
NEW JERSEY ELECTRIC BICYCLE INCENTIVE

ANALYSIS & PROGRAM PROPOSAL

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New Jersey's
cleanenergy
program™





Introduction

Over time, the dinosaur that is the internal combustion engine (ICE) vehicle is going extinct. Amidst this inevitable shift, many states are capitalizing on the opportunity to establish comprehensive clean energy goals by investing in more sustainable transportation. The state of New Jersey has the capacity to do more in this space, particularly in the ways in which New Jerseyans and goods move – with attention towards electric mobility options. It is important for New Jersey to further consider sustainable transportation options that work today and in the future. Beyond ICE-powered cars, buses and trains, New Jersey’s transportation future should seek to be largely fueled by sustainable means. According to a recent study by the New Jersey Department of Environmental Protection (NJDEP), New Jersey’s transportation sector is the largest source of greenhouse gas (GHG) emissions, accounting for 46% of total statewide emissions.¹ It is clear that the state must drastically reduce its demand for fossil fuels, and place particular resources towards the transportation sector. For the sake of our natural world and the residents of New Jersey, the state must explore other options to accelerate the transition away from fossil fuel burning ICE vehicles to all electric options as soon as possible. Doing so is not only sound public policy, but also a cost-effective solution that has the ability to diminish the damages to both the environment and public health. One of the best ways that this can be accomplished, which will be the focus of this paper, is by *electrifying* the transportation sector.

Although humanity’s usage of fossil fuels predates recorded history, there is no doubt that it has been a critical component throughout our development of the contemporary world. Since the late 1800’s, humanity relied heavily on coal in order to generate electricity. As world populations have continued to grow, so has our reliance on fossil fuel-based energy sources, which power much of our lives, from transportation to electricity to heating and cooling, and much more. Consequently, GHG emissions – such as carbon dioxide (CO₂), methane, or nitrous oxide – that are emerging from burning fossil fuels have also been increasing at rapidly alarming rates. Since 1970, CO₂ emissions have increased by about 90%, with emissions from fossil fuel combustion and industrial processes contributing roughly 78% of the total GHG emissions increase from 1970 to 2011.² There is near unanimous scientific consensus that the surges in GHG emissions have been contributing to a warmer planet, which further created a multitude of environmental issues; the largest among them being anthropogenic climate change. The theory of “anthropogenic climate change” postulates that humans are the primary drivers of the drastic and negative changes to the environment, caused by our burning of fossil fuels. Anthropogenic climate change poses an existential threat to all forms of life. There are many known consequences, such as frequent and intense drought, storms, heat waves, rising sea levels,

¹ “NJDEP-Air Quality, Energy & Sustainability.” (n.d.). Retrieved from: www.nj.gov
<https://www.nj.gov/dep/ages/oepa-trans-emissions.html>.

² U.S. EPA. (2022). Global Greenhouse Gas Emissions Data. Environmental Protection Agency. Retrieved from: <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data#:~:text=Global%20carbon%20emissions%20from%20fossil,increase%20from%201970%20to%202011.>



melting glaciers and warming oceans, which directly harm animals and their respective environments while also wreaking havoc on people's livelihoods and communities.³

Over the last century, humanity has been largely responsible for the extreme increases in GHG emissions that are giving way to this wreckage. According to a 2020 study conducted by the United States Environmental Protection Agency, the country's GHG emissions totaled 5.2 million metric tons of carbon dioxide [...].⁴ To put that in perspective, "one metric ton is the approximate weight of one Mazda Miata, or 9 LeBron Jameses, or sixteen full beer kegs, or 220 house cats, or 5,155 iPhones."⁵ This makes clear the magnitude of GHG emissions we are pumping into the atmosphere due in large part to a fossil fuel-based energy system. Overall, the degree of climate change's impact on our planet is widely measured and known, even though it remains a topic of political debate.

Roadmap

In the first part of the paper, I briefly explain the New Jersey clean energy landscape, introduce electric bicycles and how electric bicycles present an opportunity for New Jersey to further reduce transportation sector emissions. I will conclude with a presentation of the paper's policy recommendation and goals for the state of New Jersey. In the second part of the paper, I will begin with examining the background, structure and results of two successful electric bike (e-bike) programs, one state and one city. Looking at both of these locations will help with thinking through the modeling and implementation of a potential New Jersey e-bike incentive program. I will conclude by explaining the main benefits of e-bikes, such as their accessibility, health benefits, environmental benefits, affordability, and practicality for commuters. In the final part of the paper, I will utilize the research outlined above to propose the design of a New Jersey statewide e-bike incentive program. In addition, I will discuss potential promotional plans for the program as well as a few things to consider about e-bikes, such as recycling dead e-bike batteries and the possible battery combustion. Lastly, I will bring together all parts of the analysis to provide a clear conclusion and call to action.

New Jersey's Clean Energy Landscape

In the fight against climate change, New Jersey has enacted a host of cutting-edge programs and public policies aimed at reducing the state's carbon footprint. One example is electric vehicles (EVs), which have been taking on an increasingly important role in New Jersey due, in part, to the

³ Effects of Climate Change | Threats | WWF. (2022). World Wildlife Fund. Retrieved from: <https://www.worldwildlife.org/threats/effects-of-climate-change>

⁴ Sources of Greenhouse Gas Emissions. (2022). U.S. EPA. Retrieved from: <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

⁵ A Guide to CO2 Told by Cats, Cars & Kegs. (2022). Means and Matters. Retrieved from: <https://meansandmatters.bankofthewest.com/article/sustainable-living/taking-action/a-guide-to-co2-told-by-cats-cars-and-kegs/>



“Electric Vehicle Law,” also known as Senate Bill 2252.⁶ This law established new EV targets and incentives to help New Jerseyans purchase or lease EVs, construct the essential charging infrastructure, and help the state reach its clean energy goals. Furthermore, the law requires the state to have at least 330,000 registered light-duty EVs by December 31, 2025, at least 2 million registered light-duty EVs by December 21, 2035, and at least 85% of all new light duty vehicles sold or leased shall be EVs by December 31, 2040, among other important goals.

One of the most important ways for New Jersey to organize itself against climate change came in 2019, when Governor Phil Murphy signed an executive order that established New Jersey’s Energy Master Plan (EMP or 2019 EMP), which is a statewide blueprint to achieve a 100% clean energy economy. The 2019 EMP set a strategic vision to comprehensively address New Jersey’s energy system and its associated GHG emissions and air pollutants while building a world-leading innovation economy that invests in communities, vulnerable ecosystems, and public health.⁷ In addition to the rigorous goals laid out, New Jersey’s EMP also affects multiple sectors and New Jersey governmental agencies, such as the Board of Public Utilities (NJBPU), NJDEP, the Department of Transportation (NJDOT), the Department of Community Affairs (NJCA), the Department of Labor and Workforce Development (NJLWD), the Economic Development Authority (NJEDA), and NJ TRANSIT.

Overall, New Jersey’s EMP outlines seven main strategies to reach the state’s clean energy goals. Most relevant to this paper, the EMP named reductions to “energy consumption and emissions from the transportation sector” as the first strategy to combatting climate change. Within this overarching strategy are three focuses:

- 1. Decarbonize the transportation sector;**
- 2. Improve connections between people, jobs, and services; and**
- 3. Reduce port and airport emissions.**

For the purposes of this paper, the emphasis will be on the first focus: “decarbonize the transportation sector.” Within the first strategy, the EMP’s vision is clear; the transportation sector should be almost entirely electrified by 2050, with an early focus on light-duty vehicles and short-range medium-heavy-duty vehicles, particularly in environmental justice communities.⁸ In addition to the important task of encouraging EV adoption, the EMP calls for the exploration of alternative ways to reduce vehicle miles traveled (VMT). For reference, VMT is the primary metric used to assess vehicle travel, where one vehicle traveling one-mile equals one VMT. Reducing VMT is fundamental to the state’s emission goals and this paper.

⁶ Smith, Bob, Linda Greenstein, Daniel Benson, Nancy Pinkin, and James Kennedy. (2020). Senate Bill 2252. Retrieved from: <https://pub.njleg.state.nj.us/Bills/2018/PL19/362.PDF>.

⁷ Office of the Governor | Governor Murphy Announces Planning for New 2024 Energy Master Plan. (n.d.). www.nj.gov. Retrieved from: <https://www.nj.gov/governor/news/news/562023/approved/20230120a.shtml>

⁸ https://www.nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf



Electric Bicycles (e-bikes)

Typically, the existing infrastructure for, and people's views around, transportation tend to be centered on automobiles. This reality is reflected in the often inadequate or limited amount of space that is available to other forms of transportation, such as bicycles. Unfortunately, this narrow type of thinking makes it harder for people to consider getting around with something other than an ICE vehicle. According to the United States Department of Transportation (USDOT), the average U.S. household produces about 9.5 trips a day.⁹ About half of these trips are within three miles, but fewer than 2 percent of those trips are made by bicycles.¹⁰ Now a days many of the places that people need to get to for work or errands are not too far away, especially in a densely populated state like New Jersey. Instead of focusing on using a car for close trips, New Jersey needs to make it easier for its residents to choose other options to get around – especially those that are more environmentally conscientious.

These close proximity trips typically made by car can easily be replaced with an e-bike! For reference, an e-bike is a bicycle equipped with a battery and small electric motor that allows riders to move faster and further than a conventional bicycle. This emerging technology is becoming more widely adopted by governments and people who want affordable transportation options that reduce their carbon footprint while completing essential commutes and errands. While e-bikes can be seen as simply fun modes of transportation, they are also more accessible and sustainable. In recent years, e-bikes have become increasingly available due to recent innovations with low-cost batteries and related technology. Furthermore, e-bike use has been flourishing among cities and states throughout the country as a successful way to reduce VMT and progress towards clean energy goals. E-bikes are categorized by classes – class one, two and three – which are generally defined as below:

- **Class One:** These e-bikes have a pedal-assist mode that turns on only while the rider is actively pedaling, and the electric motor assist stops when the rider reaches 20 mph;
- **Class Two:** These e-bikes have a pedal-assist mode up to 20 mph, but they also provide riders a throttle-powered mode, similar to a motorcycle, that does not require active pedaling; and
- **Class Three:** These e-bikes function just like class two e-bikes, but the electric motor will not stop assisting until the rider reaches 28 mph.

Class one and two e-bikes are typically allowed anywhere a regular bike is allowed, while there are more restrictions placed on class three e-bikes. In addition, e-bikes operate on battery chargers, which are usually small and can easily be set up for charging at your home or place of work. Also, depending on the size of the battery, e-bikes can take approximately 4 to 6 hours for

⁹ Fan, Z., & Harper, C. D. (2022). Congestion and environmental impacts of short car trip replacement with micromobility modes. *Transportation Research Part D: Transport and Environment*, 103, 103173. Retrieved from: <https://doi.org/10.1016/j.trd.2022.103173>

¹⁰ Ibid.



a full charge. For example, a commuter style e-bike has a 40- to 60-mile range before it needs to be recharged.

It is also worth discussing the laws and regulations for e-bikes in New Jersey. Thankfully, New Jersey regulates low speed e-bikes similar to traditional bicycles. While the laws and policies are always subject to change, currently New Jersey designates two types of e-bikes: class one and class two. These two classes of bikes do not require registration, licensing or insurance that would normally apply to a motor vehicle. In New Jersey, class three e-bikes are defined as motorized bicycles, which are subject to license, registration and insurance requirements. Despite the different classes of e-bikes, all riders must be at least 15 years old, wear a helmet while riding, have their e-bike equipped with a front and rear light as well as a bell or horn. E-bikes are allowed to be ridden on the roadway as long as they stay on the right side, moving with the flow of traffic. In addition, e-bikes are allowed to be ridden on regular bicycle paths, but must yield to pedestrians, and municipalities may place restrictions on where e-bikes can be used. Therefore, it is important that prospective e-bike riders research the types of regulations their municipality and county have in their respective area.

Although the motivations behind getting an e-bike vary by user and even location, there is consistency when it comes to the overall benefits that they provide to people and the environment. Not to mention e-bikes are an enjoyable and effective form of low-carbon transportation for a wide variety of users. Currently, there is no statewide e-bike incentive program offered in New Jersey. Therefore, in conjunction with the state's current EV incentive programs and policy, New Jersey needs to financially help its residents acquire their own private e-bike. Specifically, the NJBPU should create a statewide e-bike incentive program to make it less expensive for residents to purchase an e-bike and help reduce VMT in personal automobiles and their associated GHG emissions.

Policy Recommendation & Goals

The purpose of this paper is to explain the reasons why there should be increased adoption of e-bikes in New Jersey. Below are some key questions this paper seeks to address:

- **What is an e-bike and why should anyone consider using one;**
- **How are other government entities leveraging e-bikes;**
- **What are the pros and cons of e-bikes; and**
- **Why and how should New Jersey invest in an e-bike incentive program?**

The overall focus of this paper will be to make the case for a New Jersey e-bike incentive program through evidence-based research and analysis, as well as laying out a potential program design. Getting more e-bikes on the roads will provide New Jersey a unique opportunity to address the directives laid out in the 2019 EMP, and become even more of a clean energy leader.





Vermont's E-Bike Incentive Program

The state of New Jersey is in good company when it comes to other states acting to reduce VMT and establish innovative clean energy programs. By first looking at functional e-bike models in other states, it gives New Jersey the benefit of seeing what has and has not been working. For instance, the “State of Vermont Incentive Program for E-Bikes” (Vermont Program) is a good first model to consider.

The Vermont Program was the nation's first statewide e-bike incentive program and it was established by law in 2021 and offered a limited time incentive to consumers for the purchase of eligible e-bikes. Between fiscal years 2022 and 2023, the program received about \$92,000 in Transportation Funds. At the end of fiscal year 2023, the program shut down due to the exhaustion of funding, and unfortunately the state Legislature did not authorize any additional funding to date. Before the program's closure, a total of 279 e-bikes were incentivized, 155 of which were Enhanced Rebates and 124 were Standard Rebates. In addition, practically all of the funding was reserved or approved between the two fiscal years. All of the incentives were processed by a program administrator, the Center for Sustainable Energy (CSE), which is the same program administrator that New Jersey uses for overseeing its premier EV program – the Charge Up New Jersey (CUNJ) program. While the Vermont Program was active, it operated on a first-come, first served-basis until the funds ran out. Below are the types incentive options that were available:

- **Standard Rebate:** E-bikes that cost more than \$833 received a \$250 rebate, and e-bikes that cost under \$833 received rebates at 30% of the sale price; and
- **Enhanced Rebate:** E-bikes that cost more than \$800 received a \$400 rebate, and e-bikes that cost under \$800 received rebates at 50% of the sale price.

Under the Standard Rebate, retailers were able to submit a rebate application during the purchase with the consumer, or within 15-days of the sale. Under the Enhance Rebate, the purchaser had two months to submit a rebate application after the date of their purchase in order to be eligible.

Denver's E-Bike Incentive Program

The city of Denver, Colorado's “E-Bike and E-Cargo Rebate Program” (Denver Program) is another good model to examine when considering ways to structure a New Jersey e-bike initiative. The Denver Program was established on Earth Day, April 22, 2022, through a contract approved by the city's Council. The Denver Program originally allocated \$250,000 towards financing e-bike incentives, but quickly found that they needed a lot more funding to keep up with the demand. The Denver Program provided incentives monthly, and by the end of December 2022, the city had spent \$4.7 million providing vouchers to 4,734 residents – 49% of those vouchers and 67%



of the funding went to income qualified residents, and almost 45% of all bikes were e-cargo bikes.¹¹ As of March 23, 2023, the city of Denver provided 5,060 vouchers to residents so far.¹² Unlike the Vermont Program, the Denver Program is still being administered. Denver's Office of Climate Action, Sustainability and Resiliency (CASR) is responsible for creating the program. The Denver Program operates on a first-come, first-served monthly basis while funding lasts. Below are the types of incentive options available:

- **Standard Rebate:** Allows individuals to save up to \$300 on the sale of an e-bike or up to \$500 on the sale of an e-cargo bike; and
- **Income-Qualified Rebate:** Allows individuals that meet the state's income-qualified requirements, they can save up to \$1,200 on the sale of an e-bike or up to \$1,400 on the sale of an e-cargo bike.

To be eligible for the income qualified incentive, Denver residents need to show that they are either enrolled in an existing program meant to support lower income residents offered by the state, or Xcel Energy, or that they meet household income thresholds such as being below 80% of Area Median Income.¹³ The Denver Program also provides an Adaptive Rebate, which allows a person who lives with a disability and is unable to use a standard e-bike to be eligible to save up to \$1,400 on the sale of an adaptive e-bike. Adaptive e-bikes are designed to meet individual and specialized needs of each specific rider.¹⁴

Lastly, another reason the Denver Program is worth looking at is because of their deliberate inclusion of e-cargo bikes. E-cargo bikes offer heavier maximum-weight capacities and a variety of storage options for hauling groceries and the like.¹⁵ E-cargo bikes have similar benefits to e-bikes, but they are sensible supplements or replacements to delivery services. Using e-cargo bikes makes a long day of deliveries much more feasible. And beyond commercial delivery purposes, e-cargo bikes are a worthwhile consideration to accomplish everyday errands and commutes. Also, e-cargo bikes take up considerably less space than delivery vehicles do, which will help in reducing VMT associated with larger ICE vehicles, and reduce the amount of congestion on the streets. The proliferation of e-cargo bikes comes at a great time as there are

¹¹ City and County of Denver, PeopleForBikes, et. al. (2022). Denver's 2022 E-bike Incentive Program Results and Recommendations. Retrieved from: https://5891093.fs1.hubspotusercontent-na1.net/hubfs/5891093/Denvers%202022%20Ebike%20Incentive%20Program%20Results%20and%20Recommendations.pdf?_hstc=137334191.633ad2245ef15e8e4f5b6274a91aad68.1679447183284.1679447183284.1679447183284.1&_hssc=137334191.1.1679447183284&_hsfp=2422146095&hsCtaTracking=f6c129d8-5739-4033-ae8d-38d8a4d7d52b%7C4d3304a1-3f00-438b-b2bd-bd69b50cfdb9

¹² Electric Bikes (E-Bikes). (n.d.). Retrieved from: <https://www.denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/Climate-Action-Sustainability-Resiliency/Sustainable-Transportation/Electric-Bikes-E-Bikes-Rebates>

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Electric Mountain Bike Vs Cargo Bike | Differences Explained. (n.d.). Retrieved from: <https://www.gadgetreview.com/electric-mountain-bike-vs-cargo-bike#:~:text=The%20primary%20difference%20between%20the>



many businesses looking for ways to be more efficient and sustainable in how they provide goods and services.

Accessibility & Health

Inclusivity and the ability to bring healthful transportation to a range of communities are some of the more convincing reasons e-bikes are worth considering. The beauty of an e-bike is that no matter the style or class you choose, there is something available to nearly everyone. Below are the three common categories of e-bikes:

- **Cruiser style e-bikes:** For more casual riders looking to go for a joy ride, and feature comfortable seats;
- **Hybrid style e-bikes:** For riders looking to go further and faster, and feature the 28 mph; and
- **Off-road style e-bikes:** For riders looking to take things off-road and onto the trails, and feature low centered battery placement for more stability and control.

Riding a regular bicycle can be a physically demanding activity, and as a result many people may find it inaccessible. However, the reliable electric motor inside an e-bike helps to take on much of the “hard work” associated with a regular bicycle, and lowers the physicality barriers to be more seamless overall. Although users will not find themselves doing the sort of vigorous physical activity that uphill mountain biking or even hot yoga entails, e-bike use has been shown to deliver the sort of moderate physical activity most doctors recommend.¹⁶ Because e-bikes are less physically demanding on joints and muscles, they not only bring in riders who might otherwise be inactive, but they also offer the opportunity for people to ride longer periods of time and go greater distances.¹⁷ This sentiment may not sit well with some parts of the bicycle community that take pride in the ability to endure long miles and strenuous uphill climbs. However, there are many individuals, and more to come, that understand e-bikes are a practical and healthy transportation option for people of all ages, fitness levels, and abilities.

Commuting

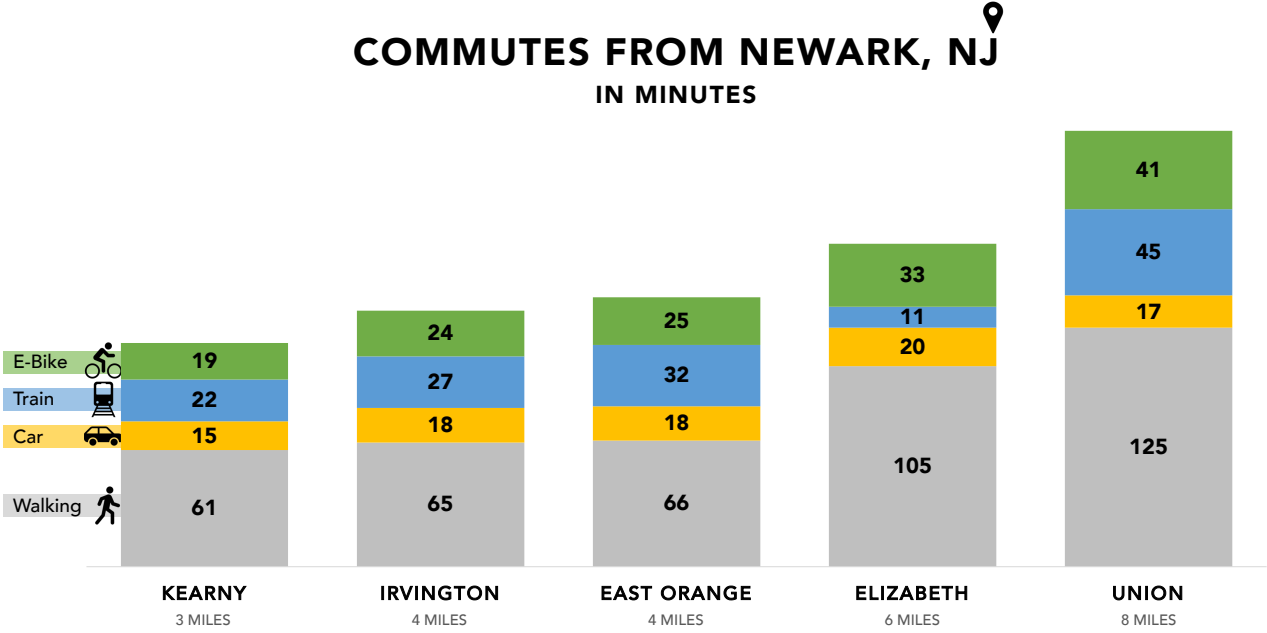
Clearly, e-bikes create a unique space for more than athletically inclined individuals to incorporate them into their daily lives and drives. They also make space for riders that might feel that a traditional bike is too demanding for their daily work commute. The practicality that e-bikes provide to commuters who live in suburbs or densely populated cities is another convincing reason e-bikes are worth considering. E-bikes are a great transportation method to use in these environments because many New Jersey suburbs and cities already have established bicycle infrastructure. Although, it is worth noting that New Jersey should also work to improve and expand the infrastructure for bicycling on routes from suburbs to cities and centers of commerce.

¹⁶ Herbert, K. (2022). The Health Benefits of Electric Bikes. PeopleForBikes. Retrieved from: <https://www.peopleforbikes.org/news/the-health-benefits-of-electric-bikes>

¹⁷ Ibid.



In many cases, the ease of transportation that e-bikes afford is causing people to replace their car trips with e-bikes. A recent study found car owners who also own an e-bike used the bike to replace about half the miles they usually traveled by car.¹⁸ Additionally, suburbs are the regions that may have the highest saving potentials since there are many commuters going in and out of nearby city centers, but are also not too far so as to make riding an e-bike unfeasible. Therefore, e-bikes present themselves as an especially beneficial option for commuters. Riding a regular bike does not sound ideal when one is wearing a dress or a suit. However, with the electric motor and pedal assist on an e-bike riders do not have to worry about getting overheated and sweaty during their commute. E-bikes allow for longer commutes to be accessible without having to use a car. Below I prepared visual representations for North and South Jersey municipalities that depict how e-bikes are an advantageous option when considering relatively short commute times:



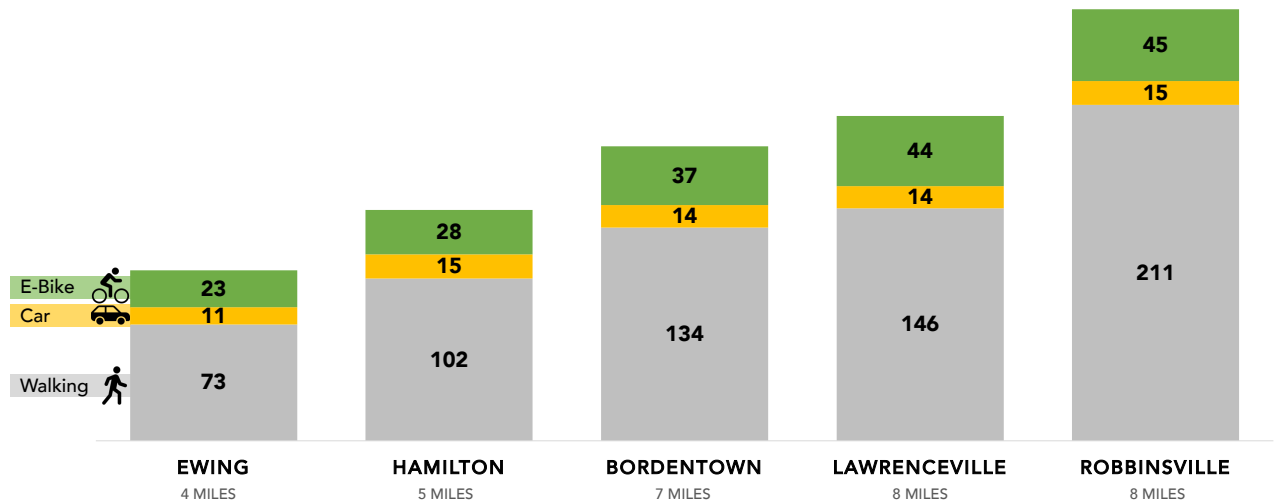
Source: Google Maps. All distance estimates shown above have been rounded to be whole numbers.

As displayed in the data above, it is clear that e-bike’s time effectiveness is similar to cars and trains in Northern New Jersey municipalities. Even with the case of Elizabeth, where train and car commute times are less than e-bikes, it is common that train commuters need additional transportation to get to and from the station. Ironically, this kind of scenario is exactly where e-bikes would be especially useful as they represent a helpful way for commuters to fill in the gaps of their journeys.

¹⁸ Reck, D. J., Martin, H., & Axhausen, K. W. (2022). Mode choice, substitution patterns and environmental impacts of shared and personal micro-mobility. *Transportation Research Part D: Transport and Environment*, 102, 103134. Retrieved from: <https://doi.org/10.1016/j.trd.2021.103134>



COMMUTES FROM TRENTON, NJ IN MINUTES



Source: Google Maps. All distance estimates shown above have been rounded to be whole numbers.

Furthermore, when looking at e-bike commutes in more Central or Southern New Jersey municipalities, it is also clear that e-bikes are similarly time effective when compared to ICE vehicles.

Environment

As I have laid out in this paper, New Jersey is no exception when it comes to the rate at which the state emits carbon. This is especially an issue for the transportation sector where nearly half of all state carbon emissions are coming from. E-bikes are not only bringing more non-riders into the fold, but they are also giving them a way to lessen their carbon footprint. New Jersey's transportation sector is filled with harmful ICE vehicles that are polluting the air of the communities they drive and idle in. Getting more people on e-bikes will help New Jersey to displace these carbon emitting vehicles, reduce VMT, and help meet state clean energy goals. For instance, according to a 2020 study that was conducted in Portland Oregon, a single e-bike could save 225 kg CO₂ per year, on average.¹⁹ That is a meaningful amount of carbon being taken out of the atmosphere. For comparison, the average gas-powered vehicle emits about 4.6 metric tons of carbon dioxide per year.²⁰ That is significantly more carbon from only one vehicle per year. It is hard to imagine the scale of what is being emitted when solely focusing on New Jersey, which has roughly 2.5 million registered drives. It is much easier to imagine supplementing many

¹⁹ McQueen, M., MacArthur, J., & Cherry, C. (2020). The E-Bike Potential: Estimating regional e-bike impacts on greenhouse gas emissions. Transportation Research Part D: Transport and Environment, 87, 102482. Retrieved from: <https://doi.org/10.1016/j.trd.2020.102482>

²⁰ U.S. EPA. (2022). Greenhouse Gas Emissions from a Typical Passenger Vehicle. U.S. EPA; United States Environmental Protection Agency. Retrieved from: <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=typical%20passenger%20vehicle%3F->



of those cars and trips with e-bikes. Moreover, researchers have found that when a household buys an e-bike, their driving (as measured by [...] VMT) decreases by more than a third.²¹ E-bikes are a great way for New Jersey, its businesses, and citizens to reduce VMT, and help the state be more sustainable overall.

Affordability

Putting a price on the ability of an e-bike to protect the environment or support a healthier lifestyle is a difficult task. However, the actual cost savings of having an e-bike is something that we *can* put a price on, and is another benefit to consider. E-bikes are much more affordable than leasing or purchasing a new or used car. The average cost of a car is about \$49,500.²² However, the equation changes when one considers that the average cost of an e-bike is about \$1,500 to \$2,500, which is much less than the cost of a car, or even an EV. E-bikes become even more affordable when one considers the soaring prices of gasoline. Additionally, the AAA estimates the annual cost of car ownership in the U.S. reached more than \$10k per year in 2022. E-bikes range from \$1000-\$8000 in upfront purchasing costs, with relatively low costs of ownership and maintenance compared to a vehicle or even an electric vehicle.²³

Furthermore, when considering low-and-moderate-income (LMI) communities or Overburdened Municipalities (OBM), particularly within the context of EV adoption, many will not be able to participate due to financial barriers. Short of incentivizing used EVs – which will require a few more years of market development – incentivizing e-bikes will make them a financially feasible option for many much sooner. I think the Denver Program is a great example of successful and innovative programming that helps people move around. They used a point-of-sale rebate, which is an important choice for LMI communities or OBMs. The point-of-sale design makes it easier for people without the capital to buy the product they want and not have to wait for a tax credit or rebate to come later. In addition, there are folks in New Jersey who do not own a car and therefore rely on rides from friends and family, walking, or frequently troublesome public transportation. For many, not having reliable transportation is a significant hindrance for job prospects, obtaining essentials, and so much more that many of us can take for granted. However, having an e-bike would help to expand people’s ability to look for a new job and move around their neighborhoods with greater ease and confidence.

²¹ McQueen, M., MacArthur, J., & Cherry, C. (2020). The E-Bike Potential: Estimating regional e-bike impacts on greenhouse gas emissions. Transportation Research Part D: Transport and Environment, 87, 102482. Retrieved from: <https://doi.org/10.1016/j.trd.2020.102482>

²² Average New Car Price Tops \$49,500. (2023). Kelley Blue Book. Retrieved from: <https://www.kbb.com/car-news/average-new-car-price-tops-49500/>

²³ City and County of Denver, PeopleForBikes, et. al. (2022). Denver’s 2022 E-bike Incentive Program Results and Recommendations. Retrieved from: https://5891093.fs1.hubspotusercontent-na1.net/hubfs/5891093/Denvers%202022%20Ebike%20Incentive%20Program%20Results%20and%20Recommendations.pdf?_hstc=137334191.633ad2245ef15e8e4f5b6274a91aad68.1679447183284.1679447183284.1679447183284.1&_hssc=137334191.1.1679447183284&_hsfp=2422146095&hsCtaTracking=f6c129d8-5739-4033-ae8d-38d8a4d7d52b%7C4d3304a1-3f00-438b-b2bd-bd69b50cfdb9





New Jersey’s E-Bike Incentive Program

The state of New Jersey was clear about the type of clean energy future it envisioned when it produced the 2019 EMP. It is no coincidence that significant reductions to energy consumption and emissions from the state’s transportation sector are priority number one. As I have demonstrated in this paper, e-bikes represent a dependable way to help New Jersey achieve a major goal of the EMP by reducing VMT. The NJBPU is the primary government agency tasked with carrying out many of the goals in the EMP. Therefore, it is only right that NJBPU be the agency to establish a statewide program to incentive the purchase of new eligible e-bikes. However, the Board has staff capacity constraints and therefore should not roll the program out alone. Similar to the setup of the Board’s CUNJ program, the Board should contract the administration of the e-bike incentive program to CSE. This organization has a proven track record of successful program administration and overall reliability. Additionally, the Board has the financial capacity to establish an e-bike incentive program by utilizing monies from Societal Benefit Charges (SBC). The major benefit here is that the Board has discretion over how these funds are spent each year. I recommend that the Board allocate \$7 million in SBC to make disbursements under an e-bike incentive program. The incentive amount should be adjusted after consideration of stakeholder input. Below I provide a general blueprint for how a New Jersey e-bike incentive program could look:

New Jersey E-Bike Incentive Program	
Launch	The Board would launch an e-bike incentive program at the beginning of a fiscal year or calendar year, whichever was sooner, or on Earth Day. Thereafter, the program would provide incentives on a bi-monthly basis for up to three years.
Intent	To encourage the purchase and ownership of new eligible class one and two e-bikes.
Amount	The incentive would be a point-of-sale rebate that comes in four tiers – the standard, enhanced, adaptive, and freight rebates – and would be a one-time payment to the purchaser of an eligible e-bike. The standard rebate would be up to \$500, and the enhanced, adaptive, and freight rebates would be up to \$1,500.
Assessment	The Board would monitor the disbursements of incentives under the program, and annually reassess the design and implementation. In addition, the Board would have the ability to revise the program, any aspect of the incentives, and the related implementation procedures or processes.
Distribution	The eligible in-store and/or online seller of an eligible e-bike would offer the incentive in conjunction with, and in addition to, any other incentives offered by the seller. The seller of an eligible e-bike would provide a purchaser the option to have the incentive amount deducted from the agreed upon sale price. The full amount of the incentive would be passed through to the purchaser in full and would be effective immediately at the time of sale. The Board would establish a process for reimbursing the seller of an eligible e-bike the cost of the incentive that was provided, similar to how the CUNJ program is administered.



The incentive amounts are important to explain further. The four tiers of rebates are based off of some of the styles observed in the city of Denver and the state of Vermont. The Standard rebate would be available to all New Jerseyans no matter where they live in the state. This incentive would provide up to \$500 towards the sale of any eligible e-bike. The enhanced rebate is similar to what Denver did, however instead of fulfilling state income-qualification requirements, the Board could make it available to New Jerseyans from either OBMs or Overburdened Communities (OBC), as defined by the Board's Office of Clean Energy Equity (OCEE). It is important that the state prioritize dedicated incentives for minority, LMI communities, and indigenous residents. This incentive would provide New Jerseyans who primarily reside in an OBM or OBC up to \$1,500 towards the sale of any eligible e-bike. The Adaptive rebate is equally as important as the Enhanced rebate. The Adaptive rebate would be available to New Jerseyans who live with a physical disability and are unable to ride a standard e-bike. This incentive would provide up to \$1,500 towards the sale of any eligible adaptive e-bike. Finally, the Freight rebate would primarily be geared toward commercial businesses who have a delivery component to their business. However, this incentive could also be available to individuals who wish to have a more robust e-bike. This incentive would provide up to \$1,500 towards the sale of any eligible e-cargo bike.

If NJBPU preferred to ensure that a program like this could be scalable, I recommend the agency consider beginning with a pilot program. The Board could start by creating a small lottery system to randomly select up to 30 participants that are at least 15 years of age. Ten participants would each come from the North, Central and Southern parts of New Jersey. Some areas to consider could be Paterson, Elizabeth, Ewing, Lawrence, Hamilton, Trenton, Brick, Jackson, Newark, Camden, Glassboro, Cherry Hill, Toms River, Hamilton, Montclair, Westfield, New Brunswick, etc. Upon selection, each participant would be provided an e-bike and equipment needed to ensure their safety while riding around for a full year at no cost. These items would include front and rear lights, reflectors, and a bell or horn. In addition to the e-bike, participants would be provided a helmet, bike lock, and ankle straps. Lastly, I recommend that the Board track these participants via a mobile app as part of their participation in order to better understand the impacts of owning an e-bike. The app would gather data on statistics such as how often they ride, how long, how far, what riding modes were used, trip purposes, etc.

Lastly, in order to ensure the program gains the traction with the nearly 9 million New Jersey residents, it is worth thinking through some of the promotional components. I recommend that the Board consider direct means and methods to accelerate e-bike adoption through strategic communications, consumer outreach and awareness. Foremost, it would be crucial for NJBPU to have a web presence dedicated to the e-bike incentive program. In addition, the Board and the Governor's Office could make use of public service announcements, press releases, social media campaign, and local access TV to get the word out and to promote the benefits of e-bikes. Another way to promote the program could be coordinated ride and drive events throughout the state. NJBPU could partner with sister agencies, such as NJDEP or NJDOT, to deploy a robust ride and drive program and look to do routine monthly or bi-monthly events. These events should ideally be held concurrently with other large public events and take place in high profile locations, such as the statehouse, malls, stadiums, museums to ensure larger audiences.



Another way to promote the program could be through the enlistment of the Governor or other New Jersey native VIPs, such as Bruce Springsteen or Danny DeVito, to help with PR spotlights. It could be a really fun and encouraging way to get people talking about e-bikes if they saw these New Jersey figures riding around on an e-bike. One final way to promote the program could be through coordination and partnership with local non-profits, bike retailers, and environmental groups to produce education and outreach opportunities. The organizations included could be Sustainable New Jersey, the National Association of State Energy Officials, ChargeVC, the New Jersey Bike & Walk Coalition, and the New Jersey League of Municipalities. In this promotional effort, it is important to prioritize dedicated outreach for LMI residents. It is equally important to place a bit more focus on New Jersey's suburbs and city centers to convince people to try out e-bikes and nudge them to make the transition.

Considerations

In order to have a more well-rounded e-bike incentive program, it is worth policy makers and e-bike riders alike to consider a few concerns related to e-bikes. The first consideration relates to what becomes of the lithium batteries that are used in e-bikes when they have reached the end of their lifetime. The most commonly used battery in e-bikes is the lithium battery. These batteries typically last on average up to seven years, but that range does depend on the type of battery and how well the user takes care of it. Industry experts agree that millions of e-bikes are expected to be purchased within the next decade, which also means that millions of lithium batteries will eventually need to be discarded when they no longer work. Although this may be a concern for landfills and the like, there are ways to ensure e-bike batteries are safely and responsibly discarded. For example, the Call2Recycle program is a successful and scalable e-bike battery recycling program. The program launched in 2021 and became a reality when more than 40 bike industry leaders from 20 PeopleForBikes member companies united under a sustainability task force and electric bicycle committee to design an industry-leading e-bike battery recycling program in collaboration with Call2Recycle.²⁴ This program works by having bike companies pay a fee to the fund that pays for Call2Recycle to collect, transport and recycle the battery. The added benefit to this program is that it gives the retailers the ability to help their customers learn about the battery recycling process and maybe purchase another e-bike. Also, this program allows customers to find a collection site of their choosing through the internet and take the battery there by themselves to be recycled.

The second consideration for policy makers and e-bikes riders is to look at what is being done to prevent e-bike batteries from heating up and potentially catching on fire. There has undoubtedly been some form of news regarding a faulty e-bike battery suddenly bursting into flames and causing major damage. While the exact reasons for these kinds of events are still being looked into, one thing is absolutely clear: the number of e-bikes in the U.S. is only growing and will continue to grow, particularly as these devices become more affordable. More devices mean more fires, experts say, especially since the industry is relatively new and unregulated, and there

²⁴ <https://www.call2recycle.org/e-bikes/>. (2021). Retrieved from: <https://www.call2recycle.org/e-bikes/>



are a lot of different companies and products on the market.²⁵ The lack of regulations is an issue in and of itself, since e-bikes are still relatively new the rules around them are not as well established compared to other modes of transportation. Clearly, there needs to be a national standard set when it comes to the certification of an e-bike's battery. One way to do this would be to require devices be certified under the safety standards recommended by Underwriter Laboratories, a group that has produced safety certifications for electric products for over a century.²⁶ Regardless of which organization is tasked with certifying safety, no one should have to worry about their device catching on fire. And finally, it is crucial that users unplug their devices after they are fully charged, not charge while they sleep, keep the device away from flammable objects, and research the types of batteries that are used in their products.

Conclusion

Humanity is in the midst of a great transportation revolution, the dinosaur that is the ICE vehicle is being swapped for more sustainable options like e-bikes. During this shift, states like New Jersey are doing the hard and necessary work to establish far-reaching clean energy programs to reduce their carbon emissions and realize their clean energy futures. As New Jersey's transportation sector continues to be the largest emitter of carbon, it is vital for New Jersey to rethink the way that people and goods are moved, and place particular focus on all electric mobility options. Guided by research and analysis, including the recommendations set forth in this paper, the NJBPU now has a blueprint for a statewide incentive program that would financially help all New Jerseyans obtain an e-bike and meaningfully play a part in the state's sustainability efforts. Getting more e-bikes on roads will afford New Jersey a unique opportunity to reduce VMT in automobiles, help to improve public health – particularly in densely populated areas of the state – and contribute to the attainment of important environmental aspirations. New Jersey's electric future will not be realized overnight nor run on limited means of transportation – the revolution will only work if we think *outside* of the *internal* combustion engine.

²⁵ What's driving the battery fires with e-bikes and scooters? (2023). NPR. Retrieved from: <https://www.npr.org/2023/03/11/1162732820/e-bike-scooter-lithium-ion-battery-fires>

²⁶ Ibid.

