ULTIMATE GUIDE FOR ELECTRIC BIKES



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Ultimate Guide For Electric Bikes.

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Ultimate Guide For Electric Bikes.

Chapter One AN INTRODUCTION TO ELECTRIC BIKES

BASIC OVERVIEW

An electric bicycle is, first and foremost, a bicycle. It uses the same designs, geometries, and components as any other bicycle, but also includes an added electric motor. This is fuelled by a rechargeable battery, which gives riders an extra boost of power and ultimately provides a smoother, more convenient, and less strenuous cycling experience. By eliminating many of the obstacles that keep people from cycling—obstacles such as headwinds, steep hills, and bike commutes that leave riders tired, messy, and sweaty—electric bikes help make the freedom, exhilaration, and satisfaction of cycling available and accessible to a wide range of potential cyclists.

The idea of creating an electric bike has intrigued cyclists since the late 1800s, when several American inventors experimented with the possibility of combining the potential power of electric motors with the simple mechanics of the bicycle. It wasn't until the technological advancements of the 20th and 21st centuries, however, that this idea finally became a viable reality. With lightweight motors, high efficiency rechargeable batteries, smoothly shifting drivetrains, and huge advances in bicycle components, today's electric bikes provide a way for cyclists of all ages, fitness levels, and physical needs to enjoy the benefits of cycling, whether it's a leisure ride, a workout, or part of a daily commute. For many, electric bikes are an attractive alternative to both conventional bicycles and traditional automobiles, providing an environmentally friendly, fun, efficient, and convenient way to travel.

THE GROWING POPULARITY OF ELECTRIC BIKES

Electric bicycles are becoming increasingly popular throughout the world, as more and more people look for efficient, affordable, and eco-friendly modes of transportation. In recent years, electric bike use has skyrocketed in Asia, most notably in China, which has established itself as the world leader in electric bike use. There are now an estimated 200 million electric bikes in China, with millions more added every year.

The explosive expansion of electric bikes in China has helped spur similar growth in other parts of the world. In Europe—the second largest market for electric bikes—electric bicycle use has been steadily on the rise.

In 2006, there were approximately 98,000 electric bikes sold throughout Europe. A decade later, this number had risen to almost 1.7 million in annual sales.

Electric bikes are also gaining increasing popularity in the United States, where e-bike sales rose sharply from about 70,000 in 2011 to over 263,000 in 2017, and the growth is likely to continue accelerating.

In Australia fuelled by the coronavirus pandemic, Australia recorded its biggest year of ebike sales in 2020, with the import of 50,000 e-bikes in the 2019/20 financial year also a record.

The growth in e-bike sales has far outstripped that of traditional models as Australia plays catch up to more mature e-bike markets in Asia and Europe and the United States.

The dramatic improvements in electric bicycle technologies and capabilities, as well as the rapid growth in the popularity of electric bicycles in recent years, have all made the prospects of owning and riding an electric bike particularly exciting. Whether they're used by people looking for a low impact way to get back into shape, older cyclists seeking a more accessible way to enjoy leisurely bike rides, urban professionals attempting to simplify their daily commutes, environmentally conscious travellers hoping to decrease their emissions footprints, or anyone in between, it seems increasingly likely that "electric-assisted bicycles will change how people think about bikes."

Chapter Two WHAT MAKES AN ELECTRIC BIKE UNIQUE?

WHAT MAKES AN ELECTRIC BIKE UNIQUE?

For many people, the thing that makes an electric bike particularly intriguing and exciting is its status as a unique type of hybrid vehicle, effectively straddling the worlds of leg-powered bicycles and motor-powered vehicles. This combination helps make the electric bike especially helpful, appealing, and accessible to a diverse range of riders.

While electric bikes share many similarities with both conventional bicycles and motorized two-wheeled vehicles, they are ultimately in a class of their own. In this section, we'll explore more thoroughly just what it is that makes an electric bike unique, especially when compared to other types of vehicles.

ELECTRIC BIKES VS. CONVENTIONAL BICYCLES

As mentioned in the Introduction, electric bikes are, in the most basic and simple sense, defined as bicycles with the added feature of an electric motor.

It is this motor that makes an electric bike different from all conventional bicycles, and it is also the feature that enables electric bikes to offer users a different type of riding experience than that of a conventional bicycle.

Electric bikes are built in one of two ways: they are either designed specifically as electric bikes and feature built-in electric components, or they are conventional bicycles that have been converted through some sort of modification. In either case, there are many similarities between electric bicycles and conventional bicycles. Many e-bikes feature commonly used bicycle components such as standard-sized wheels, tubes, stems, handlebars, forks, seats, and multi-geared drivetrains comprised of standard-sized cranks, pedals, chains, and derailleurs.

Other components, like tyres and brakes, are usually e-bike-specific in order to accommodate the additional loads and wear. This makes it relatively easy to find replacement parts and to make basic repairs. It also makes the transition from a conventional bicycle to an electric bicycle smooth, natural, and effortless—it is, in the end, simply riding a bike, but now, with the added benefit of power on demand.

The purpose of adding a motor to an electric bike is to give riders an additional source of power. Most electric bikes allow riders to control when the motor kicks in and how much power it provides. This makes possible a wide scope of riding options ranging from fully leg-powered pedalling, a combination of pedalling and motor assistance, and fully motorized riding, allowing the cyclist to fine tune their riding experience to meet their specific needs and demands. With an electric bike, for example, elderly or inexperienced cyclists can confidently head out on rides knowing that if the terrain becomes too difficult, or if they start feeling tired or worn out, they can rely on the motor to help them get back home. Similarly, an electric bike can be helpful to a person trying to get back into shape, allowing them to gradually transition from lighter, primarily motor-assisted workouts to more intensive workouts that rely less and less on motor-generated power. Urban commuters might also use the motor to help them pedal up hills without breaking a sweat, so they can arrive at the office clean and ready to work.

Along with providing a specifically tailored riding experience, the added components of an electric bike also introduce some differences from conventional bicycles in terms of overall cost and specifications. Electric bikes tend to be more expensive than their conventional counterparts, thanks to the extra components included on an electric bike. They also tend to be heavier and bulkier, which can mean that transporting an electric bike can become more difficult than transporting a conventional bike. The added weight and bulk of an electric bike also means that pedalling it without any motor assistance may be more challenging than pedalling a lighter weight, more conventional bicycle.

In the end, both conventional and electric bikes have pros and cons to them. If you're looking for a bike that offers power-on-demand and can make it easier to ride further and more frequently, an electric bike may be a good choice for you.

ELECTRIC BIKES VS. MOTORIZED SCOOTERS

Electric bikes are sometimes confused with motorized scooters, mopeds, and small motorcycles, and while each of these represents a different type of motorized two-wheeled vehicle, there are some key differences between them that need to be highlighted. The primary features making electric bikes unique from all other motorized two-wheeled vehicles are:

• Pedals. As discussed above, the electric bike's status as both bicycle and motorized vehicle is really what makes it such a unique way to get around. The fact that an electric bike has pedals that can be used either exclusively or in combination with the motor is one of the things that makes electric bikes different from motorized scooters, or motorcycles, all of which have no pedals and are powered exclusively by motors.

• Speed and Power. Typically, the motors used on electric bicycles are less powerful than the motors used on motorized scooters, mopeds, or other similar vehicles. In Australia, the majority of electric bikes utilize motors that generate 250 watts, and that have a maximum speed of up to 25 kph when being used in motor-only mode (of course, an electric bike can go faster than 25 kph depending on how hard the rider is pedalling). Motorized scooters and mopeds, on the other hand, travel around 50 kph and utilize more powerful motors. These distinctions in speed and motor capability have a direct impact on the legal statuses of these different vehicles, which brings us to the final key difference between electric bikes and other motorized two-wheeled vehicles.

• Legal Status. In general, the definition of an electric bike is more similar to a conventional bicycle than a motorized scooter, moped, or motorcycle. That means that in most cases, an electric bike can be ridden in bike lanes, on bike paths, and can be locked up to bike racks as if it were a regular bicycle. In most cases, riders are not required to have a driver's licence to operate an electric bike and are not required to obtain any special licencing or registration for their electric bikes. Conversely, motorized scooters, mopeds, and motorcycles are all generally classified as motor vehicles that require a driver's licence, registration, and are allowed only on the street. It's important to note, however, that the specific laws, rules, and guidelines governing electric bike use may vary across states and municipalities. Before you begin riding an electric bike, it's a good idea to check out the laws in your specific location.

ELECTRIC BIKES VS. CARS

Electric bikes represent a possible alternative to traveling by car, especially for those who live in urban settings or who might be looking for a different way to travel shorter and more frequently travelled routes. Obviously, cars can travel at much higher speeds and are capable of covering much larger distances than electric bikes, but as a means of traveling across smaller distances and at slower speeds, electric bikes offer a few unique possibilities.

Leg-Powered Transportation. Electric bikes offer the unique possibility of combining some level of physical activity with your day-to-day transportation, helping contribute to a more active and fit lifestyle.

1. Eco-Friendly Travel. Since electric bikes use small, highly efficient, rechargeable electric batteries instead of gasoline, riding an electric bike can be an environmentally friendly way to

travel, reducing fossil fuel consumption and helping to decrease pollution from automobile emissions.

2. Cheaper Travel. Electric bikes can help riders cut back on the amount of money spent on gasoline and overall upkeep—in general, electric bikes are much cheaper to repair than cars, and replacement parts tend to be cheaper as well.

3. For urban commuters, an electric bike may provide a more convenient way to travel, allowing riders to use bike lanes instead of waiting in traffic, lock up at bike racks instead of paying expensive parking fees, and allowing for the additional flexibility of walking the bike on the sidewalk or using it in tandem with public transportation. With many urban environments gridlocked during rush hour, commuting by ebike can often times be faster than driving.

When compared to other commonly used vehicles, the electric bike clearly occupies a unique position as a vehicle that is simultaneously people-powered and motorized. The combination of a conventional bicycle drivetrain and a rechargeable electric motor makes electric bikes particularly flexible, accessible, and capable of being tailored to the specific needs, demands, and lifestyles of its unique riders.

Chapter Three <u>WHY CHOOSE AN ELECTRIC BIKE?</u>

WHY CHOOSE AN ELECTRIC BIKE?

There are a number of reasons why a cyclist—whether beginner, expert, or somewhere in between—might choose to ride an electric bike. This section will cover three of the most important factors to keep in mind when deciding whether or not an electric bike is right for you.

ELECTRIC BIKES SAVE TIME AND MONEY

Increasingly, people around the world are turning to electric bikes as an effective solution for their day-to-day transportation needs, which might include such trips as commuting to and from work or school, grocery shopping, short errands, or going out for social events.

Using an electric bike for this type of daily travel can help riders save time and money in a number of ways, including the following:

• Electric bikes allow riders to save time by using bike lanes and paths instead of sitting in traffic in a car or waiting for public transportation.

• Locking an electric bike to a bike rack immediately in front of your destination is faster, cheaper, and more convenient than parking a car in expensive, crowded parking lots that may or may not be located close to your actual destination.

• Depending on where you live, electric bikes may help you save money by allowing you to avoid tolls or other car-related fees.

• Recharging an electric bike battery is significantly cheaper than filling a car with gasoline or paying to use public transportation.

• The costs of repairs and general upkeep for an electric bike are far less than the costs of maintaining and repairing a car.

• On average, an electric bike allows you to go much further for much less money than any other form of transportation. In fact, one study found that an electric bike can travel as far as 800 kilometres on just \$1-50 — roughly 100 times further than a car or public transportation, and 35 times further than a hybrid car.

ELECTRIC BIKES CONTRIBUTE TO A HEALTHY LIFESTYLE

Whether it's used as a vehicle for your daily commute or more specifically as a means of working out, an electric bike helps contribute to a more fit, active, and well-balanced lifestyle.

Introducing an electric bike into your regular travel transforms your daily commutes into an opportunity for some light physical activity and a chance to catch some fresh air. Electric bikes are particularly well suited for daily commuting since the motor assistance helps eliminate challenges such as steep hills and headwinds, and creates a smoother, less demanding cycling experience. By using an electric bike, commuters no longer have to worry about arriving at their destination feeling tired, sweaty, or worn out—the bike's motor takes care of the overly strenuous portions of the ride while still allowing you to mix some physical exercise into your daily routine.

Along with using an electric bike for day-to-day transportation, many cyclists use electric bikes specifically as a means of working out and becoming more fit. Electric bikes offer riders a high degree of control over the level of physical exertion required to ride, making them particularly helpful for anybody who would like to become more fit, but who may need to gradually and carefully ease into increased physical activity. Electric bikes, therefore, may provide an especially helpful way to exercise for those who fall into the following categories:

- recovering from an injury or illness,
- looking for a low-impact workout,
- elderly cyclists,
- people who are new to working out,
- returning to physical activity after a prolonged period of inactivity.

The third main reason why people choose to ride electric bikes is the comparatively small environmental impact they make. Most immediately, the fact that electric bikes require no gasoline or oil, emit no pollution while being operated, and require only a small amount of electricity to recharge a battery make electric bikes an attractive option for environmentally conscious travellers. In fact, the small environmental footprint of electric bikes has gained increasing attention in recent years as researchers from a variety of fields begin studying the ways these bikes might fit into efforts to make cities and communities more eco-friendly and sustainable.

An article published by Scientific American, for example, reports that "transportation experts say ebikes—along with electric cars, light-rail trains and more pedestrian-friendly cities—could become one of the primary drivers of cleaner air and reduced global greenhouse emissions across much of the urbanized world."⁷ The same source also noted that "the bicycle is an enormously efficient vehicle" and that ebikes emit ten times less carbon dioxide when compared to an electric car, once electricity sources are taken into account.

CONCLUSION

While there are any number of reasons that a particular cyclist might choose to ride an electric bike, three of the most important ones to take into consideration are the ways that electric bikes can help save time and money, the ways they help contribute to a healthier lifestyle, and the fact that they represent an environmentally friendly mode of transportation. At the end of the day, however, many cyclists choose electric bikes simply because they're fun to ride. Perhaps one of the most important reasons for choosing an electric bike, then, is that they make it possible for people of all ages, skills, fitness levels, and abilities to enjoy the pure pleasure of riding a bike.

Chapter Four <u>WHICH TYPE OF ELECTRIC BIKE DO I NEED?</u>

WHICH TYPE OF ELECTRIC BIKE DO I NEED?

Now that you have a better sense for what makes electric bikes unique and why people around the world are increasingly turning to them as their vehicle of choice, it's time to start focusing more on the bikes themselves—how they work, how they're designed, and what they're capable of.

This section will outline some of the specific details that make one electric bike different from another so that you can eventually select the electric bike that's right for you.

ELECTRIC BIKE CLASSIFICATIONS

Currently, electric bikes fall into two broad classes, and while these categories have been created largely as a way of helping lawmakers figure out how to approach the growing influx of electric bikes, they also provide a nice way of sorting electric bikes according to factors such as speed and power. The two primary classes of electric bikes are:

Class 1: Pedal Assist - Pedal assist electric bikes, also commonly referred to as "pedelecs," are equipped with electric motors that only work while the bike is being pedalled, and that are activated by some sort of pedal action sensor designed to detect when the bike is being used. In Australia, pedelecs are limited to 25 kph and cannot use motors that exceed 250 watts.

Most pedal assist ebikes allow riders to select the degree of power provided by the motor, enabling them to tailor the performance of the bike to fit their specific needs and geographies. A rider may adjust her level of motor assistance, for example, going from low to high and back to low again, as her commute to the grocery store carries her initially across flat ground, up a hill, and then back onto flat ground again.

Pedelecs are good, flexible electric bikes perfect for all-around use, and are a particularly good option for those seeking the convenience and experience of a bicycle, but who know they'll be using a relatively high degree of motor assistance every time they ride.

Class 2: Power on Demand - The key difference between power on demand electric bikes and pedal assist electric bikes is that power on demand bikes allow riders to activate and control the motor, regardless of whether or not they're actually pedalling. Most power on demand bikes give riders full control of the motor by using a throttle, button, or trigger located on the handlebars; some models may also include a pedal activator as well. In Australia, on road ebikes are limited to a throttle speed of 6 kmh. As with pedelecs, power on demand bikes are limited to 25kph and 250-watt motors. However, some off-road e-bikes can have throttle speeds up to 25 kph and 750-watt motors, but these must be used strictly off road.

Power on demand bikes tend to offer an especially wide range of riding options since riders can choose precisely if and when the motor kicks in, as well as how much power it provides when it is in use. Cyclists using this type of bike can go anywhere from fully human-powered pedalling to fully motor-powered riding, and anywhere in between. For this reason, power on demand bikes generally give riders more control over their riding experience than any other type of electric bike.

Perfectly straddling the worlds of conventional bicycles and motorized vehicles, power on demand bikes are an ideal option for those who want the best of both worlds. They are very often the electric bike of choice for people who are looking for a way to ease into cycling, or who are interested in a way to control and gradually increase or decrease their level of physical exercise while riding. Power on demand bikes are also great for the all-around generalist, making it possible to go on a physically strenuous bike ride one day and then a quick and easy commute the next, all on a single vehicle.

When attempting to figure out which type of electric bike is right for you, it's important to think about just what it is you're trying to get out of your cycling experience. Are you looking for a low-impact way to get back into shape? Are you trying to find a bike that will allow you keep up with your grandchildren or a faster-cycling partner? Will your bike be used primarily for leisure or for practical everyday needs such as running errands and making daily commutes to and from work? Do you want the option of a physically challenging bike ride, or are you specifically looking for an affordable, easy to use, fully motorized mode of transportation? Will you be spending a lot of time riding up and down steep hills? Will you regularly be facing headwinds or other obstacles?

The answers to these questions, along with your understanding of the basic types of electric bikes currently being built, will help point you in the right direction as you begin searching for the perfect electric bike.

Chapter THE NUTS AND BOLTS:UNDERSTANDING HOW ELECTRIC BIKES Five WORK

THE NUTS AND BOLTS: UNDERSTANDING HOW ELECTRIC BIKES WORK

While the electric motor is most definitely the defining feature of an electric bike, it cannot exist or operate on its own. Rather, it works in cooperation with a number of other important components, most notably, the battery and the bicycle's drivetrain.

In order for you to become an electric bike aficionado—ready to make a fully informed decision about which specific electric bike model will best meet your needs and objectives it's important that you understand how these components work together as well as the various ways they're configured on an electric bike. This section will outline and describe the primary types of motors, batteries, and drivetrains currently used on electric bikes so that you can begin figuring out what your ideal electric bike might look like.

MOTORS

As mentioned throughout this guidebook, the motor is the single most important feature of an electric bike—it's what makes an electric bike an electric bike. For this reason, it is extremely helpful to become aware of the different types of electric bike motors currently available, and to have a sense for the advantages and disadvantages of each one.

• Hub Motors - A hub motor is situated in the hub of one of the bike's wheels, providing propulsion by spinning whichever wheel to which it's attached. As electric bikes first began gaining popularity, these were the most frequently used type of motor, and while the increasingly widespread use of mid-drive motors is beginning to shift this trend, hub motors continue to be a dominant component in the electric bike industry.

Hub motors are described primarily by whether they're located in the hub of the front wheel or the back wheel: front hub motors provide additional power directly to the front wheel while rear hub motors give extra torque to the rear wheel. Hub motors are generally a bit lower in power and torque, but their advantage is that they are less expensive to manufacture - which results in a less expensive bicycle.

Front hub motors create the sensation that the bike is being "pulled" forward. Because front hub motors don't impede in any way the bike's drivetrain, riders can benefit from combining both the mechanical power generated by having multiple gears on the rear wheel and the motorized power in the front wheel.

Front hub motors are also quite easy to install and remove because they don't have to work around chains, derailleurs, or cassettes, which also makes it relatively easy to perform repairs.

On the other hand, front hub motors have a tendency to "slip" or "spin out" since the bulk of the rider's weight is located behind the front wheel. Additionally, the extra torque introduced by front hub motors typically requires the use of more sturdy forks, rims, and spokes than may be usual.

In contrast to front hub motors, **rear hub motors** "push" the bike forward, which often feels more natural to those accustomed to riding conventional bicycles, since they also generate power at the rear wheel using a chain and gears. Similarly, because the bulk of the rider's weight is above the rear wheel, rear hub motors tend to spin out less often than front hub motors and, in certain riding conditions, can provide a smoother, more efficient riding experience.

However, rear hub motors can be tricky to install or remove since they have to work around derailleurs, chains, and cassettes, which can also make it difficult to perform certain types of repairs. Despite the familiar feel of power being generated at the rear wheel, the added bulk of the rear hub motor can negatively affect the overall handling of the bike, making it a feel bit back-heavy. Finally, like their front hub counterparts, rear hub motors introduce extra torque to the rear wheel which means they should be used with particularly strong spokes and rims.

• Mid-Drive Motors - It's becoming more and more common to see mid-drive motors in use on a variety of electric bike models, and for many riders, these motors provide an especially versatile, balanced, and powerful riding experience.

Instead of being located in the hub of one of the wheels, mid-drive motors drive power to the bike's drivetrain, typically at the crankset. By directly powering the bike's cranks, mid-drive motors work in tight coordination with the bike's already existing gears, amplifying the mechanical advantage they provide. This becomes particularly helpful when it comes to climbing steep hills or navigating extended inclines. On this type of terrain, mid-drive motors "can leverage the lower gears of the bike and keep their RPMs in an efficient range without getting 'bogged down' like a hub motor."⁹

In addition to efficiently complementing the bike's existing gears, mid-drive motors often allow for more intuitive and user-friendly designs. Typically attached to the bike somewhere around the bottom bracket, mid-drive motors leave the huge majority of components untouched, which makes it easy to repair or replace parts as needed. Similarly, the placement of mid-drive motors means that the additional weight introduced by the motor is located closer to the bike's natural centre of gravity, creating a more natural riding sensation than hub motors. Lastly, having the motor drive the crank allows some design flexibility for the rest of the bike, such as allowing the use of an internally-geared hub and/or a belt drive transmission.

With all that said, however, mid-drive motors typically use more proprietary drivetrain components.

Additionally, most mid-drive motors come only on complete electric bikes, and in many cases are harder to use when attempting to convert a conventional bicycle to an electric bike. Lastly, the advantage of the mid-drive motor come at a premium as most electric bikes with this motor configuration are more expensive than the ones with the hub motor placement.

BATTERIES

Batteries are, in many ways, the fundamental reason electric bikes have emerged as such promising vehicles in the 21st century. The highly efficient, relatively lightweight, and rechargeable batteries currently in use ensure that electric bikes have a reliable source of power that contributes to creating a more enjoyable and effective riding experience.

The evolution of batteries, especially over the course of the last couple decades, has had a direct impact on the evolution of electric bikes. According to ElectricBike.com, "the turning point between electric bike 'history,' and our modern era" of widely available and regularly used electric bikes is "the mass production of lithium batteries," which resulted largely from the explosive growth of the computer industry. Once these lighter, more compact, more efficient, and more powerful rechargeable batteries became cheaper and more accessible, electric bike builders began using them to create more visually attractive, lighter, more reliable electric bikes.

The primary consideration to make when looking at electric bike batteries is the range of the battery, which is typically described in terms of how many kilometres you can get out of a single charge. Obviously, the distance you can travel before having to recharge your battery depends on how much motor assistance you plan to use while riding. The more you pedal and the less you use the motor, the more kilometres you can get out of the battery. Conversely, if you use more motor assistance and pedal less, then you'll get fewer miles out of your battery. In any case, though, today's electric bike batteries are efficient enough to provide any rider the power needed to make their bike rides fun, convenient, and productive.

Today's high quality electric bike batteries should typically give you somewhere between 40 and 80 kilometres per charge, and they should be lightweight enough, and compact enough to blend in with the design of the bike—a good battery should not get in the way or in any way detract from your ability to ride comfortably.

DRIVETRAINS

The third piece of componentry that you need to be aware of is the drivetrain. "Drivetrain" refers to a system—typically comprised of several smaller parts working together in tandem—that provides the power and torque necessary to turn the wheels of a vehicle. On most standard bicycles, the drivetrain is made up of the crankset, chain, and some sort of gear system, almost always attached to the rear wheel. Bikes use either a single gear or a multi-geared drivetrain to help convert the power required to turn the cranks into actual propulsion power.

Electric bikes work in conjunction with already existing bicycle drivetrains, and while this means that there are typically fewer variables involved with electric bike drivetrains than with other components like motors and batteries, you should still be familiar enough with them to make a well-informed decision when it comes time to select your own bike. Since electric bikes are focused on providing efficient, convenient, and accessible transportation, we'll focus only on multi-geared drivetrains, as these mechanisms play an important role in helping cyclists—whether riding an electric bike or a conventional bike—navigate hills and other obstacles.

• Multiple Gears with Derailleur - Having been established as the go-to technology for conventional bicycles, derailleurs mechanically move the bike chain across a range of differently sized gears that change the efficiency of each pedal stroke; some gears are better suited for climbing up hills while others are best for cruising along level ground.

Many electric bike motors work in coordination with already existing gears and derailleurs, allowing riders to shift through their gears to find the best efficiency for any given riding condition, while also utilizing the motor's power to provide an ultra-smooth, convenient, and fun way to ride.

Electric bikes combine components and technologies from various industries and fields in exciting and innovative ways in order to produce a truly unique cycling experience. By becoming familiar with the basic components and technologies that make electric bikes particularly efficient and convenient vehicles, you empower yourself to choose the specific electric bike—equipped with the perfect type of motor, battery, and drivetrain—to meet your cycling needs, expectations, and goals.

Chapter Six HOW MUCH DO ELECTRIC BIKES COST?

HOW MUCH DO ELECTRIC BIKES COST?

Now that you've become familiar with what electric bikes are, how they work, and why they're a unique and effective mode of transportation for many people throughout the world, you may be wondering what the actual costs are of buying, using, and maintaining an electric bike. This section will give you an overview of what these costs look like and will attempt to answer the questions people typically have as they begin thinking about the possibility of buying their own electric bike.

THE COST OF PURCHASING A NEW ELECTRIC BIKE

• Motor - The power and performance capabilities of an electric bike's motor play a key role in determining the overall cost of the bike—in general, the better the motor the more expensive the bike.

As discussed in the previous section, there are two main types of motors, hub motors and mid-drive motors. While both have their own distinct advantages and disadvantages, when it comes to a motor's price tag, power is the primary factor. Most standard electric bike motors come with a power rating of 250 watts and typically go up from there to as high as 750 watts. (Any motor over 250 watts can only be used off-road or on private property in Australia).

Higher rated motors generate more power than those with lower ratings, and as a result provide a snappier, more responsive, more versatile motorized riding experience.

Keep in mind, though, that the power output is not the only specification worth consideration. For example, a rear hub and a mid-drive motor can both be rated for 750 watts but have very different abilities to get you up a steep hill; that's because a mid-drive motor will have a mechanical advantage and typically generate higher torque than a hub motor. Always pay attention to torque in addition to watts.

• Battery - Along with the power of the motor, the battery used to fuel an electric bike motor is a key factor in how expensive a particular bike is. Most electric bikes use lightweight, efficient, rechargeable lithium batteries, and the primary variable differentiating one battery from another is how many kilometres of riding a battery can provide before it needs to be recharged.

As explained in chapter 5, the exact number of kilometres a rider gets out of a battery charge depends on a number of different variables such as the weight of the bike, the rider's weight, whether or not there's a headwind, the number and steepness of the hills the bike is climbing, and the proportion of human-generated and motor-generated power a rider uses. If, for example, a cyclist pedals for most of the ride and uses a low level of motor assistance, she'll get more kilometres out of her battery charge than she would if she uses the motor as the sole source of power throughout the entire ride. Similarly, a rider whose trip to the grocery store is entirely on flat ground will get more kilometres out of his battery then a rider who has to go up two steep hills to get to the store.

Since there are so many variables affecting the number of kilometres a battery can provide, electric bike manufacturers and retailers usually describe batteries in terms of kilometre ranges that attempt to account for a variety of riding styles and conditions. A good quality electric bike battery should provide, on average, somewhere between 40 kilometres and 80 kilometres of riding per charge. In general, the more kilometres a battery can provide, the more expensive it will be, so before deciding which electric bike is right for you, it's important to consider the type of riding you plan on doing.

• Drivetrain - Just like a traditional bicycle, a basic electric bike configuration comes with a derailleur and mechanical gears. Upgrading to a mid-drive configuration creates room in the rear wheel for a more sophisticated transmission, like an internally geared hub.

An internally geared hub transmission is factory-sealed, requires less maintenance and has fewer components sticking out and at risk of being damaged. Of course, these benefits come at a premium and can add hundreds of dollars to a cost of an electric bike.

Finally, the electric bike technology has evolved to the point where a fully automatic transmission is now a reality. Internally geared hubs, like the Enviolo NuVinci, can be upgraded with automatic shifting controllers, removing the need to shift gears at all! Once again, these advanced features are more expensive than a regular derailleur or a standard internally geared hub.

• Bicycle Components - Because an electric bike is fundamentally a bicycle, the mix of all the other non-electric, non-motorized bicycle components used on an electric bike is another important factor affecting the bike's overall cost.

When you pay to upgrade bicycle components, you're generally paying for components that are lighter weight, that have greater strength and increased durability, and that work more effectively and efficiently than cheaper, lower quality parts. High end derailleurs, for example, shift quicker and smoother, and are usually lighter weight and more sturdy than cheaper derailleurs. Likewise, more expensive suspension forks will generally be stronger, more rugged, and will respond to changes in terrain more smoothly than cheaper suspension forks.

As with everything else, the type of components you need on your electric bike depends largely on the kind of riding you plan to do. If you know you'll be using your electric bike exclusively on well-paved city streets to run errands and commute to work, then you probably don't need the same type of heavy, rugged parts a cyclist might need if he plans on using his electric bike for off-road riding or riding on rougher bike paths.

In short, it's important to buy an electric bike with high quality components that match the type of riding you plan to do. This will ensure that your bike is reliable, efficient, and fun, and will also help limit the need for repairs.

• Materials - The fourth and final factor that affects how much an electric bike costs is the actual material used to build the frame. Low quality bike frames made out of heavier, less durable materials will generally be cheaper than higher quality bike frames, built from lighter, stronger, more durable metal alloys.

It's important to invest in a high-quality bike frame since the frame is, quite literally, the skeleton of the entire bike. Frames that are sturdy, reliable, and lightweight ultimately provide a better riding experience, giving you a bike that handles well, that's comfortable and responsive, and that you know you can depend on.

THE COSTS OF USING AND MAINTAINING AN ELECTRIC BIKE

After the upfront cost of purchasing an electric bike, there are some additional ongoing costs associated with regularly using and maintaining an electric bike. Fortunately, though, these costs are relatively small compared to both the upfront cost of buying the bike and the cost of using other forms of transportation.

The most frequently recurring cost of riding an electric bike is the cost of **charging the battery**. Interestingly, this is also the point at which electric bikes distinguish themselves as a particularly affordable and efficient vehicle. In fact, multiple studies have confirmed that electric bikes are the most cost-effective motorized vehicle currently available.

To be more specific, one study reported that, on average, it costs roughly 10 cents to charge an electric bike battery. Given that most batteries get somewhere between 40 and 80 kilometres per charge, that's a total of 300 to 700 kilometres on just \$1 worth of electricity. In a similar project, ElectricBikeReport.com determined that it costs between 0.08 cents and 0.34 cents per kilometre to operate an electric bike, depending on the time of day a rider charges their battery.

The other primary expense associated with using an electric bike is the cost of periodic **repairs**, which will arise from time to time as parts wear out or break. Fortunately, since the huge majority of electric bike components are standard bicycle parts, nearly all repairs can be performed at a local ebike shop for a relatively low price. To put the cost of repairing an electric bike into perspective, think about how much it costs for even the most basic car repair—clearly, paying a local ebike mechanic to replace worn out brake pads on your electric bike is noticeably more affordable than a comparable repair at a car garage.

While riding an electric bike requires an upfront investment, the incredible cost- and fueleffectiveness of using it pays out huge dividends in the long run. When the low cost of operating and maintaining an electric bike is combined with the convenience, pleasure, and ease of using an electric bike—whether it's as a vehicle for running errands and commuting, as part of a workout routine, as an accessible form of recreation and leisure, or something else entirely—it becomes obvious why people around the world are relying more and more on electric bikes to meet their everyday transportation needs.

ChapterSHOULD I BUY A NEW ELECTRIC BIKE OR CONVERT MYSevenEXISTING BIKE?

SHOULD I BUY A NEW ELECTRIC BIKE OR CONVERT MY EXISTING BIKE?

While many people find it easiest and most convenient to simply buy a new electric bike, others might find it more appealing to convert their existing bicycles to electric by adding a motor and battery. This option has its own set of advantages and disadvantages, and ultimately, whether you convert your conventional bicycle or buy a complete electric bike depends on your unique needs, interests, and expectations.

In this chapter, we'll highlight some of the best methods and products currently available for converting a conventional bicycle into an electric bike. We'll also provide a brief discussion of the pros and cons of this type of conversion, especially when compared to purchasing an electric bike.

CONVERTING TO ELECTRIC

By far the most common method for converting a conventional bicycle to an electric bike is to add a hub motor to either the front or the back wheel. This method is generally the easiest, most seamless way to make a conversion, as it leaves the huge majority of the original bike and its components intact—you're adding only a new hub and some sort of controller, nothing else on the bike is affected.

The seeming simplicity of this type of modification can be a bit misleading, however, since making the change from a conventional hub to a motorized hub is actually a fairly complicated task. To begin with, taking apart and rebuilding wheels is always a challenging project, involving intensive work installing spokes and truing the completed wheel. Similarly, the extra weight of the motorized hub and the additional torque it will generate means that, in most cases, the entire wheel will need to be upgraded to include a rim and spokes sturdy enough to handle a motorized hub. In the end, you would end up with not only a new hub, but an entirely new wheel.

Recognizing this, a number of manufacturers have begun building and selling all-in-one electric wheels, which combine the rim, spokes, motorized hub, and rechargeable battery into a single, self-contained unit. These all-in-one wheels generally come with some sort of control system that riders use to turn the motor on and off, and to control how much assistance it provides.

As with the hub motors discussed in chapter 5, the all-in-one electric wheel either replaces the front or the rear wheel on your existing bicycle. To use a typical electric wheel, simply take off your bike's original wheel, install the new wheel, and download an app that usually comes with the product and turns your smartphone into a control panel.

THE PROS AND CONS: IS A CONVERSION RIGHT FOR ME?

The two biggest advantages to converting the bike you already own are familiarity and cost: converting a conventional bike to electric allows you to continue using the bike you already know and love, and buying a conversion kit is generally going to be a cheaper option than buying a complete electric bike.

On the other hand, though, there are some significant disadvantages to converting a conventional bike, especially when compared to buying an electric bike. In the early days of electric bike manufacturing, a complete ebike was not that much different from a DIY conversion. Today, most manufacturers are building purpose-built frames to neatly house various electric bike components, like the battery, the controller, and in the case of the middrive configuration, the motor. A conversion will not be as smooth or efficient as a complete electric bike, which has seamlessly incorporated the motor, battery, and controls into every aspect of the bike's design.

Similarly, all-in-one wheels rely on hub motors, which tend to produce a less natural and less efficient riding experience. As discussed in chapter 5, adding a heavy motor to the front or the rear wheel without carefully considering the overall balance is likely to result in an ebike that is difficult to ride and manoeuvre.

Whether you decide to convert your existing bike or purchase a complete electric bike depends on what you're hoping to get out of your motor assisted bicycle. Either option will significantly increase what your bike is capable of, giving you a convenient, fun, fast, and affordable way to travel. In the end, though, while a conversion kit offers a quick and easy way to completely transform your bicycle, many riders have found that there's simply no way to replace the high level of performance provided by a complete electric bike, designed from the ground up to be a uniquely convenient, efficiently motorized hybrid vehicle.

Chapter Eight PREPARING TO BUY AN ELECTRIC BIKE

PREPARING TO BUY AN ELECTRIC BIKE

At this point, you've become much more familiar with what electric bikes are, how they work, and why many people see them as a particularly appealing way to travel. Equipped with this foundation of knowledge, it may be time to start preparing to actually purchase an electric bike of your own. Below are some tips and pointers that will help you navigate the electric bike marketplace so you can find the right bike for you.

WHERE TO BUY AN ELECTRIC BIKE

Electric bikes have become much more widespread in the last several years and there are now more options than ever when it comes to purchasing one for yourself. If you are in a market for an electric bike, there are three types of places you can buy from - traditional bike shops, specialty electric bike shops or online direct-to-consumer brands. Let's consider each one in turn.

Traditional bike shops - While initially resistant to the idea of an electric bicycle, many bike shops now carry at least a few electric bike models from which to choose. The two big advantages of buying through a traditional brick-and-mortar shop is that they are local and you can test ride one of their ebikes. On the other hand, the selection is likely to be limited, compared to other channels, the value is not always there, and the store associates are unlikely to have a deep knowledge of the components and the technology.

Specialty electric bike shops - In response to the increased popularity of electric bikes, there is also a small but steadily growing number of shops dedicated entirely to selling ebikes. If you're interested in checking out and purchasing an electric bike from a brick-and-mortar shop, this is a good option. An ebike store is likely to carry a much greater selection and

they'll have the knowledge and expertise needed to answer your questions. They'll also be best equipped to deal with any repairs or warranty issues that may arise.

Online direct-to-consumer brands - With most consumers now comfortable purchasing big ticket items online, the direct-to-consumer market for electric bikes is thriving.

Of course, shopping online also has its disadvantages. One potential drawback to buying an electric bike online is the difficulty of test riding a bike before you buy it. While a brick-and-mortar e-bike store makes it possible to immediately hop on a bike and give it a test ride, shopping online requires that you contact the manufacturer or retailer to see if they can arrange a way for you to test ride a bike. The other big drawback is the problem of what to do if you have any problems with the bike. It can be very costly to return the bike and a lengthy wait to receive any replacement parts and then you will need to pay to have them fitted.

THE DETAILS: WHAT YOU SHOULD ASK RETAILERS

Whether you buy your electric bike online or from a brick-and-mortar retailer, there are a number of important questions you need to ask to figure out if a particular ebike model is right for you. The familiarity with electric bikes you've gained by reading this guide will help you have meaningful conversations with ebike retailers since you'll go into these conversations with a strong foundation of knowledge already in place. This foundation will ultimately become the base from which you make your purchasing decisions.

When you start talking to e-bike retailers, here are the ten most important questions you should ask:

1. Does the bike have a hub motor or a mid-drive motor? As discussed earlier, the two dominant ebike motor configurations are the rear hub and the mid-drive. The two types of motors are suited for different applications.

The mid-drive motor generates significantly more torque, resulting in more power to climb steep hills. The power also comes through the chain, resulting in a more natural feel. However, ebikes equipped with the mid-drive motor are usually more expensive.

The hub drive motor often has a comparable power output rating but does not benefit from the torque multiplication and gearing reduction of the mid-drive motor. As a result, the hub drive ebikes are typically less capable of climbing steep hills. That said, hub drive equipment electric bikes are more affordable and can be a good first ebike for a new owner.

2. How powerful is the motor? The power of an ebike motor is described in terms of how many watts it generates; most electric bike motors fall somewhere in the range of 250 - 750 watts.

In general, if you're riding in an area that doesn't have a lot of steep hills, if you plan on using motor assistance sparingly, and if you weigh less than 90kg, a 250 -watt hub or middrive motor should be enough to give you a great riding experience. If, on the other hand, you'll be riding up a lot of steep hills, if you plan on using primarily motor assistance, or if you weigh over 90kg, a mid-drive motor in the 350 -to-750-watt range is probably a good idea since it will provide the extra torque needed to quickly motor up hills and respond to changes in your riding conditions or needs. A hub motor, even with a 750-watt power output rating, might not generate enough torque to climb hills seamlessly.

3. What type of electric assistance does the bike provide? The main thing you want to know when asking this question is whether the bike offers electric assistance only while the pedals are being cranked or if it also offers a power on demand option. If you know there will be times when you want to stop pedalling and let the motor take over, then be sure the bike you're looking at offers a full throttle mode.

4. What's the bike's maximum speed? In most places in Australia, electric bikes cannot legally go faster than 25 kph, but beneath that threshold there is still some significant variance in the speeds different ebikes can reach.

The speed you need your electric bike to travel depends on where you live, how quickly you'd like to ride, and how heavily you plan on using the bike's motor. In general, though, e-bikes capable of hitting the top legal speed of 25 kph prove to be the most convenient and helpful, allowing riders to run errands, complete commutes, and get from here to there as quickly and efficiently as possible.

5. How do riders engage and control the motor? Ebikes come with a variety of different mechanisms for engaging and controlling the motor, including sensors that gauge a rider's speed or pedalling torque and then trigger the motor to respond accordingly, throttles or triggers that give riders manual control of the motor, digital control panels, and any number of combinations of sensors, controllers, throttles, and triggers.

Understanding exactly how any particular ebike engages the motor is an important factor in determining whether or not it will give you the kind of riding experience you're looking for.

6. What sort of drivetrain does the bike have? Effectively combining the mechanical efficiency of the bike's drivetrain with the power and torque of its motor is one of the best ways to fully maximize the overall performance of an electric bike. You'll want to know whether the bike is a single speed—which limits your ability to fine-tune your riding experience and may force you to rely more on the motor—or if it has multiple gears—which gives you a broader range of riding options and makes it easier to climb hills.

You'll also want to know if the bike uses a derailleur to shift through gears or if it comes with an internal-gear hub like the NuVinci. Derailleurs require riders to have a good grasp of how to shift through gears to respond to changing terrains, while something like the Enviolo NuVinci transmission offers a more seamless, intuitive approach to adjusting to changes in terrain, weather, or other factors.

7. What type of battery does the e-bike come with? Currently, lithium batteries are the lightest, most efficient, best batteries to use on electric bikes, so be sure the ebike you're looking at uses a high-quality rechargeable lithium battery.

8. What's the battery's range? Once you know that the bike, you're interested in uses a highquality lithium battery, it's important to figure out what the battery's range is. In the electric bike industry, this is generally described in terms of how many kilometres a rider can go before needing to recharge the battery.

The range of the battery you need depends on the type of riding you plan on doing. If you plan to use more motor power than pedal power, then you'll be using your battery's charge quicker and will therefore need a larger range. If you plan to pedal a lot and use the motor assistance only periodically, you can probably use a battery with a smaller range. The length of your rides similarly impacts the type of battery you need: if, for example, you have a long daily commute then you probably need a larger range than someone who only goes a few miles each day. In short, be sure the range of the ebike you're looking at will conveniently cover the distances you plan to travel.

9. How long does it take to charge the battery? This information is helpful in figuring out more concretely what the actual experience of using an electric bike will be like. This will also help you figure out if a particular ebike model realistically fits your lifestyle and how well it meets your riding needs.

10. What sort of warranty does the e-bike come with? One of the great things about riding an ebike is that the majority of repairs can be done quite easily using conventional bicycle parts by a mechanic at your local ebike shop. However, because electric bikes also include their own unique components, most obviously the motor and battery, it's a good idea to buy an ebike with a strong warranty—just in case anything goes wrong. Shoot for an ebike that comes with at least a 2-year warranty.

As electric bikes have proven their usefulness as incredibly efficient, convenient, quick, and fun vehicles for everything from leisurely rides with friends and family to daily commutes and weekly errands, they have become more widely available to consumers in Australia. And while the number of brick-and-mortar ebike stores is still relatively small, there is already a huge variety of ebikes available online.

Regardless of where you end up buying your electric bike, it's important that you know the right questions to ask before making a purchase. Doing so will ensure that when you do finally buy your own ebike, you're getting the one that best meets your unique needs, interests, and expectations.

Chapter Nine ELECTRIC BIKES:PROS AND CONS

ELECTRIC BIKES: PROS AND CONS

As we begin wrapping up our discussion of electric bikes, it will be helpful to provide an overview of some of the most important information we've covered so far. To do this, Section 9 will summarize much of what you've read, bringing it all together into a comprehensive list of the pros and cons involved with owning an electric bike. As with

everything else in this buyer's guide, this list will be helpful to you as you navigate the world of electric bicycles in search of the perfect bike.

PROS

• Cheap transportation - Especially when compared to other types of transportation, electric bikes are very clearly one of the cheapest ways to get around. With an electric bike, you don't need to worry about paying for any sort of special license or registration, you don't have to pay for parking, and the cost of recharging a battery is immensely cheaper than both public transit fares and a tank of petrol.

• Improved health - Using an electric bike as part of your regular travel is a great way to introduce some physical activity to your everyday routine, and can contribute significantly to improved overall health. By using an electric bike, you guarantee yourself time and space to exercise your muscles, lungs, and heart while enjoying a bit of fresh air.

• Exercise that's right for you - Electric bikes can be especially empowering for those who would like to exercise more, but who have a health condition that limits the amount of physical activity they can perform. By controlling the amount of assistance, they receive from the motor, ebike riders can tailor the difficulty level of their rides to meet their unique health and fitness needs. This can be especially helpful to those with joint pain, exercise-induced asthma, heart or lung problems, or who are overweight.

• Enjoy time with friends and family - For many people, electric bikes make it possible to spend more time having fun with friends and family members, allowing them to join in on recreational bike rides. If you're new to cycling or struggle keeping up, an electric bike may be the key to getting out more often to enjoy leisure rides with those you love.

• Travel further - The assistance provided by the electric motor enables ebike riders to go further than they might otherwise be able to. The amount of effort required to cover 10 kilometres on a conventional bike, for example, can carry riders closer to 20 kilometres when combined with the power generated by an ebike motor.

• Sweat-free commutes - One of the biggest drawbacks to using a bicycle for your daily commutes is showing up at your destination hot, sweaty, and uncomfortable. By using an electric bike, however, you can complete the exact same rides while exerting only a portion of the physical effort. Electric bikes make two-wheeled commuting a much more viable possibility for many people, letting riders enjoy all the benefits of commuting by bicycle while eliminating many of its messiest drawbacks.

• Tackle obstacles - The extra boost of power provided by an ebike's motor make it possible to zip up hills, plough through headwinds, and tackle any other obstacle you might encounter on a bike ride without wearing yourself out or getting burned out. As a result, electric bikes provide a convenient, accessible, extremely enjoyable cycling experience to a wide and diverse range of riders.

CONS

• Significant upfront investment - It's not uncommon for people learning about electric bikes for the first time to be surprised by the cost of an ebike, which typically ranges anywhere

from \$1,500 to \$15,000. And while there's no getting around the fact that using an ebike requires a significant upfront investment, the good news is that once you've spent the money to purchase a high-quality electric bike, there are relatively few expenses required to operate it. Similarly, the cost of purchasing an electric bike is actually not too bad when compared to what it costs to buy a car or even a high-end bicycle.

• Heavier than conventional bikes - Even after dramatic improvements in ebike technologies and components, electric bikes remain noticeably heavier than conventional bicycles. This becomes a problem primarily when you're trying to transport the bike or when you're out on a ride and the battery dies.

• More specialized, complex parts - While the majority of ebike parts are standard bicycle components that are easy to find, replace, and repair, there are also a handful of highly specialized components that are unique to ebikes. Because these parts tend to be a bit more complicated and can sometimes be harder to find, it can often be more difficult and more expensive to repair a specialized ebike component than a more conventional bicycle part.

• Confusing legal status - Because electric bikes are still relatively new to Australia, there can be a bit of confusion when it comes to the way they're viewed by the law. In general, electric bikes with a maximum speed of 25 kph and motors rated at 250 watts are treated the same as any other bicycle, which means they can be ridden on bike paths and in bike lanes and don't require any special licensing or registration.

The table below summarizes the primary advantages and disadvantages of using an electric bike, giving you a quick, at a glance resource to use as you consider becoming an ebike owner:

Pros	Cons
Cheap transportation	Expensive initial investment
Improved health	Heavier than conventional bicycles
Tailor exercise to your needs	Specialized, complex parts
Time with family and friends	Potentially confusing legal status
Increased range	
Sweat-free commute	
Tackle obstacles for easy ride	

FINAL THOUGHTS

Electric bikes can help riders of all ages, skills and physical abilities live more active lives but they are not perfect. Being aware of the ways that ebike use can be incredibly beneficial, as well as some of the challenges involved with buying and using an ebike, will make you a well-informed, savvy consumer, ready to make the best possible decision when it comes time to select and purchase an ebike of your own.

As you make this decision, keep in mind that while there are certainly disadvantages to owning and using an electric bike, it seems that many people have decided that the

advantages of riding an ebike far outweigh any potential drawbacks. Perhaps this is one reason why ebikes are fast becoming one of the most popular and widely used forms of transportation in the world today.

Chapter Ten THE FUTURE OF ELECTRIC BIKE TRANSPORTATION

THE FUTURE OF ELECTRIC BIKE TRANSPORTATION

There has never been a more exciting time than now to become an electric bike owner. Having established itself as a hugely popular, effective, and important mode of transportation in countries around the world—most notably China and several nations throughout Europe– the electric bike is beginning to take off in the United States and Australia as well.

The primary appeal of an electric bike is its unique ability to combine pedal power with motor power, giving riders an unprecedented level of control over their riding experiences. By allowing riders to choose precisely how much power the motor will provide, ebikes have quickly become some of the most flexible and accessible vehicles in the world.

Whether it's used to go on recreational rides with family or friends, as a way to get back into shape, or as a vehicle for completing your daily commutes, an electric bike is the key to easy, comfortable, and convenient travel.

AN UP-AND-COMING TECHNOLOGY

By becoming an ebike owner in 2022 you place yourself at the forefront of a transportation movement that's revolutionizing cycling, especially as it becomes increasingly important for Australians to find affordable, quick, easy, and convenient ways to get around. With a huge jump in ebike ownership in the last 5 years and plenty of room to grow, the Australian electric bike market will continue to expand quickly.

One of the key reasons for the rapid growth in ebike use is improved technology—as batteries and motors have become more efficient, durable, and lightweight, electric bikes have become increasingly viable vehicles for everyday travel. These improvements are also what make now such an opportune moment to become an ebike owner. With today's super-efficient, lightweight components, an electric bike can empower you to travel conveniently and affordably, all while having a good time.

CONCLUSION

Now that you've completed this buyer's guide, you should have all the knowledge you need to make a smart and well-informed decision as to precisely which ebike is right for you. As you start looking at specific ebike models, talking to retailers, and figuring out which bike you should buy, be sure to keep in mind your specific needs, interests, and expectations. These should include the type of riding you want to do, your current health needs, your goals for getting an ebike, and what sort of terrain you'll be riding across.

With all this in mind—and equipped with your expert knowledge—you can confidently dive into the exciting, dynamic, and rapidly expanding world of electric bikes. Good luck and enjoy the ride!

Chapter Eleven TRANSPORTING ELECTRIC BICYCLES

TRANSPORTING ELECTRIC BIKES

When trying to transport an ebike, weight, shape, and size are some of the most important factors that need to be taken into consideration.

And while in the past it may have been difficult to find ways to transport an ebike, manufacturers and bike rack companies today are developing new transportation solutions in response to the rising popularity of electric bikes. Below we outline some of the best, most convenient methods currently available for transporting electric bikes.

CAR RACKS

There are three main types of car racks: roof racks, rear racks that strap onto the trunk or rear window, and hitch racks. When transporting electric bikes, it's best to use hitch racks, as these are typically the strongest and therefore the safest way to haul ebikes. Since whichever rack you'll eventually be using will be carrying a decent amount of weight—especially if you're hauling multiple ebikes at once—you should probably stick with racks that mount to the car using a 50mm tow ball.

The next thing to think about is weight. Since many car racks are designed to hold and carry conventional bicycles, which are typically much lighter than ebikes, it's important that you pay attention to the weight capacity of a rack when figuring out which one to use. In general, go with racks that can hold at least 30kg bikes. Most racks are made to hold more than one bike at a time, so be sure that if you're getting one of these it's rated to carry multiple 30kg bikes.

Today, it's becoming more common for rack manufacturers to sell racks built specifically for ebikes.

FOLDING E-BIKES

Another possible method for transporting electric bikes is to use a folding ebike. Folding bicycles typically use some sort of hinged joint and quick release fasteners to allow riders to quickly change the bike between rideable size and collapsed transporting size. This type of ebike could be a good option if you know you'll be using your bike in conjunction with some other form of transportation—a train, boat, RV or caravan —or if you have very limited storage space at your home or office.

Folding electric bike design has improved significantly over the last couple of years. Electric folders used to have an awkward frame design, tiny motors and a very limited range. Fortunately, this is no longer the case. Many of today's folding ebikes feature comfortable ergonomic frames, fully-integrated batteries and even powerful mid-drive motors on par with their full-size siblings. In other words, technology innovation has largely eliminated the necessary trade-offs between size and capabilities.

Whichever solution best suits your needs and lifestyle, the popularity of electric bikes means now there is a myriad of options when it comes to transporting your electric bike. So go ahead and take your new ebike on that road trip or bring it along in your RV or caravan to explore new areas you visit.

Chapter Twelve ABOUT REVOLUTION E-BIKES

Revolution E-bikes Pty Ltd is the largest specialized E-Bike store in the South-West of W.A. We only sell and service E-Bikes and have an increasing range of E-Bike accessories. We are owned and operated by locals and stock e-bikes that are specific for use in our region.

We have 14 different models in our outstanding own brand range (Revolution) to suit your E-Bike needs from the Street Cruiser to Mountain Bikes to E-Trikes. We also sell two models of the ever-popular foldable e-bikes that you can take anywhere including on your caravanning holiday.

All our bikes have been specifically designed and built with top quality in mind. From the top grade alloy #6061 frames to the Bafang electric motors and hydraulic disc brakes, all our components are carefully chosen to enhance your riding experience and ensure that you get many years of trouble free cycling. Our e-bikes are backed by an Industry Leading 2 year warranty on all electrics and 3 years on the Frames.

Why choose revolution e-bikes?

- We live locally and support local businesses.
- We only sell quality electric bikes and accessories at the best prices.
- We have South-West WA's largest range of quality electric bicycles in store.
- We don't just sell electric bicycles; we match them to the specific requirements and size of the individual. This guarantees our customers a long-term investment in fun, fitness and freedom.
- We live and breathe electric bikes, it's all we do every day.
- We provide a full after sales in-store workshop service, including a 2 month free safety check and service for every bike sold.
- You can test ride any bike in the shop. We guarantee it will put a smile on your face!
- Our electric bikes comply with Australian Standards, making them street legal.
- We sell all the accessories you need for your bike.
- All our bikes come with a 2 year manufacturer's electrical component warranty (including motor & battery) & 3 years on the frame. Proving that our bikes are built to last.



E-BIKE TERMS YOU NEED TO KNOW

TORQUE \rightarrow Measured in newton-meters (or Nm), torque is a rotational measurement of force—and the number to pay attention to when you want an idea of an e-bike motor's output. More torque means more power off the line and more boost to your pedaling. The heavier the bike, the more torque it needs. Lighter road bikes typically have 30 to 40Nm of torque, trail and cargo models have at least 80Nm, and most commuter bikes fall somewhere in between.

WATT HOURS \rightarrow The size of an e-bike's battery is measured in watt hours (or Wh), which represent the amount of energy stored in the battery and how many watts it can deliver each

hour. The higher the number, the bigger the range, but the faster you go, the less range you get. So figure, if a 504Wh battery paired with a 500-watt motor gives you one hour of ride time at the highest assist, riding at about half that power will double your range.

Glossary

ASSIST MODES: These are the different modes that allow the rider to control the level of motor assistance on offer. All Revolution E-Bikes have 5 levels of assist modes.

RANGE: The range refers to the distance an e-bike can travel while assisting the rider.

TORQUE: A measure of force on a rotational axis. More torque offers a higher rate of acceleration when the assistance is given to the rider.

WATTS: A measure of the motor's power. In Australia, pedal-assist e-bikes can legally provide up to 250W of power assistance before the motor dramatically scales down its assistance to 0%.

WATT-HOURS: A measure of a battery's capacity. A 200Wh battery can produce 200W of power for one hour.