

Where are speed pedelecs used?

Regulations and experiences with speed pedelecs in Germany, Belgium, Denmark, the Netherlands and Switzerland

ZIV – German Bicycle Industry
A study by Mobycon

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1. Introduction

Speed pedelecs, or S-pedelecs for short, are electric bicycles capable of reaching speeds of up to 45 km/h. Unlike e-bikes, they achieve these speeds through electric pedal assistance and cannot be powered by the motor alone.

Speed pedelecs are becoming increasingly popular in many European countries and could be an important driver of the mobility transition as they allow greater distances to be covered, enabling those with a longer daily commute to also switch from using a car. They are moreover relevant for the bicycle industry as they support product diversification and innovation, increased sales and expansion of the target group.

Due to their higher speed and performance compared to conventional bicycles and e-bikes, speed pedelecs are subject to special regulations in many countries. Switzerland has paved the way for these fast bicycles in Europe by allowing speed pedelecs to use cycling infrastructure by default, liberalising standards and simplifying the registration process. The Swiss approach has seen strong sales figures for speed pedelecs. In 2022, 22,700 speed pedelecs were sold in Switzerland, which accounts for about 10% of all electric bicycles.

In all countries, the challenge of regulating speed pedelecs makes a compromise necessary between promoting emission-free, sustainable mobility and ensuring the safety of pedestrians and cyclists.

While these vehicles fall under the EU vehicle category of two-wheel mopeds (L1 e-B), different countries have taken different approaches to determining how, when and at what speed they are allowed to use cycling infrastructure. This study systematically compiles and compares the regulations in Germany, Belgium, Denmark, the Netherlands and Switzerland. Readers will gain insights into the differences between these regulatory frameworks, expected changes and relevant research. Methodologically, the project team complemented the findings from desk research with a series of expert interviews.

The ZIV recognises the great potential of speed pedelecs to support a switch from cars to bikes and thus drive the mobility transition. However, speed pedelecs have had little opportunity to realise their potential yet in Germany. In the absence of a comprehensive overview of how these vehicles are regulated in the European countries which have seen higher levels of usage, the ZIV commissioned Mobycon to produce such a report. Our key concern in this work has been the question of whether and under what conditions speed pedelecs are allowed to use cycling infrastructure in the selected countries, which restrictions (such as speed limits) apply and whether the accident rates for these vehicles are markedly different.



2. Country reports



GERMANY



REGULATIONS

Space on the road:	Road (use of cycle paths only permitted with additional signage)
Speed limit:	None
Licence plate:	Insurance plate + compulsory insurance
Age / driving licence:	AM class driving licence, obtainable from 16 years
Bicycle trailers:	Passenger/child transport prohibited; load trailers only via a specially tested connecting device
Compulsory accessories:	<ul style="list-style-type: none">• Helmet• Rear view mirror• Walk-assist function• Licence plate light• Horn/hooter• Brake light
Average speed:	Unknown



KEY FIGURES

Number of licenced speed pedelecs

Unknown (as speed pedelecs are grouped with all other light motorised vehicles into a common licence plate category).

Speed pedelecs sold

2022: 11,000

2021: 8,000

2020: 6,800

Accident figures

2021: 233

- 2 fatalities
- 50 seriously injured
- 181 minor injuries

2020: 287

- 0 fatalities
- 71 seriously injured
- 216 minor injuries



DEVELOPMENT OF REGULATIONS

In Germany, current regulations require that speed pedelecs be ridden on the road; the use of cycle paths is prohibited both inside and outside built-up areas.

Currently, there is no special additional sign in the German road traffic regulations (StVO) that reserves infrastructure for the use of speed pedelecs exclusively. Speed pedelecs are permitted by the additional sign 1022-12 "Krafträder auch mit Beiwagen, Kleinkrafträder und Mofas frei", as they are considered 'light motor vehicles' (*Kleinkrafträder*). However, this sign also permits motorcycles with combustion engines. In contrast, the additional sign 1010-65 "E-Bikes frei" excludes speed pedelecs.

In Baden-Württemberg and North-Rhine-Westphalia, state decrees permit certain cycle paths to be opened for use by speed pedelecs with an additional sign "Speed-Pedelec frei" (speed pedelecs permitted). The city of Tübingen has made use of this decree and Konstanz has opened a bike street specifically for speed pedelecs.



RESULTS OF EVALUATIONS

Neither the state decree of Baden-Württemberg nor the use of cycle paths by speed pedelecs in Tübingen have been evaluated. Since July 2023, RhineMain University of Applied Sciences and Darmstadt University of Applied Sciences have been conducting a joint speed pedelec field trial in Tübingen.

The German-Austrian-Swiss FFG research project SESPIN (www.s-pedelec.net) is currently investigating how speed pedelecs can be safely and efficiently integrated into the transport system. Recommendations for measures are expected at the end of the project.



KEY STUDIES

- German Bundestag (2021). Speed-Pedelecs im Straßenverkehrsrecht.
- Albers et al. (2022). Nutzung von Radverkehrsanlagen durch Speed-Pedelecs. University of Darmstadt.
- Lienhop et al. (2015): Verlagerungs- und Klimaeffekte durch Pedelec-Nutzung im Individualverkehr. Endbericht.

2.1 Speed pedelecs in Germany

In Germany, speed pedelecs are classified as “two-wheeled mopeds” (unlike conventional e-bikes) and are therefore considered motor vehicles. In order to operate a speed pedelec, the user requires an insurance license plate and insurance is mandatory.¹ An AM class driver’s license is necessary, which can be obtained from the age of 16. Wearing a helmet is mandatory. The towing of trailers containing people or children is not permitted. Cargo trailers may be towed as long as they are connected to the speed pedelec via a special, approved trailer coupling. Other mandatory equipment includes a rear-view mirror, a walk-assist function, license plate lighting, a horn, and a brake light.²

The number of speed pedelecs sold has increased over the past three years: from 6,800 in 2020, to 8,000 in 2021 and 11,000 in 2022.³ Between 2020 and 2021, there were a total of 500 accidents involving speed pedelecs. In 2020, there were 287 accidents with no fatalities, 71 serious injuries and 216 minor injuries. Although the total number of accidents decreased to 233 in 2021, they resulted in 2 fatalities, 50 serious injuries and 181 minor injuries.⁴

In Germany, speed pedelecs must be ridden on the road. Unless indicated otherwise, use of the cycling infrastructure is prohibited both inside and outside of built-up areas, including segregated cycle paths, bike lanes, protected lanes, bike streets, cycle highways, and trails in forests and through fields. Additionally, speed pedelec riders cannot cross certain bridges or ride against the flow of traffic on one-way streets.⁵

Special regulations and additional signs

There is currently no specific additional signage in the German road traffic regulations (Straßenverkehrs-Ordnung, StVO) or in the catalogue of traffic signs that allows other transport routes other than the road to be designated exclusively for speed pedelecs. However, special regulations and additional signs do exist in the StVO that allow mopeds to use other routes and the additional sign number 1022-12 includes speed pedelecs. All other additional signs for mopeds exclude speed pedelecs.



Figure 1: City of Tübingen/Daniel Hammer




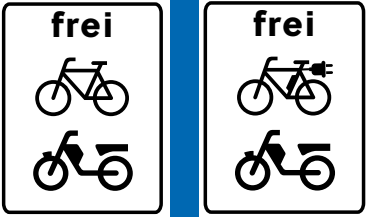
- 1 Annual insurance policy is taken out, which also issues the insurance certificate that is valid from 1 March for 12 months. The insurance must be renewed every year. (German consumer advice centre, 2022)
- 2 (Verkehrsclub Deutschland e. V., 2021); (Tolksdorf, 2023)
- 3 (Zweirad-Industrie-Verband e. V., 2020; ZIV, 2023)
- 4 (Federal Statistical Office, 2021), (Federal Statistical Office, 2023)
- 5 (Verkehrsclub Deutschland e. V., 2021)

The relevant regulations and additional signs are as follows:

Cycling paths outside built-up areas: Outside built-up areas, mopeds and e-bikes with an approved maximum speed of 25 km/h are allowed to use cycle paths (Section 2(4), sentence 6 StVO).⁶ Speed pedelecs are not included in this regulation because their speed exceeds 25 km/h.

Field and forest trails: The rules for using field and forest trails are set at the state (Land) level, not the federal level. Specific regulations often exist for pedestrians and bicycle traffic, but these do not apply to speed pedelecs unless additional signs are installed.

Additional signs:

	<p>Additional sign number 1022-11 “Mofas frei”: This sign permits the use of infrastructure by motor-driven pedelecs or e-bikes, with or without pedals, up to a maximum speed of 25 km/h. The speed limit means that this sign does not apply to speed pedelecs.⁷</p>
	<p>Additional sign number 1022-12 “Krafträder auch mit Beiwagen, Kleinkrafträder und Mofas frei” permits the use of infrastructure by light motorcycles in general, including speed pedelecs. It also allows riders of motorcycles or light motorcycles with internal combustion engines to use infrastructure alongside cyclists.⁸</p>
	<p>Additional sign number 1010-13 “E-bikes frei”: This sign was introduced in 2017 to allow municipalities to permit the use of e-bikes (up to 25 km/h) on cycle paths. This traffic sign does not apply to speed pedelecs.⁹</p>
	<p>Additional signs numbers 1022-14 “Radverkehr und Mofas frei” and 1022-15 “E-Bikes und Mofas frei”: These traffic signs were also introduced in 2017. They include e-bikes and mopeds up to 25 km/h, but exclude speed pedelecs.</p>

6 (STVO, n.d.)

7 (German Bundestag, 2021)

8 (German Bundestag, 2021)

9 (Verkehrsclub Deutschland e. V., n.d.)

Opening up cycling infrastructure in Baden-Württemberg

The German road traffic regulations (Straßenverkehrs-Ordnung, StVO) do not currently include an additional sign that specifically enables the use of infrastructure exclusively by speed pedelecs. However, based on the general administrative regulation for the StVO (VwV-StVO), additional signs not provided for in the StVO can also be installed if the competent state authority approve these. Baden-Württemberg resolved in a decree that speed pedelecs can be used on selected cycle paths when an additional sign permitting speed pedelecs is displayed (“Speed-Pedelec frei”).¹⁰ In a statement, it declared:

“With the letter dated 21 September 2018, which was sent via the regional governments to all 146 road traffic authorities in the state, the state transport ministry approved use of the additional sign permitting speed pedelecs (“Speed-Pedelec frei”), among others in combination with traffic sign number 237 (cycle path). It was also clarified that the assessment of whether aspects such as the use of a cycle path by speed pedelecs is appropriate is the responsibility of the local traffic authority. During this assessment, considerations such as traffic volume and composition, speeds of different modes of transport, available road width, etc. must be taken into account. Considering the vulnerable and ‘slow’ pedestrian traffic, particularly strict criteria should be applied when granting permission for shared pedestrian and cycle paths (traffic sign number 240 StVO).”

Speed pedelecs can be allowed to use cycle paths when this does not impede other users of the cycle paths or pedestrians. Cycle paths in urban areas that are frequently used or used for school routes are unlikely to be opened to speed pedelecs based on this particular decree.

The impetus for the state decree arose from the desire to enable new forms of mobility in line with the mobility transition rather than hinder innovation and development, with a focus on what is technically and legally feasible within the safety parameters required to protect more vulnerable users of pedestrian and bicycle infrastructure. One conflicting goal is that the aim of promoting cycling is to achieve a modal shift in favour of bicycles and not necessarily to increase the cycling speeds.

To date, the only municipalities in Baden-Württemberg to make use of the option to allow speed pedelecs on cycle paths are Tübingen and Konstanz:

- **The city of Tübingen** is gradually creating a speed pedelec network that connects the districts of Tübingen by authorising the use of speed pedelecs on selected sections. This includes allowing access to designated industrial roads, bike lanes, shared pedestrian and cycle paths, and underpasses. After assessing the width of the bike paths, the varying speeds, types of traffic as well as the traffic volume and composition, speed limits of 20 or 30 km/h were established at locations presenting an increased safety risk. In two areas, authorisation was not granted due to an increased safety risk.



Figure 2: City of Tübingen/Daniel Hammer

10 (Albers et al., 2022)

The speed pedelec network will continue to evolve in the future and will be considered in the planning of bike priority routes. The city views this network as a means of ensuring that as many speed pedelecs as possible use routes that are adapted to their speed, in view of the fact that many speed pedelecs are modified by their owners to resemble e-bikes (e.g. by removing the number plate) to avoid restrictions. Allowing speed pedelecs on the aforementioned routes will remain an isolated measure, unless surrounding municipalities also create onward connections.

So far, there has been no significant increase in the use of speed pedelecs as a result of the city's measures. Nor is there any record of any significant clusters of accidents or complaints from citizens, the police or traffic authorities. A scientific evaluation and study are currently being conducted by RheinMain University of Applied Sciences in collaboration with Darmstadt University of Applied Sciences and the city of Tübingen as part of a speed pedelec field trial (05/2023–12/2024). The project examines the infrastructure, technical, behavioural and legal conditions under which speed pedelecs can contribute to the mobility transition. Volunteers test a speed pedelec in their daily lives for several weeks. Recommendations for the expansion of "speed pedelec-friendly" cycling infrastructure are expected by the end of 2024.¹¹

- **The city of Konstanz** used the state decree to designate a bicycle street (eastern section of Eichhornstraße and southern section of Jakobstraße) for use by speed pedelecs and commissioned a consultancy to develop a speed pedelec network. This initiative was accompanied by an appeal to citizens for ideas and requirements related to such a network. The dominant response was opposition ("No speed racers on our pavements and cycle paths!"). The district of Konstanz recently took up the issue to develop an intermunicipal approach for commuter mobility.

According to the state ministry of Baden-Württemberg, speed pedelecs are not a controversial issue overall; there is neither significant local support or opposition. Perhaps in part because the state's pro-cycling policies do not aim to increase the use of speed pedelecs, there is as yet no discernible change in cycling's modal share that can clearly be attributed to speed pedelecs.



Figure 3: Bicycle street with the additional sign "Speed-Pedelecs frei" in Konstanz. Photo: City of Konstanz/Gregor Gaffga

¹¹ <https://www.hs-rm.de/de/fachbereiche/architektur-und-bauingenieurwesen/forschung/s-pedelec>

Opening up cycling infrastructure in the state of North Rhine-Westphalia

Following the regulations in Baden-Württemberg, the Ministry of the Environment, Nature Conservation and Transport of the state of North Rhine-Westphalia agreed a decree on 18 July 2023 that provided its cities and municipalities with the option to allowing speed pedelecs to be used on cycling infrastructure and to install an additional sign (“speed pedelecs allowed”).

The local traffic authorities decide on the placement of additional road signs on an individual basis, taking local conditions into account. In the evaluation process, “particular attention should be paid to the needs and need to protect pedestrian traffic. Additionally, factors such as the width and road markings in the respective traffic area, visibility and traffic composition as well as the volume and speed of the various modes of transport should be borne in mind.”¹²

Potential areas of application explicitly include bicycle highways, bike streets and bike zones inside and outside urban areas. Mandatory cycle paths, shared pedestrian and cycle paths as well as separated pedestrian and cycle paths outside urban areas are also considered. The use of speed pedelecs within urban areas is already limited to “special exceptions” by decree and mandatory cycling lanes on main roads with permissible maximum speeds of more than 50 km/h are listed as a use case. Speed pedelecs are not approved for use on two-way cycle paths that are frequently crossed by intersections or have a high accident rate.

To protect vulnerable road users, the federal state seeks to avoid allowing the use of speed pedelecs on substandard cycle paths. Only cycling infrastructure that meets the required width and construction standards will be considered. So far, this provision has not been enforced in North Rhine-Westphalia (NRW).

In the district of Coesfeld (North Rhine-Westphalia), a citizen’s petition was submitted in 2020 to allow speed pedelecs on a combined pedestrian and cycle path, following the example of Tübingen. However, this request was denied, with the justification that it is a combined pedestrian and cycle path that also falls below the recommended width for cycling infrastructure.¹³

Further attempts

In Hamburg-Altona, a traffic experiment was requested to allow speed pedelecs to use selected “extra-wide bike lanes or bus lanes”, with a speed limit of 25 km/h. The motivation behind the request was to enhance the safety and comfort for speed pedelec users, who were often hooted at by motor vehicle drivers unaware of the legal situation, encouraging them to move off the road. However, the request to conduct a traffic experiment was rejected on the grounds that opening bike lanes within urban areas to speed pedelecs is not permissible under the German road traffic regulations (StVO), and traffic experiments under Section 45 StVO, are only allowed within the framework of existing laws.¹⁴

Potential for the mobility transition

In Germany, the use of speed pedelecs is not being systematically promoted at present; the authorisation to use infrastructure in Baden-Württemberg is currently the exception. The German pedelec study Pedelection found that speed pedelecs have the greatest potential for creating a modal shift away from cars however: Respondents would have covered 71% of the kilometres covered using a speed pedelec by car before they acquired a speed pedelec.¹⁵

12 Letter from the Ministry of the Environment, Nature Conservation, and Transport of North Rhine-Westphalia dated 18 July 2023 on the additional “Speed-Pedelecs frei” sign

13 (District of Coesfeld, 2020)

14 (Free and Hanseatic city of Hamburg, 2023)

15 (Lienhop et al. 2015)

BELGIUM



REGULATIONS

Space on the road:	<ul style="list-style-type: none">• Within built-up areas: users may choose between the road and the cycle path• Outside of built-up areas, on roads limited to 50 km/h and above: cycle path• Exceptions to these cases are signposted
Speed limit:	Various
Licence plate:	Speed pedelec licence plate
Age / driving licence:	<ul style="list-style-type: none">• From 16 years• AM+ class driving licence
Bicycle trailers:	Permitted
Compulsory accessories:	Bicycle/moped helmet
Average speed:	36.7 km/h



KEY FIGURES

Number of licenced speed pedelecs

2021: 61,506

2018: 16,094

2017: 5,352

Speed pedelecs sold

2021: 12,377

2020: 12,596

2019: 13,417

Accidents

2021: 319

2018: 96

2017: 15



DEVELOPMENT OF REGULATIONS

In 2016, Belgium introduced a new vehicle class ("Moped Class P speed pedelecs") to its road traffic regulations, thereby setting them apart from conventional mopeds. It subsequently became possible to make regulations that apply exclusively to speed pedelecs. The introduction of this separate category was made possible by the reclassification of three-wheeled and four-wheeled vehicles at the EU level in 2013, and Belgium is the only EU country that has taken advantage of this opportunity.

In Belgium, certain changes can be decided at the regional level, including setting of the maximum speed for speed pedelecs on cycle paths, which can be determined individually by each of the three regions.



RESULTS OF EVALUATIONS

- The average travel speed of speed pedelec users during commuting is 36.7 km/h
- The average maximum speed of speed pedelec commutes during commuting is 40.1 km/h.



KEY STUDIES

- Herteleer, B., Van den Steen, N., Vanhaverbeke, L., & Cappelle, J. (2022). Analysis of initial speed pedelec usage for commuting purposes in Flanders. *Transportation Research Interdisciplinary Perspectives*, 14.
- Speed Pedelec Vlaanderen. (2022). Hoe zit het echt met speed pedelec ongevallen. 'Geen verdubbeling maar maximum 4% groei.'

2.2 Speed pedelecs in Belgium

In 2021, there were 61,506 speed pedelecs registered in Belgium. In 2017, there were only 5,352; by 2018, this had already risen to 16,094. The significant increase in speed pedelecs is to some extent linked to regulatory changes, albeit with a slight delay. Almost all the country's speed pedelecs (96%) are registered in Flanders¹⁶ where the regulations have been modified in recent years with the aim of increasing their use.

Belgium used the reclassification of two-wheeled vehicles at the EU level in 2013 (Regulation 168/2013) to introduce its own category for speed pedelecs on 1 October 2016: "moped class P – speed pedelecs" (SP license plate). This categorisation places speed pedelecs within the moped group, but its distinct subcategory allows for the introduction of rules tailored specifically to speed pedelecs that do not apply to other light motorised vehicles (e.g., the possibility to travel in both directions on one-way streets or cycle lanes).¹⁷

If the speed limit is less than 50 km/h, speed pedelec users may choose whether they wish to use the road or the cycle path. If the speed limit is higher than 50 km/h, the cycle path must be used. In both cases, local traffic authorities can use special signs to alter the situation to account for specific circumstances.¹⁸

A helmet must be worn when using a speed pedelec, but insurance is not required. The rider must hold a class AM driver's license, which can be obtained from the age of 16. From the age of 18, speed pedelec users are allowed to transport passengers, with the restriction that children under 3 years of age may not be transported.¹⁹ Children between 3 and 8 years of age must be seated in an appropriate child seat.²⁰

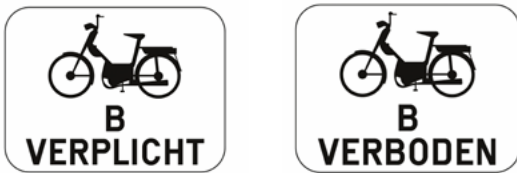


Figure 4: Additional sign for speed pedelecs in Belgium (Left: speed pedelecs required to use the cycle path; right: speed pedelecs prohibited from using the cycle path) (Source: www.fietsersbond.be/speedpedelec)



16 <https://speedpedelecvlaanderen.be/2022/06/13/explosieve-groei-speed-pedececs-in-belgie/>

17 (Politie België, 2018)

18 (Fietzersbond, n.d.)

19 (Boormeester, 2023)

20 (Politie België, 2018)

Speed pedelec speeds in Flanders²¹

In 2022, a study was conducted in the Belgian region of Flanders to investigate commuting and recreational cycling with speed pedelecs. 98 individuals recorded their speeds using GPS devices. The average speed²² of the 98 participants was 36.7 km/h. The study indicates that speed pedelecs achieve similar speeds regardless of the purpose of the ride, whether for commuting or leisure.

Changes in regulations at the federal and regional levels

In Belgium, changes to the regulation of speed pedelecs have been made at both the national and regional levels. At the national level, decisions have been taken regarding the place of speed pedelecs on the road and the use of helmets. In contrast, the Belgian regions (Flanders, Wallonia and Brussels) have the authority to set speed limits for speed pedelecs on bike paths, although they have yet to do so.

In 2016, speed pedelecs were still excluded from certain cycling and pedestrian infrastructure. Today, they are allowed on bike paths (marked with D7 signs) and to use the existing infrastructure. One example of the expansion of the regulations is the approval of speed pedelecs on paths marked with the D9 sign (indicating separate cycle and pedestrian paths). This expansion was introduced in October 2023.²³ Speed pedelecs are still not permitted on roads with a D10 sign (shared cycle and pedestrian paths), where bicycles and pedestrians share the same space. Furthermore, it's expected that speed pedelecs will soon be allowed on bicycle, school and play streets, provided that speed pedelec users behave appropriately and dismount when necessary.



Figure 5: A speed pedelec license plate in Belgium (Source: www.vlaanderen.be/speedpedelec)

21 (Herteleer et al., 2022)

22 "This indicates the speed at which speed pedelecs can be encountered in traffic, as it is the speed at which the longest distance is covered. This serves as an indicator for the risk (time or distance travelled at a certain speed) and the consequences (speed in the event of an accident)." (Herteleer et al., 2022)

23 (Belgisch Staatsblad, 2022), www.wegcode.be

At the same time, Belgium promotes commuting by bicycle by offering kilometre allowances. Since 1 January 2018, the scheme has been extended to include electric bicycles and speed pedelecs. Starting from 1 July 2023, every employer is required to grant this allowance.²⁴

Regulatory changes have favoured the increasing use of speed pedelecs in Belgium and the rules for speed pedelecs are gradually being aligned more to those for regular cyclists. This development is primarily driven by the increasing use of speed pedelecs. A working group comprising representatives from the regions and the federal government is addressing user's needs. The aim of adapting the rules to user needs and making existing infrastructure accessible is to better integrate speed pedelecs into the transportation system in order to achieve a more sustainable mobility system.

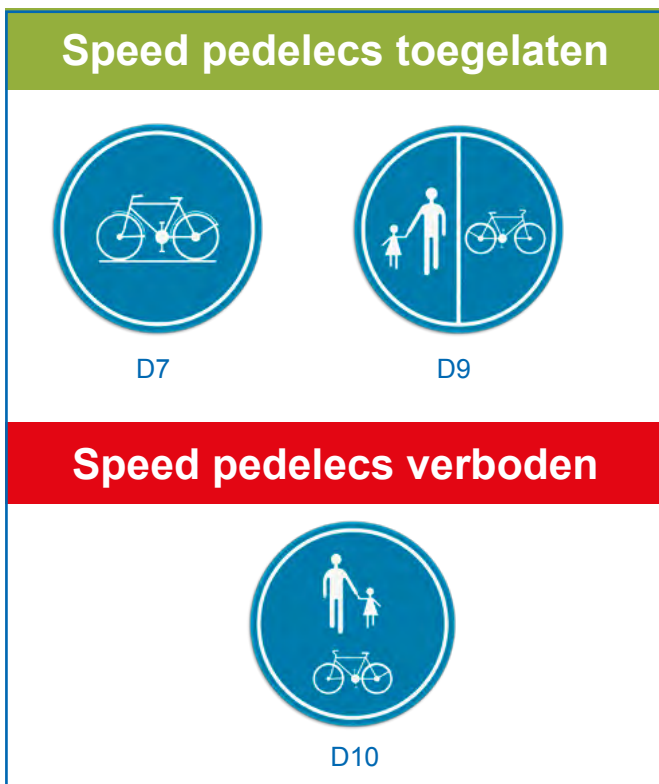


Figure 6: Speed pedelecs are allowed on D7 and D9 routes and prohibited on D10 routes
(Source: www.slimnaarantwerpen.be/nl/fiets/veilig-met-de-fiets-of-bromfiets-door-antwerpen/veilig-met-de-speedpedelec)

²⁴ (Vlaanderen, n.d.)

DENMARK



REGULATIONS

Space on the road:	Cycle path
Speed limit:	None
Licence plate:	None (but insurance is compulsory)
Age / driving licence:	<ul style="list-style-type: none">• From 15 years with moped driving licence• From 17 years with regular driving licence• From 18 years without driving licence
Bicycle trailers:	Prohibited
Compulsory accessories:	<ul style="list-style-type: none">• Helmet• Lights (also during the day)• Reflector• Horn/hooter
Average speed:	Unknown



KEY FIGURES

Number of licenced speed pedelecs
Unknown

Speed pedelecs sold
2019: 3% of e-bikes sold in Denmark

Accidents
Unknown



DEVELOPMENT OF REGULATIONS

Since 1 July 2018, a pilot regulation has been in effect in Denmark, introducing rules for the use of cycling infrastructure and age restrictions for the first time.

Speed pedelecs have since been treated largely like bicycles and permitted to use cycle infrastructure. The minimum age for riding speed pedelecs is 15 years, and various driving licences are required for users between 15 and 18 years.

Prior to this, there were no regulations in place.

The pilot project is being evaluated by the Danish road safety authority. If the pilot phase is successful, the regulations will be made permanent. Conclusions regarding legislation for speed pedelecs are expected in the second half of 2023.



RESULTS OF EVALUATIONS

The pilot project has not yet concluded, but underwent initial evaluations in 2019 and 2020. There are indications that the regulations are likely to be retained.



KEY STUDIES

- Færdselsstyrelsen. (2020). Evaluering Af forsøgsordningerne for små motoriserede køretøjer.
- Færdselsstyrelsen. (2020). Forsøgsordningerne med elektriske løbehjul, andre små elektriske køretøjer og speed pedelecs.
- Supercykelstier, Via Trafik. (2019) Speed pedelecs Påsupercykelstierne

2.3 Speed pedelecs in Denmark

In 2019, speed pedelecs accounted for 3% of the electric bicycles sold in Denmark.²⁵

Since July 2018, speed pedelecs have been allowed to use cycle paths in Denmark. The rules for speed pedelecs are similar to those for regular bicycles with a number of restrictions: although speed pedelecs do not require a license plate, insurance for users is mandatory. Speed pedelecs can be ridden from the age of 15 with a moped licence. From the age of 17, they can be ridden with a driving licence and from the age of 18, no licence is required.²⁶ A helmet must be worn at all times and speed pedelecs require working lights and reflectors. The transportation of passengers, including children, and the attachment of trailers are both prohibited.²⁷

Speed pedelecs are categorised within the moped vehicle class for the accident statistics, which is why separate data is not available.



Figure 7: A speed pedelec user in Denmark
(Source: <https://dagbladet-holstebro-struer.dk/holstebro/ny-el-cykel-koerer-for-hurtigt-til-cykelstien-2022-12-9>)

²⁵ (Vejdirektoratet, 2019)

²⁶ (Færdselsstyrelsen, n.d)

²⁷ (ANWB, n.d)

Regulation as a pilot project:

The rules discussed above have been in force since 1 July 2018²⁸ when they were introduced as part of a pilot project. The aim of the project was to create greater flexibility in favour of new, environmentally-friendly modes of transport, and to increase acceptance. Safety concerns arose after the pilot project began. The Danish cyclists' association (Cyklistforbundet) argued that allowing teenagers aged 15 and over to ride speed pedelecs with neither training nor a driver's licence was too dangerous, for example.²⁹ The rules were subsequently adjusted so that speed pedelecs could only be ridden by users under 18 years of age if they had a driver's licence.

The pilot project has been evaluated regularly by the Danish traffic safety authorities:

- The pilot project was first evaluated in 2019, one year after implementation. Due to the short period since the regulations came into effect, the data was limited and did not always differentiate between speed pedelecs and other vehicles. The study revealed that 16% of users of small motorised vehicles (including speed pedelecs) broke traffic rules at intersections, such as riding on pavements and pedestrian crossings and turning right at red lights. The study also found that 33% of speed pedelec rides replaced car trips and 44% replaced trips that would have been completed on foot or with a conventional bicycle otherwise.³⁰

- In 2020, another evaluation was conducted,³¹ expanded to include motorised scooters and other small electric vehicles, which had been the subject of a similar pilot program since January 2020. It found that 84% of speed pedelec users were between the ages of 22 and 64 and 9% were older than 64. The study showed that 36% of speed pedelecs were used to commute to work. As with the findings from the previous year, 33% of trips replaced car journeys and 35% substituted cycling or walking. The overall sense of safety regarding speed pedelecs among non-users was higher than for electric scooters or other small electric vehicles. In total, the respondents favoured continuation of the pilot project or permanent implementation of this legislation, while 18% wanted the project to end.

The final evaluation is expected in the second half of 2023. Political decisions will be made based on this regarding retention or modification of the regulations.³²



²⁸ (Færdselsstyrelsen, n.d)

²⁹ (Cyklistforbundet, 2018)

³⁰ (Færdselsstyrelsen, 2020.a)

³¹ (Færdselsstyrelsen, 2020.b)

³² (Transportministeriet, 2022)

NETHERLANDS



REGULATIONS

Space on the road:	On cycle paths where mopeds are permitted. Otherwise on the road.
Speed limit:	<ul style="list-style-type: none">• 30 km/h on cycle paths open to mopeds within built-up areas.• 40 km/h on cycle paths open to mopeds outside built-up areas.
Licence plate:	Yellow number plate + insurance
Age / driving licence	<ul style="list-style-type: none">• From 16 years• AM class driving licence
Bicycle trailers:	Not mentioned in regulations
Compulsory accessories:	<ul style="list-style-type: none">• Moped/speed pedelec helmet• Left mirror• Reflector (red and yellow/white)• VIN number• Light
Average speed:	33 km/h outside built-up areas, 28 km/h within built-up areas



KEY FIGURES

Number of licenced speed pedelecs

32,223 (December 2022)

26,000 (October 2021)

21,100 (July 2020)

Speed pedelecs sold

4,701 (2020)

Accidents

2014–2022:

- 270 accidents, involving 271 speed pedelecs (3% of all accidents are speed pedelec accident victims)
- 5 speed pedelec fatalities
- Most accidents involve motor vehicles



DEVELOPMENT OF REGULATIONS

In the Netherlands, speed pedelecs are legally considered to be mopeds. They are only permitted to use cycle paths wherever mopeds are permitted; these paths have a default speed limit of 30 km/h within built-up areas and 40 km/h outside built-up areas.

In Guelders, an observation study was carried out to investigate exemptions for speed pedelecs on cycle paths near dangerous roads. These exemptions allow speed pedelec users to choose whether to ride on the road or cycle path. The study concluded that speed pedelec users feel unsafe on the road, due to the high speed of car traffic and the limited understanding that motorists have for them. Traffic trials were carried out in Rotterdam and Amersfoort in which speed pedelec users could apply online for a special permit which allowed them to use cycle paths.



RESULTS OF EVALUATIONS

- Speed pedelec users prefer to use cycle paths within built-up areas and, when they do, they ride at a lower speed than elsewhere (DTV (2021), Keypoint (2018))
- Speed pedelec users ride more slowly on cycle paths within built-up areas than outside them (Keypoint (2018))
- According to the Rotterdam study, 60% of speed pedelec journeys replace a car journey (Berndsen (2021)).



KEY STUDIES

- DTV. (2021). Positie speed-pedelec op de weg. Praktijkcases en regelingen.
- Keypoint Consultancy. (2018). Effectmeting uitzonderingsmaatregel speed pedelecs.
- Berndsen, V.J. & Christiaens, B. (2021). Speed pedelec op het fietspad. Evaluatie ontheffingen speedpedelec toegestaan op het fietspad.
- SWOV. (2021). Speed-pedelec ongevallen. Hoe ontstaan ze, waar gebeuren ze en hoe zijn ze te voorkomen?

2.4 Speed pedelecs in the Netherlands

In the Netherlands, speed pedelecs have increased significantly in number in the past decade. In 2022, there were 32,223 registered speed pedelecs, compared to just 10,000 in 2017. The annual sales of speed pedelecs rose from 171 units in 2013 to 4,701 in 2020. Approximately 80% of speed pedelec users are male and two thirds of speed pedelec owners are between 45 and 65 years of age. 18% fall in the 35 to 45 age group, while the remainder is split fairly evenly between those aged 65 to 75 (8%) and 16 to 35 (7%).³³

In the Netherlands, speed pedelecs are classified as motorised two-wheelers³⁴ and require a yellow moped license plate, designating vehicles with a maximum speed limit of 45 km/h. A class AM driver's license is required to ride a speed pedelec, which can be obtained from the age of 16. Helmet use is mandatory and speed pedelecs must have a mirror at the left as well as red/white or red/yellow reflectors, adequate lighting and a vehicle identification number (VIN).

Since 2017, speed pedelecs have been subject to the same rules as mopeds in the Netherlands. This means that speed pedelecs should be used on the road, unless there is a bike path which is also open to mopeds. In the Netherlands, these are often (but not always) found alongside roads with a speed limit of 50 km/h or higher. The maximum speed for speed pedelecs on bike paths is 30 km/h in built-up areas and 40 km/h outside built-up areas. On many other cycle paths, speed pedelecs are tolerated, even if they are not officially allowed. On the roads, they can travel at their full speed of 45 km/h.³⁵

WHICH CYCLE PATH ARE YOU PERMITTED TO RIDE ON?		fietspad		
Bicycle, including pedelec		Allowed but not required	Required	Required
Snorfiets (moped): max. 25 km/h, helmet not required	 	Prohibited (Unless electrically powered)	Required	Required
Bromfiets (moped), including Speed-Pedelecs: max 45km/h on roads, on the moped path max. 30km/h (built-up areas) or 40km/h (outside built-up areas), helmet required	  	Prohibited	Prohibited	Required

Figure 8: Cycle path usage for bicycles/e-bikes, mopeds up to 25 km/h, and mopeds/speed pedelecs up to 45 km/h in the Netherlands

33 (SWOV, 2022)

34 (SWOV, 2017)

35 (Rijksoverheid, n.d.)

Experiments and traffic tests

Observational studies in the province of Guelders: Speed pedelec speeds and the choice between bike paths and roads

In 2018, a trial was conducted in the province of Guelders to allow speed pedelec users to choose between roads and bike paths on 16 provincial routes.³⁶ The accompanying observational study examined the behaviour of speed pedelec users regarding their route choices and the speeds of both speed pedelecs and the surrounding traffic. The average speed on designated bike paths for speed pedelecs was 33.3 km/h, while on the road, it was 34.2 km/h.³⁷

A similar experiment was carried out by the Dutch Institute for Road Safety Research (SWOV). It found that the average speed was 32 km/h on roads and 29 km/h on bike paths. However, the bike paths in the study area were not designated for speed pedelecs but had been used illegally by speed pedelec users who apparently did not feel comfortable riding on the road.³⁸

In both studies, it was evident that speed pedelec users preferred to use the cycling infrastructure. Motor vehicle

drivers often showed limited tolerance for speed pedelecs and a limited understanding of their needs, leading cyclists to not feel safe. Additional uncertainties arose from the significant speed differences between motorised traffic and speed pedelecs. Given these varying speeds and the lack of a sense of safety, the integration of speed pedelecs into Dutch road traffic faces challenges.³⁹

After evaluating the experiment, the province of Guelders decided to continue allowing speed pedelec users to choose between using the roads or the cycling infrastructure on 16 routes. Other Dutch provinces have since followed suit, with Groningen introducing this option on eight provincial bike paths outside built-up areas in 2019.⁴⁰ Provinces such as Overijssel also introduced this option on certain routes. The national legislation has not been changed yet.



Figure 9: Additional sign allowing speed pedelecs in the Netherlands.
Photo: Province of Groningen

36 Provincial routes are roads that run within city limits.
37 (Keypoint Consultancy B.V., 2018)

38 SWOV, 2017)
39 (Keypoint Consultancy bv, 2018; SWOV, 2017)
40 (Provincie Groningen, 2019)

Individual exemptions to bike path usage in Amersfoort, Rotterdam and Utrecht

In Amersfoort, a traffic experiment is currently underway that allows speed pedelec users to use bike paths thanks to special exemption, which they can apply for online.

A similar experiment began in Rotterdam in 2020. Those who applied for permission could use bike paths with a maximum speed limit of 30 km/h. A detailed evaluation of this experiment is expected in 2024. Between March 2020 and March 2022, 275 exemptions were granted to Rotterdam residents and commuters. However, it's worth noting that only one fifth of speed pedelec owners in Rotterdam applied for this exemption. This low number suggests that some speed pedelec riders may remove their rear mirrors and license plates to resemble conventional e-bikes, avoiding certain restrictions. Rotterdam sees speed pedelecs primarily as a means to improve intermunicipal mobility and early evaluations indicate that 60% of speed pedelec trips replace car journeys. The city of Rotterdam considers speed pedelecs part of the solution for regional accessibility and calls on policymakers to promote their use.⁴¹

From 1 July 2023, the province of Utrecht will also conduct a similar experiment for two years and allow speed pedelec owners to apply for exemption to use bike paths. This exemption applies to all bike paths in the province of Utrecht, participating surrounding municipalities and some parts of Guelders. The condition in Utrecht (as in other places) is that speed pedelec users must behave as guests on bike paths and not exceed 30 km/h.⁴²

Safety

Many Dutch bike paths are used by a variety of vehicles, including traditional bicycles, racing bikes, e-bikes, light mopeds and mopeds. The integration of speed pedelecs onto bike paths leads to increased differences in speeds. Ensuring that speeds do not exceed 30 km/h is often challenging. Since speed pedelec speeds cannot be verified retrospectively, they are held fully liable, as the fastest road users on cycle paths, in the event of an accident.

According to the accident statistics, there were a total of 270 accidents in the Netherlands involving speed pedelecs between 2014 and 2022,⁴³ accounting for about 3% of all accidents. These accidents resulted in five fatalities. Dutch accident records classify speed pedelecs in the moped category, meaning that the involvement of speed pedelecs can only be determined through an analysis of the licence plates.

A study by the Dutch Institute for Road Safety Research (SWOV) investigated the causes of speed pedelec accidents and categorised them as follows:

1. Speed pedelec users lose control due to road surfaces that are slippery, dirty or damaged.
2. Speed pedelec users collide with obstacles.
3. Speed pedelec users take risks, leading to collisions with other road users or falls due to evasive manoeuvres.
4. Other road users take risks, leading to collisions with speed pedelec users or falls due to evasive manoeuvres or collisions with obstacles.
5. Speed pedelec users navigate complex or unclear intersections, resulting in collisions with other road users.⁴⁴

One key argument in the Dutch debate on allowing speed pedelecs on bike paths is the significant weight difference between a speed pedelec and a motor vehicle, which can lead to more severe consequences in case of a collision. In Rotterdam, there are differing opinions on this matter: while the Rotterdam police discourage the increased use of speed pedelecs on bike paths, the Dutch cyclists' association (Fietzersbond) highlights the increased safety for speed pedelec users on bike paths compared to on the road.⁴⁵

41 (Berndsen & Christiaens, 2021)

42 (Provincie Utrecht, 2023)

43 (DTV Consultants B.V., 2023)

44 (SWOV, 2021)

45 (DTV Consultants B.V., 2023)

SWITZERLAND



REGULATIONS

Space on the road:	Bicycle infrastructure
Speed limit:	According to the signposted maximum speed
Licence plate:	Yellow licence plate + compulsory insurance
Age / driving licence:	<ul style="list-style-type: none">• From 14 years with M class driving licence• From 16 years without driving licence
Bicycle trailers:	Permitted
Compulsory accessories:	<ul style="list-style-type: none">• Lights (also during the day)• Horn/hooter• Bicycle helmet
Average speed:	32.2 km/h



KEY FIGURES

Speed pedelecs sold

2022: 22,782 (10.4% of e-bikes)
2021: 22,655 (12.1% of e-bikes)
2020: 19,422 (11.3% of e-bikes)
2019: 18,164 (13.7% of e-bikes)

Accidents

2022: 123 speed pedelec users suffered a serious accident
2021: 98 speed pedelec users were involved in serious accidents



DEVELOPMENT OF REGULATIONS

Switzerland played a pioneering role when it allowed speed pedelecs to use cycle infrastructure by default in 2012.

To date, there have been no noticeable changes in the accident statistics that suggest a need to limit speed pedelecs' access to cycling infrastructure. In order to prevent conflicts with pedestrians in particular, while at the same time promoting the use of speed pedelecs in general, the following regulatory changes are currently under discussion:

- Removing the obligation to use cycle paths, thereby giving speed pedelec users the choice between using cycling infrastructure and the road, according to the situation
- Not allowing speed pedelecs on footpaths with the additional sign "Bicycles permitted"
- Exempting speed pedelecs from existing moped bans on certain cycle infrastructure.

Overall, in the view of the Swiss Federal Council, the potential mobility benefits of speed pedelecs outweigh the risks associated with their use on cycle infrastructure.



RESULTS OF EVALUATIONS

Surveys by Transitec show that speed pedelecs travel at an average speed of 32.2 km/h on flat roads and that even relatively small differences in the average speed result in significantly more overtaking manoeuvres. The density of e-bikes and speed pedelecs in traffic is a key criterion to take into account when dimensioning infrastructure.

The German-Austrian-Swiss FFG research project SESPIN (www.s-pedelec.net) is investigating how speed pedelecs can be safely and efficiently integrated into the transport system. Recommendations for measures are expected at the end of the project in early 2024.



KEY STUDIES

- Sigmaplan et al. (2016). Bases pour le dimensionnement de voies cyclables sûres.
- Transitec et al. (2017). Vélos électriques - effets sur le système de transports

2.5 Speed pedelecs in Switzerland

Switzerland is a pioneer in the field of speed pedelecs and considers itself the birthplace of electrically assisted bicycles. In 1992, the Swiss company Velocity, now Dolphin E-Bikes, introduced the first prototype and in 1995, they launched the first small-scale production series.⁴⁶ In 2022, 22,700 speed pedelecs were sold in Switzerland, compared to 15,200 in 2014.⁴⁷ The Swiss population, including non-users, generally has a positive view of speed pedelecs. The Cycle Week held in Zurich in May 2023 highlighted the significant and growing interest in speed pedelecs as well as their development as a vehicle class. Speed pedelecs are considered a crucial economic and cultural enabler of cycling and are demonstrably important as commuter vehicles in Switzerland, replacing car journeys and relieving the pressure on public transport at peak times. Switzerland has refrained from imposing strict regulations, partly to avoid negative impacts on the established speed pedelec industry in the country.

In Switzerland, speed pedelecs (as well as petrol mopeds up to 30 km/h) are classified as “motorised cycles”.⁴⁸

Since 2012, they have largely been subject to similar rules to regular bicycles and must use the cycling infrastructure.⁴⁹

From 1 April 2022, if speed pedelecs are used on roads without separate cycling infrastructure, the same speed limits apply as for motorised traffic (e.g. 30 km/h zones). Speed pedelecs can be operated from the age of 14 with a class M driver’s license. They must be equipped with the yellow control plate for use in Switzerland, which is provided during the bike’s registration. Wearing a helmet is mandatory. Transporting items with a bike trailer is permitted and one child may be carried on a type-approved child seat on the luggage carrier and up to two children in a trailer. From 2024, speed pedelecs are required to display their speed on a digital display.⁵⁰



Figure 10: A speed pedelec user in Switzerland.

⁴⁶ (Smolik et al., 2010)

⁴⁷ (Velosuisse, n.d)

⁴⁸ (Art. 18 OETV, 2019)

⁴⁹ (BFU, n.d)

⁵⁰ (BFU, n.d)

Road safety

In 2022, 123 speed pedelec users were involved in serious accidents. One year earlier, it was 98. As is the case for e-bikes, the 55–64 age group are most likely to be involved in serious accidents; the number of serious accidents has also increased more for this group than any other. Of all e-bike and speed pedelec users involved in serious accidents, in three quarters of cases, responsibility for the accident was attributed to the users themselves as a result of inattention and distraction, inappropriate behaviour or the influence of alcohol.

Studies and recommendations

In 2017, the Swiss Federal Roads Office (FEDRO) commissioned the Swiss engineering firm Transitec to analyse the effects of electrically assisted two-wheelers on the Swiss transport system. The study confirms the importance of speed pedelecs as a commuter vehicle in Switzerland. The greatest potential lies in commuter journeys of between 5 and 15 kilometres. This is where the greatest impact on the transport system is expected, as the shift away from motorised traffic at peak times relieves the overloaded car infrastructure. The authors identify the greatest potential in (1) journeys between the periphery and centre of large urban areas (especially where public transport is at capacity), (2) journeys on routes where public transport is less efficient, e.g. from periphery to periphery and (3) as a feeder to regional (rail) transport.

Further conclusions of the study include the need to widen cycling infrastructure to enable safe overtaking and improve visibility so that higher speeds can safely be accommodated, as speed pedelecs travel at an average speed of 32.2 km/h. The speed difference between e-bikes and conventional bicycles is smaller than previously assumed on flat roads, but significantly greater when travelling uphill. Even relatively small differences in the average speed (of both e-bikes and speed pedelecs) already result in significantly more overtaking manoeuvres, which must be taken into account when dimensioning infrastructure.

However, the legal framework must be revised as a matter of priority before infrastructure measures are implemented so that the new regulations are understood widely and well among planners as well as users. Regulatory advantages for speed pedelecs should be maintained in order to further promote them as an alternative to cars. As the most frequent accidents involving electrically assisted two-wheelers are due to a loss of control and underestimating the riding speed, training, awareness-raising and communication measures for both speed pedelec users and other road users should be stepped up.⁵¹

A study carried out by Sigmoplan in 2016 on the dimensioning of safe cycle traffic infrastructure identified six infrastructural elements that improve the use and safety of speed pedelecs. In view of their higher speeds, increasing the minimum width of cycling infrastructure is important, as are turning radii and sight distances. Parking facilities for speed pedelecs should also be improved.⁵²



51 (Transitec et al., 2017)

52 (Sigmoplan et al., 2016)

Possible changes in regulations

In Switzerland, speed pedelecs are now largely on an equal footing with bicycles. In general, the aim has been to restrict speed pedelecs as little as possible in order to promote their use and uptake. However, due to the differences in speeds compared to conventional e-bikes and bicycles, there is tangible pressure from some quarters to distinguish between these different vehicle classes. Thus far, however, there have been no noticeable changes in the accident statistics that imply a need to prohibit the use of speed pedelecs on cycling infrastructure. Few – if any – accident statistics can be clearly attributed to the presence of speed pedelecs on cycling and pedestrian infrastructure, meaning that there is as yet no objective basis for changes in regulation (Swiss Federal Council report, 2021).

In 2022, 123 speed pedelec users were involved in serious accidents. Adjusted for kilometres travelled, this user group is therefore involved in fewer accidents than users of bicycles and e-bikes. It is assumed that speed pedelec users are mostly skilled and experienced middle-aged adults, while e-bikes capable of up to 25 km/h are more often used by older people.

While there is no objective evidence of safety risks from the use of speed pedelecs on cycling infrastructure, there are indications that the subjective safety of pedestrians is limited on shared cycling and pedestrian infrastructure. For this reason, it is possible that some legislative changes may be made in 2024 or 2025 to counteract this effect caused by the present of higher-speed motorized bicycles. The proposed amendments are described in the Swiss Federal Council's report (2021), although a final decision based on this report is still pending. The following key changes are under discussion:

- Exemption of speed pedelecs from existing moped bans on certain cycling infrastructure.
- Relaxing of the obligation for speed pedelec users to use cycle paths: The obligation to use cycling infrastructure will be relaxed for all riders of motorized bicycles. Speed pedelec users will then have the choice to move onto the road from cycling infrastructure that may be inadequate (due to its dimensions) or from shared cycling and pedestrian infrastructure. The current legislative proposals would thus give speed pedelecs users the freedom to choose between the roads and cycling infrastructure according to their assessment of the situation.⁵³

- Banning of speed pedelecs on footpaths with the additional sign of "Bicycles permitted": Under the current regulations, speed pedelec users may ride on footpaths and shared infrastructure bearing the additional sign of "Bicycles permitted" (especially on safe routes to school), on the condition that their pedal assistance (motor) is turned off. In future, the new regulations would remove this exemption for heavier and higher-speed motorized bicycles, including speed pedelecs. They would then no longer be permitted to use infrastructure of this kind, even with the pedal assistance turned off.⁵⁴
- Exemption of speed pedelecs from existing moped bans on certain cycling infrastructure.
- **Exemption of speed pedelecs from existing moped bans on certain cycling infrastructure:** In Switzerland, some cycling infrastructure bears a sign that prohibits the use of motorcycles, for example, in nature conservation areas. Because this restriction was originally aimed at mopeds with combustion engines due to the emissions and noise they create, speed pedelecs have been permitted to ride on this infrastructure on the condition that their pedal assistance is turned off. As this regulation has proven impractical, the ban on motorised bicycles would henceforth only apply to single-track motorized bicycles with combustion engines.⁵⁵

Overall, the Swiss Federal Council believes that the potential mobility benefits of speed pedelecs outweigh the risks associated with their presence on cycling infrastructure and other shared infrastructure. For as long as accident statistics do not suggest a need for intervention, this access for speed pedelecs ought to continue to be granted. The regulatory changes described above, which are currently under discussion, are intended to counteract possible conflicts arising from the opening up of cycling infrastructure to motorised bicycles.⁵⁶

53 (Bericht des Bundesrates (2021), Ziff. 7.1.1)

54 (Astra (2023))

55 (Astra (2023))

56 (Report from the Federal Council (2021), 5.1.4)

3. Conclusions



3.1 Comparison of infrastructure usage






The introduction of speed pedelecs in the countries discussed has led to various regulations, all of which balance promoting active mobility with road safety concerns.

In the Netherlands, Belgium, Denmark and Switzerland, speed pedelecs are allowed on bike paths with varying degrees of restriction. Only in Germany are speed pedelecs generally not permitted to use bike paths (although Baden-Württemberg and North Rhine-Westphalia have created legal provisions for exceptions). In Denmark and Switzerland, in contrast, speed pedelecs are treated much like bicycles and generally use cycling infrastructure where it is available. In the Netherlands, speed pedelecs are allowed on bike paths open to use by mopeds, which are often found alongside roads with speed limits of 50 km/h or higher. In places where there is a bike-only path, speed pedelecs must use the road.

In Switzerland, the question is currently being considered of whether speed pedelec users should be permitted to use the road in addition to the cycling infrastructure. In Belgium, speed pedelec riders may choose between using the road (with speed limits of up to 50km/h) and bike paths within built-up areas. Outside built-up areas, they must use bike paths however. In the Netherlands, experiments are being conducted that give speed pedelec users a choice between using the roads and using the bike paths. Studies show that speed pedelec users' preference for bike paths or roads largely depends on their perception of safety.

When deciding on access to cycling infrastructure versus road space, various factors come into play. These include the overall road space allocation for cycling, the adequacy or scarcity of cycling infrastructure and their condition. In Flanders (Belgium), for example, there is an increasing trend toward well-developed intermunicipal connections separate from the motor vehicle road network, using old dykes and towpaths along canals, which were officially opened to speed pedelecs last year. These separate connections outside urban areas make speed pedelecs an attractive choice for commuters.

In the Netherlands, the norm is to physically separate bike paths from the road when the speed limit is 50 km/h or higher. Some of these bike paths are already combined bike and moped paths. These networks of separate bike paths make it easier to open selected cycling infrastructure to speed pedelecs. In Germany, the physical separation of road users is less consistent, with shared pedestrian and bike paths being common in many places. Cycling infrastructure is often too small and old raised-edge bike paths are of an insufficient quality for speed pedelecs, cargo bikes and conventional e-bikes. In Germany, protecting the limited road space for existing pedestrian and bicycle traffic consequently often takes precedence over promoting speed pedelecs.

					
Allowed on roads	Yes	Yes (up to 50 km/h possible in urban areas)	No	Yes (Generally mandatory up to 50 km/h)	No
Allowed on cycling infrastructure	No	Yes	Yes	Yes, but only on combined moped/cycle paths (generally over 50 km/h), mandatory there	Yes
Further measures	Exceptions in Baden-Württemberg and North Rhine-Westphalia	Within built-up areas up to 50 km/h: choice between road and cycle path Over 50 km/h and outside built-up areas: cycle path	Regulation in pilot phase	Speed limit for mopeds/speed pedelecs on cycle paths: max. 30 km/h within and max. 40 km/h outside built-up areas	Only without engine support on some cycle paths; ongoing discussions on allowing users to choose in future

3.2 Where is it safest to ride speed pedelecs?

A clear statement regarding the safest place for speed pedelecs based on accident data is not currently possible. There is no evidence at the present time to determine objectively whether speed pedelec users are safer on the roads or on the cycle paths. The data in all countries is insufficient in terms of both its quantity and quality; it often is not possible to distinguish between accidents involving speed pedelecs and those involving mopeds in the statistics, for instance.

Overall, there is no observable increase in the risk of accidents compared to conventional bicycles. However, the consequences of crashes involving speed pedelecs are often more severe.

Initial studies indicate that especially when there is faster motor vehicle traffic on the road, speed pedelec users feel less safe on the roads and safer on cycle paths. They experience less stress and their subjective sense of safety is higher. These results align with findings regarding the subjective safety of conventional cycling, suggesting untapped potential for users to switch to speed pedelecs if there are networks in place offering both subjective and objective safety.

Knowledge about the safety perceptions of pedestrians and conventional cyclists concerning speed pedelecs is currently lacking. Denmark's evaluation of speed pedelec regulations found that speed pedelecs are perceived as less problematic for pedestrian and cycling traffic than e-scooters are, for example. Moreover, there is a shortage of studies and confirmed information regarding the relationship between active modes of transportation and the potential dangers of speed pedelecs to others.

Is the concern about “speeding on the pavement” an accurate forecast or simplistic characterisation? Are speed pedelec riders inappropriately pushing the limits of their technical capabilities? And, most importantly, under what conditions do all road users behave appropriately? Initial studies show that average speeds vary between urban and rural areas and speed pedelec users adjust their speeds according to the prevailing situation. Speed pedelecs rarely attain 45 km/h. However, it is also apparent that the permitted maximum speeds for speed pedelecs on Dutch bike paths of 30 km/h in built-up areas and 40 km/h outside built-up areas are not consistently adhered to. As past experience has shown that such speed limits are practically unenforceable, particular attention should be paid to structural, design and communication measures that shape the physical environment in a way that encourages the desired behaviour as intuitively as possible.

Switzerland has not altered its liberal regulations for speed pedelecs for safety reasons. Instead, there are debates about increasing the width of cycle paths rather than restricting speed pedelec usage. In Belgium, a reduction in motor vehicle speeds in urban areas is being considered to increase the safety of speed pedelecs. Harmonising speeds enhances road safety when physical separation is not feasible.



Figure 11: City of Tübingen/Daniel Hammer

3.3 Speed pedelecs in the transport system

The countries analysed differ in their efforts to systematically integrate speed pedelecs into their transportation systems, driven by the question of what role speed pedelecs can or should play in a successful transition to a more sustainable mobility system. The systemic significance of speed pedelecs is perceived differently in each context:

- **Belgium** (particularly the Flanders region) and Switzerland are particularly committed to promoting speed pedelecs. In Switzerland's hilly terrain, electric assistance makes cycling possible for many and Flanders already has a good network of old intermunicipal paths along canals separated from motorised traffic. In both countries, speed pedelec users are granted greater freedom than in the other countries under consideration.
- **Belgium** has used the opportunity created by EU Regulation 168/2013 to introduce a separate vehicle category for speed pedelecs. This allows specific rules to be defined in the road traffic code and the strategic integration of speed pedelecs into the transport system.
- In **Switzerland**, it is reported that the success of speed pedelecs and other electrically assisted two-wheelers has led to greater acceptance of bicycles as a means of transport.
- In **Denmark**, the (as yet limited) use of speed pedelecs has demonstrably led to a modal shift and a reduction in journeys completed by car. A trial regulation allowing speed pedelecs on cycle paths appears to be gaining traction despite the initial criticism.
- Measures in **Germany**, predominantly in Tübingen, have so far remained localised within municipal city limits, resulting in a set of spatially isolated measures.

Conclusion

The analysis shows that a key factor for the successful integration of speed pedelecs into the transportation system is the quality of infrastructure and, building on this, the establishment of clear, enforceable regulations. Understanding and expertise relating to speed pedelec user groups remain limited. Narratives of the “wolf in sheep’s clothing” dominate in countries like Germany, shaping the perception of users and diverting attention from the potential of speed pedelecs in the mobility transition. In all countries, a central challenge is to set the right course to achieve safe, appropriate and comfortable mobility for pedestrians, cyclists and speed pedelec users alike.

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