The Complete Electric Bike Buyer's Guide

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What is an electric bike? An electric bike—or e-bike for short—is, first and foremost, a bicycle. It uses the same designs and components as any other bicycle, but also includes an electric motor that gives riders an extra boost of power. This motor, which is powered by a rechargeable battery, ultimately provides a smoother, more convenient, and less strenuous cycling experience, making electric bicycles the world’s most accessible way to get around by bike; in fact, over 200 million of them are already on the streets today!

Because an e-bike’s motor effectively eliminates many of the obstacles that keep people from cycling—obstacles such as steep hills, health or fitness difficulties, and commutes that leave riders tired and sweaty—some people think that riding an electric bike is in some way cheating. This is simply not the case. In fact, the exact opposite is true—e-bikes make it possible for people to become avid bike riders who otherwise may not be able to ride a conventional bicycle.

To illustrate this, imagine a person who would like to use a bicycle to get to work every day but doesn’t, primarily because pedaling up the two hills on the route would leave them worn out and sweaty. With an e-bike, it suddenly becomes possible for this person to become a bike commuter. They can let the motor help them up those hills quickly and easily, without any additional strain, and mostly pedal on the rest of the commute.

Similarly, picture a couple who wants to take recreational bike rides with their children and grandchildren, but who struggle to keep up because of health conditions and aging joints. The motor assistance provided by an electric bike makes it possible for this couple to hop on their bikes and head out with their family, relying on the motor to help them pedal confidently, comfortably, painlessly, and effortlessly.

By allowing riders to decide precisely how much or how little they pedal, e-bikes actually make it possible for a large variety of people to enjoy the many benefits of cycling. Regardless of age, body type, health condition, cycling experience, or fitness level, anyone can ride an electric bike. Far from being a cycling cheat, then, electric bikes make the freedom, exhilaration, and satisfaction of cycling available and accessible to more people than ever before.

A BRIEF HISTORY

The idea of creating an electric bike has intrigued cyclists since the late 1800s, when several American inventors experimented with the possibili-
ty of combining the potential power of the electric motor with the simple mechanics of the bicycle. These early attempts, however, failed to produce a usable electric bike since the motors and batteries used then were still too heavy, inefficient, and limited in range and capacity. Technological advancements of the late 20th century finally made the idea of a usable electric bike a reality.

Improvements in motor design throughout the 20th century had already resulted in more efficient, smaller, and lighter motors ideal for attaching to bicycles. Add the explosive growth of computer technologies of the last few decades that produced small, lightweight, ultra-efficient, rechargeable batteries ideal for providing power to compact electrical motors, and e-bikes suddenly became a realistic transportation option.

By using lighter, more compact batteries to power equally compact and powerful motors, electric bike builders are now able to create visually attractive and highly efficient electric bicycles that handle well and significantly expand the scope of what’s possible for two-wheeled travel.

THE GLOBAL POPULARITY OF ELECTRIC BIKES

Electric bikes are becoming increasingly popular throughout the world, as more and more people look for efficient, affordable, accessible, and eco-friendly ways to travel. In recent years, electric bike use has skyrocketed in Asia, with China recognized as the de facto world capital of e-bike use. According to The New York Times, electric bicycles are hugely popular in China where the number of electric bikes on the road jumped from “a few thousand in the 1990s” to about 120 million electric bicycles in 2010.2

The dramatic expansion of electric bikes in China has helped spur similar

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growth in other parts of the world. In Europe, the second largest market for e-bikes, electric bicycle use has been steadily on the rise. In 2006, there were approximately 98,000 electric bikes sold throughout Europe, while that number rose to 907,000 by 2013.³

Electric bikes are also gaining increasing popularity in the United States. E-bike sales rose sharply from about 70,000 in 2011 to 159,000 in 2012, with some predicting figures as high as 340,000 by 2018⁴. Today, e-bikes are experiencing explosive growth in the US as they move increasingly into the mainstream.

The dramatic improvements in electric bicycle technology and capabilities, as well as the rapid growth in the popularity of electric bicycles in recent years, have all made the prospect of owning and riding an electric bike particularly exciting. Whether chosen 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 commute, environmentally-conscious travelers hoping to decrease their emissions footprint—or anyone in between—it is apparent that e-bikes are changing the way that people think about using a bicycle.

WHAT TO EXPECT IN THIS BUYER’S GUIDE

With some basic e-bike history under your belt, it’s time to figure out whether or not an electric bike is right for you. In the pages that follow, you’ll learn everything you need to know about e-bikes in a succinct,


straightforward, and easy-to-understand format. In particular, this information will help you understand:

- Why e-bikes make great all-around vehicles,
- What kind of an e-bike rider you are,
- What types of e-bike models, options, and technologies exist,
- Which e-bike components and designs will best meet your needs,
- Shopping for an e-bike that gives you exactly what you’re looking for,
- How to get the most out of your e-bike.

Put simply, this buyer’s guide was written to help you figure out what you need from an electric bike and to guide you in making an informed purchase. We believe e-bikes are truly incredible vehicles that can become a fun, positive, productive, helpful, and efficient part of your everyday life, and we hope the information in this buyer’s guide will help you choose the perfect electric bike.
One of the most interesting and exciting things about electric bikes is how they bridge the gap between human-powered bicycles and motor-powered vehicles. This combination helps make e-bikes especially helpful, appealing, and accessible to a diverse range of riders.

While electric bikes share many similarities with both conventional bicycles and various types of motorized vehicles, they are ultimately in a class all their own. In this section, we’ll explore more thoroughly just what it is that makes an electric bike so unique.

**ELECTRIC BIKES VS. CONVENTIONAL BICYCLES**

As mentioned in the Introduction, electric bikes are defined as bicycles that have been equipped with an electric motor and a small battery, both of
which are integrated into the bike’s drive system. These additions are what make an electric bike different from a conventional bicycle, and what also makes possible a different, more accessible, and more flexible riding experience.

E-bikes are built in one of two ways: (1) they are designed specifically as electric bikes and feature built-in electric components; or (2) a conventional bicycle is converted into an e-bike through modification.

In either case, many similarities exist between electric bicycles and conventional bicycles. Most importantly, the huge majority of electric bikes are fundamentally based on classic bicycle designs and feature commonly used bicycle components such as standard-sized wheels, tubes, tires, stems, handlebars, forks, braking systems, seats, and multi-gated drivetrains comprised of standard-sized cranks, pedals, chains, and derailleurs. This makes it easy to find replacement parts and to make basic repairs to an e-bike. 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 a motor.

The purpose of adding this motor 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 range of riding options, including fully human-powered pedaling, a combination of pedaling and motor assistance, and fully motorized riding, allowing riders to fine-tune their riding experiences to meet their specific needs and demands.

With an electric bike, for example, older or inexperienced cyclists can confidently head out on rides knowing that if the terrain becomes too difficult, or if they start feeling tired, 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 can also use the motor to help them pedal up hills without breaking a sweat so they can arrive at the office clean, refreshed, and ready to work.

Along with providing different types of riding experiences, there are also some differences between e-bikes and conventional bikes when it comes to overall cost and bicycle specifications.

Electric bikes are often a bit more expensive than their conventional counterparts, thanks primarily to the extra components included on an e-bike. This is really only the case, however, with entry-level models. As soon as you start comparing mid-level and higher-end models, the cost of purchasing a high-quality road or mountain bike is actually pretty close to what it costs to purchase an electric bike of equal quality.

As far as model specifications go, e-bikes tend to weigh more than conventional bicycles, which could mean that transporting an electric bike is a little more difficult than a conventional bike. Fortunately, new solutions to this potential challenge are appearing on the market all of the time. The added weight and bulk of an electric bike also means that pedaling it without any motor assistance may be slightly more challenging than pedaling a lighter, more conventional bicycle. Keep in mind, however, that riding an e-bike with no motor assistance is certainly possible and many riders do so the vast majority of the time.

When comparing e-bikes to conventional bicycles, it’s important to highlight the fact that many e-bike riders turned to electric bikes precisely because riding a conventional bicycle was, for one reason or another, simply not a viable option. For many, the choice is not between riding a conventional bicycle or riding an electric bicycle, but between not riding a bike at all or riding an electric bike. When viewed from this perspective, it becomes apparent just how much e-bikes have done to open up the world of cycling, making it possible for anyone and everyone to enjoy the many opportunities and benefits of riding a bike.
ELECTRIC BIKES VS. MOTORIZED SCOOTERS

Electric bikes are sometimes confused with motorized scooters, mopeds, and small motorcycles. 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 include:

**Pedals**
As discussed above, what makes the electric bike so unique is the way it functions as both a bicycle and a motorized vehicle. The fact that an electric bike has pedals that can be used either exclusively or in combination with the motor clearly differentiates them from motorized scooters, mopeds, 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 the United States, the majority of electric bikes use motors that generate between 250 and 750 watts, with a maximum speed of up to 20 mph when in motor-only mode. Of course, an electric bike can go faster than 20 mph depending on how hard the rider is pedaling. Motorized scooters and mopeds, on the other hand, travel around 30-40 mph and feature more powerful motors.

**Where They Can Be Ridden**
Typically, electric bikes are allowed on bike lanes, bike paths, and anywhere a regular bicycle is allowed. This is in contrast to motorized scooters and mopeds, which are restricted to regular traffic lanes.

**No License, Registration, or Fees**
In general, electric bikes are viewed by the law as more similar to a conventional bicycle than a motorized scooter, moped, or motorcycle. This means
that riders are not required to have a driver’s license to operate an electric bike and are not required to obtain any special licensing or registration. Conversely, motorized scooters, mopeds, and motorcycles are generally classified as motor vehicles that require a driver’s license, registration, and are allowed only on the street. It’s important to note, however, that specific laws, rules, and guidelines governing electric bike use may vary from city to city and from state to state.

**ELECTRIC BIKES VS. CARS**

Electric bikes represent a real, viable alternative to traveling by car, especially for those who live in urban settings or who might be looking for options for short or frequently traveled routes. Obviously, cars can travel at much higher speeds and are capable of covering much longer distances than electric bikes, but as a means of traveling shorter distances where speed is not a factor, electric bikes offer a few unique possibilities.

**Easy Urban Commuting**
For urban commuters, an electric bike provides a more convenient way to travel—using bike lanes instead of waiting in traffic, locking up at bike racks instead of paying expensive parking fees, and choosing the additional flexibility of walking the bike on the sidewalk or using it in tandem with public transportation.

**Healthy Lifestyle**
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, healthy, and fit lifestyle.

**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 use, maintain, and repair than cars.
Eco-Friendly Travel
Since electric bikes use small, highly efficient, rechargeable electric batteries instead of gasoline, riding an electric bike is an environmentally friendly way to travel, reducing fossil fuel consumption and helping to decrease pollution from car emissions.

ELECTRIC BIKES AND LIGHT ELECTRIC VEHICLES

As people around the world seek out cheaper, quicker, more convenient ways to travel, a new class of vehicle has emerged: the light electric vehicle, or LEV for short.

An LEV is “a land vehicle propelled by an electric motor that uses an energy storage device such as a battery or fuel cell, has two or three wheels, and typically weighs less than 100kg.”6 LEVs are considered to be a distinct category—separate even from other electric vehicles such as electric cars—because of their small, compact size and their incredible energy efficiency, both of which make LEVs ideal for daily commutes and short pleasure rides.

When placed in the context of LEVs and other types of electric vehicles, e-bikes are generally more compact, easier to ride, and relatively affordable. Electric bikes are unique in being designed and constructed to combine human-generated power with motor-generated power to create a highly efficient, convenient, and enjoyable way to travel.

All of this helps explain why electric bikes are currently the world’s most popular, most widely-used electric vehicle, despite the fact that relatively few people in the US are even aware they exist. Globally, there are over 200

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million e-bikes on the road today, with nearly 40 million sold every year. If nothing else, this huge market in electric bikes indicates that they are much more than simply a niche product benefiting only a small group of people.

E-bikes are, in some basic and fundamental ways, similar to an electric hybrid car. Both attempt to bring together multiple sources of power to create a super-efficient mode of transportation. The key distinction, however, is that e-bikes very uniquely combine electrical power with human power.

In so doing, electric bikes differentiate themselves from all other vehicles. They draw on the best of what an automobile has to offer, and the best of what a conventional bicycle has to offer, bridging the gap between the two and creating in the process a truly unique way to travel.
There are numerous reasons why a person—regardless of their familiarity or experience with bicycles—might choose to ride an electric bike. This section will outline some of the most important reasons why people around the world are increasingly coming to see e-bikes as a unique and particularly effective mode of transportation.

**ELECTRIC BIKES MAKE RIDING CONVENIENT, EFFORTLESS, AND FUN**

The most common reason people choose electric bikes is simply that they want to ride a bicycle, but conventional ones are for some reason an unrealistic option for them. Maybe they live in an area with too many hills, maybe they don’t want to arrive at their destination sweaty and have to shower and change when they get there, maybe they have a health condition or injury that makes pedaling unsafe or uncomfortable, or maybe a convention-
al bike makes it too hard to keep up with the friends and family they want to spend time with.

Regardless of an individual’s specific challenges, the main point is that if someone wants to ride a bicycle, but pedaling a conventional bike is not the best option for them, an e-bike may be the solution they’re looking for. The motor assistance of an electric bike truly puts the rider in charge, allowing them to decide how much they pedal, how physically challenging the ride is, and when the motor takes over. All of this makes riding convenient, effortless, and fun, so that anyone and everyone can hop on an e-bike and enjoy the ride.

**ELECTRIC BIKES CONTRIBUTE TO A HEALTHY LIFESTYLE**

Whether you use an e-bike for recreation, as a vehicle for your daily commute, or specifically as a way to work out, an electric bike can help you lead a more fit, active, and well-balanced lifestyle. Introducing an electric bike into your regular travel transforms your daily commute into an opportunity for physical activity and a chance to catch some fresh air. Even if you end up using a significant amount of motor assistance along the way, the time you spend riding your e-bike is guaranteed time away from the usual daily grind during which you choose how much or how little physical energy you want to use pedaling.

For those who use their bike specifically as a workout tool, electric bikes offer a particularly accessible, flexible, and effective way to exercise. While a conventional bicycle requires you to exert yourself constantly to maintain a steady pace throughout the ride, an e-bike allows you to control the amount of effort you put into the ride. This means that as you’re initially getting back into a regular exercise routine, you can use a high degree of motor assistance, but as your legs and lungs strengthen, you may find yourself doing more pedaling and using less motor assistance.
Because electric bikes give riders such a high degree of control over how much they exert themselves, they are particularly helpful for anyone who would like to become more fit but who may need to gradually and carefully ease into increased physical activity. E-bikes, therefore, provide an especially helpful way to exercise for those:

- Facing issues with aging,
- Who are new to working out,
- Looking for a low-impact workout,
- Recovering from an injury or illness,
- Returning to physical activity after a prolonged period of inactivity,
- Who haven’t ridden a bike in years but want to get back into it.

When it comes to using an e-bike to exercise, many people voice the concern that they might somehow be “cheating” if they’re not pedaling for the entire ride. The reality of how e-bike owners actually use their electric bikes negates this concern. Studies have found that, on average, electric bikes are used far more frequently than conventional bicycles. Often, newly purchased regular bicycles end up sitting dormant and largely unused in garages, while the majority of newly purchased e-bikes are ridden somewhere around 3-4 times per week.

This means that far from cheating on your workouts, using an e-bike is a good way to ensure that you’ll actually follow through with your workout plans. We’ve found that electric bikes provide such a positive, user-friendly riding experience that e-bike owners love getting out and riding as often as they can.

**ELECTRIC BIKES CONTRIBUTE TO WEIGHT LOSS**

Because e-bikes make it easier and more enjoyable to get out and ride, they are excellent tools for helping people lose weight. To begin with, pedaling a bicycle for any significant distance can be a daunting and potentially
overwhelming task for a person struggling with weight issues. But with an e-bike, these riders can head out for rides more confidently than ever before knowing that the motor is there to help whenever they might need it. As they begin losing weight and become more comfortable pedaling, they can always scale back the amount of motor assistance used and increase the amount of pedaling.

Simply put, electric bikes make cycling accessible to those struggling with weight loss issues, opening up possibilities for working out that might not otherwise have been possible. With an e-bike, people hoping to lose weight are more likely to actually go on bike rides, which ultimately increases their ability to meet their fitness and weight loss goals.

As one e-bike rider described: “I bought an [e-bike] at the end of January and have enjoyed it more than any biking experience ever! In less than 90 days I have lost 25 pounds already! And it has been fun. I have 6 bikes and sometimes [I] don’t go riding because I’m too tired, but with my [e-bike] I go anyways because I know I have a little ‘push’ with the electric motor.”

**ELECTRIC BIKES ARE THE PERFECT WAY TO COMMUTE**

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 commuting on an electric bike, you no longer have to worry about arriving at your destination feeling tired, sweaty, or worn out—the bike’s motor takes care of the strenuous portions of the ride while still allowing you to mix some physical exercise into your daily routine.

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The bike’s motor assistance also makes it easier to carry groceries or shopping bags, making an e-bike the perfect vehicle for day-to-day errands. Finally, with an e-bike you use bike lanes and take bike paths instead of sitting in traffic, and you lock up at bike racks instead of paying parking lot fees.

**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. Time formerly spent in the car waiting for traffic to clear during rush hour can be freed up by the judicious use of bike lanes and bike paths.

Examples of money-saving opportunities include:

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

- If you have a mobile home or RV, e-bikes are perfect for “last mile transportation.” Just bring your electric bike with you on your travels, and you have a convenient, quick, affordable way to get around and explore once you arrive at your destination.

- Electric bikes can help you save money by allowing you to avoid car-related fees such as tolls for bridges, highways, etc.

- Recharging an electric bike battery is significantly cheaper than filling a car
with gasoline or paying to use public transportation. On average, you can expect to get up to 500 miles of electric-only riding for only about $1 worth of electricity.\textsuperscript{8}

The cost of repairs and general up-keep for an electric bike is far less than the cost of maintaining and repairing a car.

Overall, an electric bike takes you much farther for much less money than any other form of transportation. As mentioned, an electric bike can travel up to 500 miles on just $1 of electricity—roughly 100 times farther than using a car or public transportation, and 35 times farther than a hybrid car.\textsuperscript{9}

\textbf{ELECTRIC BIKES ARE GOOD FOR THE ENVIRONMENT}

Another reason people choose to ride electric bikes is the comparatively small environmental impact they make. The simple facts remain—an electric bike requires no gasoline or oil, emits no pollution, and requires only a small amount of electricity to recharge its battery. Consequently, e-bikes are increasingly becoming an attractive option for environmentally-conscious travelers.

In fact, the small environmental footprint of e-bikes has focused significant attention on them in recent years. Researchers continue to study the ways electric bikes may fit into efforts to make cities and communities more eco-friendly and sustainable. One of the most important of these studies found that “in addition to being light and relatively inexpensive, e-bikes are also more climate-friendly than other modes of transportation,


\textsuperscript{9} Ibid.
including gasoline- or diesel-powered cars and buses, and even electric passenger vehicles.”\textsuperscript{10}

This is primarily because e-bikes are so much lighter than electric cars—or any other vehicle for that matter—that their motors have significantly less mass to move. The energy expended on an e-bike ends up going much farther and is used much more efficiently than energy expended in an electric car.\textsuperscript{11}

**FINAL THOUGHTS**

While there are any number of reasons that a particular cyclist might choose to ride an electric bike, the information outlined in this section should give you a good sense for some of the most common and most compelling reasons e-bike users love riding their electric bikes. Whether it’s an easy way to get around town, an affordable way to run errands, an effective way to work out or lose weight, a good way to spend time with family and friends, or anything else, at the end of the day, many people choose to ride electric bikes simply because they’re fun to ride.

As so many people around the world have already discovered, electric bikes provide a riding experience that so perfectly meets their specific interests and various needs that riding one very naturally becomes a regular—and enjoyable—part of their everyday lives. In the end, it’s all about fun, recreation, freedom, and accessibility, and electric bikes make it possible for people to enjoy the biking experience who otherwise might not be able to.


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—and how they can meet your unique needs, interests, and expectations.

**ASSESSING YOUR NEEDS**

The starting place to figuring out how an e-bike can become a meaningful part of your daily life is to assess specifically what it is you need from an electric bike. When thinking about this, some of the most important factors to consider are:

**Personal Biking Objectives**

One of the greatest things about e-bikes is that they can be used for
such a wide variety of purposes. The specific objectives you have for wanting to ride an e-bike will play an important role in helping you determine which specific e-bike will be best for you.

If you plan on using your e-bike to complete a daily commute to work or school, you’ll want to look for a bike with the motor and battery capabilities best-suited to the distances and terrain you’ll be traveling every day. If your e-bike will be used for exercise, you may want a bike that offers greater control over when the motor kicks in and how much assistance it provides. If you’ll be using your e-bike for recreational purposes, then you’ll want to be sure that the range of the battery (before needing to be recharged) will be adequate for the type of rides you plan.

Health Condition
If you have a health condition that makes it difficult to pedal a conventional bicycle, an e-bike capable of providing a high level of motor assistance over long distances will give you the freedom and flexibility to enjoy bike rides painlessly, confidently, and comfortably. If your back tires easily, you may want to look for the type of frame that allows you to maintain an upright sitting position rather than leaning into the handlebars.

Age
Older cyclists may realize they now face stamina issues, but they still want to head out on rides without having to worry about getting tired halfway through. Such riders should focus on finding an e-bike that’s been designed to carry riders over longer distances. That way you can more fully enjoy your time on the bike, confident that its motor and battery will give you whatever assistance you may need to complete the ride.

Body Type and Weight
E-bikes offer an especially accessible form of biking, making it possible for people of all sizes, shapes, and body types to enjoy the experiences and benefits of cycling. In order to get the most out of your e-bike, it’s
important to match your bike to your body type. If you weigh more than 200 pounds, you’ll probably benefit from a more powerful motor. If you weigh less than 200 pounds, a less powerful motor will still be responsive and efficient enough to give you an enjoyable, convenient, and smooth e-bike riding experience.

**Fitness Level**
When thinking about what you need from an electric bike, your fitness level plays an important role in helping you figure out precisely which type of bike will best meet your needs. If you know that you’ll be using a high level of motor assistance every time you ride, you may want to look for an e-bike that gives you automatic motor assistance and that has a fairly long range. If, on the other hand, you plan on using a great deal of motor assistance now but hope to scale that back as you become a stronger cyclist, then an e-bike that gives you more flexibility to control and fine-tune the amount of assistance the motor provides might be a better fit.

**Terrain**
As far as terrain is concerned, hills are the most significant factor. If you live in a place that has a lot of steep hills, you are likely to need an e-bike that comes with a more powerful mid-drive motor, while a person riding over relatively flat terrain may be satisfied with a less powerful hub motor.

**How Far You Plan to Ride**
As you think about how you plan on using your e-bike and the terrain you’ll most likely be riding across, you should also think about how long your rides will be. To get the most out of your e-bike experience, you need to match the range of your bike’s battery to the distances you plan on riding.

Once you’ve begun identifying your unique needs, interests, and expectations, you can begin looking for an e-bike that meets them. The rest of this section, along with Section 5, describes the different types of e-bike mod-
els and designs currently on the market, as well as various components they come with. All of this will help you match your needs and interests with the e-bike that will give you the best all-around riding experience.

ELECTRIC BIKE CLASSIFICATIONS

Electric bikes are generally classified according to the way they activate and control the motor. Although this is a fairly broad way to classify and organize the large and rapidly growing world of electric bikes, it’s a great spot to begin when comparing your needs and interests to the types of e-bikes available for you to choose from.

THE PRIMARY TYPES OF ELECTRIC BIKES

Pedal-Assist
Pedal-assist e-bikes, also sometimes referred to as “pedelecs,” are e-bikes that use some sort of pedal assist system (PAS) to detect when the bike is being used in order to activate the motor accordingly. Simply put, as soon as someone begins riding this type of bike, the PAS kicks in and activates the motor assistance. From there, most pedal-assist e-bikes give riders the ability to select and control the degree of power provided by the motor. Riders can also turn the pedal assist off if they want to ride entirely by pedaling.

Because pedal-assist e-bikes provide automatic motor assistance every time you use the bike, they are good, flexible bikes that are perfect for all-around use. They are a particularly good option for those seeking the convenience and experience of a bicycle, but who already know they’ll be using a relatively high degree of motor assistance whenever they ride.

E-bikes within the pedal-assist category can be further classified according to the specific type of PAS they use. The first type of PAS is designed to detect pedal strokes—as soon as the pedals begin rotating, the sensor triggers the automatic motor assistance.
The other type of PAS uses torque sensors to detect not only when the pedals are being cranked, but more precisely, how hard they’re being cranked. A torque sensor can help the motor adjust more immediately to a rider’s changing needs. When it detects the greater torque generated by pedaling up a hill, it can direct the motor to provide additional assistance; when it detects the decreased torque of coasting down a hill, it can scale back the amount of assistance the motor provides.

Both types of PAS provide reliable and automatic motor assistance whenever the bike is in use, giving riders a smooth, user-friendly, and extremely convenient e-bike experience.

**Throttle-Only**

While pedal-assist e-bikes offer an automatic form of motor assistance that kicks in whenever the PAS detects that the bike is in use, “throttle only” refers to another type of electric bike that does not include any sort of PAS sensor, and for which riders use some sort of trigger or throttle to manually control the motor.

The only way to activate the motor on a throttle-only e-bike is to use the trigger or throttle. These e-bikes do not offer the same sort of automatic motor assistance that pedal-assist e-bikes do. Rather, throttle-only e-bikes put riders entirely in control of when the motor turns on or off, and how much power it provides, making it extremely easy to ride in either pedal-only or motor-only mode.

**Combination or Power-on-Demand**

Many of the of e-bikes currently being built and sold combine pedal-assist and throttle-only technologies. These bikes include both a manual throttle and a PAS, and are designed to give riders access to—and control over—an especially broad range of motor functions.

E-bikes that combine power-on-demand and PAS technologies allow riders to control whether or not the motor kicks in automatically, how much pow-
er the motor provides, and also lets them choose to ride in pedal-only or motor-only mode. In many ways, this type of e-bike is the most flexible in terms of giving riders complete control over how the motor operates and the degree and type of assistance it provides.

**IT’S ALL ABOUT CONTROL**

When thinking about the type of electric bike that will best meet your needs, one of the most important things to consider is the type and degree of control you want over the motor. If you know you’ll be using a fairly high degree of motor assist each and every time you ride, and don’t want to deal with manually turning the motor on and off while riding, then a pedal-assist e-bike could provide the simple, convenient, and automatic motor assistance you’re looking for.

If you plan on riding your e-bike in changing or varying riding conditions and terrains, or if you’re looking for the type of comprehensive control that will allow you to switch in and out of pedal-only and motor-only modes, then a throttle-only e-bike might be a good choice.

Finally, if you’re looking for a little bit of everything, and feel that you’d like some degree of automatic motor assistance, while also retaining the ability to control precisely when and to what extent the motor generates power, an e-bike that offers some combination of pedal-assist and power-on-demand is probably the best choice.

In the end, all e-bikes are specifically designed to expand what’s possible with a bicycle. Simply by having a motor to give you extra power, an electric bike enables you to bike farther, more comfortably, and with fewer obstacles than ever before.

To maximize the benefits you gain from moving to an e-bike, however, you should focus on fine-tuning your choice and matching your specific needs, interests, and expectations with the right electric bike. For the majority of
riders, and for most riding conditions, the combination of pedal-assist sensors with manual controls will provide the most flexible, accessible, and effective type of electric bicycle.
To become an electric bike aficionado—ready to make a fully informed decision about which specific model will best meet your needs and objectives—you need to understand how components such as the motor, battery, and drivetrain work together, as well as the various ways they may be configured on an electric bike.

In this section, we will outline and describe the primary types of motors, batteries, and drivetrains used on electric bikes, so that you can begin figuring out just what your ideal e-bike might look like.

**MOTORS**

Because the motor is such a crucial component of any electric bike, it’s important to understand a bit about the different types of e-bike motors available, and to have a sense of the advantages and disadvantages of each.
**Hub Motors** - A hub motor is situated in the hub of one of the bike’s wheels, and provides power by spinning whichever wheel it’s a part of. 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.\(^{12}\)

Hub motors are differentiated 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.

Front hub motors create the sensation that the bike is being “pulled” forward. Because they don’t have to work around chains, derailleurs, or cassettes, they’re relatively easy to install and remove. This also makes it easy to perform a wide variety of 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 usual.

In contrast to front hub motors, rear hub motors “push” the bike forward, which may feel more natural to those accustomed to riding conventional bicycles, which 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. In certain riding conditions, they can provide a smoother, more efficient riding experience.

However, rear hub motors can be tricky to install and remove since they have to work around derailleurs, chains, and cassettes. This 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 feel a 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.

Whether located in the front or the rear wheel, one of the biggest drawbacks to hub motors is their inability to take advantage of the bicycle’s already-existing set of gears, which means that they’re not as efficient as they could be. This is primarily because a hub motor generates power directly at the wheel and therefore has no direct interaction with the bike’s drivetrain.

**Mid-Drive Motors -** Known for providing an especially versatile, balanced, and powerful riding experience, mid-drive motors have moved to the forefront of the e-bike industry in recent years.

Instead of being located in the hub of one of the wheels, mid-drive motors provide power directly to the bike’s drivetrain, typically at the crankset. By delivering additional torque to the bike’s cranks, mid-drive motors work in seamless coordination with the bike’s already-existing gears, amplifying the mechanical advantage they provide. Because of this, e-bikes that use a mid-drive motor “can leverage the lower gears of the bike and keep their RPMs in an efficient range without getting ‘bogged down’ like a hub motor.”

In addition to efficiently complementing the bike’s existing gears, mid-drive motors can allow for more intuitive and user-friendly designs. Typ-

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ically attached to the bike somewhere around the bottom bracket, a mid-drive motor leaves the majority of components untouched, making it easy to repair or replace parts as needed. Similarly, the placement of a mid-drive motor closer to the bike’s center of gravity creates a more natural, better-handling riding sensation than a hub motor does. This more-natural feel tends to offset any potentially negative effects introduced by the motor’s weight.

All things considered, mid-drive motors provide a significantly better riding experience than hub motors. By working seamlessly with the bike’s drivetrain, mid-drive motors create an ultra-efficient, smooth-handling, well-balanced electric bicycle.

The table below summarizes the main advantages and disadvantages associated with each type of motor.

**HUB MOTORS**

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Most affordable option on the market today, due to its popularity and cheaper components</td>
<td>• Rear wheel hubs can be difficult to put on and take off</td>
</tr>
<tr>
<td>• Quick and easy way to convert a conventional bicycle to electric</td>
<td>• Rear wheel hubs can make it difficult to repair or replace parts</td>
</tr>
<tr>
<td>• Front hub motors are relatively easy to put on and take off</td>
<td>• Tend to produce an unbalanced riding sensation (front hub motors “pull” bike, rear hub motors “push” bike)</td>
</tr>
<tr>
<td>• Front hub motors don’t interfere with very many components, making maintenance and repairs fairly simple</td>
<td>• Hub motors do not take advantage of gears; inefficient use of power</td>
</tr>
<tr>
<td></td>
<td>• Tend to spin out on hills or in slippery conditions</td>
</tr>
<tr>
<td></td>
<td>• Additional torque may damage spokes, rims, fork, or dropouts</td>
</tr>
</tbody>
</table>
MID-DRIVE MOTORS

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provides power directly to bike’s drivetrain</td>
<td>• More expensive than hub motors</td>
</tr>
<tr>
<td>• Works in coordination with bike’s gears to maximize efficiency,</td>
<td>• Harder to use for converting a conventional bicycle to electric</td>
</tr>
<tr>
<td>speed, and power</td>
<td>• May add wear and tear to bottom bracket, cranks, chains, derailleurs,</td>
</tr>
<tr>
<td>• Located near the bike’s center of gravity to provide natural</td>
<td>or cassettes</td>
</tr>
<tr>
<td>riding sensation and smooth handling</td>
<td></td>
</tr>
<tr>
<td>• Doesn’t interfere with other components; simple to perform</td>
<td></td>
</tr>
<tr>
<td>repairs or maintenance</td>
<td></td>
</tr>
</tbody>
</table>

BATTERIES

The battery is quite possibly the most important factor when distinguishing a high-quality e-bike from a low-quality e-bike. It is actually the most expensive part on an electric bike, and if an e-bike builder skimps on the battery, the entire bike suffers, no matter how well-designed or chosen the other components are.

In many ways, the battery is the fundamental reason that electric bikes have emerged as promising options for travel and recreation in the 21st century. The highly efficient, relatively lightweight, rechargeable batteries currently in use are what make it possible for e-bikes to provide users with energy-efficient, long-range, reliable transportation.

The evolution of batteries, especially over the course of the last couple of 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 e-bikes was the ability to mass produce 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, and more reliable electric bikes.

The primary factor to consider when looking at electric bike batteries is the range of the battery, typically described in terms of how many miles you can travel on 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 miles you can get out of the battery. Conversely, if you use more motor assistance and pedal less, you’ll travel fewer miles on your battery. In any case, 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 electric bike batteries should typically provide somewhere between 20 and 60 miles per charge, and they should be small enough, lightweight enough, and compact enough to blend in with the design of the bike—a good battery should not get in the way or detract from your ability to ride comfortably.

In the past, most electric bikes used Sealed Lead Acid batteries (SLA), but today, the majority of e-bike builders have moved to lithium battery technology. Generally speaking, SLA batteries provide decent performance at a fairly cheap price, but because they have significantly shorter life spans than lithium batteries, they have to be replaced more often. In the long run, therefore, SLA batteries can be more expensive. They also require careful main-

tenance, as improper charging or discharging can ruin the battery. Finally, SLA batteries are heavier than lithium batteries, making them a less efficient option for e-bike use.

Lithium batteries, which are being used more and more in all sorts of devices, are generally lighter, more energy-efficient, and provide much greater range. They are also usually more expensive than SLA batteries. However, the longer life span offsets the initial higher price of a lithium battery and, in the long run, the choice of lithium over SLA generally is a financial plus.

**DRIVETRAINS**

The third part of an e-bike you need to consider 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.

Because the best e-bikes are those designed to work in close coordination with the bicycle’s drivetrain, it’s a good idea to have some familiarity with the drivetrains most often used on electric bikes.

**Multiple Gears With a Traditional Derailleur**

Long established as the go-to technology for conventional bicycles, derailleurs mechanically move the bike chain across a range of different-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

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Mid-drive motors work in coordination with the already-existing gears and derailleurs, allowing riders to shift through the gears to find the best efficiency for any riding condition, while also making use of the motor for an extra boost of power. As mentioned earlier in this section, this coordination is one of the main reasons why mid-drive motors are considered superior to hub motors.

**NuVinci® N360™ and Other Internal Gear Hubs**

In contrast to drivetrains that use a derailleur to shift through a set of external gears attached to the rear wheel, internal gear hubs like the increasingly popular NuVinci® N360™ feature a range of gears housed inside the hub of the rear wheel.

As opposed to traditional multi-geared drivetrains, which give riders a limited number of gears to shift through one at a time, the NuVinci® N360™ drivetrain provides riders with an unlimited range of gears, which can be moved across seamlessly and smoothly. Instead of shifting from one gear to the next, this drivetrain allows cyclists to simply turn a dial located on the handlebars to increase or decrease the amount of effort required to turn the pedals.

When combined with an electric motor, the NuVinci® N360™ drivetrain provides an incredibly flexible way for a rider to fine-tune and tailor their riding experience to meet specific needs, the surrounding terrain, and their preferred riding style. Best of all, internal gear hubs reduce the learning curve typically associated with figuring out how to properly shift through traditional gears.

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 such efficient and
convenient vehicles, you empower yourself to choose the specific e-bike—equipped with the perfect motor, battery, and drivetrain—that will best meet your cycling needs, expectations, and goals.
Now that you’ve become familiar with what electric bikes are, how they work, and why they’re such a unique and effective mode of transportation, you may be wondering about the actual cost of buying, using, and maintaining an electric bike. This section will give you an overview of these costs and will attempt to answer 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**

As with other types of vehicles, there is a fairly wide price range for new e-bikes, typically starting around $1,000 and going up to as high as $10,000 or more. Within this range are all sorts of electric bikes, each of which has different capabilities and features. To better understand why one electric bike costs $1,000, another $2,500, and still another $10,000, it’s helpful to
break down the overall cost of a new electric bike into four main parts.

**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 and more powerful 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 increase to as high as 500-750 watts. Higher-rated motors generate more power than those with lower ratings, and as a result, provide a snappier, more responsive, and more versatile motorized riding experience.

Whether or not you need a more powerful motor depends primarily on the type of riding you’re planning to do, the terrain on which you’ll be riding, and your weight. The following table provides some basic guidelines for figuring out which type of motor is right for you.

<table>
<thead>
<tr>
<th>A 250W motor may be right for you if:</th>
<th>A 500W (or more) motor may be right for you if:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• You live in a mostly flat area with moderate hills</td>
<td>• You live in a hilly area and need to climb steep hills quickly</td>
</tr>
<tr>
<td>• You plan to pedal the bulk of the time, only using the motor for only periodic assistance</td>
<td>• You plan to do very little pedaling and will use the motor more heavily</td>
</tr>
<tr>
<td>• You weigh less than 200 pounds</td>
<td>• You will be using the motor to maintain faster cruising speeds</td>
</tr>
<tr>
<td></td>
<td>• You weigh more than 200 pounds</td>
</tr>
</tbody>
</table>

**Battery**
The battery is the most expensive, and arguably the most import-
ant, component on an e-bike. The quality of the battery being used can really make or break the overall effectiveness of the bike. As mentioned in the previous section, e-bikes generally use either SLA batteries or lithium batteries (the latter being more common in recent times). SLA batteries are often cheaper initially, but because they’re heavier and have much shorter lifespans than lithium batteries, they end up being more expensive in the long run.

To illustrate this more concretely, a good lithium battery can be recharged somewhere around 750 times—the equivalent of three years’ worth of relatively hard riding—before it starts to lose capacity, while an SLA battery may very well begin losing capacity after only 250 recharges. The longer-lasting, lighter, more energy-efficient lithium battery—although it will likely have a higher initial price tag—turns out to be more economical across the entire life of the e-bike.

Along with the type of battery being used, the range of the battery has a direct impact on the overall price of an e-bike. Electric bike manufacturers and retailers usually describe batteries in terms of mileage ranges, a measure that tries to quantify how far any given battery charge will actually carry a rider. On average, a good, high-quality electric bike battery should provide somewhere between 20 and 40 miles of riding per charge, while higher-end batteries can bump that range up closer to 60 miles per charge.

In general, the more miles 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.

If you know you’ll be using predominantly motor-generated power over hilly terrain or for extended rides, then paying a bit more for a battery with a longer range is probably a good idea. If, on the other hand, you know that you’ll be pedaling a lot, and plan on using the motor only for occasional or light assistance, you may be able to opt for a more affordable battery with a slightly shorter range. Regardless of the range you end up choosing, be
sure that you’re getting a lithium battery made by a well-known electronics manufacturer. This will give you the most miles for your money and ensure that your e-bike maintains peak performance for as long as possible.

**Bicycle Components**

Because an electric bike is fundamentally still a bicycle, the mix of all of the non-electric, non-motorized bicycle components used in its construction is another very important factor affecting the bike’s overall cost.

When you pay to upgrade bicycle components, you’re generally paying for components that are lighter in weight, have greater strength and increased durability, and work more effectively and efficiently than cheaper, lower-quality parts. Higher-end derailleurs, for example, shift more quickly and smoothly, and are usually lighter and sturdier 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 and how frequently you plan to use the bike. 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 as a rider who plans to use their electric bike for off-road riding or 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. This ensures that your bike is reliable, efficient, and fun, and will also help limit the need for repairs.

**Post-Purchase Service & Warranty**

The fourth and final factor that affects how much an electric bike costs is the kind of post-purchase support included. Because buying an electric bike is a long-term investment that you want to be able to enjoy for many
years, it is important to think about the kind of warranty an e-bike comes with, the kind of technical and mechanical service that will be provided, and the level of support you’ll receive after making your purchase.

Having both a good warranty to back up your purchase and a trustworthy team of experts to provide support and service as you begin using your e-bike plays a central role in ensuring that your e-bike experience is successful and enjoyable. For this reason, it’s important to buy from an e-bike company that has a good reputation, has received consistently good customer reviews, and has a proven track record of providing strong post-purchase service.

To bring all this together in a more concrete way, an e-bike in the $1,000-$1,500 price range is likely to come with:

- A less-powerful, lower-quality motor,
- A cheaper SLA battery that’s heavier and less efficient than a lithium battery,
- A battery with a shorter range,
- Lower-end bicycle components,
- A weaker warranty and limited post-purchase support;

... While an e-bike in the price range of $2,000-$4,000 is likely to include:

- A more-powerful, higher-quality motor,
- A lighter and more efficient lithium battery,
- A battery with a longer range,
- Higher-end bicycle components,
- A more extensive warranty with good post-purchase support.

Of course, you can always spend more than $4,000 on an e-bike by upgrading parts and components and adding other accessories to the bike.

In general, however, if you buy an e-bike that’s built and sold by a reputa-
ble e-bike company and priced somewhere in the $2,000-$4,000 range, you can be confident that you’re getting a quality e-bike that’s reliable, durable, and powerful, with solid components backed up by excellent post-purchase support.

**THE COSTS OF USING AND MAINTAINING AN ELECTRIC BIKE**

After the up-front cost of purchasing an electric bike, the additional ongoing costs of using and maintaining it are very similar to the costs associated with regularly using and maintaining a conventional bike.

One of the expenses associated with using and maintaining any bike is the cost of periodic repairs, which will arise from time to time as parts wear out or break. Fortunately, since the majority of electric bike components are standard bicycle parts, nearly all repairs can be performed at a local bike shop for a relatively low price. To further help offset these costs, make sure that your bike comes with a comprehensive warranty.

Along with the cost of maintenance and repairs, the most frequently recurring cost of riding an e-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 confirm that electric bikes are the most cost-effective motorized vehicle currently available.

One such study reported that, on average, it costs roughly 8 cents to charge an electric bike battery. Given that most batteries get somewhere between 20 and 40 miles per charge, that’s a total of 250 to 500 miles on just $1 worth of electricity.16 In a similar project, ElectricBikeReport.com determined that

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it costs between 0.0625 cents and 0.245 cents per mile to operate an electric bike, depending on the time of day a rider charges their battery.\textsuperscript{17} As with maintenance and repairs, the cost of charging the battery is incredibly affordable, especially when compared to the operating costs of other forms of transportation.

While riding an electric bike certainly requires an up-front investment, their incredible cost- and fuel-effectiveness 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 use of an electric bike—whether as a vehicle for running errands and commuting, as part of a workout routine, as an accessible form of recreation and leisure, or a combination of them all—it becomes clear why people around the world are relying more and more on e-bikes to meet their everyday transportation needs.\textsuperscript{*}

\textsuperscript{*} Note: For a detailed breakdown of the price of an e-bike, identifying the items factored into the final retail price, with an estimate of the costs involved, take a look at EVELO’s blog post, “Transparent Pricing: Where Does Your Money Go When You Buy An Electric Bike?” http://www.evelo.com/blog/transparent-pricing-where-does-your-money-go-when-you-buy-an-electric-bike/

While many people find it easiest and most convenient to simply buy a new electric bike, it is also possible to convert a conventional bicycle to electric by adding a motor and battery. This option has its own set of advantages and disadvantages. Ultimately, whether you convert the bicycle you already own or buy a complete electric bike depends on your unique needs, interests, and expectations.

In this section, 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 simplest method for converting a conventional bicycle to an elec-
tric bike is to purchase and install what is generally known as an all-in-one (AIO) wheel. An AIO wheel is a pre-built wheel that includes a hub motor, battery, and some sort of control system, all integrated into a simple, self-contained unit. Using this type of wheel is generally the easiest, most seamless way to convert a conventional bike to electric, as you simply swap the front or rear wheel on your bicycle with the AIO wheel and that’s it! An AIO wheel conversion leaves the bulk of the original bike and its components intact—you’re really only swapping out a wheel and installing a controller, and nothing else on the bike is affected.

In recent years, a number of e-bike companies have begun building and selling AIO wheels, which have everything necessary to transform a conventional bicycle into an electric one quickly and easily. Because AIO wheels have emerged as a simple method for this type of conversion, it’s important for anyone considering this option to become familiar with the best AIO wheels currently available on the market.

As we describe these AIO wheels, you’ll notice that none feature motors more powerful than 350 watts. This is because the torque generated by more powerful motors is too strong and could possibly damage the bike, break components, or cause an accident. As a result, the wheels tend to use hub motors that are a bit less powerful than those typically used on a complete electric bike. With that said, using an AIO wheel conversion could still be a viable way to expand what your bike is capable of. Here are three examples of AIO wheels.

**EVELO Omni Wheel** [http://omni.evelo.com]
The Omni Wheel is an AIO wheel designed to provide an ultra-easy, fast way to convert the bike you already own into a super-efficient electric bike. The Omni Wheel replaces your regular front wheel and includes a wireless LCD panel that allows riders to turn the motor on and off, and control how much assistance it provides.

The front wheel design makes installing the Omni Wheel especially easy,
since you don’t have to deal with drivetrain compatibility or work around chains, derailleurs, and cassettes. Similarly, the wireless LCD control panel provides a user-friendly way to control and monitor the wheel’s motor assistance.

The Omni Wheel, which comes in either 26-inch or 700c rim sizes, is equipped with a 350 watt motor capable of generating a top speed of 20 mph. The standard battery has a range of 15-25 miles and takes 4 hours to charge, while the extended-range battery provides up to 40 miles of assistance and takes 9 hours to charge; both have a life cycle of 750 charges. Depending on the model, the Omni Wheel weighs between 19 and 21 pounds.

**Copenhagen Wheel [http://superpedestrian.com]**
The Copenhagen Wheel comes in both 26-inch and 700c rim sizes. It is a rear wheel designed to fit the majority of standard bike frames and to work with most Shimano and SRAM drivetrains. It uses a 350 watt motor to generate a top speed of 20 mph, and its 48 volt lithium battery takes about 4 hours to charge, provides around 31 miles of riding, and has a life cycle of 1,000 charges. The Copenhagen Wheel weighs in at 13 pounds.

To use the Copenhagen Wheel, simply take off your bike’s original rear wheel, install the new wheel, and download the Copenhagen Wheel app to your smartphone. The wheel uses a set of embedded sensors that monitor your riding and work in conjunction with the app. The app allows you to lock and unlock your wheel, control the motor, and track different data such as time, distance, calories burned, and elevation change.

*NOTE: The Copenhagen Wheel has been in development since 2012. While it’s currently possible to pre-order a wheel, as of September 2015, wheels have not yet shipped to customers.*

**FlyKly Smart Wheel [http://flykly.com]**
Sold either as a hub alone or as an AIO wheel, it is available in 20-inch, 26-inch, and 700c rim sizes. The FlyKly Smart Wheel is a rear
hub motor that combines built-in sensors and a rider-operated smartphone app to provide a quick and easy way to convert a conventional bicycle to a highly efficient and responsive electric one. The Smart Wheel uses a 250 watt motor to generate speeds of up to 16 mph, and a lithium battery that takes around 3 hours to charge. It has a range of 25 to 60 miles, and an average life cycle of around 1,000 charges. The FlyKly Smart Wheel hub weighs about 6 pounds.

In many ways similar to the Copenhagen Wheel, a Smart Wheel simply replaces your already-existing rear wheel. The downloadable smartphone app then allows you to lock and unlock the wheel, control the motor, and track a number of different data while you ride.

The following table summarizes some of the key features of these all-in-one wheels, giving you an at-a-glance way to compare them to one another.

<table>
<thead>
<tr>
<th></th>
<th>Position</th>
<th>Control</th>
<th>Motor</th>
<th>Top Speed</th>
<th>Range</th>
<th>Charge</th>
<th>Battery Life</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omni Wheel</td>
<td>Front</td>
<td>Wireless LCD panel</td>
<td>350 W</td>
<td>20 mph</td>
<td>15-40 mi.</td>
<td>4+ hrs.</td>
<td>750 cycles</td>
<td>19-21 lbs.</td>
</tr>
<tr>
<td></td>
<td>Rear</td>
<td>Smartphone app</td>
<td>350 W</td>
<td>20 mph</td>
<td>31 mi.</td>
<td>4+ hrs.</td>
<td>1,000 cycles</td>
<td>13 lbs.</td>
</tr>
<tr>
<td>Copenhagen Wheel</td>
<td>Rear</td>
<td>Smartphone app</td>
<td>250 W</td>
<td>16 mph</td>
<td>25-60 mi.</td>
<td>3+ hrs.</td>
<td>1,000 cycles</td>
<td>6 lbs.</td>
</tr>
</tbody>
</table>

**BUYING A NEW ELECTRIC BIKE**

Buying a new e-bike has three main advantages over using an AIO wheel to convert a conventional bicycle to an electric bike.

The first is that when you purchase a new electric bike, you’re getting an
e-bike that has been specifically designed and built from the ground up to be powered by an electric motor. This means that all aspects—from the materials used to build the bike, to its frame geometry, to the mix of components included—have been carefully designed, selected, and crafted to maximize efficiency, power, and smooth handling. No matter how good an AIO wheel is, there’s simply no substitute for this level of ground-up engineering.

The second distinct advantage to buying a new e-bike is that you can select a bike that uses a mid-drive motor instead of a hub motor (the only option when it comes to using an AIO wheel). As we’ve discussed a few times already, mid-drive motors are more efficient than hub motors, they have a more natural and well-balanced feel while riding, and they interfere with far fewer parts, making maintenance and repairs significantly easier.

And finally, when you buy a new electric bike you’ll also be getting some sort of post-purchase support that covers the entire bike, not just the wheel and electronics. This means that the warranty, the mechanical support you receive, and the technical expertise you have access to is there to help with anything you may need, regardless of if it’s a mechanical issue with a basic bicycle component or a technical issue with the electric throttle.

When you use an AIO wheel, on the other hand, you split your post-purchase support between whatever support may or may not be in place for your existing bicycle and whatever support is available for the new AIO wheel. Buying a new e-bike is the only real way to guarantee peace of mind and ensure the fullest possible post-purchase support.

WEIGHING IT OUT: THE PROS AND CONS

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 an AIO wheel is generally going to be a cheaper option than buying a complete electric bike.

On the other hand, there are some significant disadvantages to converting a conventional bike, especially when compared to buying an electric bike. A conversion will not operate as smoothly or efficiently as a complete electric bike, which has seamlessly incorporated the motor, battery, and controls into every aspect of the bike’s design. Similarly, AIO wheels rely on hub motors, which tend to produce a less natural and less efficient riding experience than an electric bike with a fully integrated mid-drive motor (see Section 5 for a more detailed discussion of hub and mid-drive motors).

In the end, using an AIO wheel to convert your conventional bicycle to an electric bike could be a good idea if you’re looking for a comparatively cheap and quick way to get more performance out of the bike you already own. This type of conversion will make it easier to ride up hills and into headwinds, and will allow you to run errands on your bike quickly and cheaply without arriving at your destination already worn out. If you’ve been wanting to get back on your bike as a form of exercise or simply for fun, but the bicycle you already own is a bit too demanding, complicated, or inconvenient, then using an AIO wheel will certainly make that bike significantly more accessible and user-friendly.

Cost-effectiveness is the final thing to think about when considering whether it’s better to convert your existing bike or buy a new e-bike. While it is true that the price of an AIO wheel is generally going to be lower than the price of a complete e-bike, it may not necessarily be the most cost-effective when you take into consideration the benefits of purchasing a complete e-bike that you’d miss out on by choosing an AIO wheel.

To bring everything together, the following table highlights the advantag-
es of buying an AIO wheel versus the advantages of choosing a complete e-bike.

<table>
<thead>
<tr>
<th>All-in-One Wheel Conversion</th>
<th>Complete E-Bike</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allows you to use the bike you already know and love</td>
<td>Designed and built from ground up to be powered by a motor</td>
</tr>
<tr>
<td>Cheaper than a complete e-bike</td>
<td>Some models use mid-drive motor instead of hub motor</td>
</tr>
<tr>
<td>Quick way to dramatically expand what your conventional bike is capable of</td>
<td>Extensive post-purchase support</td>
</tr>
<tr>
<td></td>
<td>Complete e-bike provides superior riding experience that, for most riders, more than makes up for the slightly higher price tag</td>
</tr>
</tbody>
</table>

Whether you decide to convert your existing bike or purchase a complete electric bike depends on what you’re hoping to get out of a 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 an AIO wheel offers a quick and easy way to 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.
As e-bikes become increasingly popular in the US, it’s becoming easier and easier to find places to purchase them. Electric bikes are currently sold at bicycle shops, specialty electric bike retailers, as well as a number of online sites.

Regardless of where you actually end up purchasing your electric bike from, it’s important that you know the right types of questions to ask retailers. Doing so will help you gather the specific information you need to make the best possible purchasing decision.

To help get you started, we’ve compiled a list of the 12 most important questions to ask retailers as you try to find the e-bike that’s right for you.

**Does the bike have a hub motor or a mid-drive motor?**
As discussed earlier, mid-drive motors are in many cases the better of the
two, primarily because they work in coordination with—and take full ad-
vantage of—the bike’s gears, thereby maximizing power and efficiency. A mid-drive motor’s lower center of gravity also tends to produce a more nat-
ural, better-handling riding experience.

**How powerful is the motor?**
The power of an e-bike 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 200 pounds, a 250 watt motor should be more than enough to give you a great riding experience. If, on the other hand, you’ll be riding up a lot of steep hills, you plan on using primarily motor assistance, or if you weigh over 200 pounds, a motor in the 500+ watt range is probably a better choice since it will give you the extra torque you need to quickly motor up hills and respond to changes in your riding conditions or needs.

**What type of electric assistance does the bike provide?**
The main information you are seeking from this question is whether the bike offers electric assistance only while the pedals are being cranked or if it also offers fully electric riding (sometimes referred to as “turn the throt-
tle and go” riding). If you know there will be times when you want to stop pedaling and let the motor take over completely, then be sure the bike you’re looking at offers a motor-only mode.

**What’s the bike’s maximum speed?**
In most places in the US, electric bikes cannot legally provide motor assis-
tance if the speed the bike is traveling exceeds 20 mph. Beneath that thresh-
old, however, there is still some significant variance in the speeds different e-bikes can reach.

The maximum speed you want your electric bike to travel depends on
where you live, how fast you’d like to ride, and how heavily you plan on using the bike’s motor. In general, e-bikes capable of hitting the top legal speed of 20 mph 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. Keep in mind that your e-bike may reach speeds of greater than 20 mph under certain conditions (for example, when going down a steep hill), but the motor itself will not provide assistance if the speed of the bike is more than the limit.

**How do riders engage and control the motor?**
E-bikes come with a variety of different mechanisms for engaging and controlling the motor, including sensors that gauge a rider’s speed or pedaling torque and trigger the motor to respond accordingly; throttles or triggers that give riders manual control of the motor; digital control panels; and a number of different combinations of sensors, controllers, throttles, and triggers. Understanding exactly how any particular e-bike 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.

**What sort of drivetrain does the bike have?** Effectively combining the mechanical efficiency of a 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 conventional derailleur to shift through gears one at a time or if it comes with an internal-gear hub like the NuVinci® N360™ or Shimano Nexus/Alfine. Derailleurs require riders to have a good grasp of how to shift through gears to respond to changing terrain, while something like the NuVinci® N360™ offers a more seamless, intuitive approach to adjusting to changes in terrain, weather, or other factors.
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 e-bike you’re looking at uses a high-quality rechargeable lithium battery.

What’s the battery’s range?
Once you know that the bike you’re interested in uses a high-quality 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 miles 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 more quickly and may therefore need a longer range. If you plan to pedal a lot and use the motor assistance only periodically, you can probably choose a battery with a shorter 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 longer range than someone who only goes a few miles each day. In short, be sure the range of the battery on the e-bike you’re looking at will conveniently cover the distances you plan to travel.

What brand is the battery?
Along with ensuring that the battery is a lithium one with adequate range, the brand of battery on an e-bike is also important to know. As a general rule, it’s best to stick with a well-known, high-performance electronics manufacturer like Panasonic or Samsung. Brand-name companies like this tend to make better, longer-lasting battery cells than generic ones.

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 determine whether or not a particular e-bike model realistically fits your lifestyle and how well it will meet your riding needs.
What sort of warranty does the e-bike come with?
One of the great things about riding an e-bike is that the majority of repairs can be done quite easily using conventional bicycle parts by a mechanic at your local bike 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 e-bike with a strong warranty—just in case anything goes wrong. Shoot for an e-bike that comes with at least an 18-month comprehensive warranty.

What other post-purchase support does the e-bike include?
In addition to an adequate warranty, a good e-bike company should offer their customers extensive post-purchase support. Before buying an electric bike, you’ll want to know what sort of support your retailer offers if something goes wrong, if you run into a question or difficulty, or if you need repairs or replacements. Call or email the company first to see how quickly they respond and how helpful they are. Use this initial interaction as a gauge for how future interactions are likely to go. Finally, look for an e-bike company that offers a fairly comprehensive post-purchase support package—these are the companies that you know will take care of you as you begin using your e-bike.

As electric bikes have proven to be 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 the US. With a wide array of purchasing options currently available, it’s important to know how to navigate the ever-expanding e-bike marketplace. By using the 12 questions above to guide the conversations you have with e-bike retailers, you put yourself well on the road to finding the perfect electric bike.
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.

This section will summarize much of what you’ve read, bringing it all together into a comprehensive list of the pros and cons of owning an electric bike. As with everything else in this buyer’s guide, this list may prove helpful as you navigate the world of electric bicycles in search of the perfect bike for you.

**PROS**

**Make cycling accessible to everybody**
Electric bikes are incredibly user-friendly, versatile, and accessible. Regardless of age, fitness level, health condition, or previous cycling experience,
anyone can enjoy the many benefits of riding an e-bike.

**Tackle obstacles**
The extra boost of power provided by an e-bike’s motor makes it possible to zip up hills, plow through headwinds, and tackle any other obstacle you might encounter on a bike ride, all without wearing yourself out. As a result, electric bikes provide convenient and extremely enjoyable cycling experiences for a wide and diverse range of riders.

**Improved health**
Using an e-bike as part of your regular travel is a great way to introduce some physical activity into your everyday routine, which 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 whose health condition(s) limits the amount of physical activity they can tolerate. By controlling the amount of assistance received from the motor, e-bike 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 trying to lose weight.

**Enjoy time with friends and family**
An electric bike can make it possible for you to spend more time having fun with friends and family by enabling you to join in on recreational bike rides. If you’re new to cycling or you struggle to keep up with others, an electric bike may be the key to getting out more often to enjoy leisure rides with friends and family.

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

**Sweat-free commute**

One of the biggest drawbacks to using a bicycle for your daily commute is showing up at your destination hot, sweaty, and uncomfortable. Using an electric bike, however, you can complete the exact same ride while exerting only a portion of the physical effort—riders enjoy all the benefits of commuting by bicycle without any messy drawbacks. Even if you are lucky enough to have shower facilities at work, the time and energy saved by not having to shower or change clothes after a daily e-bike commute is a big bonus.

**Cheap transportation**

When compared to other types of transportation, electric bikes are 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 the battery is incredibly low when compared with either public transit fares or a tank of gas.

**CONS**

**Heavier than conventional bikes**

Even after dramatic improvements in e-bike technologies and components, electric bikes remain somewhat heavier than conventional bicycles.

**More specialized, complex parts**

While the majority of e-bike 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 e-bikes. Because these parts tend to be a bit more complex and can sometimes be harder to find, it may prove more difficult and/or expensive to repair a specialized e-bike component
compared to more conventional bicycle parts.

**Up-front investment**

It’s not unusual for people first learning about electric bikes to be surprised by the cost of an e-bike, which typically ranges from $1,000 to $4,000 or more.

While there’s no getting around the fact that choosing an e-bike requires a significant up-front investment, the good news is that once you’ve purchased a high-quality electric bike, relatively few expenditures are required to operate it.

Keep in mind as well that the purchase price of an e-bike may be more favorable than you first thought when you compare it to other forms of transportation. Buying a high-quality e-bike priced between $2,000-$4,000 is certainly much less expensive than buying a new car. But even when compared to the purchase price of a good-quality mountain or road bike, the price of an electric bike doesn’t require a jump into the stratosphere.

The table that follows summarizes the primary advantages and disadvantages of electric bikes, giving you a quick, at-a-glance resource to use as you consider becoming an e-bike owner.

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
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<tbody>
<tr>
<td>• Accessible transportation</td>
<td>• Heavier than conventional bicycles</td>
</tr>
<tr>
<td>• Tackle obstacles for easy ride</td>
<td>• Specialized, complex parts</td>
</tr>
<tr>
<td>• Improved health</td>
<td>• Initial investment of purchasing a new e-bike</td>
</tr>
<tr>
<td>• Tailor exercise to your needs</td>
<td>• Time with family and friends</td>
</tr>
<tr>
<td>• Increased range</td>
<td>• Sweat-free commute</td>
</tr>
<tr>
<td>• Cheap transportation</td>
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**FINAL THOUGHTS**

In an interview published earlier this year, e-bike expert Court Rye sum-
marized the advantages of riding an e-bike by saying that “electric bikes remove many of the roadblocks and challenges that people face with traditional pedal-powered cycles.”\textsuperscript{18}

Being aware of the ways that e-bikes can be incredibly beneficial, as well as some of the challenges involved with buying and using an e-bike, will make you a well-informed, savvy consumer, ready to make the best possible decision when it comes time to select and purchase an e-bike of your own.

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 make inroads in the United States market, with sales and use climbing steadily among consumers.

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 experience. By allowing riders to choose precisely how much power the motor will provide, e-bikes have quickly become some of the most flexible and accessible vehicles in the world.

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

**AN UP-AND-COMING TECHNOLOGY**

By becoming an e-bike owner, you place yourself at the forefront of a transportation movement that’s about to explode, especially as Americans begin to prioritize finding affordable, quick, easy, and convenient ways to get around. As the experts at eCycleElectric succinctly put it, “many factors are urging Americans toward more sustainable transportation, and e-bikes are a vital part of our future.”

Market analyst Frank Jamerson confirmed this upward trend in e-bike popularity when he calculated that between July 2011 and July 2012 approximately 100,000 electric bikes were sold in the US. That number nearly doubled the following year. One analyst writes that “by 2016, as more manufacturers and retailers get into the electric bike market, Jamerson expects annual sales above 400,000. Within 20 years, he thinks the number could be as high as 2 million, and that the United States will be one of the top markets for electric bicycles in the world.”

With the e-bike industry approaching $11 billion dollars globally, predictions like Jamerson’s are certainly a possibility.

One of the key reasons for the rapid growth in e-bike use is improved tech-

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nology. 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 makes this point in time such an opportune moment to become an e-bike 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 which electric bike is right for you. As you start looking at specific e-bike 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 e-bike, and what sort of terrain you’ll be riding across.

With all this in mind—and equipped with a strong foundation of knowledge—you can confidently dive into the exciting, dynamic, and rapidly expanding world of electric bikes.

Along the way, feel free to contact our friendly and knowledgeable e-bike experts who are there to answer any questions you may have. You can email us at ask@evelo.com or call us 7 days a week at 877-991-7272. We guarantee a response within 24 hours (in most cases, we’ll get back to you within 2 hours). You can also fill out our free Custom Fit Consultation form to begin finding the perfect e-bike for you today.

Good luck and enjoy the ride!

22 http://www.evelo.com/support/free-fit-consultation/
APPENDIX A. TRANSPORTING ELECTRIC BIKES

When transport an electric bike, some of the most important factors that need to be taken into consideration include weight, shape, and size. In the past, it may have been challenging to find ways to transport an e-bike, but manufacturers and bike rack companies are developing new transportation solutions in response to the rising popularity of electric bikes.

Here are some of the best and most convenient methods currently available for transporting e-bikes.

CAR RACKS

For bike transport, 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, hitch racks are certainly the best and safest option since they are typically the strongest of the three types. When choosing between the typical 1-¼” or 2” hitch mount sizes, keep in mind that hauling one or even two e-bikes means that the rack will be carrying a fair amount of weight, and the 2” hitch is sturdier than the 1-¼” hitch size.

The next thing to think about is weight capacity. Since many car racks are designed to hold and carry conventional bicycles, which are typically much lighter than e-bikes, it’s important that you pay attention to the weight capacity of a rack when figuring out which one to use. In general, choose a rack that can hold bikes weighing at least 60 pounds. Most racks are made to hold more than one bike at a time, so check that the rack you like is rated to carry multiple 60-pound bikes.

It’s becoming more common for rack manufacturers to sell racks built specifically for e-bikes, taking into account the weight requirements and loading logistics. Even if a rack isn’t necessarily designed for e-bike use, if you choose one with the proper hitch size and weight capacity, you should be fine. Here’s a list of the most popular racks currently available, all of which
are good options for carrying electric bikes.

- Hollywood Racks Sport Rider SE2 (the HR1450E model is this brand’s e-bike-specific version of the popular Sport Rider SE2 rack)
- Thule EuroPower 916 (Thule’s e-bike-specific rack)
- Thule T2 2 Bike 916XTR
- Saris Freedom SuperClamp 2-Bike
- Yakima HoldUp 2”
- Küat NV
- 1Up Super Duty Quik Rack

FOLDING E-BIKES

Another possible method for transporting electric bikes is to use a folding e-bike. Folding bicycles typically use some sort of hinged joint and quick-release fasteners to allow riders to quickly transform the bike from ridable size to collapsed, transporting size. This type of e-bike could be a good option if you know you’ll be using your bike in conjunction with some other form of transportation—maybe a bus, subway, train, airplane, or ferry—or if you have very limited storage space at your home or office.

Because e-bikes make it so easy to get wherever you need to go right from your front door, using a folding e-bike really only makes sense if you need to bring your bike with you on trips long enough to require some other form of transportation. If, for example, you frequently travel by airplane and would like to start bringing an e-bike with you for use on land, then a folding e-bike could be what you’re looking for.

While folding e-bikes are certainly easy to pack up and bring with you on long journeys, there are also drawbacks to using this type of bike. Most obviously, folding e-bikes look significantly different from any other sort of bike: they have smaller wheels, smaller frames, and often use unusually long handlebar stems and seatposts to make up for the small frame size. While these differences don’t really affect the riding experience, they do
make the bike look fairly unusual, especially for those who have never seen a folding bike before.

Another significant drawback to using a folding e-bike is that most models can’t accommodate mid-drive motors and so typically end up relying on hub motors. As we’ve talked about throughout this buyer’s guide, hub motors tend to produce a less efficient, less natural riding experience than mid-drive motors. Unfortunately, in most cases, mid-drive motors and folding bike designs simply do not mesh.

Taking all this into consideration, folding e-bikes may be a good option for a very select group of riders. For the huge majority of e-bike owners, however, it may make more sense to buy a high-quality, durable, and reliable electric bike, and then use an equally high-quality and sturdy car rack for those times when you need to bring your e-bike with you on the road.

**Manual Transportation**

In any scenario where you find yourself having to manually carry or roll your e-bike, the main challenge is dealing with the weight of the bike. Fortunately, there are a couple of simple steps you can take to make this easier.

If you ever need to lift your e-bike—maybe you have to carry the bike up a flight of stairs or lift it up onto a car rack—then we suggest removing the battery first. This will immediately decrease the overall weight of the bike by about 10 pounds, making it noticeably easier to carry.

For a situation when you need to manually roll your e-bike—as might happen if you’re walking it on a busy sidewalk or if you’re using a car rack with a loading ramp—you can simply use the throttle to make the motor do the hard work for you.

Although electric bikes are relatively heavy, especially when compared to a conventional bicycle, there is no reason why this should be a concern that
keeps you from purchasing and riding one. As outlined here, there are a number of simple solutions for transporting e-bikes effectively and safely. On top of that, and most importantly, the freedom and flexibility your e-bike will give you more than offsets any concerns you may have about transporting it. If you find yourself facing any lingering concerns, feel free to contact us—there’s a solution out there and we can help you find it.
ABOUT

Boris & Yevgeniy Mordkovich are co-founders of a New-York based electric bicycle company, EVELO.

EVELO’s mission is to make cycling more accessible for more people by removing barriers that keep people from getting on the bike - such as the fear of hills, inconvenience of arriving to the destination sweaty, fitness levels and others. EVELO develops a line of stylish, powerful electric bikes designed to fit everybody’s budget. With an innovative direct-to-customer distribution model, customers can customize their perfect bike online in minutes and have it delivered nearly fully assembled directly to their door in just a few days.

Learn more at www.evelo.com

Got questions about any topic covered (or not covered!) in this book? Send us an email at contact@evelo.com and you’ll hear back from us in 24 hours or less!