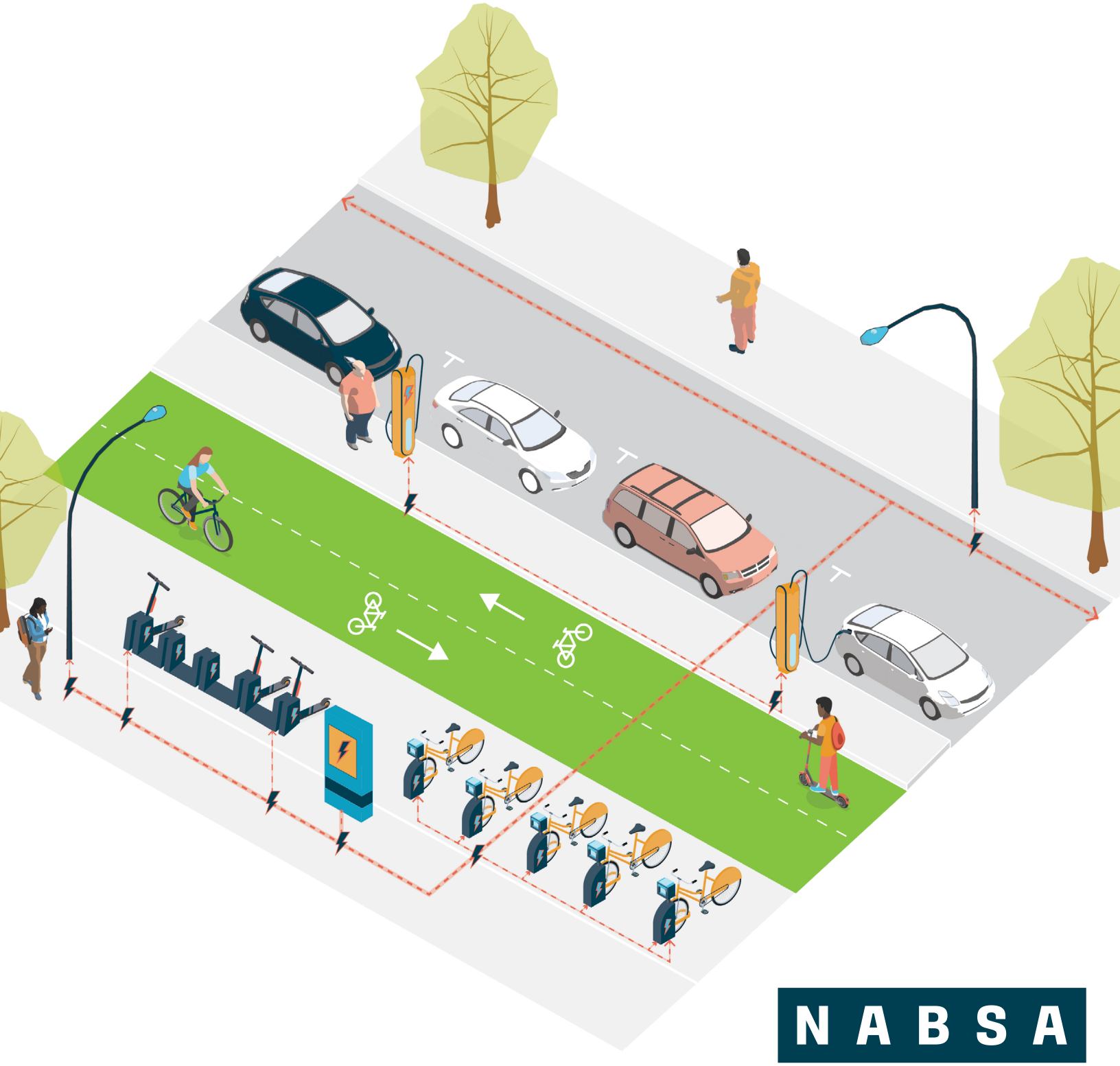
Incorporating Shared Micromobility in Electric Vehicle Charging Projects

August 2023



NABSA

NORTH AMERICAN BIKESHARE & SCOOTERSHARE ASSOCIATION

The Benefits of Incorporating Shared Micromobility in Electric Vehicle Charging Projects

Across North America, transportation is one of the most significant contributors to greenhouse gas emissions. It is responsible for 29% of the emissions in the US, 22% of the emissions in Canada, and 31% of Mexico's emissions. The World Resources Institute identified transport as one of the most significant contributors to emissions globally.

In response, civic leaders are prioritizing the electrification of transportation and incorporating electric vehicles (EVs) and EV charging into transportation networks. However, the emphasis has largely been on electric cars. Recent research has concluded that city residents worldwide need to choose modes like walking, biking, and transit for at least 40% of the miles they travel by 2030 to mitigate the worst effects of climate change. Given that many daily trips are three miles or less, with the right investments, this shift is very feasible. A US Bureau of Transportation Statistics report found that 52% of all daily trips in the US are under three miles, and 28% are under one mile. The North American Bikeshare and Scootershare Association's (NABSA) 2022 Shared Micromobility State of the Industry Report found that the average shared micromobility trip is 1.4 miles (2.3 km), and the average shared e-bike trip is 1.9 miles (3.1 km).[1]

Electric shared micromobility (such as e-bikeshare and e-scootershare) is a powerful mode replacement option that can be leveraged to help achieve these outcomes. Shared micromobility reduces barriers and increases access to e-bikes and e-scooters by providing service at a significantly lower cost than personal ownership and fulfilling the maintenance, storage, and charging needs of the devices for users.

As we seek to electrify transportation, electric shared micromobility– e-bikes and e-scooters– must be included. Integrating shared micromobility into electrification projects and EV charging networks will help build resilient multimodal transportation ecosystems that provide viable alternatives to private car trips, while improving transportation equity and access.

Benefits of Electric Shared Micromobility

Travels faster and requires less physical exertion than pedal bikes

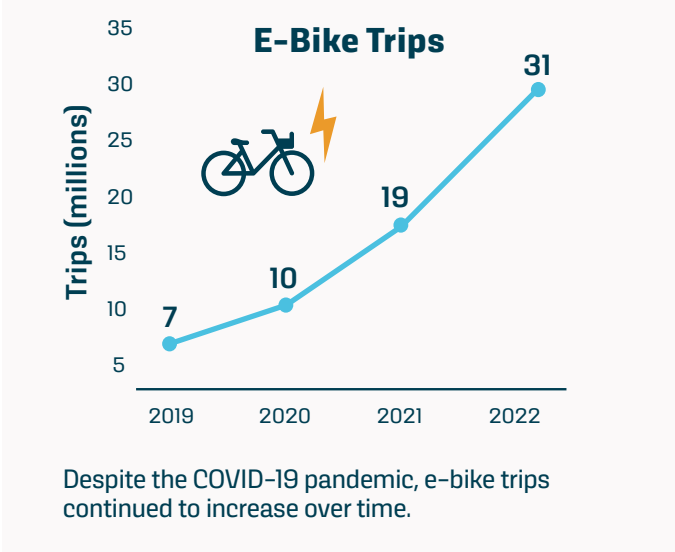
Eliminates need for personal storage

Provides low-cost and convenient access to e-bikes or e-scooters

The popularity of electric shared micromobility has grown exponentially since its start in 2018, as cities of all sizes take advantage of its ease, accessibility, and ability to help respond to climate change in the face of a dire need to lower global transportation-related emissions. Millions of people in North America rely on shared e-bikes and e-scooters to connect them to transit, essential services, and destinations that would otherwise be too far or cumbersome for walking or classic pedal bikes.

1 Unless cited elsewhere, shared micromobility statistics in this paper are from NABSA's State of the Industry report.

The popularity and growth of ridership speak for themselves. The 2022 NABSA Shared Micromobility State of the Industry Report found that about 65% of shared micromobility trips taken that year– 103 million of the 157 million trips– were made on e-bikes and e-scooters, accounting for well over half of the 289,000 total vehicles deployed across North America. Additionally, e-bikes in particular have thrived despite the COVID-19 pandemic, demonstrating a significant growth trajectory between 2019 and 2022.



Despite the COVID-19 pandemic, e-bike trips continued to increase over time.

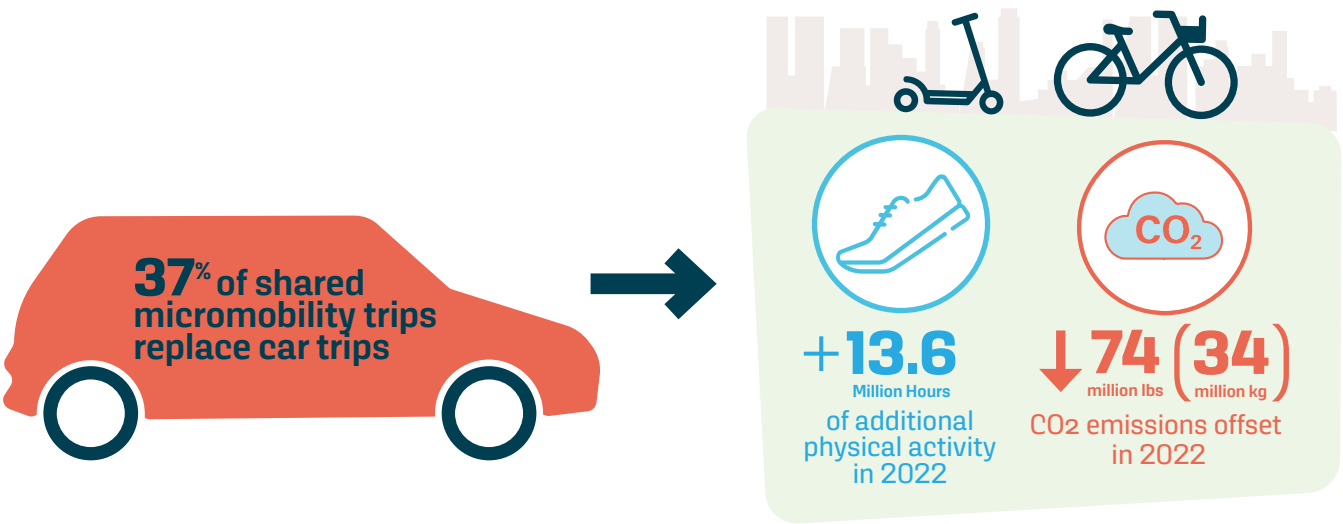
NABSA found that 7 million trips were made on e-bikes in 2019, 10 million in 2020, 19 million in 2021, and nearly 31 million in 2022. The percentage of systems that had e-bikes increased from 28% in 2019 to 44% in 2020, 50% in 2021, and 55% in 2022.

The popularity of electric shared micromobility means that users have increased access to destinations they might not have had before, or with more ease.

In many cases, these trips replace a car trip or create a new connection to transit, making multimodal mobility more accessible. NABSA has found that 37% of shared micromobility trips replace car trips. Additionally, 64% of shared micromobility riders report that they use shared micromobility to connect to transit, and 23% were for the purpose of connecting to transit.

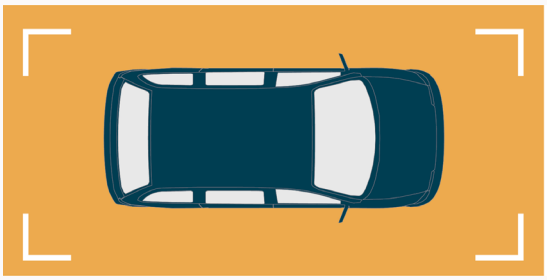
Shared micromobility, and particularly bikeshare, also offers an active transportation option that is an avenue for physical activity that, for underserved areas, is also an equity and quality of life benefit.

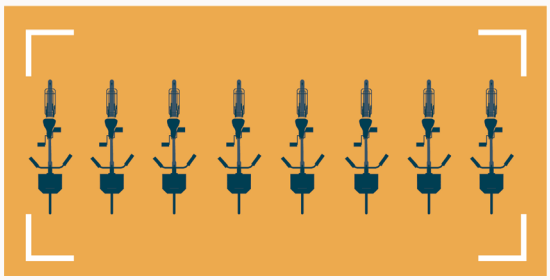
In these ways, shared micromobility benefits cities and communities as a tool to achieve climate, sustainability, and equity goals. The availability of e-bikes and e-scooters encourages mode shift, helping people replace short car trips with more sustainable options like biking, scooting, and transit. This mode shift is more important now as research continues to identify it as one of the most critical elements of climate change mitigation strategies. In 2022, shared micromobility trips offset approximately 74 million pounds (34 million kg) of carbon dioxide emissions by replacing auto trips.



Scaling Electric Shared Micromobility

1 vehicle parking space can accommodate charging for 8 shared micromobility vehicles.





Scaling electric shared micromobility is essential for reaping the most benefits for climate action.

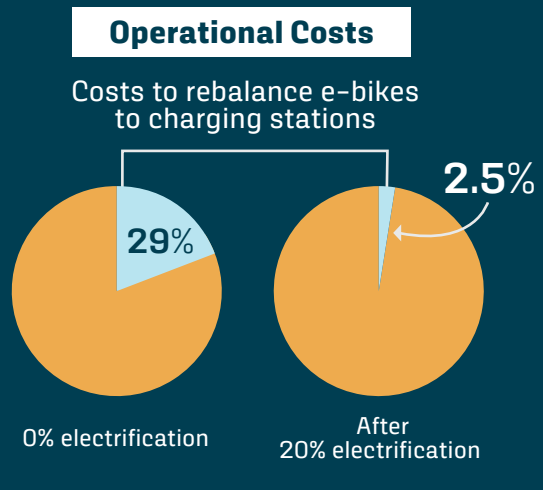
The US National Renewable Energy Lab has estimated that high adoption of shared micromobility could save 2.3 billion gasoline-equivalent gallons per year across the US. And as the US Joint Office of Transportation and Energy's new Urban Electric Mobility Toolkit notes, micromobility devices weigh almost two orders of magnitude less than electric vehicles, so "the use of micromobility modes when possible and at-scale can significantly impact the consumption of raw materials." Essentially, the minerals and other materials utilized in battery and device production for micromobility devices are significantly less than for electric vehicles. Creating sustainable transportation will take a multimodal approach.

Shared micromobility charging is different from electric vehicle charging in that shared devices cannot be charged at home, and rely on publicly-accessible charging infrastructure. Though micro-mobility charging station implementation has begun, right now most electric shared micro-mobility is charged through battery-swapping or out-of-field charging, which requires additional touch points for each device.

This is time-intensive and involves transport and travel, and is a major cost to operators that is not viable at a large scale. Charging infrastructure for electric shared micromobility improves system efficiency by maintaining vehicle availability, reducing the need for battery swapping, and capitalizing on regularly-occurring rider usage of the system to naturally move vehicles to stations that charge them. The implementation of charging stations at scale would enable shared micromobility ridership and its climate benefits to grow. The major barrier is funding.

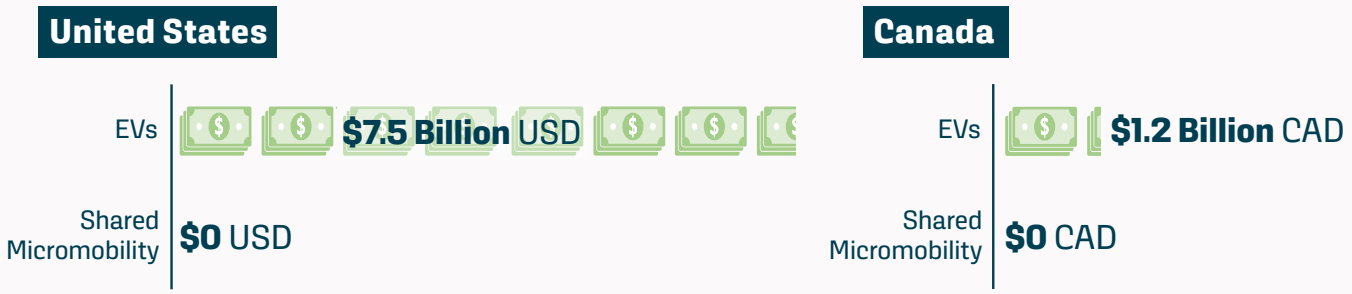
Electrification can reduce operating costs

Vancouver's docked bikeshare operator (Mobi) estimates significant operational cost savings if just **20%** of their top-performing stations were electrified.



Dedicated Funding for Charging Infrastructure

As of 2023, there is **$0 in federal funding** allocated to standalone shared micromobility charging infrastructure.



In order to scale the benefits of shared micromobility and support the growing demand, it is essential to develop connections to the electrical grid and implement electric shared micromobility charging stations. Funding and support at all levels of government is critical to making this happen.

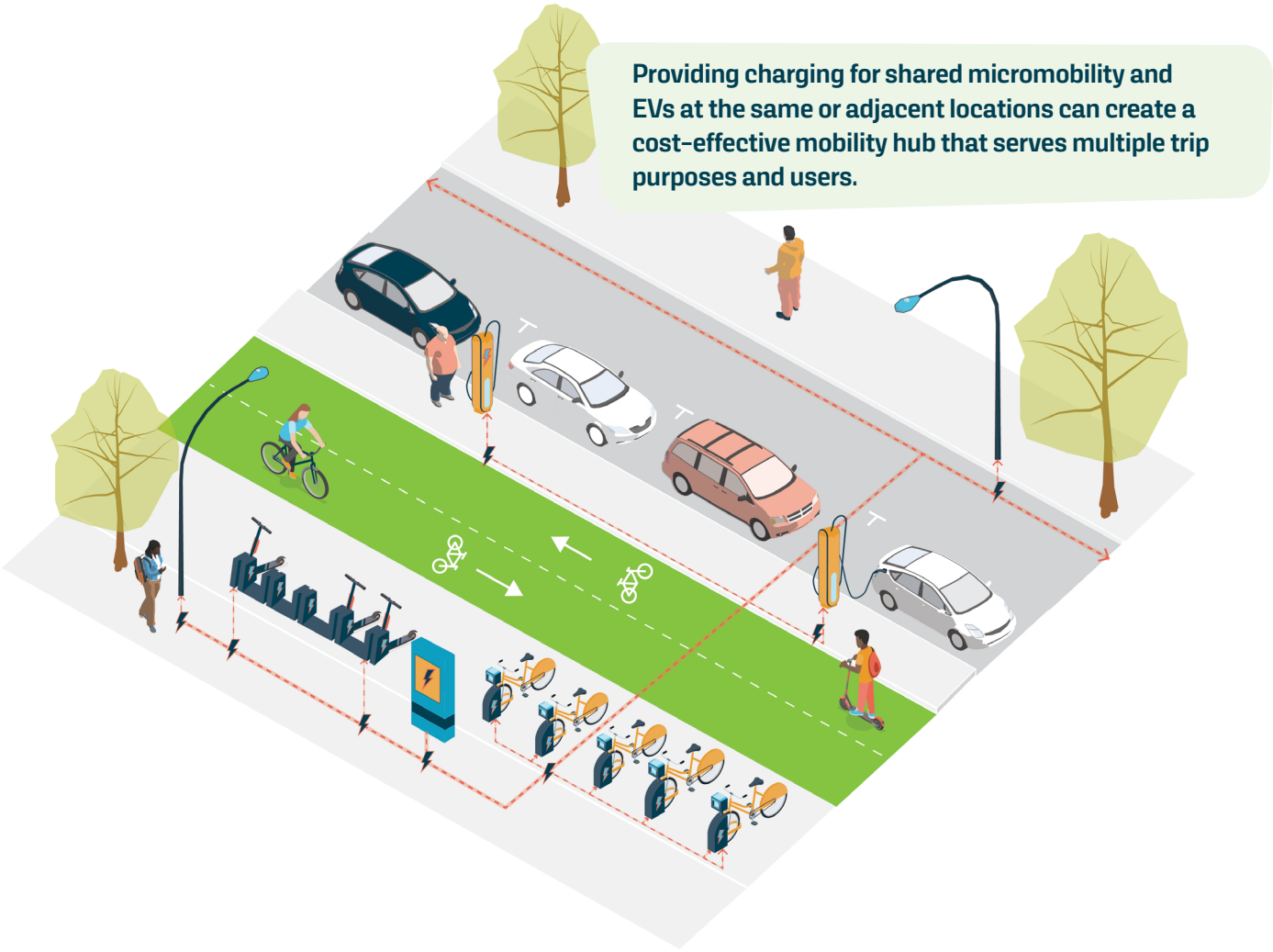
Shared micromobility charging stations most often require a connection to the electrical grid. This involves site preparation work and trenching in addition to installation and equipment costs.

In addition to grid-tied shared micromobility charging stations, solar charging stations have been implemented by shared micromobility programs in the US within the past two years. Solar equipment is a substantial additional cost to the charging station itself, and could conceivably be used to support the grid if stations are grid-tied. In other words, no matter if a shared micromobility charging station is grid-tied or off-grid solar, **funding to enable systems to integrate charging stations into the network is needed.**

What's Needed

Implementation of shared micromobility charging stations is relatively new, having begun in 2022, and has already demonstrated impact. Now, as countries like the US and Canada develop and carry out programs to create charging networks for EVs, it is time to plan and implement charging for electric shared micromobility at scale as well.

The National Electric Vehicle Infrastructure Program (NEVI) and the Community and Fueling Infrastructure Grant Program (CFI) in the US ($7.5 billion USD) and the Zero Emission Vehicle Infrastructure Program (ZEVIP) and the Charging and Hydrogen Refuelling Infrastructure Initiative (CHRI) in Canada ($1.2 billion CAD) are programs focused on building charging networks for cars and do not directly include funding for shared micromobility charging projects and equipment. However, these funding sources present an opportunity to build grid connection points for current and future shared micromobility charging stations, which can be co-located and installed at the same time. Co-location of charging for multiple modes can provide residents with meaningful mobility connections to complete trips and while EVs charge.



Providing charging for shared micromobility and EVs at the same or adjacent locations can create a cost-effective mobility hub that serves multiple trip purposes and users.

It is also most time and cost-effective to literally dig once for trenching projects. As plans are designed for EV charging readiness and installation (or even other types of projects in which trenching will occur), charging for electric shared micromobility should be concurrently included to capitalize on the cost and effort of trenching and electric grid work.

This is an important moment and opportunity for policymakers and civic partners to think and act multimodally and holistically across policy and implementation. Meeting the needs for shared micromobility system coverage and charging across communities at scale will take involvement from different sectors and partners.

While the specific percentage will vary by system and city characteristics, based on information currently available, it is estimated that on average between 20–30% of total stations or hubs in a shared micromobility system need to be electrified to adequately serve the charging needs of the system, with emphasis on the most heavily used station locations.

To support this at the local level, city and municipal agencies can holistically plan for the widespread electrification of the curb for multiple uses at once, including electric shared micromobility. For example, the City of Vancouver's Public Realm Electrification Program, which is part of the city's Climate Emergency Action Plan (CEAP) plans for electrified bikeshare stations alongside car charging, food truck connections and other uses. Generally, as EV charging projects are planned and funded, this is an opportunity to assess the needs of, and plan for, the shared micromobility program as well. By electrifying the curb and providing grid access for current and future shared micromobility charging stations, governments can lay the groundwork for shared micromobility expansion, extend the benefits of electric mobility, and build a more sustainable transportation ecosystem.

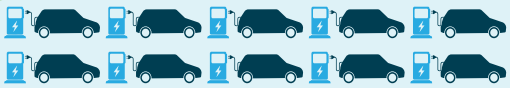
Charging Infrastructure Cost Savings

Co-locating charging infrastructure can provide substantial savings by reducing site preparation and construction costs.*

Installed separately:

~$75,000 USD
~$100,000 CAD
Charging for 10 shared micromobility vehicles

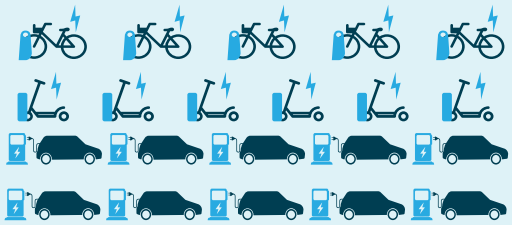
~$87,000 USD
~$115,000 CAD
Charging for 10 EVs



~$162,000 USD
~$215,000 CAD

Installed together:

Charging for 10 shared micromobility vehicles + 10 EVs



~$112,000 USD
($50,000 savings)

~$150,000 CAD
($65,000 savings)

*This infographic was developed for illustrative purposes only and is based on average estimated costs for charging equipment, site preparation, and construction. Actual costs will vary based on location and site attributes. Interviews conducted by NABSA suggest construction costs may be higher in Canada than the US.

So far, developers, universities, and other private entities that own land suitable for shared micromobility charging station locations have been important players in helping to build out charging for shared micromobility. These entities have allowed public access to their land and have contributed funding toward the charging station, site construction and preparation, and connection to the grid.

From a policy perspective, local land use codes could be amended to further incentivize developers to invest in electric shared micromobility charging. For example, the US Alternative Fuel Vehicle Refueling Property Credit (26 US Code 30C) can now be applied to charging for electric bikes and scooters.

Utilities are also an important partner, and developing charging infrastructure for shared micromobility is a critical opportunity to forge new partnerships with utilities. Utilities can support shared micromobility by taking on the site preparation work, routinely creating connections to the grid for shared micromobility charging stations, and supporting the ongoing charging costs.

States and provinces are increasingly important partners in this effort, as they decide how federally-allocated transportation dollars will be spent. In the US, states were required to submit statewide EV charging plans to receive their allocated funding. Oregon is the only state (so far) to consider micromobility in these plans. In Canada, the province of Québec is subsidizing 50% of bikeshare charging station costs for any city in the province that wants them.

In sum, there are costs to developing infrastructure for shared micromobility charging– site preparation that could include trenching, installing connections to the grid, and creating a pad for station placement, as well as station and equipment purchasing, installation of the station, and ongoing electricity use. Funding is needed to finance each aspect of these projects. And the money is well-spent towards climate goals.

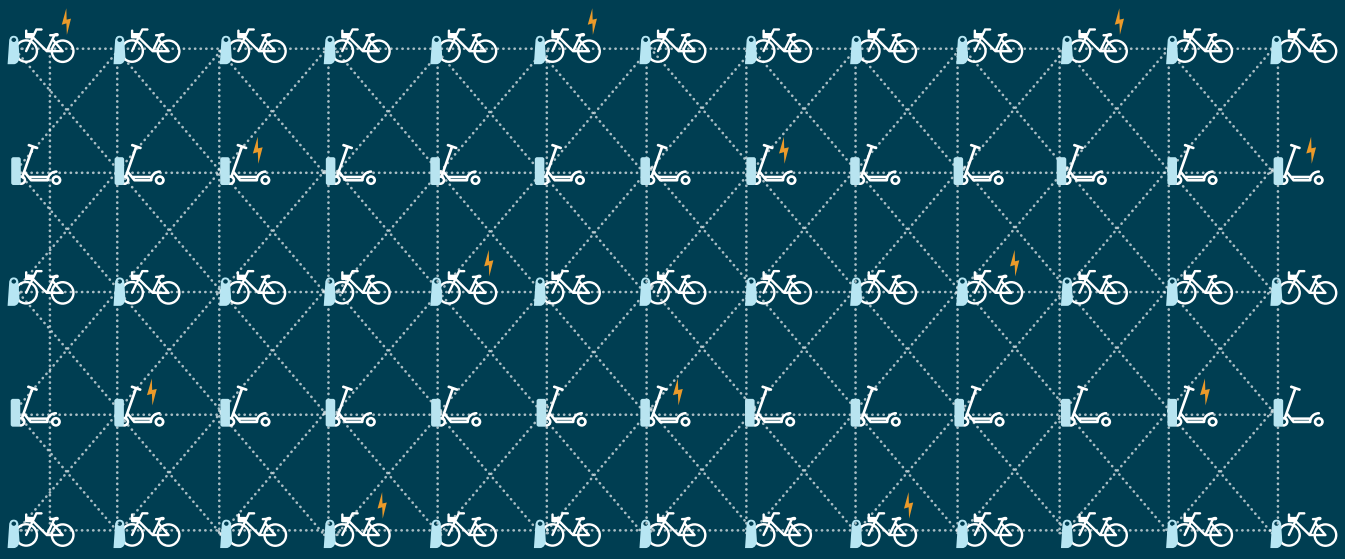
In addition to specific federal funding available for EV charging, there are other federal sources that can be leveraged for shared micromobility charging. Examples include the new US Carbon Reduction Program (CRP), which includes eligibility for shared micromobility projects, and Canada's Active Transportation Fund that can be used for charging stations. However, these programs were not designed with shared micromobility in mind, and restrictions on how federal dollars can be spent often do not account for the shared micromobility use-case.

There is work to be done at the federal level to not only make shared micromobility charging eligible in projects, but to address program design restrictions that are prohibitively cumbersome at the level of shared micromobility program implementation in order to better allow electric shared micromobility to thrive.

As nations focus on building out infrastructure for electrified transportation, now is the time for civic partners at all levels to be incorporating shared micromobility into policies, plans, and projects to scale shared electric micromobility and build a more sustainable, equitable, and resilient transportation future.

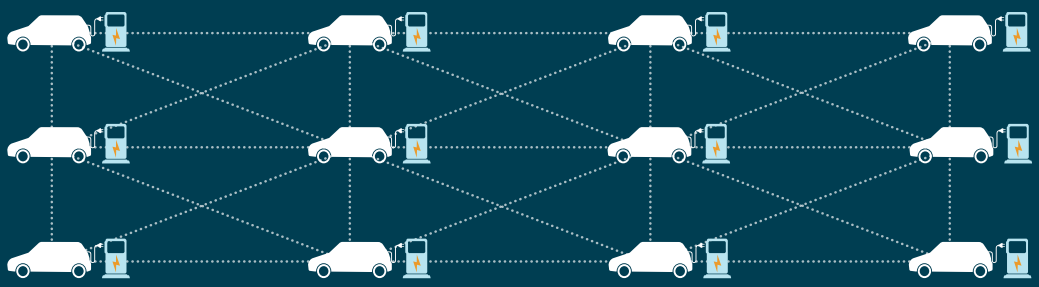
In a multi-modal network, $1 million USD can pay for...

A charging network that supports 650 electric shared micromobility vehicles*



OR...

A charging network for 120 EVs



*This infographic was developed for illustrative purposes only and assumes shared electric micromobility fleets require 20% of their docking stations to be electrified. Actual costs will vary based on location and site attributes.

The Takeaways

Fund it: Put funding towards electric shared micromobility charging infrastructure at all levels.

Multimodal Mindset: Now is our opportunity to create the transportation culture and infrastructure we want for tomorrow. As we embark on developing EV charging infrastructure, we should seize the moment to think through and **develop placements for shared micromobility charging along with car, bus, and other charging and transportation needs.** Co-location can provide residents with meaningful mobility connections to complete trips and offer additional mobility options while EVs charge.

Dig Once: It is most time and cost-effective to literally dig once for trenching projects. As plans are designed for EV charging readiness and installation (or even other types of projects in which trenching will occur), charging for electric shared micromobility should be concurrently included to capitalize on the cost and effort of trenching and electric grid work. **Include shared micromobility charging work in EV infrastructure plans and projects.** This is similar to the best practice of incorporating bike infrastructure like protected bike lanes and protected paths when bridge and road plans and projects are occurring.

Diversity, Equity, Inclusion: Ensure that a diversity of people and needs are being included when planning for and constructing locations for charging. Engage communities in the planning process and ensure that distribution of charging infrastructure **accounts for the mobility needs of disadvantaged communities.**

Ready the Grid: Shared micromobility charging requires the allocation of connection points to the electric grid. **Creating these connection points is an important step in preparing for future charging stations**, and is a great first step even if the charging station has not yet been funded, or may be installed at a later time.

Public Private Partnership: Partnerships between the local government and private sectors are needed to implement shared charging station infrastructure, both the needs below and above the ground. This includes partners such as the equipment manufacturer or provider and the operator of the shared micromobility system in which the charging station will be a part, the utility company, as well as developers and commercial landowners who may be able to augment some of the public station placements by incorporating publicly-accessible shared micromobility charging stations on their property.

Links and Resources

The Benefits of Incorporating Shared Micromobility in Electric Vehicle Charging Projects

Fast Facts on Transportation Greenhouse Gas Emissions (Environmental Protection Agency, 2023). Available at: https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

Canadian Environmental Sustainability Indicators: Greenhouse Gas Emissions (Environment and Climate Change Canada, 2023). Available at: https://www.canada.ca/content/dam/eccc/documents/pdf/cesindicators/ghg-emissions/2023/greenhouse-gas-emissions-en.pdf

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More than Half of all Daily Trips Were Less than Three Miles in 2021 (Office of Energy Efficiency and Renewable Energy, 2022). Available at https://www.energy.gov/eere/vehicles/articles/fotw-1230-march-21-2022-more-half-all-daily-trips-were-less-three-miles-2021#:~:text=A%20research%20study%20for%20the,were%20greater%20than%2050%20miles

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2021 Shared Micromobility State of the Industry Report (NABSA, 2021). Available at: https://nabsa.net/industry

2022 Shared Micromobility State of the Industry Report (NABSA, 2022). Available at: https://nabsa.net/industry

Everything You Need to Know About the Fastest-Growing Source of Global Emissions: Transport. (World Resources Institute, 2019). Available at: https://www.wri.org/insights/everything-you-need-know-about-fastest-growing-source-global-emissions-transport

The Climate Change Mitigation Effects of Daily Active Travel in Cities (Brand et. al.). Available at: https://doi.org/10.1016/j.trd.2021.102764

Scaling Electric Shared Micromobility

Estimating energy bounds for adoption of shared micromobility (Sun et al, 2021). Available at: https://doi.org/10.1016/j.trd.2021.103012

Charging Forward: A Toolkit for Planning and Funding Urban Electric Mobility Infrastructure (U.S. Department of Transportation, 2023). Available at: https://www.transportation.gov/urban-e-mobility-toolkit

What's Needed

National Electric Vehicle Infrastructure Formula Program (US Federal Highway Administration, 2021). Available at: https://afdc.energy.gov/laws/12744

Charging and Fueling Infrastructure Grant Program (US Department of Transportation, 2023). Available at: https://www.transportation.gov/rural/grant-toolkit/charging-and-fueling-infrastructure-grant-program

Zero Emission Vehicle Infrastructure Program (Government of Canada, 2023). Available at: https://natural-resources.canada.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876

Charging and Hydrogen Refuelling Infrastructure Initiative (Canada Infrastructure Bank, 2022). Available at: https://cib-bic.ca/en/projects/green-infrastructure/charging-and-hydrogen-refuelling-infrastructure-initiative/

Public Realm Electrification Program (City of Vancouver, 2023). Available at: https://vancouver.ca/green-vancouver/public-realm-electrification-program.aspx

Electric Micromobility in Oregon (Oregon Department of Transportation Climate Office, 2023). Available at: https://www.oregon.gov/odot/climate/Documents/E-MicromobilityTEINAfollowup_ES.pdf

Financial Assistance Programs for the Development of Active Transportation in Urban Areas (Quebec Ministry of Transport and Sustainable Mobility, 2023). Available at: https://www.transports.gouv.qc.ca/fr/aide-finan/municipalites/Pages/programme-developpement-transports-actifs.aspx

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BIXI

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Spin

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WE-cycle

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