential unit in apartment buildings. Since bicycle use is much lower here than on the European average, ECF believes this would serve as a good basis for an EU minimum requirement to be introduced through this directive.[5] More details about the Bulgarian approach can be found in Annex 2.

In other European cities with high bicycle use, typically at least two bicycle-parking spots per residential unit are required.[6]

- Malmö mandates 2.5 bicycle-parking spots per apartment.
- For an apartment in Hamburg with more than 125m^2, at least five bicycle-parking spots have to be provided.
- Copenhagen mandates four spots per 100m^2 apartment surface.

In jurisdictions without any requirements set by the national and/or regional level, it is up to local authorities to set minimum quantitative and qualitative bike-parking requirements that developers have to abide to. These can differ considerably resulting in a patchwork approach.

Bicycle-parking requirements in European countries



Source: ECF (2019)

2.1.3. ECF policy recommendations

ECF recommends introducing these changes into the revised EPBD.

- **In all residential buildings:**
    - Requirement of at least 1.5 bicycle-parking spots per residential unit (based on the Bulgarian standard).
    - 10% of the total number of bicycle-parking spots shall be reserved for bicycles with larger dimensions, such as cargo bikes, tricycles and long-tails/tandems.
    - In existing residential buildings without dedicated bicycle parking, the 1.5 bicycle-parking spots per residential unit can be created either by repurposing existing car

parking or by providing on-street roofed bicycle parking in near proximity/adjacent to the building.

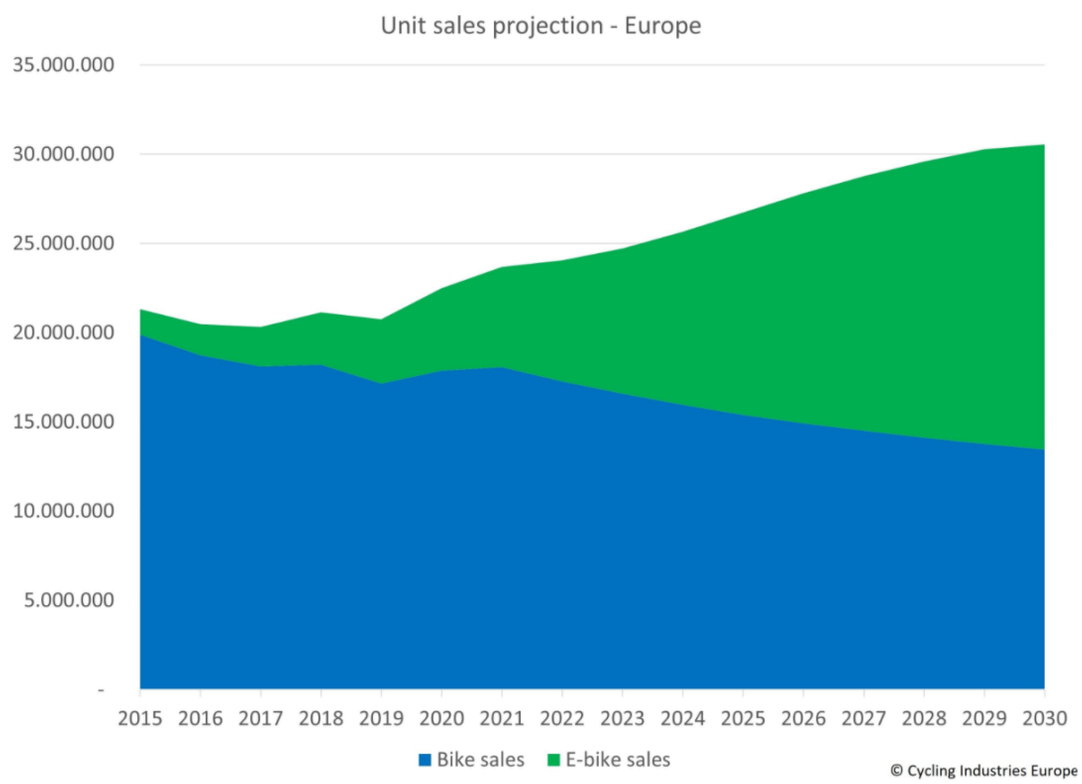
- **In all non-residential buildings:**
    - Requirement of at least 1.5 bicycle-parking spots per ten employees.
    - 10% of the total number of bicycle-parking spots shall be reserved for bicycles with larger dimensions, such as cargo bikes, tricycles and long-tails/tandems.
    - In existing non-residential buildings without bicycle parking, 1.5 bicycle-parking spots per ten employees can be created either by repurposing existing car parking or by providing on-street roofed bicycle parking in near proximity/adjacent to the building.

- Member states shall lay down additional voluntary quantitative as well as mandatory qualitative bicycle-parking requirements for all residential and non-residential buildings by 1 January 2027.

2.2. Introduce minimum requirements for e-bike charging infrastructure

2.2.1. Why e-bike charging infrastructure?

E-bikes are a success story. An estimated 5.1 million units were sold in the EU-27 in 2020, bringing total stock to about 20 million units in the EU.[7] The European bicycle industry forecasts strong growing demand for e-bikes over the next decade and will reach annual sales of 17 million units in 2030.[8]



E-bikes also represent a growing share of annual bicycle sales. About 25% of all bicycles sold in the EU in 2020 were e-bikes. In the Netherlands and in Belgium, the share is already as high as 50%.[9] In Germany, the largest market for bicycles in the EU, the e-bike share in 2020 was 38.7%.[10]

By 2030, it is expected that about two in three bicycles sold in the EU will be electrically assisted.[11]

Also, electric cargo bikes are picking up in sales, albeit no aggregate figures exist for the whole of the EU regarding sales of e-cargo bikes yet. However, German data suggests that this product segment is developing rapidly with some 78,000 units being sold in 2020. E-cargo bikes represented 4% of the total German e-bike market of 1.95 million units.[12]

For the vast majority of electric bicycles currently sold in the EU single market, batteries can be removed from the bike frame and charged in the apartment or in an office space through a standard household power socket. No specific adaptions to the charging infrastructure are needed.

Even so, ECF recommends having some basic charging facilities for electric bicycles in place. Daily mobility choices are influenced by convenience: How easy is it to use (and charge) my e-bike? Easy access to reserved car parking was one of the preconditions for the automobile “success story” in the post-war years. The same must now be the case for electric bicycles. The average bicycle battery weighs around 3.5kg and carrying it up into the apartment might be perceived as a barrier by some.

E-bike charging station in Triptis, Thuringia, Germany, provided to its tenants by the public housing company.[13]

2.2.2. ECF policy recommendations

- **In all residential buildings**: Require at least 1.5 charging points for electric bicycles per ten residential units.
- **In all non-residential buildings:** Require at least 1.5 charging points for electric bicycles per 100 employees. The e-charging point should be in close proximity to the bicycle-parking spot.
- Member states shall lay down additional voluntary quantitative as well as mandatory qualitative requirements for charging electric bicycles for all residential and non-residential buildings by 1 January 2027.

2.3. Improve the social, environmental and mobility performance of buildings by better regulating requirements for car parking

2.3.1. Adverse effects of minimum car-parking requirements

Minimum car-parking norms for residential units have been around from as early as 1939, when Germany legislated that every new housing unit should be equipped with at least one car-parking spot.[14] These regulations have been copied and pasted into housing laws and zoning codes in other jurisdictions.

Numerous academic researchers have demonstrated that such minimum requirements have an adverse effect on the overall mobility system, as they reduce urban density and increase car ownership and car use.

On car ownership and use

Recent research conducted by Millard-Ball et al (2021)[15] found that urban residents' transportation behaviour is affected by local features of the built environment, and particularly by parking. They demonstrate that variation in on-site parking availability greatly changes households' car ownership decisions and driving frequency, with substitution away from public transit. The more parking in a building, the more likely a resident household is to own a car. In buildings with no on-site parking, only 38% of households own a car. In buildings with at least one parking space per unit, more than 81% of households own cars (in randomly assigned houses, so controlling for residential self-selection).

In addition to car ownership, parking ratios also affect mode choice. The frequency of driving increases with the building's parking ratio, more on-site parking reduces transit use, increasing the frequency of driving by a similar amount while having a smaller but still statistically significant negative impact on the frequency of walking. Increased residential parking leads to a higher probability of commuting by private car and a lower probability of commuting by transit, determining an overall higher carbon footprint of the building.

Social aspects and affordability

In the past, planners thought that requiring developers to build more parking would transfer the cost of parking supply onto private developers. Unfortunately, it also created a perverse incentive for developers to build more parking than the market required and stimulated car use (Kodransky & Hermann, 2011).[16]

Parking requirements are a large, nearly invisible cost that is rarely evaluated as a separate expense (Litman 2021).[17] Parking accounts for about 10% of the development costs of a typical building (Litman and Doherty, 2018).

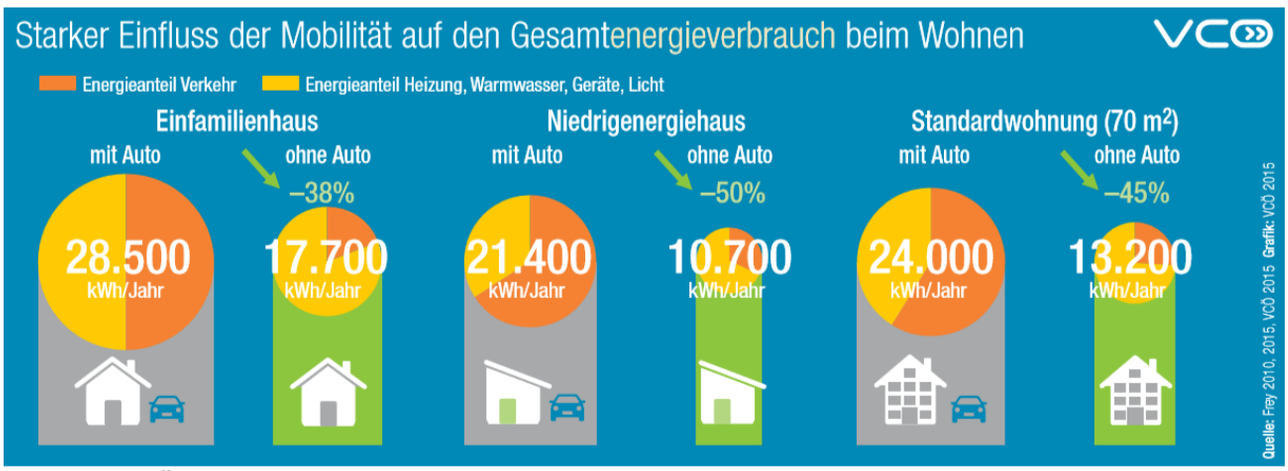
According to Shoup (2014), the national average cost to build one underground parking space in the US in 2012 was $34,000 (or about €28,500 in current exchange rates, June 2021).[18] A research on housing infrastructure costs in Finland Kurvinen & Arto, 2020) states that the cost of an underground parking space ranged from €60,000 to €80,000[19], whereas in downtown Amsterdam, the cost of an underground parking garage ranged from €50,000 to €80,000 per space (Wentink, 2009).[20]

With stricter energy performance standards further increasing construction and renovation costs, removing minimum car-parking norms for cars would be an efficient way to control the effects of these measures on social equity, allowing to keep house prices reasonable especially for households with less or no cars (eg low income, young, elderlies), improving housing affordability.

Environmental cost

Building underground parking necessitates the use of carbon-intensive material such as cement, whose production industry alone contributes to 5% of global CO2 emissions. It also impacts ground-water systems. Through the larger space efficiency of bicycles compared to cars, these environmental costs can be reduced considerably.[21]

The Austrian mobility think tank VCÖ also compared the total household energy consumption of car households vs non-car household of various residential units, with the latter consuming 38%-50% less energy.[22]



Source: VCÖ (2015)

2.3.2. Replacing minimum car-parking norms by maximum norms

Some cities in Europe have recognized the need to institute parking maximums or zone-based maximums.

- In Paris, if a development is 500m from a metro stop (nearly every part of the inner city), there is no obligation to build parking. Minimum requirements were eliminated while maximum parking for housing is one spot for every 100m2.
- In 2008, the city of Strasbourg initiated the building of an eco-quarter. One of the features of the new quarter will be strictly imposed parking maximums (400 parking spaces for 650 house units).
- Dutch cities, following the national “A, B, C” policy introduced in 1989, divided themselves into three types of zones: areas with excellent transit access and poor car access (A), areas with good transit access and good car access (B) and areas with good car access but poor transit access (C). Each zone had its own parking minimum and parking maximum. New developments in zone “A” could only build a few parking spaces. In zone “B” they had to build a moderate amount of parking within a specified range and in zone “C” they could build even more parking, but again within a specified range.
- In London, the change from minimum to maximum standards first took place in the central area with the Greater London Development Plan in 1976. The 2004 parking reform extended this change for the whole city (Mingardo, 2015). All London Boroughs abolished their minimum parking requirements for all land uses and adopted maximums in 2004 or in the years soon after. OECD (2019) reports the empirical evidence of the effectiveness of this reform: it led to a remarkable 49% reduction of parking spaces in new residential developments, freeing up space for other uses.[23]
- In Dublin, the “car-parking standards” apply parking maximums. Parking provision in excess of these maximum standards shall only be permitted in exceptional circumstances.

- New Zealand's National Policy Statement on Urban Development 2020 is banning local governments that administer "urban environments" (settlements with more than 10,000 people) from including minimum car-parking requirements in their district plans. Minimum parking requirements have to be removed by 20 February 2022. Only “accessible carparks” can be required (parking for use by persons with a disability or with limited mobility). [24]

The International Transport Forum has recently published a discussion paper recommending to eliminate minimum off-street car-parking requirements. [25]

Yet according to ECF research, about half of EU member states still apply minimum car-parking requirements. [26]

2.3.3. Examples of (nearly) parking-free developments in Europe

ITDP (Foletta & Field, 2011) has issued a report that examines eight developments across Europe and finds that the measures employed by these developments to limit car use are working: they have lower rates of car ownership and car mode share, and higher rates of bicycling, walking and transit use than comparable areas or their surrounding cities. This also means these developments have lower carbon footprints from transportation. [27] For instance:

- GWL Terrain in Amsterdam (completed in 1998, 600 units, 0.2 parking spaces per residence) counts 80% of non-motorised mode share. The bicycling mode share is 50% compared with the 32% of the rest of Amsterdam West. None of the units include parking spaces. 129 on-street parking spaces are located on the west side of the district, five of which are reserved for carsharing vehicles and two for persons with disabilities.
- At Stellwerk 60 in Cologne (completed in 2011, 700 units, <0.3 parking spaces per residence), car ownership is 20% of that in the surrounding neighbourhood, and per capita transport-related CO2 emissions are half those of the city as a whole. The project could not get a total exemption to German minimum parking standards, so the developers comprised on an “optically car-free” plan, with a separate garage providing the negotiated minimum of 120 parking spaces for 400 planned housing units, at a cost of €16,000, with a maintenance fee of €70-80 per month. 16 carsharing vehicles are available on site, with discounted fees for residents. [28]
- Greenwich Millennium Village in London (completed in 2014, 2,300 units, 0.8 parking spaces per residence) has a car mode share of 18%, less than half of that in the surrounding district, which has a car mode share of 44%.
- Vauban, in Freiburg (completed in 2010, 2,000 units, <0.5 parking spaces per residence) has a car mode share of 16% compared with the citywide average of 30%.

Also, Melia (2014) have analysed car-free and low-car housing in the UK and continental Europe, concluding that all the cases have led to lower traffic generation. The London Borough of Camden, which pioneered the approach, granted “car-free or car-capped” planning permissions covering 2,416 dwellings between 2000 and 2011; some other British cities such as Brighton and Glasgow have planning policies which specifically allow for car-free housing. This planning strategy appears to have contributed to restrain traffic through lower car ownership: between the 2001 and 2011 censuses, the population of Camden grew substantially, but the number of households owning cars fell in absolute and relative terms. [29]

2.3.4. ECF policy recommendations

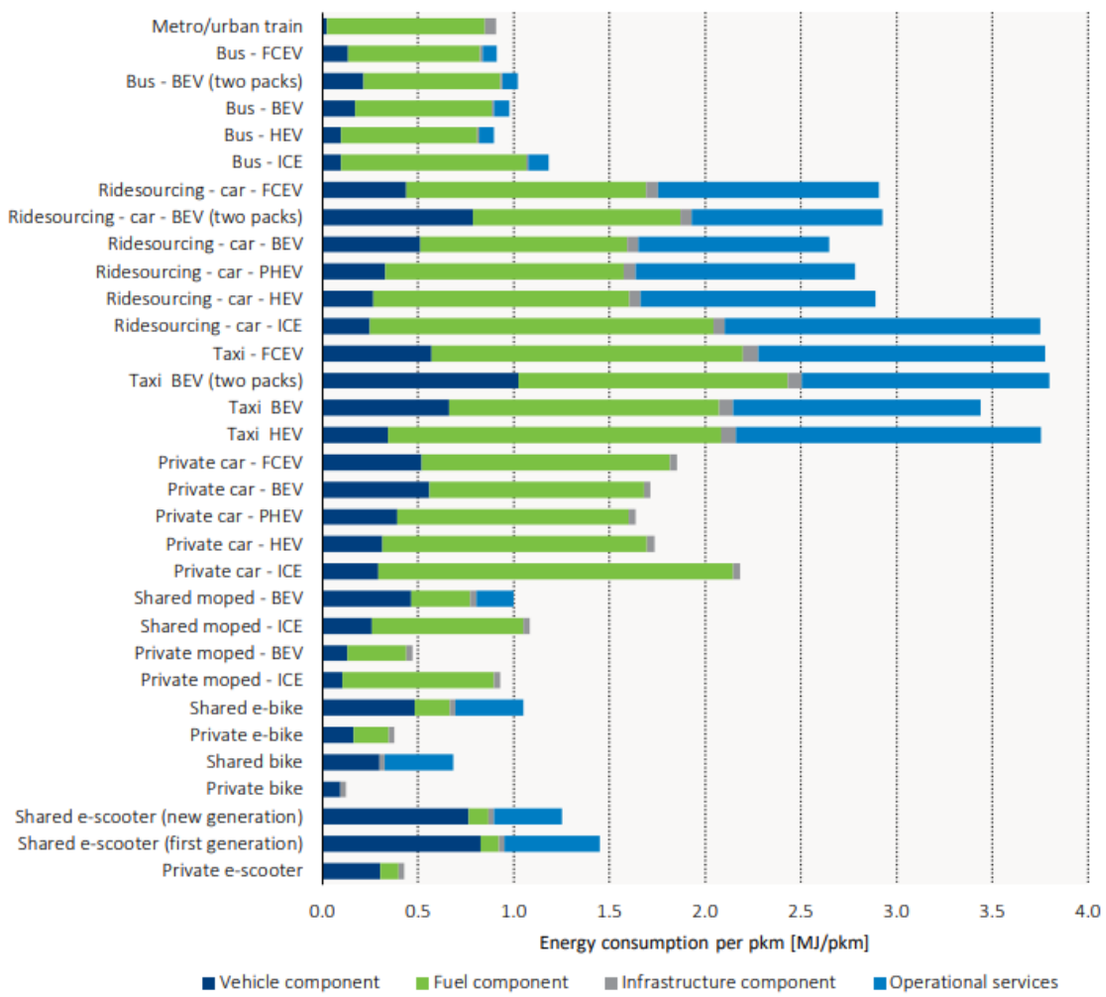
- At the very minimum, all minimum car-parking requirements in urban centres that are well served by public transport as well as safe walking and cycling facilities should be eliminated and replaced by maximums (not higher than 0.5 parking spots per residential unit).
- In peri-urban or rural areas where minimum requirements may still apply, developers should have the flexibility to go below these minimums if certain mobility management measures will be introduced, such as providing (cargo) bike sharing and car sharing, discounts for public transport use, etc.
- Member states shall lay down restrictive car-parking requirements for all residential and non-residential buildings by 1 January 2027.

Annex

1. Energy efficiency of e-bikes compared to other transport modes

According to data provided by the International Transport Forum (ITF), the private bicycle as well as private e-bike are the most energy efficient of all vehicles, both for vehicle-km as well as person-km. [30]

Figure 3. Central estimates of life-cycle energy requirements of urban transport modes per pkm



Source: International Transport Forum (2019)[31]

2. Regulation for bicycle parking in Bulgaria

Table 10:
Regulation for Bicycle Parking Bulgaria

	BUILDING TYPE	REGULATION PARKING SPACES	CLASSIFICATION
BULGARIA	Hotels	1 space per 10 rooms	· Class 1: 60% · Class 2: 40%
	Hospitals	1 space per 500 m²	· Class 1: 75% · Class 2: 25%
	Cinemas, theatres	1 space per 20 visitors	· Class 1: 20% · Class 2: 80%
	Places of religious worship	(minimum 10 spaces)	· Class 1: 100%
	Stadiums, sports arenas, etc.	1 space per 100 m²	· Class 1: 20% · Class 2: 80%
	Administrative/ business offices	1 space per 100 m²	· Class 1: 50% · Class 2: 50%
	Shops in city-centre areas	(minimum 10 spaces)	· Class 1: 30% · Class 2: 70%
	Libraries, museums, galleries	1 space per 100 m²	· Class 1: 20% · Class 2: 80%
	Schools, colleges, universities	· 1 space per 5 students · 1 space per 10 employees	· Class 1: 20% · Class 2: 80%
	Childcare facilities	· 1 space per 10 children · 1 space per 10 employees	· Class 1: 10% for employees · Class 2: 90%
	Multifamily residential buildings	1.5 spaces per household (minimum 6 spaces)	· Class 1: 100%
	Dormitories	1 space per 2 beds (minimum 6 spaces)	· Class 1: 60% · Class 2: 40%
	Sanatoriums, rest homes/ homes for the elderly	1 space per 4 employees	· Class 1: 25% · Class 2: 75%
	Railways, bus terminals, airports	· 1 space per 30 passengers/ hour · 1 space per 10 employees	· Class 1: 30% · Class 2: 70%
	Metro stations/ Intermodal passenger terminals	· Station with 1 line: 6 spaces · Station with >1 line: 12 spaces	· Class 2: 100%

Source: ECF (2019)

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