

Battery-Powered Micro-Mobility Guide to Infrastructure

The rapid improvement of battery technology and the mass adoption of Battery-Powered Micro-Mobility (BPMM) devices represents an exciting opportunity to reduce commute-related greenhouse gas (GHG) emissions. With the implementation of policy and infrastructure supporting the use of BPMM devices in health care, institutions will improve their environmental footprint, along with safety and worker wellness. This fact sheet makes the case for institutional support of BPMM devices as well as provides recommendations to reduce BPMM safety hazards.

Making the Case

The integration of alternative transportation methods, including BPMM, presents a significant opportunity to reshape commuting habits. Electric bikes (e-bikes) and electric scooters (e-scooters), with an average battery range of 20–50 km, align well with, for example, Toronto's average commute distance of 12.6 km, which is the longest average commute in Canada.[1] This range makes them a viable option for a larger proportion of employees, potentially increasing the radius within which workers might consider alternatives to cars or public transit for their daily commute.

The environmental impact of this shift could be substantial. A 15% reduction in personal car travel distance has been shown to lead to a 12% decrease in CO₂ emissions. This figure might even be an underestimate, considering that daily commutes to and from work often account for more than 15% of a person's total travel distance. Even when accounting for the emissions related to their production, each BPMM represents a reduction of approximately 225 kg of CO₂ per year.[2] In the Canadian health care and social service sector in particular – which employed over 2.6 million people in 2022[3] – support and promotion of a transition to clean transportation,

including BPMM, has the potential to result in a significant decrease in GHG emissions.

The sector has already shown an interest in clean transportation, with almost 300,000 claiming to use 'sustainable transportation' and 130,000 claiming to use 'active transportation' methods in 2021.[3] Given other motivators, such as the limited parking availability at many health care facilities, and proven interest in active and sustainable transport among health care workers, there is a unique opportunity to encourage a shift towards BPMM in this sector.

From an organisational behavior perspective, an orientation towards the common good, such as is often the case with embracing BPMM, can lead to happier and more engaged employees.[4] When workers are forced to rely on private motor vehicles due to a lack of support for active and sustainable transport methods, it can negatively impact their mental health. Longer commutes and the pressure of navigating traffic can contribute to a sense of frustration and isolation.

In the health care sector, where the pressures of work are often compounded by challenging working conditions, BPMM offers a valuable alternative. By providing a means of transport that supports physical

well-being, mental health, and social engagement, BPMM aligns with the broader goals of health care professionals.[5] This alignment with the common good and environmental goals, therefore, presents a compelling case for health care institutions to support the use of BPMM as a viable commuting option.

BPMM Infrastructure

Increasing the use of BPMM devices like e-scooters and e-bikes necessitates formal regulations and institutional investments in safe storage and proper charging infrastructure. This is crucial to mitigate risks associated with battery fires, such as inhalation injuries, burns and structural damage.

Proper storage solutions and designated charging areas with safety features can significantly reduce these risks. It is also important to consult with the local fire department to ensure fire safety and issue a notice and/or include guidance in fire safety policies. It is essential that all riders follow manufacturer recommendations for handling, charging and storage of lithium batteries in order to prevent potential fire and safety hazards.

For best practices surrounding lithium batteries check out this guide from the Canadian Electric Bicycle Association:

<https://cebassociation.com/important-usagelstorage-and-safety-information-for-lithium-batteries/>

To ensure the safe and sustainable integration of BPMM devices into urban environments, proper rider education and implementation of the following recommendations is essential.

Storage Recommendations

BPMM devices (e-scooters and e-bikes) offer a space-efficient alternative to cars, requiring significantly less storage space. While an average car parking spot measures 8 feet by 16 feet and typically accommodates one vehicle carrying one person, the same space can secure 10 BPMMs, each transporting one person.

Providing structures for riders to adequately lock their devices is essential. For BPMM and regular micro-mobility parking, it is recommended to use stainless steel or galvanized steel racks.



Sloping solar canopies elegantly combine vehicle shelter and power generation, providing rain and snow management that goes beyond just power generation. Note covered outdoor e-bike/BPMM charging feature. SOURCE: VCT Group <https://vctgroup.com>

Avoiding wood, soft metals, and untreated metals ensures racks are not easily cut through or disassembled. One may also want to consider wrap protectors around racks to help avoid scratching of devices.

Dedicated BPMM parking and storage areas should be accessible, close to building entrances but separate from other structures, at ground level or easily reachable, and without stairs or steep slopes. They may also include dedicated bicycle ramps and way-finding signage. Storage areas should also be covered but well ventilated.

Thermal runaway in batteries can produce 300-6,000 liters of toxic gasses from a 1-kilowatt hour (kWh) battery. Proper ventilation therefore reduces potential risks associated with inhalation.

Due to the cost of BPMM devices, institutions may consider added security for storage areas such as key card accessible cages and security cameras to protect this mode of transportation for their employees and to embrace and encourage the uptake of BPMM devices.

If the storage area has outlets to allow for BPMM charging, please utilize the following charging recommendations.

Charging Considerations

The charging of BPMM devices, such as e-bikes, is an important consideration for health care organisations looking to support sustainable commuting. BPMM devices are powered by lithium batteries, and while the risk associated with certified Underwriters Laboratories (UL) lithium batteries is minimal under normal conditions, education on proper storage and charging is essential to minimize any potential risks.

Lithium batteries can typically be charged using 120-volt AC (alternating current) outlets, the standard in most Canadian settings. It is recommended to plug chargers directly into the wall outlet (extension cords should not be used with BPMM devices). Charging times can vary significantly, from two and a half to nine hours, depending on the battery's capacity and the speed of the charger.

When setting up internal charging guidelines, a few key points should be considered:

Temperature for Charging: The ideal charging temperature for a lithium battery is between 10°C-20°C to prevent battery degradation. Charging should not occur if the ambient temperature is below 0°C or above 49°C. Batteries themselves should be at room temperature before charging occurs.



Thoughtfully designed micro-mobility infrastructure from the outset. Each stall features electrical plugs and seamless accessibility for residents. Image courtesy of Silvera for Seniors in Calgary, Alberta, a senior housing provider.

Use of Chargers: Riders are advised to NEVER use a charger that is not from the manufacturer of the battery being charged. While chargers may look alike, they may not function the same and thus pose a safety and fire risk. ONLY use approved chargers from the manufacturer of your battery that are designed for your battery.

Charging Fees/Cost: Offering free charging can significantly increase BPMM use at a relatively low cost to the health care organisation. If the number of chargers is limited, a paid model can help ensure the availability of chargers matches demand. However, it's important to consider that lower-income individuals are less likely to use paid charging services. Therefore, the potential impact on equitable access should be carefully weighed before implementing a paid charging system.

Suggested Additional Feature

Bike repair stations can be a valuable addition to a facility's micro-mobility infrastructure, and are a great way to encourage micro-mobility usage. Offering the opportunity for convenient repairs allows riders to keep their devices in excellent shape and prevent potential breakdowns.

Repair stations should include air pumps and reliable, built-to-last tools as well as be installed in easily-accessible, well-lit, and spacious areas free of obstacles.[6]

After Installation

Raising awareness about BPMM devices and available infrastructure is crucial to encouraging their use among employees, particularly for those currently relying on private motor vehicles for commuting. Here are some effective strategies to increase awareness and promote adoption of BPMM devices:

Information in Orientation Packages: Including a detailed BPMM information sheet in new employee orientation packages is an excellent way to introduce new staff to available commuting options. This sheet can outline the locations of storage and charging facilities, and any incentives or support provided by the health care organisation.

The bottom-line recommendations

Option A: Provide a covered, secure, key-card accessible and temperature-controlled structure in or adjacent to an existing parking garage for storage and charging of BPMM devices. Ideally the structure should be more than six metres away from the health care facility to minimize fire hazards.

Option B: Offer a large outdoor, caged storage area without charging capabilities that is not temperature-controlled and dedicate a smaller area in a temperature-controlled structure for charging and limited storage.

**Note that offering solely outdoor storage, that is not temperature-controlled, may lead to individuals storing and/or charging batteries within the health care facility, posing an increased risk of fire hazard.*

Targeted Communication: Creating/distributing a newsletter, flyers, or email blast specifically targeting commuters who currently use private motor vehicles can be highly effective. This communication should highlight the advantages of BPMM, such as cost savings, health benefits, and environmental impact, as well as available storage and charging capabilities.

Strategic Placement of Posters and Information Sheets: Placing posters and information sheets en route to and inside the parking garage can catch the attention of automobile users. These materials should be eye-catching and provide concise, compelling information about BPMM options and benefits.

Visibility of Storage/Charging Areas: If the storage and charging area for BPMM is in a high-visibility location, using brightly coloured paint or distinctive signage can make it even more noticeable. This visual cue can remind employees daily of the alternative commuting options available to them.



Advertising Free Secure Charging and Storage:

Promoting the availability of free and secure charging and storage facilities can significantly lower the barriers for employees considering BPMM. Highlighting these features in all communications will reassure potential users about the practicality and safety of switching to BPMM.

Increasing Use

Creating opportunities for health care organisation employees to experience and familiarize themselves with BPMM commuting options can encourage their adoption. Here are some initiatives that could be implemented:

Semi-Annual Guided Commute: Organising a semi-annual guided commute between health care facilities is an excellent way to showcase the existing infrastructure and engage (potential) users. This event could highlight safe commuting routes, including separate bike lanes and traffic-calmed streets. It serves as an educational and experiential opportunity for employees to learn about the most efficient and safest routes for BPMM commuting.

Test Riding Day: Partnering with a local cycling shop to arrange a day for test riding various BPMMs can be both effective and fun. Such an event would allow employees to try out different types of e-bikes and e-scooters in a safe, controlled environment, potentially increasing their comfort and interest in these modes of transport.

Revisiting Charging Models: If the current model for BPMM chargers is on a paid basis, it might be worth considering a shift to a free charging model. While free charging can increase usage at a relatively low cost to the health care organisation, it's important to balance this with the availability of charging spots. A paid model can regulate demand but may deter lower-income employees from using the service. Therefore, assessing the impact on equitable access is crucial before making any changes.

We encourage all BPMM users to advocate for and actively support the adoption of chargers and safe storage facilities at your health care organisation. To get started, view our BPMM Champion slide deck [HERE](#) (COMING SOON).

References:

- [1] <https://www.sciencedirect.com/science/article/abs/pii/S1361920920306696>
- [2] <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410039201>
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About us: The Canadian Coalition for Green Health Care is Canada's premier green health care resource network and is leading the evolution of green in Canada's health sector as a national voice and catalyst for environmental change. Collaboratively, we strive to reduce health care's ecological impact from compassionate care delivery while providing a platform upon which to discuss and promote best practices, innovation, environmental responsibility and climate change resiliency. www.greenhealthcare.ca

Written by Dr. Gurinder Sandhu B.Sc, MD, Emergency Medicine Resident and Autumn Sypus, Project Coordinator, Canadian Coalition for Green Health Care. Design/layout by Autumn Sypus. Reviewed/Edited by Kent Waddington, Communications Director, Canadian Coalition for Green Health Care, and Michael Pasquali, CEO, E-Bike Pros.

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