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AUTHORS

Author	Institution	Contact (e-mail, phone)
Cassandre de Froidmont	ECF	c.de-froidmont@ecf.com
Philip Amaral	ECF	p.amaral@ecf.com

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INTRODUCTION

The purpose of this report is to present the latest and most relevant information on the state of cycling in Europe as a key deliverable for the SmileCity project. Information that would particularly be relevant to the project and its partners was selected. When relevant, special emphasis was given to the context of the cities and regions involved in SmileCity: City of Belgrade (Serbia), City of Bursa (Türkiye), Region Castilla y Leon (Spain), Region of Crete (Greece), City of Istanbul (Türkiye) , City of Lucca (Italy), City of Manresa (Spain), City of Sosnowiec (Poland), City of Turin (Italy), City of Varna (Bulgaria).

Electric bicycle charging stations are especially a recuring theme because this is a central focus in the SmileCity project. More specific information on electric bicycles may be found in CIE's deliverable 2.4: Eco-mobility Digital Tools.

Firstly, it is important to review why we talk about cycling and its positive impact and benefits on economic, social, and environmental level. Cycling plays a pivotal role in Europe's economy, with an impact that goes far beyond transportation. Cycling generates over €150 billion in economic benefits annually across the EU, with more than €90 billion linked to positive effects on the environment, public health, and congestion reduction. Notably, cycling prevents around 18,110 premature deaths each year in the EU-28, which is valued at €52 billion per year. Cycle tourism alone adds another €44 billion annually to the European economy, supporting hundreds of thousands of jobs. Cycling offers significant environmental advantages by reducing pollution and conserving natural resources. It helps cut over 16 million tons of CO_2 emissions annually in the EU, contributing directly to climate change mitigation. Cycling also reduces air pollution, which is one of the leading environmental health risks in Europe, and helps decrease noise pollution, which causes thousands of premature deaths and cases of hypertension each year. Additionally, bicycle infrastructure requires less land and sealing compared to roads for cars, leading to less soil and water pollution. By replacing car trips with cycling, we reduce the demand for fossil fuels and lower the overall environmental footprint of transport, making cities cleaner, quieter, and more sustainable.

Cycling is also a social activity. By bringing people together and connecting neighborhoods, it provides the potential for improved social interactions and more exchange between them. It can connect people from different backgrounds and social classes, thus improving the cohesion of society. Furthermore, cycling increases accessibility, not only to employment, but also to places of social and cultural exchange. The yearly costs for owning and using a bike only amount to around 5% (10% for electric bicycles) to the costs for owning and using a car; therefore, by providing a cheap transport option, cycling can help to make jobs and participation in social life better accessible to disadvantaged population groups. Research shows that cycling tends to benefit women more, because they gain more free time if the children and elderly they are taking care of can undertake journeys by bike independently and do not need a lift by car.

1. Cycling Policies

1.1 European Declaration on Cycling

In April 2024, the European Commission adopted the most ambitious initiative on cycling to date: the European Declaration on Cycling. This inter-institutional Declaration elevates cycling to a strategic priority and acknowledges the vital role cycling must play in generating enormous benefits for Europe, stating: "This

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Declaration recognises cycling as one of the most sustainable, accessible and inclusive, low-cost and healthy forms of transport and recreation, and its key importance for European society and economy."

In order to ensure the relevance of the Declaration, the Commission took a collaborative and consultive approach by involving its Expert Group on Urban Mobility (EGUM), which is composed of key stakeholders including the cities, regions, Member State officials, industry associations, companies and NGOs.

The Declaration contains eight principles with 36 commitments to enable more and better cycling and to support the delivery of climate targets and objectives of the European Green Deal, the Sustainable and Smart Mobility Strategy and the New EU Urban Mobility Framework, as well as the aims of the EU industrial strategy. The eight principles include:

- Developing and strengthening cycling policies
- Encouraging inclusive and affordable mobility
- Creating more and better cycling infrastructure
- Increasing investments and creating favourable conditions for cycling
- Improving road safety and security
- Supporting green jobs and the development of a world-class European cycling industry
- Supporting multimodality and cycling tourism
- Improving the collection of data on cycling

The European Declaration on Cycling stresses the role of Member States, together with regional and local authorities, to support the further growth of cycling. A key way of doing so is through the development of National Cycling Strategies. These multi-year plans are designed to establish a comprehensive vision for coordinating policies, objectives, and actions related to cycling. They define clear interventions, tools, and specific goals to promote and develop cycling at the national level.

1.2 National Cycling Strategies

A national cycling strategy aims to consolidate all policies implemented at the national level to support and grow cycling based on clear objectives and resourced by sufficient budgets. It sends a strong political signal that cycling matters and should therefore be systematically supported by public authorities, businesses, academia, and civil society organisations.

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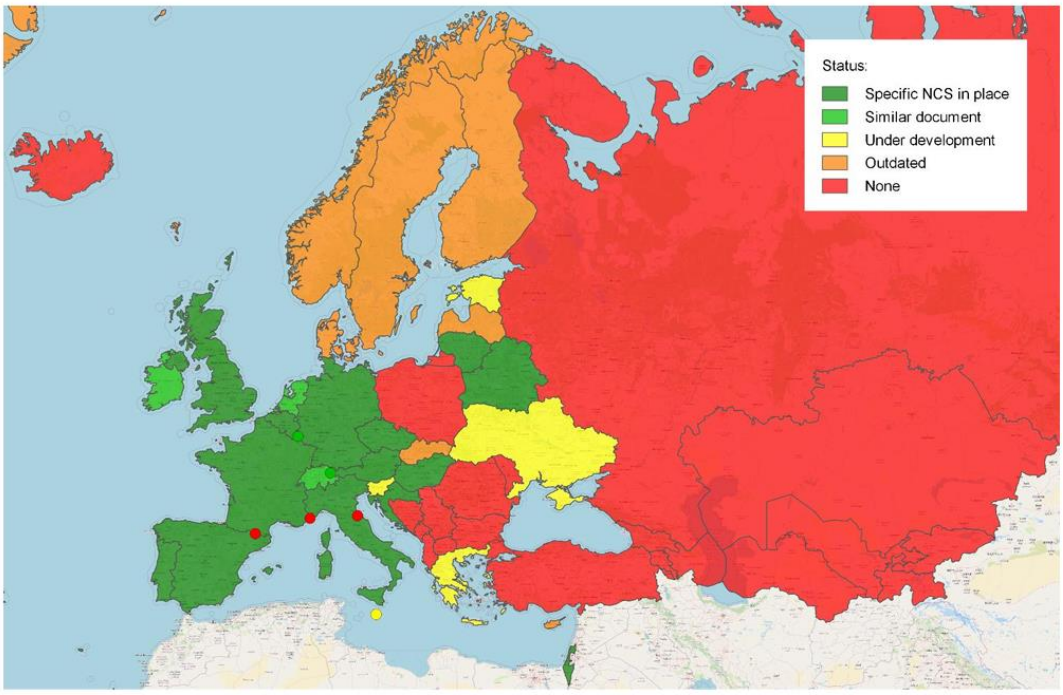

The Status of National Cycling Strategies in Europe in 2024

For the last few years, ECF has published an annual analysis of the state of national cycling strategies in Europe. In its 2024 report, ECF found that 14 countries have a national cycling strategy in place; seven countries had a similar document in place; four countries had an expired strategy, eight were developing a strategy for the first time; 21 countries had no strategy nor plans to create one.

Among the countries represented in the SmileCity project:

- Italy and Spain are the only ones who have a national cycling strategy in place
- Greece has a strategy that is still under development. In their case, it is important to note that they do have a document called a "Public Policy Guide for Cycling in Greece." However, that document is created as a policy preparatory basis for a national cycling action plan that is still to come.
- Poland, Türkiye, Bulgaria and Serbia do not have a national cycling strategy according to ECF's analysis from 2024.

Italy's strategy is called the 'General Plan of Cycling Mobility 2022-2024,' and includes a €1.154 billion investment in cycling, including €600 million from the National Recovery and Resilience Plan. The plan has a three-year duration and has a regional, national and urban focus. It aims to increase the modal share of cycling to 20% in provincial capitals and metropolitan cities, increase the density of cycling infrastructure, create enclosed bike parking spaces for at least 30 bicycles and outdoor bike parking spaces for at least 30 bicycles for every public building and facility, promote and improve multimodality and make changes to the highway code to facilitate more cycling.

Spain adopted its first ever cycling strategy in 2021. It defines state investments exclusively dedicated to cycling, aiming for a cycling modal share of around 20% by 2030. The plan also aims to increase the national cycling network, implement traffic calming measures in Spanish cities, modify tax regulations to provide citizens with tax incentives for cycling and make changes to the highway code.

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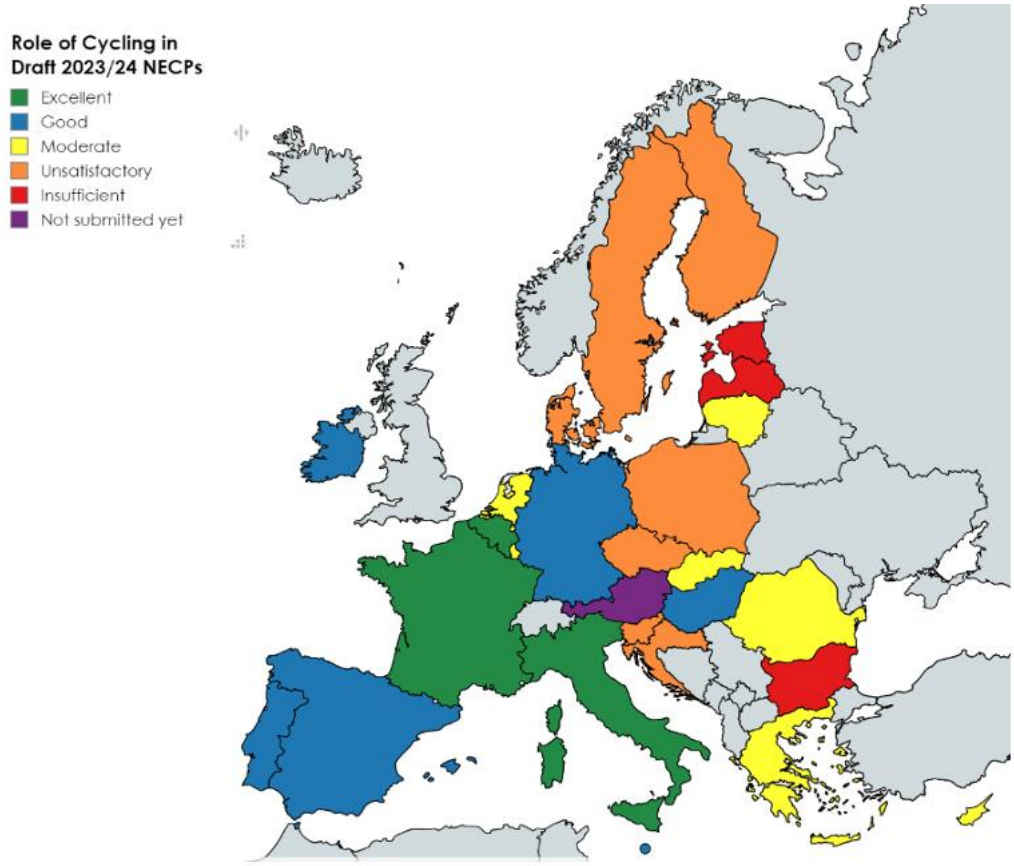
1.3 National Energy and Climate Plans

To meet the EU's energy and climate targets for 2030, EU countries need to establish a 10-year integrated National Energy and Climate Plan (NECP) for the period from 2021 to 2030. The national plans outline how the EU countries intend to address five areas: energy efficiency, renewables, greenhouse gas emissions reductions, interconnections, research and innovation.

Perhaps unsurprisingly so, it may be noticed that the map below, which shows the role of cycling in Draft 2023/24 NECPs, is similar to the one of countries with National Cycling Strategies.



Role of Cycling in Draft 2023/24 NECPs

1.4 Sustainable Urban Mobility Plan

In 2024, for the first time ever, promoting active modes of transport has been included in the revised Trans-European Transport Network (TEN-T) objectives. Towns and cities of all sizes are encouraged to have a Sustainable Urban Mobility Plan (SUMP) which should include an active mobility component. The strategic plans are designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. The EU city database on SUMPs provides information on the 431 urban nodes on the trans-European transport network.

1.5 Energy Performance of Buildings Directive

The bicycle parking supply is an important determinant of cycling. A systematic review of bicycle parking research showed that convenient/high-quality bicycle parking is associated with more cycling; conversely, a lack of bicycle parking and/or inadequate bicycle parking discourages cycling. This is partly because good

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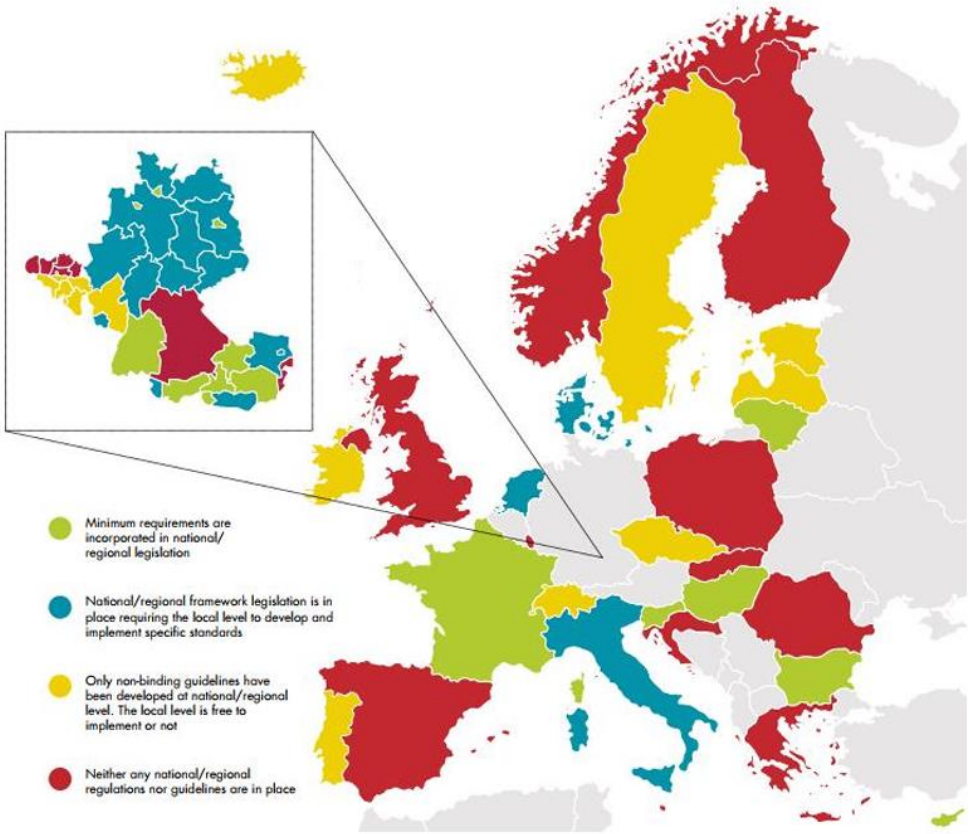
bicycle parking is important for limiting and managing bicycle theft.

Currently, there is no EU bicycle parking requirement for Member States to follow. However, that will change when the Energy Performance of Buildings Directive comes into force in January 2027, an EU law that does mandate bike parking for residential and non-residential buildings. Existing national requirements throughout the EU are also very varied. Some Member States have very good requirements while others have none.

In 2019, ECF carried out a study of existing requirements across 31 European countries. It looked at off-street parking regulations, both for bicycles and cars, in a total of 31 countries (EU-27 + UK + Iceland, Norway and Switzerland). EC analysed national legal codes for 28 of the countries, and for three federal structures – Austria, Belgium and Germany – ECF analysed a total of 28 regional parking regulations in the federal regions. The main criterion in deciding the quality of the requirement was how parking had been regulated in apartment buildings. This was chosen as most trips start and/or end with an apartment. To categorise the many different parking regulations the report defined four different categories for both cars and bicycles: Excellent; good; sufficient; and insufficient. Here are the results for bicycle parking requirements across the EU. See below for the colour-coded map.



Map of National Bicycle Parking Requirements

The Bulgarian, French, Hungarian and Lithuanian building codes call for a specific amount of parking spaces for different kinds of apartment buildings. In Slovenia bicycle parking is only regulated for residential buildings with three or more living units. Cyprus only regulates new buildings with a total floor area of 1200 m2 or more. Croatia requires a specific amount of bicycle parking for several types of buildings but not apartment buildings. It therefore was not included in the green category.

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In the blue category are countries with national or regional legislation that requires the local government level to regulate bicycle parking, but without specifying exact numbers. For example, Denmark's regulatory framework generally requires space for peoples' modes of transport with bikes being explicitly mentioned as one of them. This group includes Denmark, Italy and the Netherlands, and a large set of federal regions in Austria and Germany. Italy's law was only adopted in December 2017 and requires local authorities – whenever they revise their building codes – to set minimum requirements. Implementation of the law will hence take many years.

In the yellow category are countries and regions with national or regional legislation that explicitly mentions bicycle parking but without establishing requirements. These suggestions are therefore not binding on local building authorities – and in practice they are applied in some areas and not in others. Countries with this type of arrangement include Czechia, Estonia, Iceland, Ireland, Latvia, Portugal, Sweden and Switzerland; Ireland's legislation is a guideline and only sets a benchmark of minimum standards which "should be required". The Icelandic legislation is phrased similarly.

The red category contains countries and regions that have no legislation generally requiring bicycle parking. This is by far the largest group and includes Croatia, Finland, Greece, Luxembourg, Malta, Norway, Poland, Romania, Slovakia, Spain and the United Kingdom. In Luxembourg, bicycle parking facilities are required by national legislation in new government buildings only.

In May 2024, the Energy Performance of Buildings Directive (EPBD) was revised and adapted to further integrate cycling and bicycle parking. The main cycling related outcomes are listed below.

- (Article 14 Para 1) For new non-residential buildings and those undergoing major renovation with more than five car parking spaces: Bicycle parking spaces represent at least 15% of the average or 10% of the total user capacity of the building. Space for bicycles with larger dimensions than standard bicycles, such as cargo bikes, shall also be included.
- (Article 14 Para 2) For existing non-residential buildings with more than twenty car parking spaces: Bicycle parking spaces shall represent at least 15% of the average or 10% of the total user capacity of the building. Space for bicycles with larger dimensions than standard bicycles shall be included. These provisions have to be applied by 1 January 2027.
- (Article 14 Para 4) For new residential buildings and those undergoing major renovation with more than three car parking spaces: At least two bicycle parking spaces for every residential building unit. A legally non-binding recital stipulates that the rule of two bicycle parking spaces per residential unit should also apply to buildings without car parking.
- For residential and non-residential buildings, requirements regarding charging infrastructure for electric vehicles shall be included with the following precisions relevant for electric power assisted bicycles.
- For new/renovated non-residential buildings with more than five car parking spaces [Article 14; Para 1; Sub Para (b)] "the installation of pre-cabling for at least 50% of car parking spaces and ducting, namely conduits for electric cables, for the remaining car parking spaces, to enable the installation at a later stage of recharging points for electric vehicles, electrically power-assisted cycles and other L-category vehicle types".
- For all other non-residential buildings with more than twenty car parking spaces [Article 14; Para 2; Sub Para (a)] "the installation of at least one recharging point for every 10 car parking spaces, or of

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ducting, namely conduits for electric cables, for at least 50% of the car parking spaces to enable the installation at a later stage of recharging points for electric vehicles".

- For New/renovated residential Buildings with more than three car parking spaces [Article 14; Para 4; Sub Para (a)] "the installation of pre-cabling for at least 50% of car parking spaces and ducting, namely conduits for electric cables, for the remaining car parking spaces to enable the installation, at a later stage, of recharging points for electric vehicles, electrically power-assisted cycles and other L-category vehicle types".

The text also requires EU Member States to provide technical assistance to building owners and tenants seeking to install recharging points and bicycle parking spaces (Article 14; Para 9).

Member States will also have to adhere to the extensive mandate outlined in the directive: "Member States shall ensure the coherence of policies for buildings, active and green mobility, climate, energy, biodiversity and urban planning." (Article 14; Para 9) Similar to other EU Directives, Member States retain the authority to invoke specific "qualifications" that may allow Member States to adjust the required number of bicycle parking spaces for certain types of non-residential buildings.

- For both new residential buildings and residential buildings undergoing major renovation, "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." (Article 14; Para 4; Sub para 4)
- Regarding residential buildings undergoing major renovation, "where ensuring two bicycle parking spaces for every residential building unit is not feasible, Member States shall ensure as many bicycle parking spaces as appropriate." (Article 14; para 4; Sub Para 5)
- In the case of non-residential buildings (new, renovated and existing), "Member States may adjust requirements for the number of bicycle parking spaces […] for specific categories of non-residential buildings that are not typically accessed by bicycles." (Article 14; Para 3)

In sum, these changes provided to the EPBD are a positive step forward to further enable cycling around Europe. They indicate that bicycle parking will be fully incorporated into the legislation and will require the EU Member States to also update their building regulations to include bicycle parking. The EPBD establishes, for the first time, minimum bicycle parking standards across various categories of residential and non-residential buildings throughout Europe. From being first a sentence in a recital with the previous iteration to now being fully incorporated within the Article 14 of the of the directive, this is a major step forward. This represents significant progress in influencing people's modal choice and, hence, energy consumption. The directive will help reduce greenhouse gas emissions and energy poverty in the EU and make cycling easier for millions every day.

There is some qualifying language in the directive that can be viewed positively by the Member States to increase the number of bicycle parking spaces in their territories. However, there are also possibilities to reduce the number of bicycle parking spaces. Member States should consider their desire to increase cycling that they have committed to within the European Cycling Declaration and within the recitals of the EPBD.

2. Financial Incentives

2.1 EU funds

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There are various types of funds that can be used for cycling projects across Europe. Certain programmes even fund cycling infrastructure, which could be interesting when considering the continuation of the SmileCity project.

Funds can be distributed by different actors on different levels. National and regional level authorities distribute most of the European funds available for cycling. This includes the European Regional Development Fund (ERDF). The ERDF aims to reduce development disparities between regions of the European Union by supporting a range of activities such as infrastructure, business development, and research and innovation. There are also European-level programs which are distributed directly via European Institutions. The Connecting Europe Facility (CEF) for instance, is a program can be used to develop cycling infrastructure measures connected to the Trans-European Transport Networks (TEN-T). It aims to support investments in building new transport infrastructure in Europe or rehabilitating and upgrading existing ones. The budget allocated to CEF transport for the period 2021-2027 amounts to €25.8 billion.

2.2 Financial incentives for cycling

There are almost 300 tax-incentive and purchase-premium schemes for cycling across Europe offered by national, regional and local authorities to make it attractive to cycle more and drive less. While many incentives in Europe were already introduced in the last decade, the number of schemes has increased significantly since 2019.

ECF has mapped these schemes in a new online tool that provides information about the size of the subsidy, the type of bicycle and the eligible target groups. The tool gives an overview of cycling incentives at the national, regional and local level and is aimed at a wide range of stakeholders. It allows cycling businesses to identify market opportunities around Europe in countries, regions or cities where incentives and purchase premiums exist. By presenting best practices, it can inspire public administrations and decision makers to introduce schemes in their area. Finally, it informs cycling advocates about schemes already implemented elsewhere around Europe to strengthen their advocacy efforts.

To illustrate the type of information that may be found on the tracker, France has been selected as an example. France offers financial aid of up to 2000€ for the purchase of a cargo bike and up to 400€ for an e-bike. This support is available to all residents of France with a taxable income of €15,400 or less. More information is available on the French Ministry of Economy website. You can also consult the Tracker tool to explore similar aid schemes in other countries.

3. Cycling Infrastructure

3.1 Definitions of Different Cycling Infrastructure

In the list below, different forms of cycling infrastructure are presented in descending order of safety, starting with the most secure facilities and ending with those that offer the least separation from motor traffic.

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Type of cycling infrastructure	Definition	Picture
Cycle track	A dedicated path for bicycles, separated from motor traffic by physical barriers like curbs, grass strips, or safety fences. It ensures safe and exclusive space for cyclists.	
Shared path with pedestrians	A path used by both cyclists and pedestrians, marked with signs but without separation between them.	
Cycle Street	A road where cars are allowed, but bicycles have priority. Signs and rules can vary by country.	
Limited access road	A road where most motor vehicles are restricted (e.g. only residents or farm vehicles allowed), but bicycles can use it freely. Cyclists don't have priority unless it is also marked as a cycle street.	
Bus lane	A lane reserved for public transport buses and cycles.	
Cycle lane	A painted section of the road set aside for bicycles, without any physical separation from cars or other vehicles.	

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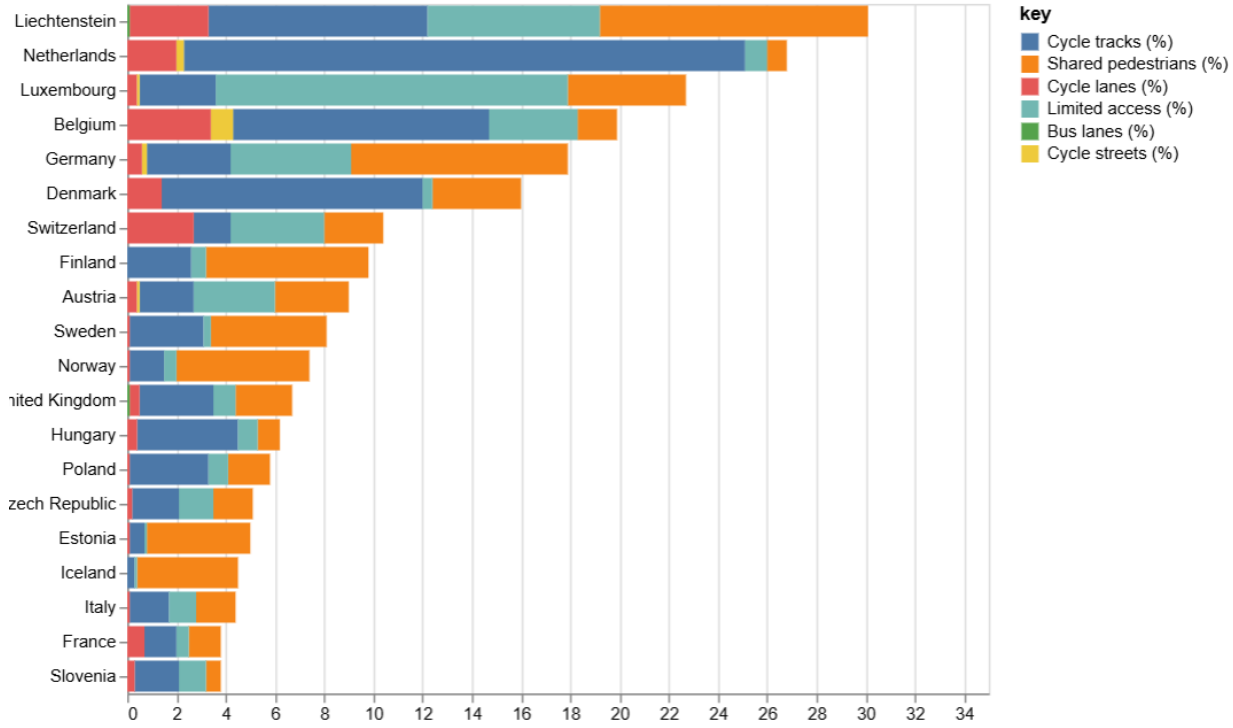
3.2 ECF Cycling Infrastructure Tracker

In order to assess the state of cycling infrastructure on a European scale, ECF has put into place a Cycling Infrastructure Tracker which extracts cycling infrastructure data from OpenStreetMap (OSM). The different types of cycling infrastructure are quantified across European countries and regions. Comparing the lengths of cycling infrastructure to the lengths of relevant public road networks to estimate the level of completeness of the cycle network. Statistics on surface types of cycle tracks and uptake of contraflow cycling are also provided.



Ratio of Extended Cycling Infrastructure to Public Road

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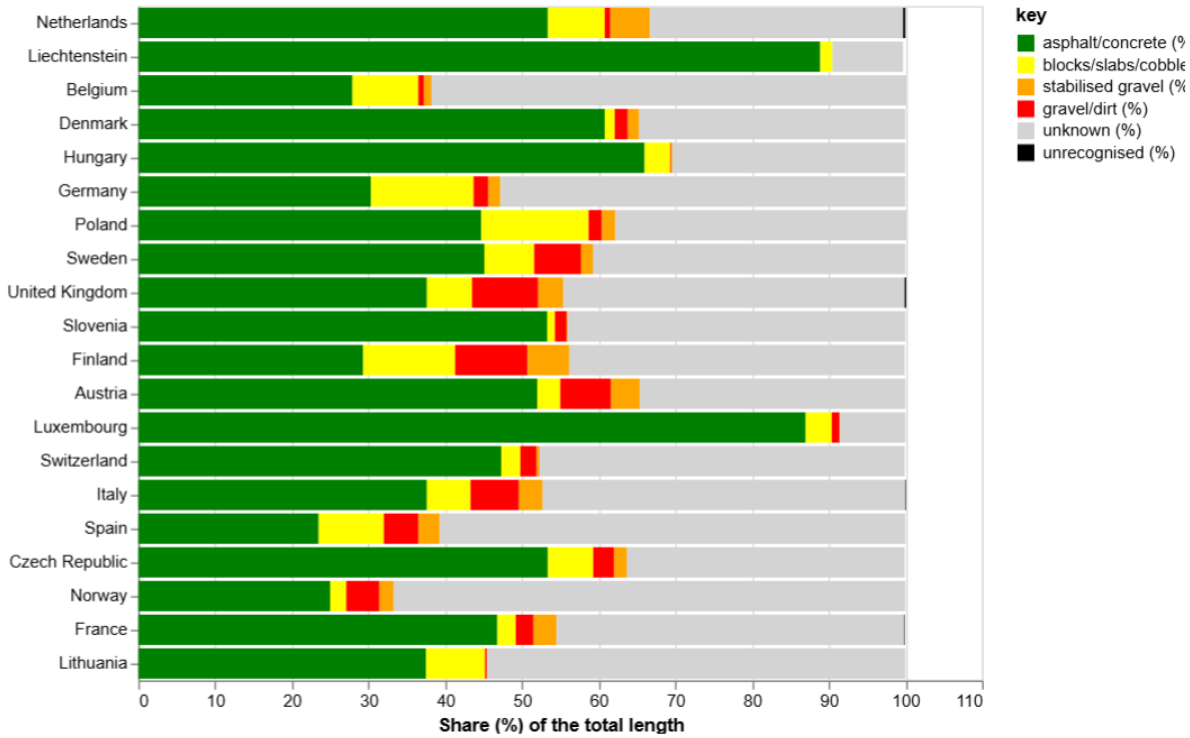

Surface Type Share in the Cycle Tracks

3.3 Guidelines on European Standards for Cycling Infrastructure

Although there is currently no common agreement on cycling infrastructure criteria on the European level, the UNECE Group of Experts on cycling infrastructure module, which ECF is part of, has developed a guide for designating cycle route networks. This guide is largely aligned with the quality parameters described and summarised below.

The geometry of cycling infrastructure is a critical aspect of its safety and comfort. Bicycles need to maintain a certain speed to keep their balance. They travel in curves and cannot change direction at straight angles. Sharp turns make it difficult for cyclists to stay on track or maintain stability, and difficult for other road users to predict the bicycle trajectory. This can lead to falls, "run-off-the-road" accidents and collisions between cyclists, other vehicles or pedestrians. Unsuitable geometry can also exclude some user groups, in particular those who need dedicated cycling infrastructure the most, such as elderly cyclists and parents with children. The following sections give a summary of the differences across 15 national or regional standards and guidelines in: Austria, Belgium, Bulgaria, Catalonia, Croatia, Czechia, Denmark, Finland, Germany, Greece, Italy, Ireland, the Netherlands, Poland, Slovakia and the UK. It ends with the recommended quality criteria according to the EuroVelo European Certification Standard. More information on this topic may be found on ECF's Geometric design parameters for cycling infrastructure paper.

3.3.1 Design Speed

Design speed defines how fast cyclists can travel along the route section without endangering their safety. High design speed means shorter travel times and therefore increases the competitiveness of cycling. Consistent design speed reduces the need of braking and accelerating. A good view of the route ahead gives advance time to make decisions. National and regional design speed standards vary depending on the role of the route in the network and its location. Typically, it means 20 km/h for local and 30 km/h for main cycle routes, with even higher values (35-45 km/h) for cycle highways or outside built-up areas. Regardless of the

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route category, design speed needs to be increased on inclines/declines. On the other hand, some standards allow somewhat reduced design speed in the intersection area. 10-12 km/h is usually used as the lowest possible threshold; below that speed a standard two-wheeled cycle becomes unstable.

3.3.2. Minimum Horizontal Curve Radius

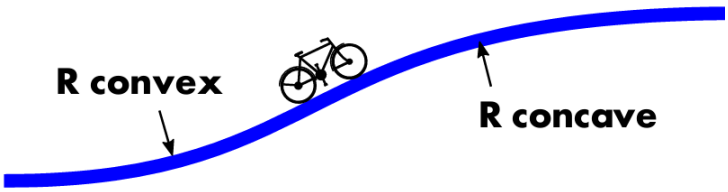
In all design standards and guidelines, except for Denmark, minimum horizontal curve radius is clearly tied to design speed. Germany and Catalonia also consider the type of surface, with Catalonia additionally considering the cant (elevation of one side) of the curve. Nearly all standards agree that a curved radius between 20 and 25 m is required for a design speed of 30 km/h. Requirements vary more both for lower and higher speeds: between 8 and 15 m for 20 km/h and between 25 and 47 m for 40 km/h.

In some documents, the growth of the required curve radius with design speed is given as linear or nearly linear (Germany, Netherlands, UK), in some it is quadratic (Catalonia, probably also Austria and Czechia, though no explicit formula is given in the latter cases). The difference is negligible for lower speeds but becomes significant above 25 km/h. Given the growing popularity of electrically power assisted cycles and the potential of speed pedelecs (reaching speeds up to 45 km/h) in rural areas, additional analysis or research could be desirable.

Several documents require or advise increased width of cycle tracks in bends. This is to accommodate the fact that cyclists lean into the curves (at higher speeds) or require additional space for balancing on the bike (at lower speeds). Unless stated otherwise, the radii are calculated for clean asphalt surfaces. Non-asphalted or poorly maintained surfaces require roughly 1.5-2 times higher curve radii because of the lower friction coefficient.

3.3.3. Minimum Vertical Curve Radius

Vertical curves are applied to avoid sudden changes of gradient. They need to ensure comfort and stability of riding, so the bicycle wheel does not jump on concave “bump”, or crash into the opposite wall of a convex “hole”. Vertical curves, especially concave, have also an impact on sight distance.



Vertical Curves Figure

Vertical curve radius represented the biggest variety in the analysed parameters. Half of analysed documents do not mention it at all, some set the minimum requirements relatively low (10-40 m), other go as high as 250-300 m (up to 1370 m in Finland). Wherever there is a distinction between requirements for concave and convex curves, higher minimum curve radius is required for concave. This can be justified by the impact of concave curves on visibility of the route ahead.

3.3.4. Minimum Sight Distances

A cyclist should be able to see the road ahead of them enough to have time to react to obstacles or other users. The required sight distance calculations involve the reaction time and the time needed to decelerate. When evaluating the sight distance, a range of eye heights should be considered to accommodate different cyclists (children, adults) and different cycles (including recumbent). Specific values (0.8-2.2 m) are given for

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example by the UK guidelines. On bidirectional cycle tracks the visibility should be ensured for double stopping sight distance (or sum of stopping distances for cyclists coming from the opposite directions). If it is not possible, the directions of traffic should be clearly separated.

3.3.5. Recommendations

The recommended quality criteria are grouped into three levels, following the classification of users developed in the frame of the EuroVelo European Certification Standard (see section 4.1):

- Essential: minimum requirements covering the most basic user needs. Can be applied if space is limited and the expected usage is not high. If the cycle infrastructure does not meet the Essential criteria, it is probably not safe and it definitely should not be obligatory to use. On this level, design speeds of 20 km/h and exceptionally 10 km/h are considered. When translating this design speed into minimum geometric parameters, we used the first quartiles from the analysed documents (which means that 75% of standards require higher parameters for the same design speeds).
- Important: addresses the needs of most regular and occasional users and is sufficient for typical cycle routes. On this level, a design speed of 30 km/h is assumed and median values from the analysed guidance documents are given as recommended.
- Additional: covers the widest range of cycle users, including those travelling on road bikes, electrically assisted pedal cycles, velomobiles, handbikes, tandems and bikes with trailers. It is an equivalent of a cycle highway in most guidelines, and can be considered the aspiration level for main, future-proof functional cycling connections. When translating the design speed into geometric parameters for this level, the third quartiles from the analysed documents are listed as recommended.

Criteria level	When to apply	Design speed	Minimum horizontal curve radius	Minimum vertical curve radius	Minimum stopping sight distance
Essential	Exceptional cases: when changing direction of travel, for example on an intersection or at a junction of cycle tracks	10 km/h	3 m	20 m concave 10 m convex	15 m
	Local cycle routes with low expected usage	20 km/h	10 m		
Important	Most typical cycle routes	30 km/h	22 m	60 m concave 35 m convex	35 m
Additional	Main, future-proof functional cycle routes Downhill sections on all routes	40 km/h	45 m	190 m concave 110 m convex	57 m

More information on other specific cycling infrastructure parameters may be found in the following papers[1]:

- Quality parameters for cycle infrastructure: interruptions and delays

[1] SmileCity partners have shared specific information about cycling infrastructure surface types in their region. These are available to all project partners and may be sent upon request.

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- Quality parameters for cycle infrastructure: at-grade uncontrolled crossings
- Factsheet on longitudinal gradients on cycling infrastructure

4. Cycling Tourism

Cycling tourism is a growing industry with high potential for positive local and regional economic impact. Its benefits are also numerous on a personal level. In the graph below are the responses from the participants of the Danube Cycling Tourist Survey 2024: Active2Public Transport Needs Assessment, on their reasons for going on cycling holidays.

Reasons for going on a cycling holiday

The European cycle route network EuroVelo report provides an overview of the European cycle tourism market and evaluates its potential for development. Cycle tourism is growing across Europe, especially in countries like France, Germany, and the Netherlands, despite uneven development and limited official statistics. An estimated 2.3 billion trips generate over €44 billion annually, highlighting its significant economic value. As per the economic impact of the EuroVelo network, it has a lot of potential if developed, but it is not a significant transportation or tourism network. A model developed to assess the potential impact of EuroVelo estimates that, if fully developed as a European transport and tourism network, 60 million trips could generate €7 billion in direct revenue.

4.1 Cycle Route Networks

When developing a cycle route network, several aspects should be considered to make sure it is well-developed and successful.

Six principles have been defined by the UNECE group of experts on cycling infrastructure in the Guide for designation of cycle route networks (2024) that ECF contributed to. These are true for all cycle networks although some aspects are especially relevant for those in rural areas:

- Safety: the cycle route should be safe both in terms of interaction with motorised traffic (external interaction), with other cyclists (internal interaction), pedestrians or users of other mobility devices and between the cyclist and the infrastructure.

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- Security: the cycle route should offer a good degree of personal security by providing frequent access points, lighting and passive surveillance as far as possible.
- Directness: the cycle route should allow for a direct and short connection between two places unless the route is designed for cycling leisure or tourism purposes, in which case directness should be considered from the angle of the attractiveness objective; the latter also applies when a route follows a geographical corridor (along a river valley or crossing a mountain for example).
- Continuity: the cycle route should be uninterrupted, well connected and signposted.
- Attractiveness: the cycle route crosses through recommended points of interests and scenic environment.
- Comfort: the cycle route allows easy use (no steep slopes where possible; good surface quality; clear signage, access to facilities, connectivity to public transport, rest areas and equipment along the route) and comfortable flow of traffic.

These general principles should be interpreted and translated into quality parameters considering the users' needs to guarantee the high-quality development of cycle route networks. The European Certification Standard (ECS) methodology provides minimum quality parameters to fulfil to ensure that the 6 above-mentioned principles are respected. This comprehensive methodology has proven instrumental in identifying gaps and opportunities to enhance the quality of cycle route networks both nationally and across Europe. Notably, the French section of EuroVelo 1 – Atlantic Coast Route, also known as *La Vélodyssée*, achieved EuroVelo Certification. It is only the second EuroVelo route to meet the high standards required for certification since 2015, following EuroVelo 15 – Rhine Cycle Route.

As of now, the requirements concerning bicycle charging stations are not very strict within ECS. The "Additional Criteria" requires at least one charging station per daily section. However, many cycling friendly schemes require electric charging stations at businesses in the hospitality industry, tourist attractions or shops in order to be certified as cycling friendly. It is generally recommended to install charging stations in places where cyclists can safely leave their bicycles to charge for several hours.

Although for now only EuroVelo routes may be certified with ECS, it is a good set of criteria to evaluate all cycle routes.

Across Europe, several networks which may be used for cycling and often other activities such as hiking, horse riding, roller skating and more, exist. A common approach taken by many of them which ensures the, at least partial, alignment with the UNECE principles, is developing routes along old railway lines or towpaths. A few examples of these are: the Réseau Autonome des Voies Lentes (RAVeL - autonomous network of non-motorised paths); the Camino de Santiago, and EuroVelo.

4.1.1 EuroVelo

EuroVelo is the European cycle route network – a network of 17 long distance cycle routes that cross and connect the whole of Europe. The total length will be over 90,000 km when completed. The development of EuroVelo will lead to safe, direct, coherent and connected cycling infrastructure and cycle route networks that will benefit all categories of cyclists including cycling tourists.

The EuroVelo routes passing through or close by regions and cities participating in SmileCity are EuroVelo 1, 3, 4, 5, 6, 8 and 11. These may be considered for the installation of charging infrastructure for bicycles in the frame of the project or afterwards.

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The EuroVelo Network

Between 2021 and 2024, more than 10,000 additional kilometres of EuroVelo routes have been officially reported as developed, bringing the network to a solid 67% level of development. Moreover, 39% of the network is now equipped with EuroVelo signage, improving accessibility and navigation for cyclists.

The latest EuroVelo Usage Barometer for 2024, published by EuroVelo in collaboration with Eco-Counter, confirms that cycling traffic on the EuroVelo network remained largely stable compared to 2023, with a slight overall increase of +0.5%. While weekday traffic showed no significant change (-0.1%), weekend cycling grew, rising by +2.2%. This suggests a more dynamic development of leisure cycling, possibly influenced by favourable weather conditions and changing habits.

Compared to pre-pandemic figures, cycling levels across the EuroVelo network showed a sustained increase, with a notable +10.3% growth since 2019. Despite this long-term trend, largely steady traffic levels in 2024 compared to 2023 indicate a plateau after the COVID-19-induced cycling boom. This points towards a need for further investments in the network to ensure renewed substantial growth in future years.

5. Cycling Industry

5.1 Charging Stations

5.1.1 E-Bike Uptake and Sales in Europe

The European e-bike market has experienced remarkable growth in recent years, reflecting a broader shift toward sustainable and electric mobility. In 2023, out of the 11.7 million bicycles sold across Europe, 5.1 million were e-bikes, accounting for nearly 44% of total sales. This marks a significant milestone, as electric bicycles increasingly replace traditional bikes, particularly for urban commuting and leisure use.

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Economically, the sector has become a major contributor, with combined sales of bicycles and e-bikes generating €19.3 billion in turnover, reflecting a 8.9% decrease from 2022. Looking ahead, the European e-bike market is projected to expand from USD 16.69 billion in 2025 to USD 42.35 billion by 2033, representing a compound annual growth rate (CAGR) of 12.34%. This is part of a broader global trend, with the global e-bike market expected to grow at a CAGR of 14.5% from 2024 to 2030.

Germany currently leads the market in total e-bike sales and in 2024 saw electric bicycles outsell traditional bikes for the first time— a trend that has continued into 2025. The Netherlands boasts the highest per capita ownership of e-bikes, driven by its deep-rooted cycling culture and supportive infrastructure. Meanwhile, countries such as France, Italy, and those in the Nordic region are emerging as high-growth markets, thanks to expanding bike infrastructure and environmentally focused government policies.

5.1.2 Data Related to E-Bike Charging Stations

As e-bike adoption increases, the need for accessible, safe, and standardized charging infrastructure has become a pressing issue across Europe. Public and private stakeholders are investing in the expansion of charging networks to support e-bike usage, particularly in urban areas where secure parking and charging are essential for commuters.

The regulatory landscape is evolving in response to these demands. Several standards and guidelines now govern the deployment of e-bike charging stations. EN 17194 provides a dedicated European standard for the design, installation, and operation of e-bike charging infrastructure. Additionally, broader electric vehicle charging standards such as IEC 61851 and ISO 15118 are being adapted to fit the specific needs of e-bikes, particularly in terms of safety protocols and communication between the bicycle and the charger.

Battery safety and storage are also critical considerations. In Germany, the VDMA 24994 standard sets out stringent requirements for charging cabinets, including temperature control and internal smoke detection systems. In the Netherlands, interim safety measures are in place via EN 14470-1, with country-specific guidelines (PGS 37-2) under development to govern the storage of lithium-ion batteries, including those used in e-bikes.

5.1.3 Industry Activities on Charging Technology and Infrastructure

Across the European Union, both policy frameworks and industry initiatives are actively shaping the future of e-bike charging technology and infrastructure. One of the most influential legislative efforts is the EU Charging Infrastructure Law (2023), which, while primarily aimed at electric vehicles, sets an important precedent for developing similar infrastructure for e-bikes. The law mandates public EV charging stations every 60 kilometers along major transport routes by 2026. Although e-bikes are not yet explicitly included, this regulation paves the way for future investments in micromobility infrastructure.

Complementing this is the European Commission's Sustainable Mobility Framework 2030, which outlines a strategic vision that includes the expansion of rural charging networks, vehicle-to-grid (V2G) integration, and support for ultra-fast charging technologies. These priorities suggest a future where e-bike charging is integrated into broader energy and transport systems.

Industry players are also introducing new products and services tailored to the evolving needs of e-bike users. The CHAdeMO Association, known for its electric vehicle charging standards, has developed the 'Charge2Bike' initiative. This interoperable charging interface is designed specifically for e-bikes, aiming to provide a safe, standardized, and universally compatible solution.

From a regulatory perspective, the introduction of Regulation (EU) 2023/1542 marks a significant step

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forward. This legislation governs the entire lifecycle of batteries used in Light Means of Transport (LMT), including e-bikes. It covers sustainability, safety, traceability, removability, and recyclability requirements, and introduces the concept of a digital battery passport to enhance transparency and consumer information. The implementation of this regulation will be phased in through 2031, with several critical provisions, such as CE marking and battery removability standards, already taking effect or due soon.

5.1.4 Industry Efforts on Universal Plugs

Efforts to create a standardized plug system for e-bike charging are gaining momentum, as interoperability becomes a key requirement for scaling public charging infrastructure. The lack of a universal plug has long been a barrier to more widespread deployment of public e-bike charging stations. Addressing this, the CHAdeMO Association has launched the 'Charge2Bike' initiative, a plug-and-communication interface developed specifically for e-bikes. It aims to enable compatibility across different brands and models, thereby supporting the broader goal of standardized public charging.

The adaptation of ISO 15118, initially developed for electric vehicles, also plays a role in enabling smart charging capabilities for e-bikes, such as automated authentication, usage tracking, and integration into energy management systems.

While the industry increasingly supports the development of universal charging solutions, there is a nuanced debate around regulation. For example, the German Bicycle Industry Association (ZIV) supports standardization for public infrastructure but cautions against mandatory regulations for private use. They argue that allowing flexibility in private charging solutions will preserve innovation and competition within the market.

These developments reflect a growing consensus within the industry: while standardization of plugs and charging systems is crucial for the public domain, a balanced approach is needed to ensure innovation is not stifled in the private sector.

5.2 Cargo Bikes

With more and more individuals, companies and cities turning to cargo bikes as a solution, they are increasingly seen as a critical tool in sustainable urban development. No less than 50% of urban trips related to the transport of goods could be shifted to cargo bikes. Such a shift would have a significant impact on reducing GHG emissions and easing congestion in urban areas. In order to have a better understanding of the situation around cargo bikes, ECF has systematically analysed the cargo bike friendliness of 125 European cities, looking at a range of criteria, including financial incentives, sharing schemes, urban context and projects. ECF's new cargo bike-friendly cities dashboard will facilitate the ongoing comparison of data on cargo bikes between cities and serve as a crucial resource for policy officials, industry leaders, and climate and sustainable mobility advocates.

Using cargo bikes for last-mile delivery is a growing industry with a lot of potential. Because cargo bikes are often electric, collaborations between this industry and bicycle charging stations should be considered.

6. Cycling within the wider transport network

6.1 Cycling and multimodal lifestyles

Multimodality refers to the lifestyle choices people make over time, where different modes of transport are

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combined to meet their needs. This approach not only provides a strong alternative to individual car use, but also offers various benefits to society, the economy, and the environment. By integrating multiple transportation options, multimodal systems can enhance the resilience of mobility and public transport systems. To successfully transition to multimodal lifestyles, it is essential to understand what people want from their transport options. Most importantly, people seek to travel Door-to-Door as quickly, safely, and comfortably as possible.

Various solutions can address these needs, such as secure bike parking facilities at transport stations, combined with shared mobility services. Public transport systems can also allow mobility devices on board, particularly on suburban and regional services or during off-peak hours on inner-city lines. For example, some train and tram operators already offer these services during off-peak hours, and many buses in places such as South Moravian Region (Czechia) have bike racks at the rear of the vehicles. In Brest, France, the public transport authority has set a goal to increase the cycling modal share from 1.4% to 4% over a four-year period. The city has integrated bikes into public service contracts, offering services similar to those of other public transport modes. This includes long-term electric bike rentals, shared bikes, the ability to bring bikes on trams during off-peak hours, and secured lockers for personal bikes. Another example is Madrid's Canalejas 360 Hub which demonstrates how cities can reclaim public space and promote sustainable travel by offering EV charging, shared mobility services, and secure parking for bikes and scooters—all within an underground facility aimed at enhancing urban quality of life.

6.2 Cyclists Love Trains

As the most sustainable solutions and two modes of transport that complement one another perfectly, it is clear that bicycles and trains should shape the future of mobility. ECF believes that cyclists and the train sector should be considered as *allies* in stimulating a modal shift away from an unsustainable dependence on private car use and towards a healthy mix of public transport and active mobility. Combining cycling and taking the train is especially attractive for travelling longer distances.

The *Cyclists Love Trains* 2025 report ranks the bicycle-friendliness of 67 European long-distance railway companies. This analysis is based on the onboard carriage of unfolded, non-dismantled bicycles on long-distance trains, considering both physical infrastructure ("hardware") and service-related factors ("software") such as costs, booking methods, available languages, and website or app functionality.

Three operators are ranked as "excellent" overall: NMBS/SNCB (Belgium) & SBB/CFF/FFS (Switzerland) and ÁV-START (Hungary). However, a majority of 46 (68.65%) operators score less than 60/100 points and are ranked somewhere ranging from "moderate" to "very poor".

ECF observes that, although the overall standard is still far from satisfactory, there is positive momentum to the last Cyclists Love Trains report from 2021. Recommendations for operators to improve their cycling friendliness may be found in the report.

7. Road Safety

Below may be found a table with the latest cyclist fatalities from the last ten years with long term and short-term changes from the CARE ERSO database.

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Country	2013	2019	2020	2021	2022	2023	LT*	ST*
Belgium	83	95	87	87	102	101	22%	6%
Bulgaria	31	27	19	17	25	14	-55%	-48%
Czechia	74	53	51	64	54		-27%	2%
Denmark	33	31	27	25	23	28	-15%	-10%
Germany	354	445	426	372	474	446	26%	0%
Estonia	0	2	1	7	3	5		
Ireland	5	8	10	7				
Greece	15	22	12	14	13		-13%	-41%
Spain	70	80	71	63	81	90	28%	13%
France	147	187	178	227	245	221	50%	18%
Croatia	23	16	9	28	9	18	-22%	13%
Italy	251	253	175	220	205	212	-16%	-16%
Cyprus	2	1	1	1	4			
Latvia	13	9	17				31%	
Lithuania	18	10	12	11	5	11	-39%	
Luxembourg	0	0	3	0	1	2		
Hungary	68	63	40	53	42	43	-37%	-32%
Malta		0	0	0	0			
Netherlands	112	148	158	145	220	208	86%	41%
Austria	52	33	40	50	44	42	-19%	27%
Poland	306	258	249	185	170	154	-50%	-40%
Portugal	29	27	19	34	31	33	14%	22%
Romania	161	198	191	149	160	160	-1%	-19%
Slovenia	16	9	8	10	12	9	-44%	
Slovakia		17	24	17	26	13		-24%
Finland	20	23	31	24	18	20	0%	-13%
Sweden	14	17	16	20	23		64%	35%
EU	1,918	2,032	1,875	1,847	2,014	1,948	2%	-4%
Iceland	0	0	0	1	0	1		
Norway	10	6	3	4	6	6		
Switzerland	21	27	44	39	42	38	81%	41%

*LT = Long term change of last available year over 2013.
*ST = Short term change of last available year over 2019.

Limited data available for Ireland, Latvia, Malta, Slovakia, and Sweden.

Annual number of cyclists fatalities by country (2013, 2019-2023)

However, this table is not quite representative of the whole picture. A major limitation is that it is unknown how many people are cycling and how often or how far, in other words the "exposure" to the risk is unknown. The Netherlands has a high number of fatalities, but this is probably due to the high number of people cycling. Likewise, although Malta has zero fatalities it is certainly not the safest place to cycle, rather people do not cycle there.

This underlines the important connection between cycling safety and cycling promotion; reducing fatalities should be linked to cycling promotion. If the safety perception of cycling were improved with better facilities and infrastructure then cycling safety would also improve, likewise if cycling safety improves then it will likely attract more people to cycling.

Two things may be concluded so far:

- Exposure is important to understand the *risk* to cyclists
- Cycling promotion should be seen as an important aspect to cycling safety

An interesting, and perhaps related concept, is the "Safety in numbers" concept. Safety in Numbers' is the theory that there is a correlation between cycling levels in an area, or country, and the relative safety of cycling - that higher cycling levels correlate with higher safety levels. In other words, as cycling numbers increase, fatality/injury figures either fall or rise at a lower rate, therefore the risk to each individual cyclist actually falls with an increase in numbers of cyclists.

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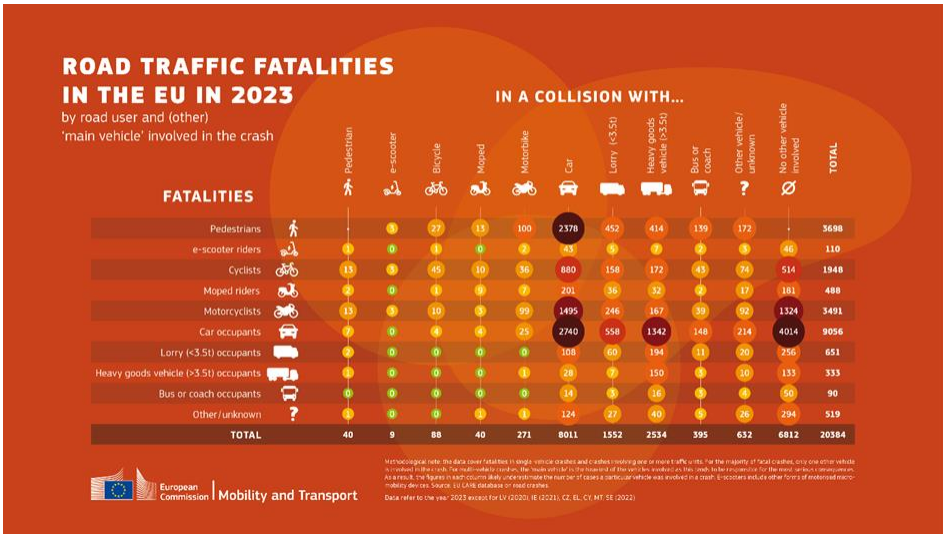
A strong form of this theory is that simply increasing cycling levels will increase (relative) safety. Weaker forms simply point out the correlation, without making any strong causal connections, and it is probably more likely, that safer environments lead to higher cycling levels, in other words it is better infrastructure and environments that improve both safety and promote numbers, rather than those two causing each other.

The absolute number of cyclist fatalities has not shifted from around 2,000 for about 10 years. This could be explained by several factors:

- There are more people cycling now, and this accounts for the absolute number of cyclists fatalities remaining static or increasing
- The average age of cyclists is increasing, and therefore older, frailer bodies are at more risk of higher injury or fatality
- The road is becoming more dangerous

Unfortunately, as there is no exposure data we cannot rule out the theory that the roads are getting more dangerous. However, it is known that there is more infrastructure being built for cyclists. And it is suspected that the number of cyclists is increasing. Therefore, the first two theories are more likely. Considering this, it is imperative to continue implementing good quality cycling infrastructure as well as reduce and calm motorised traffic.

When looking at cycling safety it is also important to consider also third-party crashes, i.e. who is crashing with whom on the roads. Bicycles, e-bikes, micromobility and pedestrians do not bring danger to other road users. The collision matrix below clearly shows where risk on the roads lies. Across the EU there were nine fatalities of other road users in crashes with an e-scooter (88 fatalities in crashes with a bicycle; 40 fatalities in crashes with a pedestrian). There were 13,836 third-party fatalities (minus vehicle single vehicle crashes) in crashes with a motorised vehicle.



8. Conclusions

As described in this paper, there is a very rich and wide policy and regulatory context for which SmileCity can situate itself and achieve its main goals and objectives. Given that a central aim of SmileCity is to utilise recycled materials – such as concrete and rubber from tires – to build e-bike charging infrastructure, and to use those recycled materials to even build infrastructure for cyclists to ride on, the most crucial points from

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this paper for the ongoing delivery of SmileCity are:

- The European Declaration on Cycling: This landmark political declaration creates a general strategic framework from which the EU can move cycling forward together with Member States and cities.
- EU structural funding for cycling infrastructure in Member States: This is a resource that Member States already use to build cycle route networks and major segments of cycling infrastructure. It could be a way for SmileCity products and results in being integrated into future cycle projects.
- Bicycle parking requirements in the Energy Performance of Buildings Directive: From January 2027, Member States will need to enforce the rule that new and renovated residential buildings provide two bicycle parking spaces per dwelling, and non-residential buildings provide bicycle parking capacity for between 10-15% of the building's total and/or average user capacity. The EPBD also enables buildings to be equipped with e-bike charging infrastructure.
- Common standards on cycle infrastructure: though standards do not yet exist at the EU level, at the wider European level, the UNECE provides common standards on signage and infrastructure that can guide SmileCity partners as the project advances. ECF has also developed numerous recommendations and guides on the geometric and technical standards for cycle infrastructure.
- Financial incentives for cycling: E-bike usage is booming throughout Europe, but the cities involved in SmileCity will need to consider how to incentivise their citizen to cycle and make use of the infrastructure created by the project. Numerous financial incentives insist, many of them based on apps or as direct policy interventions.
- Cycle tourism trends and routes in Europe: SmileCity urban partners have already expressed that a potential good use of the project's results will be for the cycle tourist audience, considering that people in this category travel longer distances and may benefit from having e-bike charging infrastructure on their route. Existing EuroVelo routes that pass through or near partner cities would be an ideal place for the project's results, but also other local and national cycle tourism routes.

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