

# Electric Bike Buyer's Guide

WHAT TO CONSIDER WHEN BUYING AN ELECTRIC BIKE



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## INTRODUCTION

Not only are electric bikes simple and easy to ride they are also a lot of fun. They allow people to significantly increase their range and tackle difficult hills with reduced effort, reduced cost, and reduced damage to the environment. They also help you increase your physical health, as you'll probably end up using an electric bike more often than a conventional one and contrary to popular belief, you do still need to pedal!

Now you know the benefits of an electric bike, where do you start to find one to suit your needs? With so many options out there, what should you look for when buying an electric bike?

This guide has been put together to help you make a more informed decision when buying an electric bike, with comments from industry experts.

For many more good reasons to buy an electric bike request a free guide from ***spencerivy.com***.

## PRICE

Prices for electric bikes can vary from around £500 to over £2000. The battery and motor system the bike uses tends to have the biggest impact on the price. As with most things, the more you pay, the better quality product you get and this is certainly true with the majority of electric bikes.

The decision on how much you want to spend really comes down to which aspects of an electric bike are most important to you and how you intend to use it. So whether it is climbing hills, tackling headwinds, travelling long distances, low maintenance or reliability. This will be explored further below.

You should remember that once you've paid for an electric bike, the running costs are very low - on average 5p per full charge. Far less than the cost of public transport or a personal motorised vehicle.

## **QUALITY**

This is probably the most important factor to consider and will normally be reflected in the price you pay for an electric bike.

Look into where the bike has been manufactured, and ask your retailer how long the manufacturer has been around. As with buying a car, it can be good to stick to proven brand names that can demonstrate reliability or companies that offer good servicing and long warranties.

A simple online search for reviews of the electric bike that you are planning on purchasing is recommended as it will reveal what previous customers have said, as well as reading through press reviews on the manufacturers website.

## **WARRANTY**

Whichever electric bike you end up buying, you should expect a warranty of at least one year. This will include the electrical parts such as the motor and battery but won't include consumable parts such as the tyres and brake pads. One way to ensure the parts last long after the warranty expires is to opt for a higher-grade bike. Assuming that the price is based on quality, the more you pay for the bike, the longer you should expect the warranty to last.

## **WEIGHT**

This will be important if you have to carry the bike up any stairs on your journey or to store it. The EU law states that the maximum weight for electric bikes is 40kg. This is based on the early electric bikes that first started appearing on the market 15 years ago with sealed lead-acid batteries (as used in cars), which were very heavy.

Nowadays most urban electric bikes are under 26kg and weights of 23kg are now common. As technology improves, electric bikes continue to get lighter. Look for bikes that use lightweight aluminum frames and parts. Electric bikes using lithium batteries will also be lighter.

You should also bear in mind off-road electric bikes will start at a higher weight category, whilst road bikes at a lower weight category.

## **BATTERY**

This is what delivers the power to the motor system, so the battery technology used is an important consideration when purchasing an electric bike. In most instances the battery choice will be limited to what is used on a particular model as most manufacturers only provide the type that suits their electric system.

The battery plays a considerable part in the cost of the bike but if chosen correctly batteries can last for years.

A good battery is reflected in the compound. This will dictate the range, life and weight. There are three main types of electric bike batteries.

### *Sealed Lead-Acid (SLA)*

Commonly found in bikes in China where the focus is on low-cost. It is the heaviest battery and will add quite a bit of weight to the bike. It suffers from short battery range (15-20miles) and low charge-cycles, as well as poor memory effect towards the end of its life. As they are difficult to recycle they lack eco-friendly credentials.

### *Nickel-Metal Hydride (Ni-MH)*

These were popular a few years ago as the range, weight and life was a considerable improvement on the SLA's. The memory effect is improved and sustained for a longer period but as PRESTO, an EU programme designed to promote the use of everyday cycling, points out their performance is

significantly reduced in cold weather and they need to be fully discharged regularly to maximise the battery life.

*Lithium-ion based (more common types are Lithium Manganese, Lithium Polymer, Lithium Phosphate)*

Most electric bikes in Europe now use Li-ion batteries as their advantages outweigh the cost. They're half the weight of Ni-MH, with twice the energy density. They therefore have the best battery range (40 miles and upwards), charge life and don't suffer as much from diminished memory effect, allowing them to be topped up at any time.

**- Lithium manganese (Li-Mn)**

This battery offers a good mixture of power to energy, perform well at low temperatures, and generally have a good safety record. The most common all round battery type is the 18650 design, which is produced on a scale of hundreds of millions per year, at low cost, and at a high manufacturing quality.

**- Lithium Polymer (Li-Po)**

This type of battery can consist of a number of chemistries and offers significant advantages in packing design and in high power applications, such as a motorbike. However, it often has the disadvantage of limited availability and high costs due to low production run. It can really be considered a specialist battery.

**- Lithium Phosphate (LiFePO<sub>4</sub> or LFE)**

These batteries have considerable electrical and thermal stability. However, at present compared with the Li-Mn and Li-Po

battery types, the LFE batteries have considerably lower nominal voltage, energy densities, and higher production cost.

Spencer Ivy currently use 10AH Li-Mn batteries and will soon have the option of a 18AH battery that is capable of an 86 mile range. This new battery will last 5-6 years for the average rider.

Money continues to be invested worldwide on improving lithium battery technology, which will only reduce the price in future.

## **MOTOR**

### *Hub motors vs crank motors*

This is what PRESTO had to say in their Cycling Policy Guide for Electric Bicycles:

“An integral part of the bike, advanced electric bike motors were first developed in the early 1990’s in Japan by companies such as Panasonic and Yamaha with the motor situated in the crank as they are today. As the units were so expensive, other organizations soon made cheaper alternatives where motors would be mounted in the hub of the wheel. This brings us to the two most common electric bike motors currently on the market, which are the hub motor located in the hub of either the front or the rear wheel and the crank motor. The Japanese pedelecs from Panasonic that use a motor mounted near the sprocket is



mechanically coupled, via gears, to drive the sprocket for smoother power-assist. Hub motors, due to their confined space and the complexity of adding internal, changeable gears, are less efficient than a bottom bracket drive.”

We also asked Edward Benjamin, Chairman of the Light Electric Vehicle Association, who had the following to add:

“A crank motor requires a special frame, which is expensive, and normally such motors come from suppliers that require you to buy the entire system - which has both pros and cons. The pro being that the motor drives the normal bicycle gears - a big benefit, and the con being that such systems are expensive. There are cheap crank motors that are new to the market, but I would be wary of those at this moment.”

“Hub motors work on nearly any frame, are easy to install, offer more choices and lower prices. But they cannot drive the bicycle transmission, and they thus constrain performance. A wide variety of hub motors exists, the best ones are equivalent to, or higher in price to the crank motors.”

The proven track record of motor systems from a known manufacturer could very well mean the difference between a long life or a quick decline in performance for your electric bicycle.

### *Do I need a regenerative braking motor?*

This is an often-asked question as it seems to make sense to have a bike that can recharge itself. In theory it is indeed possible to use the motor as an electric generator, but as PRESTO point out there are a number of factors that diminish the usefulness of this concept which centre around the batteries ability to accept the energy created by the regenerating motor:

“...only a small percentage of the energy created by the down hill run, or the rider’s effort will make it back into the battery as useful energy that can propel the bike. The amount of energy recovered by even the most efficient systems, under ideal conditions, amounts to only a few meters of extra range per trip, at best.

“...to recharge the battery by pedaling is an arduous effort for all but the strongest of riders. Carrying a charger and using it on the journey is much more practical. Or pedaling more while on the bike. Even mild effort while pedaling will greatly extend range by decreasing the demand on the battery.”

### *To throttle or not to throttle*

The two main methods of operation are pedal-assist or throttle. With pedal-assists, there is a torque sensor that picks up the amount of pressure you apply to the pedals to determine how much assistance to provide. On most pedal-assist bikes, you will also have the option of 3 levels of assistance, from low to high, the latter being ideal for tackling hills

offering an entirely new and fun experience. Bikes with throttles are commonly found on bikes with motors in the hub of the wheel, and don't require much pedaling.

It is possible to get throttles on crank motors, but the function is merely to travel at a walking pace up hills without (6kph). A throttle certainly remains useful for those with limited use of their legs and require maximum assist.

### *Noise*

The best way to test for motor noise is to take it up a steep hill when the motor is under the greatest pressure load.

## **TEST RIDE**

If possible, always arrange to have a test ride before you make your purchase. If this isn't possible to buy the bike and try it out – as long as it is in good condition you can normally return it within 7 days of delivery. Check the company's return policy. Alternatively try to get a personal recommendation from someone who has had a good experience with their electric bike.

## **SAFETY**

### *Lights*

As pointed out by PRESTO, “hub dynamos are becoming more and more popular on electric bikes. As the technology improves, they now have much better performance, are less vulnerable, thus much more reliable than before. This also means you won't ever forget your lights and you can have

them on all day for added safety to people can see you. Also, these lights continue to function when you stop for a short period, for instance at traffic lights.”

### *Helmets*

As electric bikes are classified as standard bicycles, this means in the UK the rider is not required to wear a helmet, however we would always recommend people do.

### *Tyres*

Tyre technology is also constantly improving and bike manufacturers regularly provide puncture-resistant tyres as standard to reinforce the added safety when travelling on an electric bike.

## **BIKE INSURANCE**

We recommend checking to see if your home insurance covers your bicycle, and if not, how it can be included. If the insurance company insists they won't cover the bicycle, the Spencer Ivy team have done some research and have found the bicycle insurance provided by the Environmental Transport Association to be the most comprehensive offering and at a competitive rate. There is a link to them from our website ***[spencerivy.com/shop.php](http://spencerivy.com/shop.php)***

## **WHICH RETAILER**

Whilst the UK electric bike market is fairly young, looking online to see if any customers have left any comments can help you understand what kind of service to expect from your nearest retailer.

## **BIKE REPAIR**

With mechanical faults, you will usually have no choice but to take it to the manufacturer's specialist service centre. Where you do have a choice is in picking an electric bike where the non-motorised parts are the same as conventional bikes so when they need looking at, you can take it into a conventional bike shop and have their mechanic happily run the repairs.

## **LOCAL LAWS**

The laws surrounding electric bikes that seem to vary the most between countries involve the minimum riding age (14 in the EU, 16 in the US) and the maximum power output (250W in the EU, up to 1000W in certain US States). In the EU the maximum assisted speed is 15.5mph, this increase to 20-30mph in the US (depending on State).

## ABOUT SPENCER IVY

We hope that you have found this guide to buying an electric bike useful. If you want to know some great reasons to turn to electric bikes check out our other guide that outlines the key benefits by visiting our website ***spencerivy.com***

Spencer Ivy provide stylish, high quality, eco-friendly electric bicycles. Our vision is simple - we want to get the whole world cycling. Thanks to the electric assistance, everyone from busy mums to the fitness-challenged can pedal away. It's cool, sustainable, and most importantly, lots of fun.

Here are some reviews of our bikes. To read more please go to ***spencerivy.com/press.php***

“I've been riding Ivy for a month now and it has changed my life. Never have I spent so much time on a bike. I am discovering new parts of London every day even though I've lived here 10 years!”

***Amanda Astill, North London***

“the ‘Spencer’ gent’s model we tested demands you work the Shimano Alfine eight speed hub gears just as you would on a ‘conventional’ bike with the torque sensor in the chainring adapting to your pedalling, subtly sharing the workload in the background. This offers a silky smooth ride feel, which isn’t always the case with some pedal assist systems and the positioning of the battery pack and motor around the bottom bracket of the bike just adds to this as the Spencer feels

composed and deceptively nimble....The ride quality is excellent, the Panasonic motor is one of the best we've come across to date and battery notwithstanding we think the Spencer is actually a rather good looking bike."

***Rob Hopkins, Editor, The Bicycle Buyer magazine***

"When asked to test drive an electric bicycle for Spencer Ivy, I was initially a little skeptical wondering what sort of high tech gadgets an electric bicycle would consist of. However I needn't have been too alarmed, as an electric bicycle is in fact pretty much just like an ordinary bike, except that it has a motor attached to it.

... Once I had tentatively mounted the bike, I soon clocked on to the ingeniousness of the design.... This is especially useful when going up hills, as your fellow road users will be flummoxed at how effortlessly you are climbing while they huff and puff and sweat."

***Angie Yussuf, Hello Eco Living magazine***

## **TELL US WHAT YOU THINK**

We'd love to know what you think of this guide. Your feedback and suggestions can be included for a follow-up guide as the market continues to grow and technologies continue to advance.

As we aim to encourage more people onto two wheels, please help us by recommending this guide to your friends, who can request it for free from our website, or you can just pass this copy onto them!

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