



NEXT GEN E-RIDES

# 7 DIRTY SECRETS YOU MUST KNOW BEFORE BUYING AN EBIKE

**(#2 COULD SAVE YOU A LOT OF HEARTACHE)**



# 1 ARE EBIKES ILLEGAL IN AUSTRALIA?

The simple answer is no, ebikes are not illegal in Australia. Ebikes generally fall into 2 categories. Road legal and off-road legal. The laws vary slightly from state to state but there are generally 3 requirements for road legal ebikes in Australia:

1. Max power motor of 250W (200W max for ebikes with throttle-assist)
2. Max speed of 25km/h (6km/h for throttle assist)
3. Must comply with European standard EN15194 with the main source of power being pedal

If the ebike does not meet the relevant state regulations the rider will be required to register the ebike as a road vehicle and hold a relevant motorbike licence to legally ride on the road. Alternatively, off-road legal ebikes (motorbikes) can be ridden on private roads only should the rider choose not to register as motorbike.

## Australian Ebike laws state by state

### Australia Electric bike laws for all states and territories

#### Queensland



- 250W max motor
- 25km/h max speed & 6km/hr throttle-assist
- Must meet European standard EN15194
- The main source of power must be pedals i.e. pedalec

#### New South Wales



- 250W max motor
- 25km/h max speed & 6km/hr throttle-assist
- Must meet European standard EN15194
- Main source of power must electronically power-assisted (EPAC)

#### Victoria



- 250W max motor
- 25km/h max speed & 6km/hr throttle-assist
- Must meet European standard EN15194
- Main source of power must electronically power-assisted (EPAC)

#### South Australia



- 250W max motor
- 25km/h max speed
- Should be EN15194 compliant
- The main source of power must be pedals i.e. pedalec

#### Western Australia



- 250W max motor
- 25km/h max speed
- Must be EN15194 compliant
- Width of load must not exceed 660mm

#### Tasmania



- 250W max motor
- 25km/h max speed & 6km/hr throttle-assist
- Must meet European standard EN15194
- The main source of power must be pedals i.e. pedalec

#### ACT



- 250W max motor
- 25km/h max speed
- Should be EN15194 compliant
- The main source of power must be pedals i.e. pedalec

#### Northern Territory



- 250W max motor
- 25km/h max speed
- Should be EN15194 compliant
- The main source of power must be pedals i.e. pedalec

## Understand what you are buying

It is very important for you to know the law that applies to your state, so you understand what you are buying. This is especially important if you want to insure your bike. If you have an accident and it is found that your bike was not legally allowed on the road then you may lose the right to any insurance claims.

The key is to ensure your bike meets the EN15194 European standards. This should be displayed on your ebike, and it is worth ensuring that the supplier shows you proof of this by identifying the permanent EN15194 markings on the ebike or by showing relevant documentation. All ebikes imported into Australia must provide the Australian Government Department of Infrastructure, Regional Development & Cities with proof that the model of ebike meets European standards, this is sometimes called a Certificate of Compliance and should state the model number and manufacturers details. This will give you peace of mind that the bike meets the strictest of European standards (including testing of electrical, batteries, cables & connections etc.).

## 2 CAN YOU RIDE EBIKES IN THE RAIN, ARE THEY WATERPROOF?

You can ride ebikes in the rain. Ebikes are water resistant but not waterproof. This is a very important distinction to make. Your ebike will withstand riding in light drizzle or getting a little water on it if you ride through a puddle but it is not waterproof. Any supplier that claims this should be treated with a healthy degree of scepticism.

A good way to look at it is to think of your ebike just like any other electronic device. Would you expose your mobile phone to heavy rain or take it swimming underwater? Probably not. What you would do is happily walk-through light rain while talking on your phone or listening to music on your headphones.

### The difference between waterproof and water resistant?







A waterproof device allows no water to get in and no water to get out. Suppliers will also stand by the product should they get water damaged.

A water-resistant device is highly impervious to water. It is designed to make it incredibly hard for water to get in but most importantly the supplier does not guarantee against the prevention of water damage. This means that if your ebike was to malfunction because of water damage you would not be able to make a warranty claim as they do not guarantee the ebike will resist water. It is at your own risk if you expose the ebike to water. Much the same as if you drop your mobile phone in a puddle and it gets waterlogged, the supplier will not refund you for this as a rule.



## 5 important dos and don'ts for ebikes and water

### The do's and don'ts of ebikes and water

DO'S	DON'TS
 Clean your bike and battery points after wet weather riding	 Ride ebike in submerged water or in torrential rain
 Ride cautiously in wet conditions	 Clean bike with high pressure hose
 Wear the right wet weather gear and adjust your tyre pressure for wet conditions	 Store your bike outside for long periods of time and risk water or battery damage

### 3 CAN EBIKES GO UP STEEP HILLS?

Whether an ebike can handle a hill is common question that many first-time buyers are concerned about. The short answer is that yes ebikes are equipped to handle steep hills. This is one of the main reasons they have become so popular. With over 30 million sold each year in China to all manner of countries with all manner of hills it is safe to say that ebikes would not be anywhere near as popular if only good for flat and downhill riding.

#### Ebike designed for specific use

Electric bikes are specifically designed towards ensuring that hill climbing is within reach of all riders no matter their age or fitness level. There are three ways that an ebike assists in climbing hills mechanically.

1. Pedal assistance settings (PAS) – Most bikes will offer 5-6 PAS settings. Generally, 0 will be no assistance up to the highest assistance level of 5 or 6 depending on the model.
2. Gears – Like a standard bike the rider can also shift down to a lower gear to allow higher cadence to help propel the bike up a hill
3. Throttle-assist – Sometime known as mechanical or full electrical setting this is much like a motorbike and provides 100% motor power to assist the rider. This is generally only allowed for off-road use in Australia.



## Human factor still important in climbing hills but not vital

The e-bike is designed to complement human power, it does not serve as a complete replacement. This is the reason why pedalling is also required when riding an electric bike. This is especially true when going up a hill.

To put this in perspective, an electric bike will effectively reduce the gradient of the hills thereby eliminating the 'groan' factor when a gradient comes into view. If you give a good amount of effort, you should expect to climb hills of 1 in 10 (10 percent) on an electric bike without any difficulty. At the same time, you can clear a maximum gradient of 1 in 7 (14 percent), or even more. In hilly countries, the effect is nothing short of extraordinary.

## How to climb a hill

There are a few elements needed to climb steeper hills, like a traditional bike the basics remain the same:

- 1. Body Position** – On steeper gradients it is good shift your body weight forward to help maintain traction on the rear wheel. You lower your chest to the handlebars and bend your elbows
- 2. Pedal power or cadence** – This is vital as hills do not allow the rider to stop and therefore risk momentum. It is a good idea to increase pedal momentum and speed prior to approaching the hill so you can gain momentum before you hit the change in slope.
- 3. Tyre pressure** – Ensure you have the right tyre pressure to improving handling and traction of bike. What tyre pressure will depend on a number of factors, terrain, rider weight, riding style.
- 4. Select lower gear and higher pedal-assist settings** – If you select a gear that is too high it will be difficult to maintain a consistent cadence when you hit the steeper slope. To assist ensure you increase the pedal-assist setting so that you ensure you have enough speed to reach the top of the hill.

## 4 HOW DO EBIKES WORK?

An electric bike is at its core a bicycle, but it has a motor, battery, and (sometimes) a throttle that standard bikes do not have. Almost all ebikes require pedalling, as reflected in the term “Pedelec.” With Pedelec bikes, the amount of assistance is linked to your pedalling.

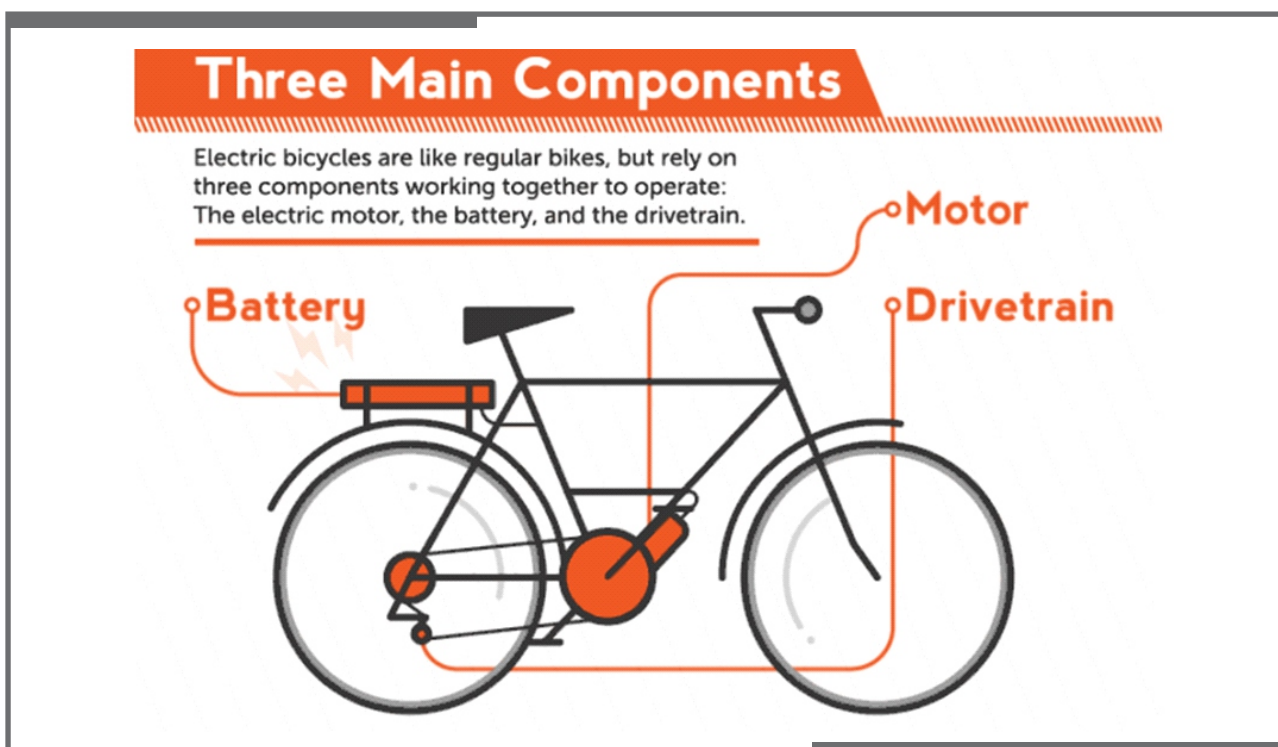
Pedelec systems either use a torque sensor or a cadence sensor. A torque sensor reacts to how hard you pedal, and adjusts accordingly. A cadence sensor simply reacts to whether or not you are pedalling. Once you start pedalling, there is a two second delay, and then the motor starts up. With a Pedelec system using a cadence sensor, the level of assistance is controlled by the level of assistance you have chosen on the console, not by how hard you are pedalling. Torque sensors are more advanced, and some people say they provide a more natural feel while cycling by mimicking your exertion level. The motors on an ebike can be broken up into two main groups, mid-drive motors and hub motors.

### Hub motor

A hub motor is the most common type of electric bike motor. Think of them as first generation as they were the earliest type of motor. The hub motor sits in the centre of the wheel via the bikes chain drive. They can either be in the rear or front wheel.

### Mid-drive motor

Mid-drive motors are a newer technology and were designed to address some of the shortfalls of hub motors. This greatest advantage mid-drive motors have over their older counterparts is their gear ratio. A rider can power the rear wheel from the same chain and gear set as the pedals. This allows for low gears to climb the steepest of hills with more torque for longer than any hub motor can manage. They also tend to be lighter than hub motors.



## 5 HOW FAR WILL EBIKES GO?

The current world record for the greatest distance covered by an ebike is 367km was achieved by Vitalii Arhipkin at Kiev Velodrome, Kiev, Ukraine, on 12 October 2017. The Delfast model Prime e-bike was used for this record attempt. We now know the extreme end of the scale but what you really want to know is how far will your ebike go in a single charge. The good news is that you can predict the expected range once you understand the factors that dictate your ebike range.

### What are the key factors to ebike range?

Whenever you pose the question “how far will the ebike go on a single charge”, it is usually met with a non-committal response. “Well, it depends on this, and it depends on that...” This sort of response will leave you frustrated and generally raises the bullshit meter to maximum. However, this is not altogether the fault of the supplier. Their response is vague because there are a lot of factors that will determine what range your ebike will achieve. Let's break down the key factors so you can understand it better and take the power back and predict the likely bike range yourself.

### The key factors or battery drainers are:

1. Speed
2. Rider & bike weight
3. Terrain
4. Wind
5. Throttle-assist (single largest drain on your battery)
6. Level of pedal -assist

### How to estimate ebike range

First you need to calculate the battery capacity. This is expressed in Watt hours (Wh). This is calculated by multiplying the volts by the amp hours. i.e., 48V 10Ah battery would equal 480-Watt hours.

Next you need to calculate the efficiency range by dividing the watt hour capacity by the average efficiency number. This is where the key battery draining factors come into play but for simplicity, we will base the range on 3 general efficiencies.

Full power range would be for hilly terrain using high pedal assist settings which will drain the battery quickly, mid-range would be using pedal-assist on medium setting and low power range would be pushing it to the extreme with no more than the lowest pedal assist setting.

### Estimated range

Here is a guide to estimated range based on average speed of 18km/h for 250W motor. Note that most riders will tend to operate in the medium power range. Most ranges are based on lighter riders (around 70kg). If you weigh closer to 90-100kg you would need to reduce the range by 20%. Conversely if you are lighter say 45-50kg then you should extend the range by around 20%.



Battery capacity	Full power range 15Wh/km	Medium power range 10Wh/km	Low power range 5Wh/km
360Wh	360/15 = 24km	360/10 = 36km	360/5 = 72km
400Wh	400/15 = 26.6km	400/10 = 40km	400/5 = 80km
480Wh	480/15 = 32km	480/10 = 48km	480/5 = 96km
600Wh	600/15 = 40km	600/10 = 60km	600/5 = 120km

## 6 WILL EBIKES GET CHEAPER, AND WHY ARE THEY SO EXPENSIVE?

This is a combination of 2 often asked and searched questions, why do ebikes cost so much and when will they become more affordable? I remember when a microwave was a big-ticket item and would cost well over \$1,000 dollars much like the VCR (younger readers will probably not have seen or heard of this outdated technology). This is a yes and no answer I'm afraid.

### Current pricing for ebikes

As we are all aware COVID-19 has put a huge amount of pressure on worldwide supplies and ebikes have not been immune to this. The disruption that constant lockdown has had on manufacturing worldwide means that there are long production delays. This has pushed up the price of raw materials and in some cases tripled the shipping costs. The result is that the price of ebikes will not come down until things settle down and the supply and demand balance is significantly shifted.

The technology though improving is still a long way off reaching a level of maturity that would see huge drops in price like we have seen with other products. This is mainly due to lithium batteries still requiring a large amount of price sensitive metals like: cobalt, lithium, and nickel. Any rise in prices for these metals will have adverse effects on the price of ebikes.

### Future pricing of ebikes

When we gaze into the crystal ball and predict the future pricing for ebikes there are signs that as technology improves older models price points will go down as people move towards more integrated designs and better-quality motors. Like any technology excess old stock will become less popular and the price will naturally come down. Lithium batteries have become cheaper over time since 2010 and signs are this trend will continue. It may however be many years into the future before we will see any seismic drop in prices. As with any technology over time, it will come down to how long it takes the technology to develop ways to drop the cost of input materials and production costs.

*Once e-bike technology matures, only then can you finally expect e-bike prices to drop – or plummet, even.*



## Why are ebikes expensive?

The cost components of ebikes that add to the overall cost to consumer:

- Lithium batteries – think raw materials cobalt, lithium, nickel.
- Cost of motor technology – hub motors, mid-drive motors, motor sensors
- High import costs (in Australia lithium batteries are considered dangerous goods and attract additional import levies)
- Freight costs – virtually all ebikes are sent by ship to Australia (freight is expensive due to high demand and not enough ships to satisfy that demand)
- Research & Development costs (battery, motor technology, bike integration)
- Marketing – it costs money to get the product front and centre in your mind
- Increased Production costs – with so many moving components the labour to produce an ebike is far more involved than a bicycle.

Unfortunately the current climate is not conducive to low priced ebikes but with increased competition and an increase in second-hand ebikes there will always be an opportunity to find an ebike at a lower price point.



## 7 WHAT EBIKES ARE BEST?

This is a common question that many people search Google for prior to buying an ebike. The answer is complex as it really depends on what you are looking for. Maybe the question should be rephrased to “what ebike is best for me?” This is because the answer really comes down to personal preference. You need an ebike that will suit your lifestyle, is within your budget, and brings you the most joy when you ride it. At the end of the day if you don't enjoy riding your ebike what is the point in owning it?

There definitely are the wrong type of ebikes out there. For example, if you are a shorter person buying a giant 26inch rimmed mountain ebike may be totally unsuitable as you would struggle to reach the ground when seated. A smaller 20inch rimmed step through ebike may be a lot more suitable as it will be far easier to ride and therefore more enjoyable which is the point at the end of the day. Let's dive in and clarify what you need to look for when you buy an ebike so that you can find the best ebike for your needs.

The first thing to get your head around is the main categories of ebikes that are out there. Once you understand which style you prefer you can then focus on the finding the right sub-category of ebike to suit your needs. By drastically reducing the pool of potential ebikes it helps make the task of deciding on your new ebike that much quicker and easier.

### The most common ebike styles



Cargo



City/urban



Mountain



Folding



Road



Cruiser/retro

## Understanding your needs and what features will benefit you

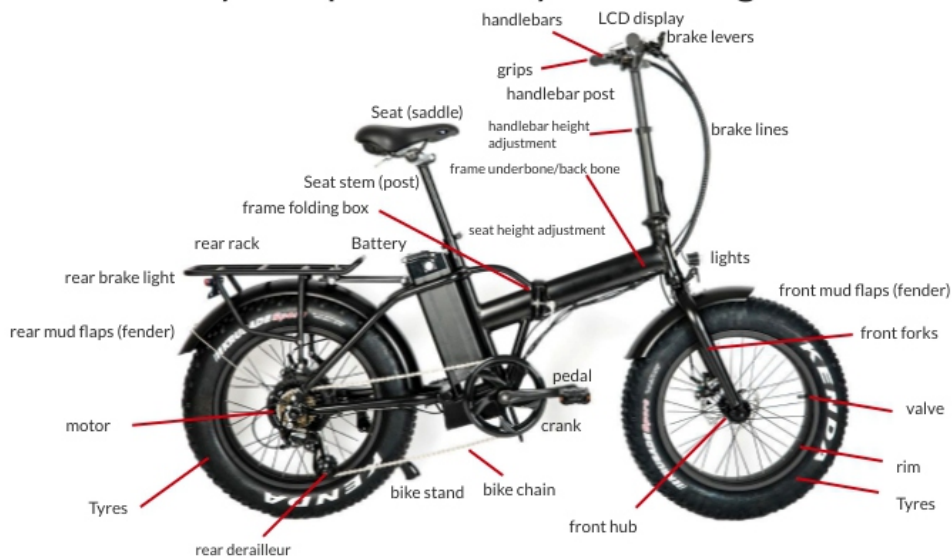
When you trawl the internet, you will be bombarded with companies claiming to have the ebike of your dreams with more features than a high-end sports car. What you really need to know however is what features will equate to tangible benefits to you. If they claim the ebike has long range will this suits your needs if you are only using the bike to commute to work? Probably not, so the key question you need to answer is, "what do I need in my ebike?"

Before we discuss what you need first you must understand the key components that make up an ebike.

### Key components of your electric mountain bike



### The key components of your folding electric bike



## Features v Benefits

Now that you understand some of the main components of an ebike we will break down how the main features of an ebike will benefit you:

Feature	Benefit to you
7-speed Shimano gears	Requires little maintenance = less cost for repairs Great for tougher terrains = safer, more fun ride Easier to pedal = more enjoyment on both climbs and descents
Long life battery	Increased bike range = ability to ride further and go on bike adventures
Adjustable height handlebars and seat/saddle	Ability to adjust bike to suit your height = a more comfortable and safer ride
Rear & front racks	More storage = great for carrying shopping or work bag
Fat tyres	More traction = safer to ride All terrain = ability to ride in a variety of road and weather conditions adding more variety to ride
Integrated design	Wiring and battery hidden in frame or rear rack = more attractive bike Less chance of damage to wiring = less repairs and costs Battery protected = less chance of damage or theft
Hub motor	Cheaper motor = less upfront cost
Mid-drive motor	Newer technology motor = less weight and greater range Better balance = easier to ride Easier to change flat tyres = easier maintenance
Pedal assist	Reduce stress and impact on knees = improves ride enjoyment Reduces need for
LED lights	Better vision = safer to ride Night riding = Ability to ride at night
Rear brake lights	More visible to motorists = safer to ride
Disc brakes	Greater stopping power = safer to ride, less likely to rear end traffic Don't heat up the bike rim = avoids tyre blowout and extra maintenance costs Precise braking = Very important for peace of mind given ebikes are heavier and take longer to stop



## So what ebike will suit you best?

To define what ebike will suit you best you need to answer the following questions:

- What ebike style do I like best?
- What is my budget – (this will help refine search)?
- How integrated does the battery and wiring need to be?
- What size battery or range do I require for my main riding use - (i.e., am I using the bike for short commutes or long distant rides)?
- Am I ok with a hub motor or do I want a mid-drive motor - (a mid-drive costs a lot more)?
- Do I need a bike with fat tyres or will I mainly be riding on road and prefer a lighter bike?
- Do I need a bike with storage capacity (front or rear racks)?
- Do I have room to store the ebike I like or do I need something smaller?
- Do I want a longer warranty than 12 months?