

ELECTRIC BIKES

Powered cycling has changed immensely in the last ten years. Richard Peace explains all and reviews the latest models



I've been testing and writing about electric bikes for the last decade and there have been some major improvements in that time that make them even more appealing. Here are the major changes:

- Performance has increased; whilst the legal speed limit for an electric bike, treated as a conventional cycle, remains at around 15mph, the acceleration and the 'fun' factor have increased dramatically. High-level conventional cycle technology has also 'trickled down', again improving the riding experience, like fast yet puncture-resistant tyres and superbly performing but affordable disc brakes.
- Battery range has increased dramatically with the introduction of lithium ion batteries, a light world away from the original heavyweight lead acid batteries, which featured on bikes weighing 30-40kg! Today 25kg would be classed as a heavy-ish electric bike.
- But, the downside of lithium-ion is the expense of replacement batteries – typically several hundred pounds – as opposed to the relatively modest cost of previous battery technologies (lead acid, Ni-Cad and NiMH). Nor do lithium-ion batteries last as long as these older technologies (though two years should really be the minimum reasonable quality Li-ion batteries should last if the buyer looks after them carefully).
- The choice of electric bikes has vastly expanded. Today, you can still buy a tank-like, very cheap, lead-acid powered bike if you don't mind the huge weight but you can also spend many thousands on bikes that push the current limits of electric bike technology.

I've picked a selection of bikes that represent what I believe to be the best of the new technologies that add to performance, whilst covering the main price band of most UK electric bikes – around £500 to £2,500.

BUYING TIPS

What should I pay?

Prices for state-of-the-art electric bikes have gone up over time, with the technology becoming ever more technical. If you want to relive a bit of your youth with hard off-road riding (but with a bit of electric help) there are now some superb machines, as exemplified by the KTM Bosch mountain bike featured overleaf.

There are even higher-spec, full suspension mountain bikes out there, costing £3,000. And similar combinations of motor system complexity and top-end bike technology exist for road riding too.

If you don't lust after the ultimate electric-assisted riding experience (or can't afford it) there is still a good selection of bikes at the 'budget' end. Unless you want something for only very occasional use I'd recommend £1,000 as the starting point, with the Momentum Model T knocking spots off most of the competition at around this price (Raleigh and Giant electric bikes are also worth a look). Go much cheaper and the compromises made in producing many of the budget machines mean a bike that may soon become defunct or at least will be slow and unpleasant to ride.

Should I buy secondhand?

Yes! There are some great bargains, though the higher end bikes rarely get resold (presumably the owners are too pleased with them). In particular quality bikes with NiMH cells could be worth looking at if you don't require a huge



range, as this battery technology has a longer life than the current lithium technology. Just make sure you get the seller to verify the condition of the batteries in writing if possible.

Where should I buy?

All the bikes here are available through local dealers and so can be test-ridden; I'd always advise a test ride. And if you can get the bike from a local dealer you always have an easy port of call should problems arise.

Conversely internet-only sellers, for example those that trade only on ebay without offering the chance for a visit and a test ride, should be avoided.

Where can I get further information?

Electric Bicycles - The Complete Guide ISBN 978-1-901464-24-5 £12.95 written by me!

A to B transport magazine covers all kinds of alternative transport including electric bicycles www.atob.org.uk
www.electricbikemag.co.uk is a free downloadable bimonthly magazine

KTM BOSCH

CONTACT FLi Distribution Tel: 01613-048555
Web: www.shop.fliidistribution.co.uk

£2,250

Featuring out and out mountain bike technology on a 29in wheel (larger than the mountain bike standard of 26in), the KTM Macina 11 29 would suit all but extreme mountain biking terrain (more suspension travel is usually needed on the roughest terrain).

It features the superb Bosch crank drive system which, as a pedelec, applies power when you pedal. It does this extremely smoothly, allowing you to switch between 30 per cent, 100 per cent, 180 per cent and a staggering 250 per cent power on top of your pedal effort.

If you know your mountain bikes you'll recognise the high-quality components: light and fast (but fast-wearing) Schwalbe Racing Ralph tyres, Rockshox compressed air suspension forks, strong DT Swiss rims with reinforced spoke holes and so on. More unusual is the Shimano 11-speed hub gear giving a huge gear range.

Whilst this bike is definitely at home off-road on seriously steep trails, it could also easily double as a very high class runabout and a rack and mudguards could be fitted if needed.

The price may be rather eye-watering, but Bosch and KTM are both highly respected names that should give years of dependable service (note battery comments elsewhere). KTM Bosch bikes actually start at £1,700 for the same motor and battery as this bike but with less high-tech bike parts.

KTM does a large range of electric bikes (25 in the 2013 range), including highly-respected Panasonic motor systems so there should be something to appeal to most riders and riding conditions if you are on the lookout for a premium brand, high quality electric bike.

PRICE: £2,250	☆☆☆☆☆
WEIGHT: (with battery) 21.5kg	☆☆☆☆☆
BATTERY CAPACITY AND WEIGHT: 300Wh at 2.5kg (120Wh/kg) 400Wh batteries available on some models	☆☆☆☆☆
SPEED: 16mph	☆☆☆☆☆
EFFICIENCY: 10Wh/mile	☆☆☆☆☆
BATTERY GUARANTEE: 2 years	☆☆☆☆☆
BATTERY REPLACEMENT COST: £450 (300Wh), £586 (400Wh)	☆☆☆☆☆
USER FRIENDLINESS:	☆☆☆☆☆
TOTAL 29/40	



£499.99

BEATBIKES

CONTACT Beatbikes Tel: 01914-914175 **Web:** www.beatbikes.com

The lightest and cheapest electric bike on test, the Beatbike is tiny and folds up quickly into an elongated package measuring 107cm by 45cm by 30cm (some 145 litres). The lightness, smallness (and probably the low price) will commend the bike to motorhomers no doubt.

Cons are quite noticeable too though; with a single gear its top speed is limited (you could fit a bigger chainwheel for greater top speed but this would make hills harder work) and for anyone bigger than my 5ft 7in frame it will feel awfully small (I felt it only just big enough to ride). The power surged through the motor for several seconds after stopping pedalling so you need to keep the brake levers (with power cut out) well covered.

There is a knack to the folding, which looks complicated at first, but once you 'get it' it's pretty quick and simple. It involves undoing two frame hinges and folding in the handlebars.

Despite the criticisms, for an electric bike of this weight, folded size and low price it has no real competitors and for short rides by smaller riders with limited storage space it could just fit the bill!

Note: I was unable to ascertain battery replacement details so star rating provisional.

PRICE: £499.99	☆☆☆☆☆
WEIGHT: 15kg with integral battery	☆☆☆☆☆
BATTERY CAPACITY AND WEIGHT: 144Wh, weight unknown	☆☆☆☆☆
SPEED: 13.5mph	☆☆☆☆☆
EFFICIENCY: 13.5Wh	☆☆☆☆☆
BATTERY GUARANTEE: Not known	☆☆☆☆☆
BATTERY REPLACEMENT COST: Not known	☆☆☆☆☆
USER FRIENDLINESS:	☆☆☆☆☆
TOTAL 21/40	



SUNSTAR S03 I-BIKE KIT

CONTACT Sunstar Tel: 01926-863163 Web: www.sunstaribike.com
 Sparticle (distributors) Tel: 01223-926111 Web: www.sparticlebikes.com
 Big Fish Web: www.bigfishbike.com

FROM
£1,010



This is the only kit available in the UK (we're aware of) that drives through the bike chain; generally a more efficient system and often associated with companies producing extremely well-engineered products, as with Sunstar. This clever system fits almost any bike, effectively replacing pedal axle and chainwheel.

There are three battery sizes, mounting either on the seatpost, water bottle mounts or bespoke rear rack (as fitted to the test bike).

The largest battery gave a great range but, when loaded with panniers too, gave the bike a noticeable wobble when making quick movements at speed. The frame-mounted option solves this and, though it has a smaller capacity and range, it's the one I'd recommend.

Riding is intuitive and pleasurable. Turn on, select one of three power levels and off you pedal. The power delivery was smooth, though not quite up to Bosch standards. But for a lightweight, high quality system that fits most bikes it's a remarkable performer.

There are cheaper hub motor kits with a motor mounted in either front or rear wheel. However, these usually have components of a lesser quality and/or ones that don't give the same ride quality as the Sunstar.

Kits come pre-programmed for 16, 20 and 26in wheeled bikes but can be programmed for any wheel size from 16in up to 28/29in. There is a network of approved fitters (self-fitting not recommended).

The Sunstar kit will be fitted as standard to the novel Bigfish Line+ electric folding bike with small 16-inch wheels that folds into a neat 240-litre package. It's compact and could easily be transported inside most motorhomes, and probably stored in larger models.

Whilst the folded package is big in comparison with the most well-known 16inch-wheeled folder, the Brompton (which folds down to a 100 litre package), it's still not bad. But it has two real weaknesses: the weight, approaching 20kg, is rather heavy for an electric folding bike; and the battery capacity of 60Wh will only take you a handful of miles. *Note: the Bigfish trial bike was a non-standard prototype and final UK prices had not been released when writing - Rating details reflect this.*

PRICE: Sunstar kit £1,010 to £1,320 Bigfish Line+ Not known	☆☆☆☆☆ ☆☆☆☆☆
KIT WEIGHT: 3.3kg motor plus batteries at 1.1kg (60Wh), 1.9kg (216Wh) and 3kg (408Wh)	☆☆☆☆☆
WEIGHT: 19.3kg stated weight for final production version	☆☆☆☆☆
BATTERY CAPACITY AND WEIGHT: 60Wh (55Wh/kg) 216Wh (113.7Wh/kg) 408Wh (136Wh/kg)	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆
SPEED: Kit 14.5mph with speed limiter 16mph without speed limiter, Bigfish Line+ 15mph	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆
EFFICIENCY: Kit 14Wh/mile Bigfish Line+ 10.5Wh/mile	☆☆☆☆☆ ☆☆☆☆☆
BATTERY GUARANTEE: 1 year	☆☆☆☆☆
BATTERY REPLACEMENT COST: 60Wh £145 216Wh £306 408Wh £390	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆
USER FRIENDLINESS:	☆☆☆☆☆
TOTAL Kit 29/40 (with largest battery option) Bigfish Line+ 20/40	

MOMENTUM

CONTACT Momentum Electric Tel: 02072-548751
 Web: www.momentumelectric.com

This small new company has produced two excellent value, fun and easy to ride electric bikes, the Model T and the Upstart.

Both models are based around the same system of hub motor and smoothly delivered pedal-activated power and feature the same two-speed hub gears that change automatically depending on your speed. This gives a very high quality bike-like riding experience as the Momentums give just the right amount of power at the right time when you press on the pedals due to their unique torque sensing mechanism.

The Model T has several things in common with its earlier, more famous, twentieth century motor car namesake: it comes in any colour so long as it's black (with neat blue and white detailing though), it has lovely vintage looks and anyone on a half-decent salary should be able to afford it. It comes fully equipped with lights, mudguards and rack and is absolutely ideal for those who value comfort and practicality above head down speeding (not that the motor isn't nippy).

The Upstart has no extra equipment, is markedly lighter than the Model T and has altogether sportier geometry – in other words it's built for speed rather than convenience.

It has no attachment points for a rack or mudguards and comes without lights – though a good bike shop be able to find a way to fit these if required. It performs markedly quicker under power, though the downside is that battery consumption is a little higher and hence the range is lower – though both Momentum models represent excellent value.

PRICE: £1,095 (both models priced the same)	☆☆☆☆☆
WEIGHT: (with battery) Model T 25.2kg Upstart 21.1kg	☆☆☆☆☆ ☆☆☆☆☆
BATTERY CAPACITY AND WEIGHT: 324Wh at 3.4kg (95Wh/kg)	☆☆☆☆☆
SPEED: Model T 15mph Upstart 16mph	☆☆☆☆☆ ☆☆☆☆☆
EFFICIENCY: Model T 9.5Wh mile Upstart 13Wh mile	☆☆☆☆☆ ☆☆☆☆☆
BATTERY GUARANTEE: 2 years	☆☆☆☆☆
BATTERY REPLACEMENT COST: £345	☆☆☆☆☆
USER FRIENDLINESS: Model T Upstart	☆☆☆☆☆ ☆☆☆☆☆
TOTAL Model T 30/40, Upstart 28/40	



VOLT

CONTACT Electric Bike Store **Tel:** 02073-784728
Web: www.electric-bike-store.co.uk

We reviewed two very different bikes from Volt, a relatively new firm which, like Byocycles, specifies its bikes from far-eastern factories. Both stand out because of the large, good value batteries (the 'standard' size for 2013 will be 432Wh). All electrical components are easily unpluggable, should a replacement part be required.

The Alpine X is billed as a mountain bike but it's more suited to rougher trails rather than an out and out mountain bike. It set a blistering pace on our tarmac speed test course though; according to its own computer, our prototype was assisted up to about 30km/h, 5km/h above the legal maximum (though this might have changed for production models – check if you are concerned about this point).

Handling was reassuring at this speed, with the adjustable suspension locked rigid and the Tektro hydraulic disc brakes giving lovely smooth yet very quick stopping power.

It also stood up to a 30-mile rigorous off-road test with ease (with plenty of power left in the battery – possibly up to 50 miles), the only thing I could fault being a rattly kickstand. The Alpine is impressively specced with strong LED lights and a whopping great 576Wh battery, the biggest I've ever tested.

The Metro folder may not set the pulse racing like the Alpine but proved to be a pretty solid performer. There are quite a few electric folders of this design and this model was priced at the top end but featured a disc front brake and good quality LEDs, which cheaper competitors don't.

Volt says customers' riding characteristics can be pre-programmed on all 2013 bikes (though not altered by the customer afterwards). It would have been interesting to test the variety of settings out fully but we didn't have the test bike for long enough.

Overall, Volt bikes are well-equipped (all have lights, mudguards, kickstand and rack, apart from the Alpine which lacks a rack).



PRICE:

Alpine X £1,899 ☆☆☆☆☆
Metro £1,099 ☆☆☆☆☆

WEIGHT:

(with battery) Alpine X 26kg ☆☆☆☆☆
Metro 22.7kg ☆☆☆☆☆

BATTERY CAPACITY AND WEIGHT:

Alpine X 576Wh at 4.6kg (125Wh/kg) ☆☆☆☆☆
Metro 360Wh at 3.2kg (112.5Wh/kg) ☆☆☆☆☆

SPEED:

Alpine X 17mph ☆☆☆☆☆
Metro 14.4mph ☆☆☆☆☆

EFFICIENCY:

Alpine X 12Wh/mile (off road) ☆☆☆☆☆
Metro 14Wh/mile ☆☆☆☆☆

BATTERY GUARANTEE: 2 years

☆☆☆☆☆

BATTERY REPLACEMENT COST:

360Wh £240 ☆☆☆☆☆
576Wh £390 ☆☆☆☆☆

USER FRIENDLINESS:

Alpine X ☆☆☆☆☆
Metro ☆☆☆☆☆

TOTAL Alpine X 28/40, Metro 21/40

BYOCYCLES FOX

CONTACT Byocycles **Tel:** 02392-488362 **Web:** www.byocycles.com



£1,499

PRICE: £1,499 ☆☆☆☆☆

WEIGHT: (with battery) 25.5kg ☆☆☆☆☆

BATTERY CAPACITY AND WEIGHT: 360Wh & 3.5kg (103Wh/kg) ☆☆☆☆☆

SPEED: 16 mph ☆☆☆☆☆

EFFICIENCY: 13Wh/mile ☆☆☆☆☆

BATTERY GUARANTEE: 1 year ☆☆☆☆☆

BATTERY REPLACEMENT COST: £349 ☆☆☆☆☆

USER FRIENDLINESS: ☆☆☆☆☆

TOTAL 25/40

Byocycles are fairly typical of electric bikes in the lower to mid-range price brackets. As here, many now feature Suzhou-Bafang hub motors (also known as Fun 8).

Unusually though, this model is fitted with NuVinci continuously variable gears; in layman's terms there are no 'steps' between different gears, you just twist the control forwards or backwards to make pedalling easier or harder and carry on pedalling. This type of system has become popular on the continent for both older and novice riders who want a very straightforward and intuitive gear changing system that gives a wide range of gears plus a virtually maintenance-free system. It works smoothly and, impressively, the only downside being that it adds weight over more conventional gear systems.

The Fox is quite a big and heavy bike so be sure of your transit and storage arrangements. There's plenty of power in the motor for hill climbs and a decent-sized battery and the riding position is designed for comfort rather than sport.

We had a few niggles; the battery was rather rattly in the rear rack frame and the suspension forks add weight but little performance (Byocycles says it has fixed the rattling battery). This model lacked a throttle, which would have been a handy feature, especially for hill starts or pulling away with a big load but apparently all sub £1,000 Byocycles models feature them.

Like the Volt models tested, the power doesn't always match the timing or pressure of your pedal strokes (technically speaking due to use of a motion sensor rather than a torque sensor). Some may find this 'lag factor' easy to get used to and others not, so a test ride is advised.

But this bike has plenty going for it. The five power levels are quite well graduated so that riding on the lower levels conserves plenty of battery power, though power assist is limited to lower speeds, but you are helped up smaller hills and against light winds. Levels four and five, combined with the wide and easily-controlled gear changes, mean it can tackle just about any hill. Byocycles says it is aiming to introduce a fully automatic version of the NuVinci gears, the 'Harmony' system, for 2014 bikes.