



Promoting (Electric) Cycling  
for Everyone as a Daily Transport Mode

## TO CYCLE ELECTRIC OR NOT TO CYCLE...

What is a pedelec?

Why do you need a pedelec?

How do you choose a pedelec?

How do you use and maintain  
a pedelec?



**INTELLIGENT  
ENERGY  
EUROPE**  
FOR A SUSTAINABLE FUTURE



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# INTRODUCTION

Today, millions of people in the European Union suffer from air pollution, traffic congestion, unsafe traffic conditions, noise, bad health, ... while our entire planet is under threat as a result of climate change.

Cycling can be part of the solution to these major problems; a part, which so far, is greatly underestimated.

Just one example: findings of the Dutch Cyclists' Federation show that if all car journeys up to 7.5 km in the Netherlands would be done by bike, this would reduce Dutch car traffic emissions by 6%. Such a reduction represents 1/8th of the Dutch objectives in the framework of the Kyoto Protocol.

Pedelecs are in this context very important. They produce no emissions, no noise and they use very little energy at very low cost. They cause no "external costs", they allow avoiding congestion and parking problems. They also assure mobility of elderly people and people with health problems. They have a positive impact on public health in general and therefore reduce medical costs. They also contribute to sustainable tourism.

But all these facts and figures will not convince you to ride and possibly buy a pedelec. The one and only thing that can convince you is the fun of riding a pedelec. We are quite confident that you will enjoy the experience. So hurry up and book a test ride with your pedelec dealer.

But before you ride off, have a look at this brochure. It is meant to help you decide which pedelec is best for you. Or if you already have a pedelec, this brochure may offer you some useful practical tips on how to use and maintain your pedelec.

**Have fun!**



# WHY DO I NEED A PEDELEC?



## I have a car, why would I need a pedelec?

Pedelects are much more environmentally-friendly and cheaper than cars, but you may not be sensitive to these arguments. If you mainly use your car in town for short trips, then you may be interested in the fact that pedelecs are considerably faster than cars for such trips (as well as being much cleaner and cheaper). This is not only due to the rapidly expanding 30 km/h speed limit for cars in European towns but also to the fact that pedelecs, just as conventional bicycles and contrary to cars, can use the most direct way from A to B.

Pedelects are particularly appropriate for convincing die-hard car drivers to leave their vehicle aside for short distances, because it overcomes a number of “popular” objections against cycling. Many people are interested in pedelecs because it makes cycling easier and more comfortable. What’s more, research has shown that pedelecs incite people to

think about routines in their transport behaviour.

## I have a bike, why would I need a pedelec?

Pedelects offer all the advantages of a conventional bicycle plus a lot more. They allow riding on flat, hilly and even mountainous roads, to cover longer distances and to carry heavier loads, all without sweating and without getting exhausted.



## Who are pedelecs for?

Pedelects are suited for a wide variety of people who are not able or not willing to ride a conventional bicycle or who simply need the fastest, most efficient means of transport in town:

- **Commuters** opt for the car rather than for the bike as soon as they have to travel more than 7 kilometres. The average speed of an electric bike is 24 km/h, compared with 17 km/h on a traditional bike. Since electric bikes make rides easier (no transpiration) and quicker, commuter trips up to 15 km one way are within reach.
- For **parents and shoppers** carrying a child and/or full shopping bags on a bike can be quite arduous. Pedelects solve the problem of carrying weight,

whether it concerns a child in a seat on the rear carrier, bags on the front and/or back of your vehicle, a trailer, ... And with a pedelec, you will never have parking problems.

- A pedelec allows **anybody who needs to travel a lot over short distances**, for instance home deliverers, lawyers, bankers, real estate agents, doctors and couriers, politicians, civil servants... to travel without getting out of breath and without sweating as well as to travel faster thus saving money and getting a green image.
- Pedelec use may help to prevent cardiovascular diseases, hypertension, diabetes type II and colon cancer. Riding a pedelec is also an excellent way for people suffering from chronic diseases to continue to exercise or to rehabilitate. Pedelects can keep **elderly and physically impaired** people mobile and independent and it furthers their social inclusion.
- Cycling tourism in Europe is becoming increasingly popular. Less fit or less trained **tourists** are no longer confined to the Dutch polders, the Loire region or the cycling path along the Danube. With a pedelec, the Alps, Abruzzo or the Dolomites become within reach of all cyclists irrespective of their fitness level.
- Pedelects provide **emergency services** such as police, firemen, medics, ... with speed and easy access.
- ...



# WHAT IS A PEDELEC?

**A pedelec is a bicycle that has a battery and an electric motor that helps pushing as soon as you start pedalling until you reach a speed of 25 km/h. The motor automatically cuts out at 25 km/h or whenever you stop pedalling. The (almost) silent push of the motor allows you to reach higher speeds and to cycle longer distances. You can also choose to ride your pedelec without the help of the electric motor, just as a conventional bicycle.**

Because the motor helps you push, riding a pedelec feels as if you always have the wind behind you, even when you are going uphill or in adverse weather conditions. As a result, you never really sweat nor do you get out of breath; you never have to wear yourself out. Still, riding a pedelec has a positive influence on your physical condition.

Apart from the motor and the battery, a pedelec is equipped like a conventional bicycle. It usually has a very similar frame and components. The gears on a pedelec have no connection with the motor; they work as on a conventional bicycle. Most brands try to make their pedelecs look as much as a "normal" bike as possible. A few exceptions are developing completely new designs.

- A pedelec is classified as a bicycle on condition that the motor stops at 25 km/h and that the motor output is not higher than 250W. You can ride such a pedelec as a conventional bicycle, without any additional obligations, on cycle lanes and cycle paths.

If the motor continues to help you push beyond 25 km/h and/or if the motor has an output of more than 250W, then the pedelec is classified as a moped. Depending on your country, for these

pedelecs classified as mopeds, there will be an age limit and obligations related to wearing a helmet, driving licence and insurance.

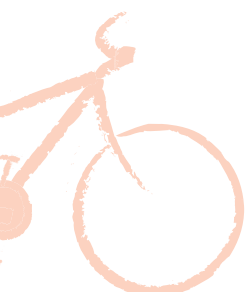
- A pedelec is sometimes confused with an e-bike. That is a bicycle fitted with a motor that pushes whether you pedal or not. An e-bike is always classified as a moped and comes with the associated obligations.

Your "bicycle" pedelec must be delivered with a Declaration of Conformity and a CE-mark. Your "moped" pedelec and e-bike must be delivered with a Certificate of Conformity.

The generic name for both pedelecs and e-bikes is electric bicycles.

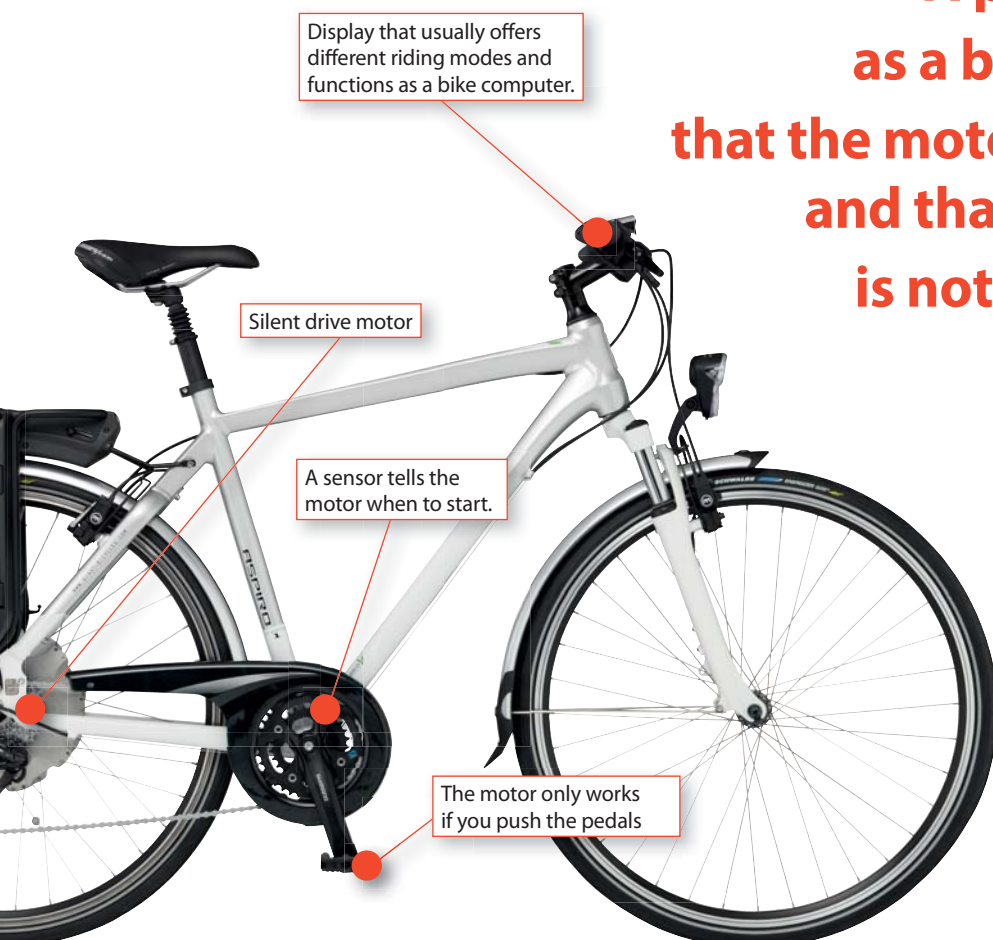
Rechargeable and removable battery

Mechanical gears have no connection with the motor.



ELECTRIC BICYCLES		
(BICYCLE) PEDELEC	(MOPED) PEDELEC	E-BIKE
Motor only works when you pedal	Motor only works when you pedal	Motor always works
Motor stops at 25 km/h and motor output is < 250 W	Motor works above 25 km/h and/or motor output is > 250 W	
No further obligations	Age limit, helmet, driving licence and insurance obligations depending on your country	Age limit, helmet, driving licence and insurance obligations depending on your country
You can ride on cycle paths and cycle lanes	In most countries you are not allowed to ride on cycle paths and cycle lanes	In most countries you are not allowed to ride on cycle paths and cycle lanes

**A pedelec is classified as a bicycle on condition that the motor stops at 25 km/h and that the motor output is not higher than 250W.**





# HOW DO I CHOOSE A PEDELEC?



Your choice will be made a lot easier if, before going into a shop or browsing the Internet, you make a shopping list based on the following questions:

**What will I use my pedelec for?**

**Is the pedelec just for me or will other people in my family use it?**

**How will I use my pedelec?**

**How far will I travel per trip?**

**What is my budget?**

**Where will I store my pedelec?**

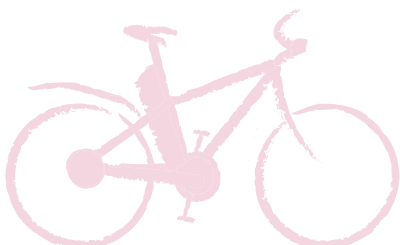
**Do I often have to lift my pedelec?**

**Where should I buy my pedelec?**

## What will I use my pedelec for?

There is an ever growing variety of pedelec models for different types of usage:

- Commuter bikes
- Carrier cycles with a special bin in the front to transport children or shopping goods
- Family bikes with extra child seats or shopping bikes with an extra luggage rack
- Folding bikes if you use your bike in combination with public transport or if you have little space at home to park your bike
- Bicycles with a very low, step-through frame if you have trouble lifting your legs or with 3 wheels if you have difficulties keeping in balance
- Bicycles designed specifically for women, specifically for men or unisex bikes specifically designed so that they can be used by both men and women
- Emergency bikes specifically designed for paramedics, policemen, firemen, ...
- Mountain bikes, touring bikes and tandems if you use your bike mainly for recreation. Some of these come standard with an extra battery to double the range
- Recumbent bikes for those who prefer an alternative way of cycling
- Trendy, retro or design bikes for cyclists who wish a distinct and/or different look



## Is the pedelec just for me or will other people in my family use it?

If you will be the sole user, then you can go for an almost tailor-made pedelec with your favourite components and fitted to your size. If however the pedelec is meant to be used by different people, then you need a model, which offers a maximum of adjustment possibilities for saddle and handlebar. That allows accommodating different body lengths with one frame. Moreover, you need to take into account any specific requirements your family may have. Two examples: if you intend to mount a child seat at the back, you should buy a unisex or woman's bike. That will save the child from coming into unpleasant contact with your shoe. If anybody in your family has leg problems, you will need a very low, step-through frame.

## How will I use my pedelec?

There is quite a difference between, say, daily commuting and riding your pedelec twice a year on holidays. For every type of usage there are adapted pedelec models as well as components.

If you use your pedelec very intensely, you will undoubtedly appreciate a bike that requires as little servicing as possible,

equipped with for instance a speed hub instead of derailleurs, tires with puncture protection and a hub dynamo. If your cycling is limited to a few holidays a year, then you will probably benefit from a bike that has been designed to keep the weight down and with a gear system that allows you to cover different types of landscape.

In this framework, you also need to consider where you will be able to charge your pedelec. This is mainly significant for models with a battery integrated in the frame, which can mean that you have to connect the whole bike to the power point. You may find it unpleasant if, every time you need to get to a power point, you have to lift your bike or it ends up parked in your kitchen.

## How far will I travel per trip?

This question is relevant for the choice of the battery. The range of a battery depends on many factors, the first one being how much electric energy can be stored in that battery. The overall majority of batteries today are lithium-ion (Li-Ion), because they offer a far better storage capacity than for instance lead-acid or nickel metal hydride (NiMH). For the same weight, Li-Ion will provide around four times the energy of a lead-acid battery. Usually, the specification sheet of the pedelec will mention at least 1 of the 3 values which are important for the



range: volt (V), Amp-hours (Ah) and Watt-hours (Wh). For instance, 36V combined with 12Ah yield 432 Wh. If the bike would use on average 100 watt per hour, this battery will last just under 4.5 hours. At an average speed of 15 km/h this would come down to a range of 67.5 km.

Do not believe any statement on a fixed range. Only "from-to-statements" are truthful. How far you will actually get on one full battery depends on many factors such as own physical input, terrain, road surface, type of ride (lots of stop and start or one uninterrupted stretch), weight of the rider, age of the battery, etc. Obviously, the more riding modes the pedelec offers, the better you can manage power usage.

For commuters, depending on the distance they daily travel, the average Li-Ion battery should cover them for 2 to 5 days of commuting. If you go on a week's cycling holiday in Tuscany with daily trips in between 70 and 100 km then you need a second battery.





Research shows that range is one of the relevant aspects for causing dissatisfaction among pedelec users. A 2008 Swiss study over 3 years shows however that in that period battery capacity has more than doubled. As a result, even for cyclists who require a high level of assistance, battery capacity usually largely exceeds their real needs. The study has also established a clear relationship between quality/price and performance of the vehicle.

### Where will I store my pedelec?

The space you have available at home to store your pedelec safely and conveniently may well be a determining factor in your pedelec choice. There is not much use in purchasing a conventional city pedelec if you live on the 5th floor of an apartment block without a garage. In this instance, a folding electric bicycle might bring help. If you buy any "oversized" pedelec, such as a tandem, a tricycle or a recumbent bike, check its dimensions first to ensure that you have somewhere to put it.

### Do I often have to lift my pedelec?

A pedelec is a bicycle made heavier with a battery and a motor. Since the introduction of Li-Ion batteries, average weight of conventional two-wheel pedelecs has considerably decreased, now hovering between 21 and 28 kg. That can still feel fairly heavy if you have to lift your pedelec every day onto those few steps in front of your house or on the car-rack when you want to go out for a ride.

In this framework, not only the weight counts, the distribution of the weight of the battery and the motor is equally

important. Batteries are placed under the carrier, behind the seat post or integrated in the frame. You will find the motor either in the front or rear hub or around the bracket. If you have to lift your pedelec often then you will benefit from a model with the battery and motor positioned in such a way that the weight is well distributed.

### What is my budget?

It is virtually impossible to find a good quality pedelec under €1,300 and depending on the frame-material and the quality of the components, prices can reach up to € 5,000. Most pedelecs under € 1,300 come with inferior and/or very heavy batteries and low-quality components. Money saved in the initial purchase will eventually disappear through higher servicing and repair costs. In assessing your budget it is also important to take into account how much you save by using a pedelec instead of another means of transport.

Some national or regional governments or even local councils in various member states offer subsidies for the purchase of an electric bicycle. In several countries, there are cycle-to-work-schemes in place that allow employers to donate an electric bicycle up to a certain amount to their employee free of tax. Other countries grant commuters who cycle to work a tax free travel expense per kilometre cycled or they have schemes aimed at making it financially very interesting for commuters to buy an (electric) bicycle. Your local bicycle dealer or cyclists' association should be able to provide you with more information.







## Where should I buy my pedelec?

With the answers to all the above questions you can now move on to the decision as to where to buy your pedelec from. In many countries, cycling magazines publish an annual catalogue listing the major brands. There are also a number of websites aimed at familiarising consumers with the pedelec world. In this framework, Extra Energy ([www.extraenergy.org](http://www.extraenergy.org)) has the longest record.

Every year they publish a test report on an increasing number of pedelecs. Your shopping list should make it easy to figure out which brands have the type of pedelec you are looking for. On the brand websites, you will usually find a dealers' list allowing you to retrieve a dealer in your neighbourhood.

It is important to select a true professional that can provide you with accurate information and advice. If possible, choose a dealer who is a member of a trade association. ETRA is the European trade association for bicycle dealers. On their website ([www.etra-eu.com](http://www.etra-eu.com)) you will find a membership list that includes a number of national bicycle trade associations. Most of these associations only accept dealers as members provided that they




offer qualitative professional services. Also, these associations organise training for dealers and their mechanics. It is of paramount importance that the dealer invites you to try out the pedelec. You should never purchase a bike, electric or conventional, without first finding out how you feel sitting on it and riding it. Make sure the dealer has a workshop equipped to maintain and repair your pedelec so that potential problems can be solved in an easy and comfortable way. A true professional dealer will sell you a pedelec that complies with all legal requirements.

## How to recognise a legal pedelec

The pedelec must come with a CE-mark as proof that it conforms to all relevant requirements.

Moreover, the frame must be visibly

 and permanently marked with a serial number, with the name of the manufacturer or his representative and with the number EN 14764.

Somewhere on the pedelec you should find the mark: EPAC according to EN 15194.

The pedelec must be supplied with detailed instructions in your language which also includes a Declaration of Conformity.

This means that the manufacturer certifies that your pedelec is conforming to all legal provisions. As for the electric part, the instructions should contain recommendations for washing, information on the control and tell tales, specific pedelec recommendations for use, specific pedelec warnings and recommendations about battery charging and charger use as well as the importance of following the instruction contained on the label of the battery charger.

Finally, the dealer has a legal obligation to offer you a minimum guarantee of two years on the pedelec and its components except for normal wear and tear.



# HOW TO USE AND MAINTAIN A PEDELEC?



## How do I get started?

A pedelec functions pretty much in the same way as a conventional bicycle. Before you start, you switch the motor on, usually with a switch on the handlebar or with a button on a display on the handlebar. However, your pedelec will not move forwards until you start to pedal. Pedelecs have a sensor, which sends a signal to the motor to make it start. Some pedelecs have a sensor that will require the rider to pedal a few strokes before the motor starts. Other pedelecs have a sensor that sets the motor off as the cyclist applies power to the pedals. In both cases, assistance should be progressively reduced until the bicycle reaches a speed of 25 km/h.

## How to deal with the battery?

The battery is the principal as well as the most expensive component of your pedelec. If you look after your battery well, you will ensure the proper functioning of your pedelec and you will prolong its lifetime. It needs about five recharges before the battery reaches its first full capacity. So, it is important to fully charge the battery those first five times. After a

cycle trip, you need to let the battery cool down before you recharge it and preferably recharge it at room temperature.

The time to recharge will depend on the capacity of the battery. It usually varies between three and eight hours. It is imperative that you use the charger that has been supplied with the bike. Use of any other charger will cause irreparable damage to your battery. You can shorten the charging time to two hours by using a speed charger but they do use more power and cause the battery to wear out faster.

You can save energy and thus extend your range by setting off in a low gear, only switching to a higher gear when you are riding full speed.

Chargers have standard plugs that allow you to charge wherever there is a standard power point. There are networks developing of charging points specifically for electric bicycles or for electric vehicles including pedelecs. Furthermore, a growing number of businesses such as restaurants, hotels, bicycle shops, museums, etc. offer their customers free charging points.

If you do not use your pedelec for a longer period then you must store your battery in a dry and cool place and you must fully recharge it once a month. Li-Ion does not like cold very much. Therefore, if in winter temperature drops below -5°, it is recommendable to remove your battery when you park your pedelec and to store it in-house.

The lifespan of a battery is estimated at in between 300 to 500 charges. The price of a new Li-Ion battery varies between € 400 and € 800.

If the battery of your pedelec runs out while you are cycling, you can still continue to cycle normally. This will however be slightly harder work than on a conventional bicycle, mainly because you are pushing more weight.

In view of the chemical content of the battery, you are not allowed to dispose of it as normal domestic waste. You should either take it back to your dealer or dump it in the relevant section of the municipal waste depot.

## How do the gears of a pedelec work in relation to the motor?

Pedelecs are equipped with a gearless motor. Any gears on a pedelec are mechanic and function exactly as on a conventional bicycle. As a result, shifting gears will not have any influence on the motor. It only allows you to pedal faster or slower.

Nevertheless, on most pedelecs there are 2, 3 or sometimes 4 levels of assistance. This enables you to ride in 'eco-mode' on easy flat stretches and to ask for more assistance uphill. Thanks to these different modes you can save energy and ride longer before recharging your battery. On the display you can also monitor how much energy is left in your battery and when it needs recharging.



## How do I protect my pedelec from thieves?

Although this is a problematic issue for bicycles in general, the question is particularly acute for pedelecs in view of their higher value. There are several ways of protecting your vehicle but none of these will ever make your pedelec 100% theft-proof.

You must in any case always ensure that you lock your pedelec when you park it, preferably with two locks: one that immobilises your vehicle and a lock to attach your vehicle to street furniture. The more locks, the more effort and time it takes to steal.

Some pedelecs are equipped with a "smart" display that has a few additional functions. It is sometimes removable, in which case it works as an anti-theft device. Without the display, the pedelec cannot be used with electric assistance, only as a conventional bicycle. Also, the software records certain information on the bicycle such as travelled distance and the details of the bike owner. This helps the dealer servicing the bike and checking whether his customer is the rightful proprietor.

Obviously a removed battery can just as well serve as an anti-theft device. A pedelec without a battery can only function as a conventional bicycle. Finally, in certain countries, you can undertake an insurance against theft. In most cases, such insurances require you to use specific locks, to show both keys upon theft and to report the theft to the police.

## Can I transport a pedelec on the bike rack on my car?

This depends on the type of rack and on the weight of the pedelec. Some pedelecs may be too heavy for traditional bicycle racks. However there are racks on the market which are specially designed for pedelecs. Some of them include a loading ramp. Enquire with your local dealer about the offer.

## Where can I use my pedelec?

Pedelecs fall under the same legal category as bicycles and can therefore be ridden wherever bicycles can be used. Riding a pedelec is very similar to riding a conventional bicycle in terms of skills and interaction with other road users. The same caution should therefore be taken as when riding a conventional bicycle: respect of traffic rules, consideration of other road users, use of a bell, lights and reflectors.

However, the speed reached on a pedelec can be higher than on a conventional bicycle. Therefore, it is really important to keep in mind that higher speed results in longer braking distances, especially in wet conditions. You should in any case adapt your speed to traffic conditions. Do not go full speed ahead in shared streets for instance, or in pedestrian areas or on crowded cycle paths.

Also, riding off and cycling the first few kilometres on a pedelec may require some "getting used to". In any case, sit down on the saddle and hold your handlebar properly for a safe start. Since a pedelec is categorised as a bicycle you can take it on all public transport modes where bicycles are accepted.

If you intend to often combine public transport with electric cycling, you may want to consider a foldable pedelec.

As for parking, a pedelec is very similar to a conventional bicycle and can be parked in the same facilities. However given the higher price of pedelecs, you may want to use parking facilities with secure access, good quality locks and possibly video-surveillance wherever present. Enquire with your local authority about the availability of these in your own city.

## Are there any additional obligations to riding a pedelec as compared to riding a conventional bicycle?

None. You do not need a drivers' licence, you have no legal obligation to wear a helmet, or to register your vehicle and there is no age limit.

In a number of member states, in case of a collision between a car and a cyclist, the latter is always and automatically covered for personal and material damages by the car insurance, irrespective of who is at fault. If such a provision exists in your country, it also applies to pedelec riders.



### Further information

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