melo YELO
E-BIKES

# A BUYER'S GUIDE TO EBIKES

WE'VE DONE THE RESEARCH, SO YOU DON'T HAVE TO.

WWW.MELOYELO.NZ

**This guide has been compiled by MeloYelo EBikes using a variety of sources, including:**

- The Spinoff - https://thespinoff.co.nz/
- NZ EBike Review - https://electricbikesnz.com/
- Juiced Bikes - https://www.juicedbikes.com/pages/torque-vs-cadence-sensors
- Electrek - https://electrek.co/2018/06/07/electric-bicycle-hub-motors-vs-mid-drive/
- Electric Bike Forum - https://electricbike.com/forum/forum/main-forum/general-discussions/7891-what-is-your-efficiency-watt-hours-per-mile-with-your-ebike
- Explain That Stuff - https://www.explainthatstuff.com/electricbikes.html

## Contents

**What is an e-bike?**

It's a bike with an electric motor which tops up the energy you're putting in pedalling, depending on the assist level you've chosen. Some e-bikes (including those from MeloYelo) have throttles which will propel you along without pedalling (which means your battery charge will drain faster). You charge the battery by plugging the charger into the wall, just like charging a laptop computer.

**Are e-bikes "cheating"?**

No. You still need to pedal and several European studies have established that e-bikers experience levels of exercise and consequent well-being similar to that of standard cyclists – in part because they ride their e-bikes more often and also ride further.

**What are the advantages?**

**Climb hills easier.** When you are approaching a hill, you have two options to make it easier to get up the hill: (1) shift into a lower gear and (2) add more boost from the motor, achieved by simply pushing a + button on the handlebar-mounted controls.

**Wind resistance.** The electric motor eliminates the extra effort you have to make while battling head winds on a regular bike.

**Range.** Electric bikes make riding fun, which means you will want to go further. While a 20 or 30km ride may be out of the question on a regular bike, it's a breeze on an electric bike.

**Keep up with the guys, the kids, the grandkids.** Maybe you've stopped riding because hubby, the kids or the grandkids ride too fast or too far. Well, now you can go riding with them, keep up with them, and have just as much fun or even more fun than them.

**Go faster.** European brands of ebikes are typically limited to 25 km/hour of motor assist,  because that is the legal limit in Europe. Other bikes, such as the MeloYelo bikes do not have this limit and can reach 32 km/hour with their larger 300 watt motors.

**How much should I pay?**

According to Barry Page, keeper of the NZ Electric Bike Review website. “The electronics will cost you between $1600 and $2000. Whatever you’re paying above that is what you’re paying for the bike. If you’re paying $2000, then it’s a $400 bike with $1600 worth of electronics strapped to it. You probably want a $1200-$1500 bike with $1600 worth of electronics on it.” Yes, you can probably buy a bike for $1000 on Trade Me – but will the vendor still be around when the shipping container is emptied in six months’ time?

**Things to be wary of when choosing a cheap ebike include:**

- **The electric system.** Chances are that cheap ebikes use motors, controllers, sensors, displays and battery cells from suppliers that do not have a proven track record for reliability. Often, you will also find that each of these components come from a different manufacturer, meaning they have not been designed together to work together from the outset. Consumer Reports NZ tested e-bike motors from 5 manufacturers: Bosch, Brose, Yamaha, Shimano and Bafang. You can see the results of their tests here: https://www.consumer.org.nz/articles/electric-bike-motors-tested

- **The warranty.** Don’t purchase an ebike unless it has a warranty of at least 2 years on the electric system. (MeloYelo has a 2 year warranty on the electric system, 6 year warranty on the frame, 12 month warranty on other parts.)
- **The availability of parts.** When an electric component fails on an ebike, it can take 2-3 months to get a replacement part under warranty. So, look for a supplier who maintains an inventory of spare parts in NZ. (MeloYelo maintains a strong inventory of spare parts at its warehouse in Taupo, including batteries, motors, controllers, displays, sensors and brake levers.)

**Service is *everything*.**

Future serviceability should be a key question. If you need a new battery in five years' time, will one be easily available? Does the supplier have parts in the country – or will that expensive German motor have to be shipped back to the manufacturer when it fails in the first week?

You can take your e-bike to any decent repair shop for mechanical service such as brakes and gears. But when it comes to the electronics, the supply of auto-electricians isn't keeping pace with the boom in the market.

MeloYelo's after-sale service is delivered through a nationwide network of technicians. MeloYelo provides its own training to these technicians, and they are able to share their learning experiences and trouble-shooting approaches by phone, by email, and through an online discussion forum. Since the launch of MeloYelo in 2016, there has not been a problem we were unable to solve.

**What's all this I hear about sensors?**

Sensors are used to determine what the motor does to assist your pedalling. There are two types of sensors: Cadence Sensors, which measure IF you are pedaling and Torque Sensors which measures HOW HARD you are pedaling.

**Cadence Sensors**

The basic cadence sensor uses a magnet on the crank, it turns the motor ON when you start pedaling and turns it OFF when you stop pedaling. It works more or less like a switch. You have to control the boost level and speed by adjusting the assist mode manually up and down. Most basic e-bikes have this.

The advantage is that it's an inexpensive way to get some sort of pedal assist onto the bike, but the disadvantage is that the pedal assistance can feel laggy and counter-intuitive.

**Torque Sensors**

The torque sensor is a totally different technology that uses a  precision strain gauge. It measures your actual force on the pedal, sampling at 1,000 times per second over the entire pedal stroke.

The harder you pedal, the more power it gives to the motor. If you pedal lighter, less power goes to the motor. It makes this adjustment in real time so it is technically amplifying your every input. It feels like you are bionic. Most higher-end e-bikes use torque sensors.

**Some of these e-bikes look like ladies' bikes. Is it okay for a guy to ride one?**

They're not ladies' bikes, they're step-through frames, and it appears that buyers are getting over such preconceptions. A lot of guys are now buying bikes with step-through frames. Step-through doesn't mean girls bike, it means a really practical bike for getting on and off, especially for those with mobility challenges.

**Hub motors vs mid-drive (crank) motors**

The two most common electric motor styles used in today's electric bicycles are rear hub motors and mid-drive motors. Rear hub motors, which place the electric motor in the centre of the rear wheel, are the most common form of electric bicycle motors. Mid-drive motors, which house the motor closer to the centre of the bicycle and transfer the motor's power to the rear wheel via the bicycle's chain drive, have become much more common over the last 2-3 years.
Both have a number of unique advantages and disadvantages, so choosing the right motor for you will largely depend on your requirements and which advantages seem more useful to your needs.

**Hub motor advantages.** One of the biggest advantages of hub motors is that they require little or no maintenance. They are an entirely independent drive system that retain all of their components inside the motor casing, leaving nothing for you to mess with or maintain. That enclosed system also means there is a lot less to fail.

Hub motors also help reduce other bike maintenance tasks compared to mid-drive motors. Since they don't connect to the main pedal drive system, hub motors don't add any extra stress to your chain or shifters, and don't cause any of those parts to wear out more quickly. If anything, your chain will probably last longer than a non-electric bike because the hub motor will be doing more work, allowing your chain to often sit idle.

As an independent drive system, hub motors also add redundancy. Since the hub motor and the pedal drive system are completely independent, you can lose one and still get home on the other. If your chain breaks while you're hitting it hard on a trail, toss the chain in your bag and ride home on just electric power. If the hub motor somehow fails, pedal back. Either way, you've got a backup. This can be huge if you're far from home, especially for older riders or those who use e-biking as a form of rehabilitation.

Lastly, hub motors are much cheaper than mid-drives. Hub motor bikes are mass-produced by the hundreds of thousands, perhaps even millions depending on the factory. The same designs have been in constant use for over a decade in some cases. This means that the prices are astoundingly cheap.

**Hub motor disadvantages.**

Of course hub motors aren't perfect. Perhaps most importantly, almost all hub motors only allow a single gear ratio. While this is usually fine for flat land cruising, a lower speed but higher torque gear would be preferable for hill climbing. It just isn't as efficient to use a single speed motor when functioning at the lower RPM range under load.

Hub motors are usually heavier than mid-drives, and that weight is unsprung weight on suspension bicycles, which can reduce the effectiveness of bicycle suspension and transfer more bumps to the rider. However this is easily overcome by adding a suspension seat post to the bike.

Tyre changing can be more difficult with hub motors, depending on the electric cabling system used. Be sure and check on this if you're buying a bike with a rear hub motor. MeloYelo ebikes feature waterproof plug-and-play cabling from Bafang, so disconnecting the electrics to remove the rear wheel is straightforward.

**Mid-motor advantages.**

The single largest advantage that mid-motors have over hub motors is their gear ratio. They allow the rider to power the rear wheel via the same chain and gear set as the pedals, which means that a low gear can be selected for powering up steep hills or accelerating from a stop with massive torque. A mid-drive motor in low gear can climb steeper hills than a hub motor of similar power, and can climb hills for longer than a hub motor. A mid-drive motor is also usually smaller and lighter than a hub motor of similar power.

**Mid-motor disadvantages.**

Mid-drive motors can be brutal on your drive system, which is perhaps their single biggest flaw. A healthy human can put out 100 W of power for a pretty long time, and 250 W of power during a hard sprint is reasonable. But mid-drive motors can output 250-750 W of power *continuously.* That's like having a professional cyclist hammering on your pedals all day. A cheap bicycle chain just doesn't stand a chance. Snap!

Because of the increased number of moving parts in a mid-drive motor, there are more points of failure. If the motor does fail, and it's a motor that is built directly into the frame of the bicycle, it can be more expensive to replace than just swapping out a hub motor. In fact, mid-drive motors in general are also more expensive than the tried and true, mass-produced hub motors found on many e-bikes.

And don’t even think about shifting while under motor power. Doing so is the best way to rip your chain in two. There’s simply too much torque in an electric motor, and the extra stress can easily break the chain when it is between cogs. Nicer mid-drive e-bikes have gear shift interrupters that briefly cut the throttle when you shift gears. But many e-bikes lack this feature, and so it is on the rider to remember to relax the throttle when changing gears.

**Hub motor or mid-drive motor?**

Mid-drives have a lot of improvements over older hub motor technology, but they have their own unique issues. There’s a reason hub motors have been around so long – they work. Most of MeloYelo’s models feature rear-hub motors.

The main advantages of mid-drive include lower weight and better gear usage, which makes them more appropriate for off-road use and those with hilly terrain to traverse.

Hub-motors, on the other hand, are fairly bulletproof and low maintenance, and thus are usually better for commuters and those that want a simple, reliable e-bike with very little maintenance.

**Batteries**

**Brands.** Look for reputable brands of battery cells such as those from LG, Samsung, or Panasonic and make sure that the warranty covers the battery for at least 2 years. Lithium ion batteries are typically said to last 800 charge cycles before beginning to degrade. They survive longer with careful use, so you should get at least 2000 half-charge cycles. A full charge typically takes between three to six hours. (MeloYelo bikes come with LG brand cells and 3 amp chargers versus the standard 2 amp, so they charge 50% faster than most.)

**Size.** Battery pack sizes vary considerably, with the typical range being from around 400 watt-hours to more than 600 watt-hours. The size you need depends on what you intend using your bike for, and how far you intend to ride on your longest ride. Following are some examples, but just remember that the range you will get depends on a number of different factors not the least of which is how hard you are pedalling:

**City/town riding:** Riding on city streets on a bike that has a 500 watt-hour battery, you might expect to use around 7.5 Watt-hours per kilometre. So, your expected range would be in the vicinity of 66kms.

**Off-road riding:** Riding on hilly  off-road trails where you are using higher levels of battery boost you might expect to use 12 Watt-hours per kilometre. So, your expected range with a 500 watt-hour battery would be in the vicinity of 42kms.

**What about components?**

You want to know about what kind of componentry is involved especially for the gear shifting system and the braking system. Shimano and SRAM are trusted names in gear systems. Likewise, Tektro and Shimano are  trusted names in braking systems.

MeloYelo uses components from the following trusted brands:

- Shimano or SRAM gear systems
- Tektro brake systems
- Suntour suspension systems
- LG or Samsung battery cells
- Bafang motors, controllers, sensors, cabling and displays (integrated electric system)
- Schwalbe or Kenda tyres

**About MeloYelo**

Melo Yelo's kiwi e-bike engineers are focused on building you the best bike your budget can buy - whether you're a commuter, a rail-trail biker or an off-roader.

Every component on your Melo Yelo e-bike has been defined in New Zealand to meet our unique conditions. Every Melo Yelo e-bike is fitted with the most appropriate suspension, power, gear & brake systems from the best manufacturers in the world.

The end result of our research, design and engineering know-how, is an e-bike you'll be mad about – powerful, flexible and comfortable!

Your Melo Yelo e-bike doesn't just help the environment by saving fuel and emissions, you're also helping the EVolocity Programme which challenges high school students to develop technologies for a cleaner future. More than 100 schools around NZ participate.

At MeloYelo we are madly committed to putting you on the best e-bike you'll find for your money.

# More ways to learn about ebikes.

1. Our blog at https://meloyelo.nz/blog/. Over the past year, we have written blogs covering many of the most commonly asked questions about ebikes and we post a new article every month;
2. Our online chat system, at www.meloyelo.nz. If we don't answer you immediately, we will answer as soon as we can;
3. Email us: ebikes@meloyelo.nz with any questions you might have;
4. Call us on 0800 MELOYELO, or 021 728 875.