



YOUR GUIDE TO
E-Bikes



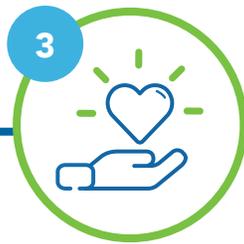
Four Reasons to Buy Electric Bicycles



Convenient &
Cost-Effective



Lower GHG
Emissions



Increased Physical
Activity



Extra boost for
Heavy Loads & Hills

Clean Energy Lives Here
[MASSCEC.COM/GOCLEAN](https://www.masscec.com/goclean)



Table of Contents

The Technology	3
Benefits of E-Bikes	4
Questions to Ask When Buying an E-bike	5
Getting the Most from Your New E-Bike	7

The Technology

Electric bikes, also known as e-bikes are a great way to offset your carbon footprint when used to replace some or all the trips you would have made in a car. E-bikes come in the same categories as conventional bikes: road, mountain, urban, hybrid, cruiser, cargo, and folding. Electric motors powered by rechargeable batteries help propel the bikes and provide either partial or full assistance to the rider. With many models, the rider can choose the level of assistance that the motor provides, and with pedal-assist bicycles, the motors are activated by pedaling meaning the rider's experience is very similar to riding a standard "analog" bicycle. Riders can also choose to ride without assistance from the motor, like a normal bike. E-bikes can be heavier than standard bicycles due to their additional components, but motor-assisted engineering makes it so riders aren't limited by the extra weight. Charging the battery is simple: most e-bike batteries can be recharged virtually anywhere that there's an electric outlet. Batteries usually take several hours to charge on a normal 110V outlet.



Benefits of E-Bikes



CONVENIENT AND COST-EFFECTIVE

You'll save money by investing in an e-bike instead of spending money on gas, vehicle maintenance, parking, or public transportation. It depends on the battery size, but if you had a 400W e-bike battery, then you would pay about \$0.10 to fully charge your bike. Most e-bikes have a 40–60-mile range, depending on which power mode the rider chooses to ride. If you fully charged your bike every day (which isn't likely), it would cost you about \$36 a year. There are also many additional conveniences of riding a bike, including easier no-cost parking, less traffic, and being able to explore scenic biking routes.



LOWER GHG EMISSIONS

Reducing gas-powered vehicle usage is a key strategy to achieving Massachusetts's carbon reduction goals. Light-duty vehicles like cars and small trucks are currently responsible for 27% of statewide emissions. Electric bicycles emit zero emissions and help reduce traffic congestion by shifting trips from cars to bicycles.



INCREASED HEALTH BENEFITS

There are obvious health benefits to getting on your bike instead of getting in your car, mainly the low-impact aerobic exercise of riding your bike. Cycling can help shape a healthy lifestyle and enhance your well-being. It also offers a great chance to be outside more.



EXTRA BOOST FOR HEAVY LOADS AND HILLS

When you're pedaling uphill or carrying a heavy load, such as groceries or carrying children, an electric bike makes these challenges more manageable. Electric bicycles also make it easier to travel farther distances and over steeper terrain. And folks with limited mobility or physical limitations can ride with assistance, while still benefiting from physical activity. Electric-assist bicycles are especially helpful for older adults who want to keep riding as they age.

Questions to Ask When Buying an E-bike

E-bikes are available in a variety of styles and have different features and options. Understanding how you will use your e-bike will help you choose the right model and features to fit your needs.

WHAT IS THE RANGE OF AN E-BIKE?

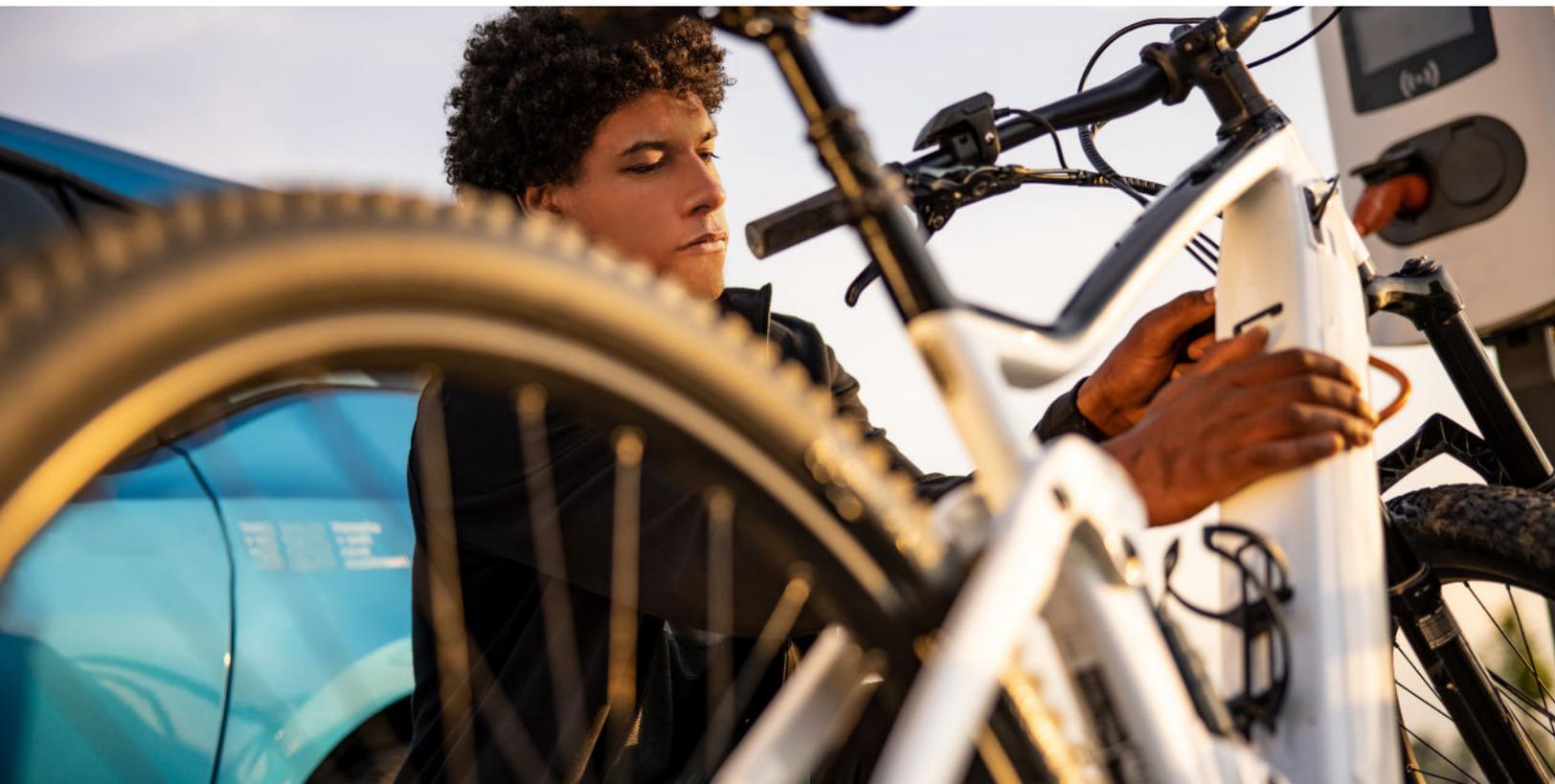
Most e-bikes have a range of 30-miles or more, but this is largely dependent on the size or capacity of the battery and the power mode chosen by the rider, so can range from 20-to 100 miles. Other factors also affect the range including your weight, how hard you pedal, how hilly it is, headwinds and tailwinds, and temperature. Generally, bigger batteries will provide more range, but mostly range depends on how much power is provided in the assist.

HOW ARE BATTERIES SIZED AND HOW BIG A BATTERY DO I NEED?

Batteries are measured in both power and capacity. The power of the battery is measured in voltage (V). Most electric bikes tend to be either 36V or 48V. The higher the voltage, the more power your bike will have. Battery capacity is stated in watt-hours (Wh), a unit of energy equivalent to one watt (1 W) of power expended for one hour. A standard battery is around 400Wh. A smaller battery is sufficient for people who will use their e-bikes for shorter rides. Bigger batteries are best for those who have long commutes, plan to enjoy extended bike outings, or like to use more help from the motor.

HOW POWERFUL A MOTOR DO I WANT?

Motor power is measured in watts. E-bike motors range from about 250 watts up to 500 watts or more. There is a tradeoff between the power that the motor delivers and the range of the battery, depending on the battery size, motor, and level of assist being used. A more powerful motor will help you climb hills and haul cargo more easily, but it will also eat up your battery charge faster.



Questions to Ask When Buying an E-bike (Cont.)

SHOULD I GET AN E-BIKE WITH AN INTEGRATED BATTERY (FIXED) OR A REMOVABLE BATTERY (EXTERNAL)?

E-bikes either come with permanently integrated batteries or external batteries that can be removed. There are pros and cons to each type of battery. An integrated battery could be challenging to charge because you must bring the bike to an outlet. Integrated batteries are lighter and are usually placed lower on the bike and so offer additional torque and therefore a more stable riding experience. External batteries can be taken off the bike and brought inside to charge and avoid theft. External batteries can also be stored in a temperate climate increasing the battery life. External batteries can also be replaced more easily and allow you to take an extra battery on your ride for additional range.

DOES THE LOCATION OF THE MOTOR MATTER?

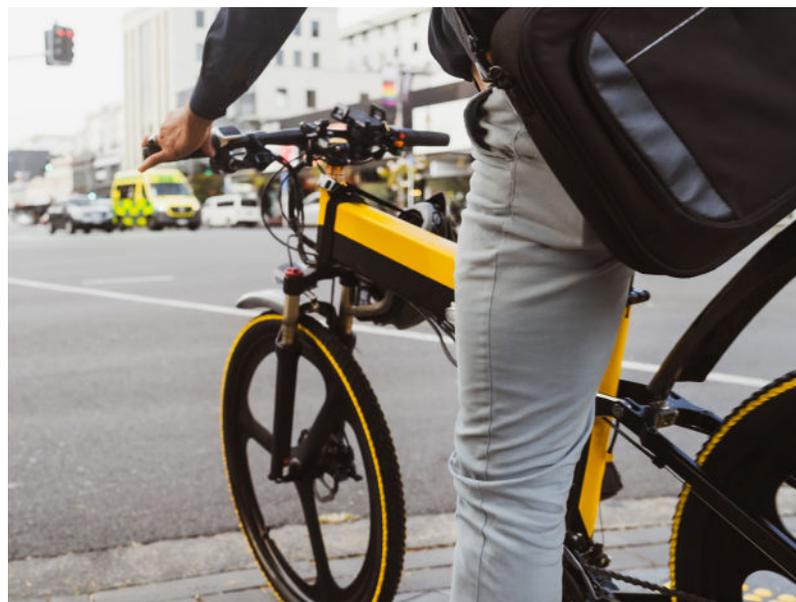
Sometimes the motor is placed on the bottom bracket, near where the crank arms (pedals) meet the frame of the bike. This is called a mid-drive motor. Mid-drive motors allow for a natural feel when using the pedal assist and the central weight of the motor provides a stable and balanced feel. Hub-drive motors are placed in the wheel, usually on the back wheel, but sometimes on the front. When the motor is in the rear wheel it will give a feeling of being pushed along. Front-wheel hub-drive motors handle like a front-wheel-drive car. Each location offers a different driving feel and is a matter of personal preference.

HOW HEAVY ARE E-BIKES?

Most e-bikes weigh between 50 and 60 pounds, compared to between 25 and 35 for a conventional bike. Weight depends on the type, battery, and motor sizes, and what material the bike is made of, usually either steel or aluminum. Just like conventional bikes, lighter bikes require less energy to propel. Also, when you select a bike, keep in mind if you will need to carry your bike upstairs, on public transportation, or into the office. Folding bikes are also available with electric assist capabilities, which may be preferred if you're looking to take your bike on a bus or train or keep it inside.

WHAT FEATURES SHOULD I CONSIDER?

Most e-bikes have a controller unit with a display to monitor battery life, assist mode, miles ridden, speed and more. More expensive bikes have more sophisticated controllers and track riding habits. E-bikes can come equipped with extras like a built-in rack, lock, or front and rear lighting (for visibility and when riding at night). Alternatively, these features and others like a child seat can be purchased as add-ons.



Getting the Most from Your New E-Bike

REPLACING THE BATTERY

The lifespan of a battery is measured in terms of charge cycles. This is the number of times that the battery is fully charged. A Lithium-ion e-bike battery should last on average for at least 1,000 charge cycles. A well-maintained battery should last 3 to 5 years before its' performance will start to be reduced and it starts holding less charge.

Typically, a new high-quality replacement battery will cost anywhere between \$500 to \$900+ depending on the brand and capacity, although battery prices continue to decline. Work with the manufacturer to make sure your replacement battery is compatible with your e-bike. Quality batteries are safer, will perform better and last longer. Also, consider keeping your old battery for backup.

BATTERY MAINTENANCE

For long periods when your e-bike is not being used, it is best to store your e-bike and the battery out of direct sunlight. If it's detached from the bike, keep the battery in a cool dry place, ideally below 68°F/20°C. If you're storing your battery for a lengthy period, it's best to store it less than fully charged (40%-80% is ideal) so you don't reduce the battery life. That also means it's best not to leave the battery plugged in for long periods after it's fully charged.¹

¹ <https://bicyclevolt.com/electric-bike-maintenance-cost/>



OTHER RESOURCES

[Buyer Guide: How to Choose an Electric Bike](#)

Bicycleguider, May 19, 2022

[Best Electric Bike Brands \(of 2021\)](#)

Bicycleguider, September 22, 2022



Clean Energy Lives Here
[MASSCEC.COM/GOCLEAN](https://masscec.com/goclean)

