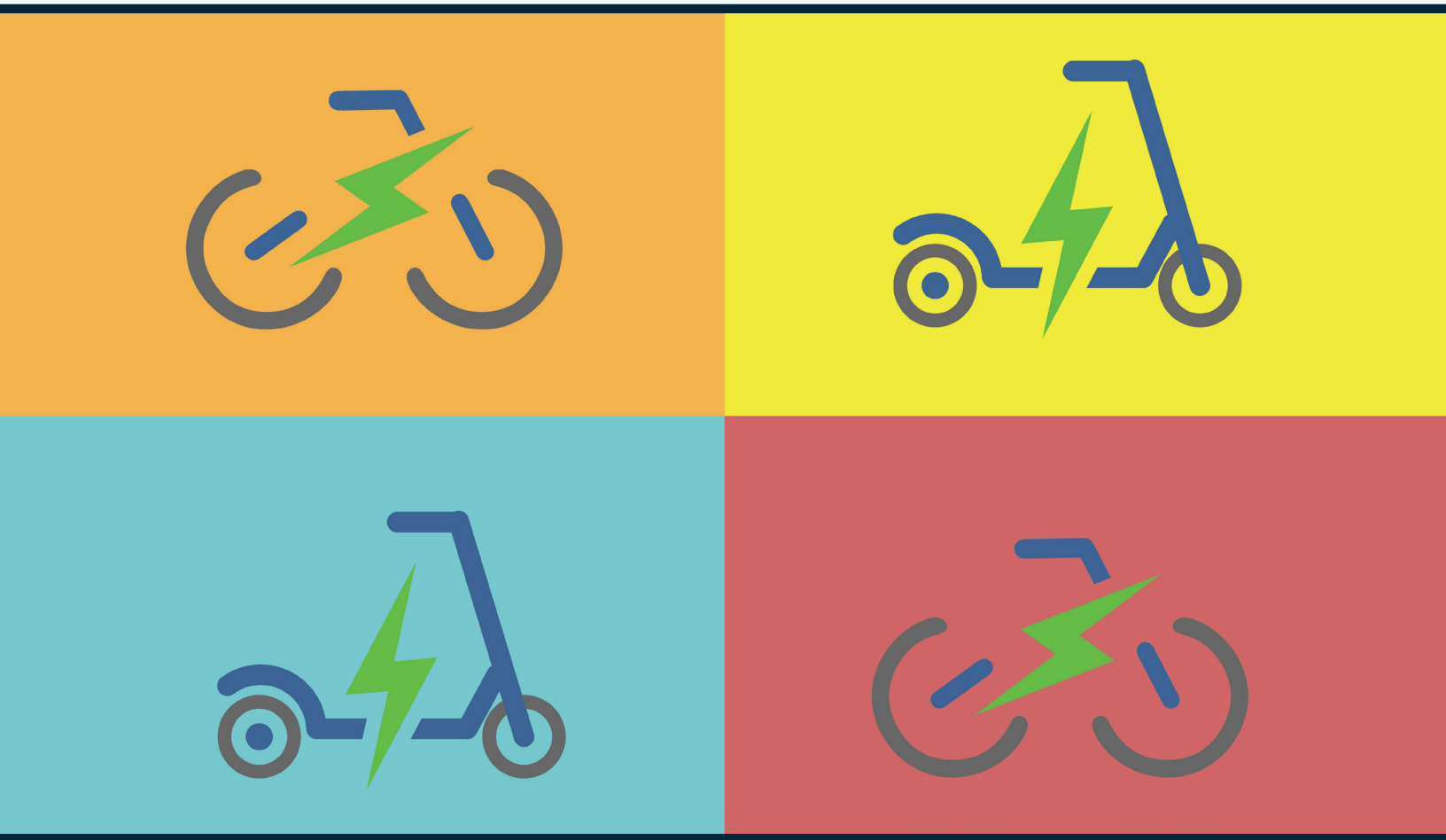
U.S. Department
of Transportation
**Pipeline and
Hazardous Materials
Safety Administration**



Considerations for **Municipalities**

for Permitting Operations of Lithium-Ion Battery Powered
Micromobility Devices

INTRODUCTION

The use of lithium-ion battery-powered micromobility devices, like e-scooters and e-bikes, is expanding, in both the consumer-owned and rental markets. Municipalities of all sizes are increasingly permitting micromobility rental companies to operate in their communities. The North American Bikeshare & Scootershare Association (NABSA) estimates that 401 cities had at least one shared micromobility system in 2022—a 35% increase from 2021.[1] These devices can provide an environmentally friendly alternative to cars, and bike/scooter shares can be a low cost and equitable transportation option in urban areas.

But this growth also means that there are more lithium-ion batteries being transported, charged, stored, and disposed of in populated areas every year. Lithium batteries are classified as a Class 9 hazardous material (hazmat) because they can catch fire in a process known as "thermal runaway"—an explosive, aggressive fire that spreads rapidly, can reignite, and is challenging to extinguish.

As the agency that regulates hazardous materials in transportation, the Pipeline and Hazardous Materials Administration (PHMSA) is concerned that this growth could lead to an increased risk of fires. In a 2023 report, the Consumer Product Safety Commission (CPSC) identifies fire risk as a significant hazard for micromobility devices, accounting for 19 deaths in a two-year period.[2] Likewise, the New York City Fire Department reports responding to over 140 lithium battery fires in 2022, with those fires being the cause of six deaths in the city.[3] Many of these batteries were found to be previously damaged, misused or abused, making them more likely to cause a serious fire.

PHMSA developed this document to raise awareness of lithium-ion battery issues facing municipalities who allow, or are considering allowing, micromobility rental operations within their jurisdictions. To develop these considerations, PHMSA contacted more than 20 entities about their experiences with micromobility rental permitting, and ultimately met with seven municipalities and four micromobility companies. The considerations below are based on information received from these respondents, consideration of existing literature, and PHMSA's subject-matter expertise in lithium-ion battery transportation.

Shared micromobility is an emerging area, based around developing technologies and a shifting legal landscape. These considerations are not intended to explain, replace, or outline any requirements under law and are not meant to bind the public in any way. They are only intended to highlight some issues to consider when evaluating the use of lithium-battery powered micromobility devices within a specific municipality.

[1] North American Bikeshare & Scootershare Association. "Shared Micromobility: State of the Industry Report." 2022. https://nabsa.net/2023/08/10/2022industryreport/. This assessment is also supported by DuPuis, Nicole, Jason Griess, and Connor Klein. "Micromobility in Cities: A History and Policy Overview." National League of Cities. 2019, https://www.nlc.org/wp-content/uploads/2019/04/CSAR_MicromobilityReport_FINAL.pdf.
[2] US Consumer Product Safety Commission. "Micromobility Products-Related Deaths, Injuries, and Hazard Patterns: 2017–2022." September 2023. https://www.cpsc.gov/content/Micromobility-Products-Related-Deaths-Injuries-and-Hazard-Patterns-2017%E2%80%932022.
[3] New York City Fire Department. "e-Bike Fire Safety: Fire Safety Hazards Associated with Powered Mobility Devices." 2022. https://www.nyc.gov/assets/fdny/downloads/pdf/codes/2022-2023-fep-annual-bulletin.pdf.

CONSIDERATIONS

1 Verify the company's knowledge of lithium battery transportation and end-of-life regulations

The hazardous materials regulations are designed to ensure public safety, and many related incidents are the result of noncompliance with U.S. DOT regulations. When municipalities rely on the micromobility companies to know and follow pertinent regulations, their ability to provide oversight is limited.

Municipalities dealing with micromobility devices should familiarize themselves with lithium battery transportation and end-of-life regulations (federal, state, county, and city), and verify the micromobility company's regulatory knowledge. This includes the U.S. DOT hazardous materials regulations found in 49 CFR Parts 171-180, such as those concerning battery-powered vehicles (49 CFR 173.220), lithium battery shipping (49 CFR 173.185) and Materials of Trade exceptions (49 CFR 173.6).

For more information, check out PHMSA's compliance aid resources, focused on:

- Hazmat Transportation Requirements
- Understanding Materials of Trade (MOTs)
- Lithium Battery Guide for Shippers

2 Consider the risks of using of private residences as charging locations for commercial operations

While many micromobility companies utilize docking stations for charging, which offer a relatively high level of safety, some micromobility companies provide incentives to customers to charge commercial devices in private residences. This may pose risks to residents, such as exposing them to lithium battery-powered devices that may have experienced misuse or abuse (and therefore pose an elevated fire risk), incentivizing charging multiple devices (which may overtax residential electrical infrastructure), or increasing the likelihood of unattended charging.

Municipalities should be aware of whether micromobility companies intend to utilize private residences as charging locations for business operations, and the risks involved, as they develop and administer local permitting programs.

If residential charging is allowed, municipalities should share information with residents on safe device charging practices. This may include recommendations such as:

- use only manufacturer-approved and/or testing laboratory-certified replacement chargers and batteries
- do not overcharge—unplug when charging is complete
- do not charge overnight or unattended
- do not block entrances and exits of spaces with micromobility devices.

For additional, consumer-oriented information on lithium battery safety, check out the New York City Fire Department's FDNYSmart resources at https://www.fdnysmart.org/be-fdnysmart-when-using-any-devices-powered-by-lithium-ion-batteries/ and NFPA's Public Education resources here: https://www.nfpa.org/Education-and-Research/Electrical/Ebikes#lithium-ion-battery-safety.

3 Verify the locations of charging stations and company business addresses

Many lithium-ion battery incidents occur during charging, as overcharging can led to thermal runaway. However, identifying where charging occurs can be difficult. Several municipalities with whom PHMSA spoke either required or encouraged companies to provide charging locations.

Verifying a company's contact information and the exact location where the micromobility equipment (including lithium-ion batteries) will be charged and stored can help ensure compliance with permits and contracts. This information can also help local fire departments anticipate potential fire risks.

4 Compliance with DOT incident reporting requirements

The federal government needs accurate data to help determine rising safety trends and regulatory gaps. Under the HMR, the DOT requires that certain hazmat incidents be reported, as detailed in 49 CFR §§ 171.15(b) and 171.16. These "reportable incidents" are limited to various types of incidents occurring when hazardous materials are considered in transportation in commerce. In the micromobility sector, this might include incidents occurring when devices are being transported as cargo, or when device batteries are shipped for replacement or disposal. Incidents occurring during charging, or in the transportation of a individually-owned device for personal use, would not require reporting.

Lithium-ion battery incidents, specifically, appear to be underreported to PHMSA, with incident data primarily capturing lithium-ion batteries transported during commercial flights. While not all lithium battery incidents necessitate a report, reports are mandatory for incidents that meet the DOT/PHMSA requirements in 49 CFR § 171.16. Municipalities should familiarize themselves with these federal regulations and require micromobility companies to comply with all DOT incident reporting requirements as a condition of their business permit.

5 Developing a program to track incidents, accidents, and/or end-of-life equipment

Oversight is important in ensuring that micromobility companies are legally compliant and/or operating safely. PHMSA's incident reporting requirements do not capture all of the risks and trends that might be useful in overseeing micromobility companies, as these only apply to certain hazmat incidents in transportation (49 CFR 171.15(b)). They do not account for incidents related to storage, charging, or use.

To better capture the safety implications, consider developing a municipal program to track data on incidents, accidents, or equipment that is no longer in use and designated for disposal/recycling. While there is an established precedent of micromobility reporting and data sharing through dashboards, these systems have not tended to capture battery-related data.

6 Verify that all lithium batteries were tested adequately per the UN Manual of Tests and Criteria

Low-quality and counterfeit batteries present greater risks to public, as they have not passed the required tests to verify that they are safe for consumer use. Without adequate safety features and the quality-assurance provided by design testing, these batteries may pose an increased risk of fire.

Municipalities should consider requiring permit holders to verify that the lithium batteries were tested and passed Section 38.3 of the UN Manual of Tests and Criteria, as required by 49 CFR §173.185(a). Manufacturers and distributors are required to make lithium battery Test Summaries (TS) available. Municipalities can request these documents and should consider avoiding permitting companies who cannot produce test summaries for their lithium batteries.

Municipalities may also consider whether micromobility equipment meets voluntary safety standards meant to reduce the risk of fire. Though not required by regulation, the US Consumer Product Safety Commission (CPSC) has urged manufacturers of micromobility devices to adhere to voluntary UL safety standards, including ANSI/CAN/UL 2272 and ANSI/CAN/UL 2849, focused on the full electrical systems of these devices.

7 Require a plan of action to properly manage Damaged, Defective, and Recalled (DDR) lithium-ion batteries

Because of the greater risk these batteries pose, Damaged, Defective, or Recalled (DDR) lithium-ion batteries should never be placed in the general waste stream. Shipments of DDR batteries, including those for recycling or disposal, are fully regulated under the HMR, requiring UN specification packaging, shipping papers, training, and more.

Unfortunately, many of the municipalities PHMSA spoke with had only limited knowledge of the safety risks presented by DDR lithium-ion batteries, or the requirements to dispose of them safely.

Municipalities should consider requiring micromobility companies to develop and adhere to a plan of action to properly manage the disposal/end-of-life for DDR lithium-ion batteries. This may include identifying contracted carriers, timelines for disposal, and tracking the estimated waste generation.

For more information on DDR batteries, visit PHMSA's Understanding the Risks of Damaged, Defective, or Recalled (DDR) Batteries

RESOURCES

The Hazardous Materials Regulations (HMR) can be accessed via eCFR.gov and navigating to Title 49, Subtitle B, Chapter 1, Subchapter C. For questions on the HMR, contact the Hazardous Materials Information Center at 1 (800) 467-4922 or via email at INFOCNTR@dot.gov.

PHMSA also provides additional compliance assistance resources on our Publications page, which can be accessed via the QR code (below). If you have feedback on this publication or would like to share best practices from your community on micromobility operations safety, please contact us at training@dot.gov.

These Considerations are not intended to explain, replace, or outline any requirements under the Hazardous Materials Regulations or provide any specific warranty or endorsement of actions by a non-Federal entity. These Considerations do not have the force and effect of law and are not meant to bind the public in any way. They are only intended to highlight some issues to consider when evaluating the use of Lithium-battery powered micromobility devices within a specific municipality.

Appendix I: References

- DuPuis, Nicole, Jason Griess, and Connor Klein. "Micromobility in Cities: A History and Policy Overview." National League of Cities (NLC). 2019. https://www.nlc.org/wp-content/uploads/2019/04/CSAR_MicromobilityReport_FINAL.pdf.
- Federal Highway Administration (FHWA). "Electric Bicycle (E-bike) Trends, Impacts, and Opportunities: Literature Review Summary." 2023. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/resources/e-bikes/ebikes_lit_review.pdf.
- Kay, Robert S. Letter to Manufacturers, Importers, Distributors, and Retailers of Micromobility Devices for Consumer Use. US Consumer Product Safety Commission (CPSC). December 19, 2022. https://www.cpsc.gov/s3fs-public/Important%20Safety%20Information%20Concerning%20Micromobility%20Devices.pdf.
- Kolpakov, Alexander, Austin Marie Sipiora, Jana E. Huss. "Micromobility Policies, Permits, and Practices." National Cooperative Highway Research Program (NCHRP). 2022. https://nap.nationalacademies.org/catalog/26815/micromobility-policies-permits-and-practices.
- National Association of City Transportation Officials (NACTO). "Guidelines for Regulating Shared Micromobility, Ver. 2." 2019. https://nacto.org/sharedmicromobilityguidelines/.
- National Association of City Transportation Officials (NACTO) and International Municipal Lawyers Association (IMLA). "Managing Mobility Data." 2019. https://nacto.org/wp-content/uploads/2019/05/NACTO_IMLA_Managing-Mobility-Data.pdf.
- National Fire Prevention Association (NFPA). "e-Bike and e-Scooter Safety." 2022. https://go.nfpa.org/e-bike-e-scooter-safety.
- National Fire Prevention Association (NFPA). "Safety with e-Bikes and e-Scooters." Accessed March 19, 2024. https://www.nfpa.org/Education-and-Research/Electrical/Ebikes#lithium-ion-battery-safety.
- National League of Cities (NLC). "Micromobility in Cities: A History and Policy Overview." 2019. https://www.nlc.org/wp-content/uploads/2019/04/CSAR_MicromobilityReport_FINAL.pdf.
- New York City Council. "663-A: Sale, Lease, and Rental of Powered Bicycles, Powered Mobility Devices and Storage Batteries." Enacted March 30, 2023. https://legistar.council.nyc.gov/LegislationDetail.aspx?GUID=D0854615-5297-460B-BCBC-646D24A75B2E&ID=5839354.
- New York City Fire Department (FDNY). "e-Bike Fire Safety: Fire Safety Hazards Associated with Powered Mobility Devices." 2022. https://www.nyc.gov/assets/fdny/downloads/pdf/codes/2022-2023-fep-annual-bulletin.pdf.
- New York City Fire Department (FDNY). "Safety Tips for Devices with Lithium-Ion Batteries." Accessed March 18, 2024. https://www.fdnysmart.org/be-fdnysmart-when-using-any-devices-powered-by-lithium-ion-batteries/.
- North American Bikeshare & Scootershare Association (NABSA). "Shared Micromobility: State of the Industry Report." 2022. https://nabsa.net/2023/08/10/2022industryreport/.
- Open Mobility Foundation. https://www.openmobilityfoundation.org/.
- US Consumer Product Safety Commission (CPSC). "CPSC Calls on Manufacturers to Comply with Safety Standards for Battery-Powered Products to Reduce the Risk of Injury and Death." December 20, 2022. https://www.cpsc.gov/Newsroom/News-Releases/2023/CPSC-Calls-on-Manufacturers-to-Comply-with-Safety-Standards-for-Battery-Powered-Products-to-Reduce-the-Risk-of-Injury-and-Death.
- US Consumer Product Safety Commission (CPSC). "CPSC Urges Consumers to Not Buy or Use "Universal" Chargers with Micromobility Products Due to Fire Hazard." September 2024. https://www.cpsc.gov/Newsroom/News-Releases/2024/CPSC-Urges-Consumers-to-Not-Buy-or-Use-Universal-Chargers-with-Micromobility-Products-Due-to-Fire-Hazard.
- US Consumer Product Safety Commission (CPSC). "E-Scooter and E-Bike Injuries Soar: 2022 Injuries Increased Nearly 21%." 2023. https://www.cpsc.gov/Newsroom/News-Releases/2024/E-Scooter-and-E-Bike-Injuries-Soar-2022-Injuries-Increased-Nearly-21.
- US Consumer Product Safety Commission (CPSC). "Micromobility Products-Related Deaths, Injuries, and Hazard Patterns: 2017–2022." 2023. https://www.cpsc.gov/content/Micromobility-Products-Related-Deaths-Injuries-and-Hazard-Patterns-2017%E2%80%932022.

Appendix II: List of Interviewees

Semi-structured interviews were conducted between October 2022 and January 2023, with seven municipalities and four micromobility companies. The organizations and their relevant characteristics can be seen in Table 1, below.

Table 1. Municipal Interviewees

ORGANIZATION	LOCATION	MICROMOBILITY OPERATION(S)
San Francisco Municipal Transportation Agency (SFMTA)	San Francisco, CA	Powered Scooter Share Permit Program; BayWheels Bicycle Share
Seattle Department of Transportation (SDOT)	Seattle, WA	Scooter Share, Bike Share
City of Durham Transportation Department	Durham, NC	Shared Active Transportation Systems (SATS) (eScooter, eBike)
Chittenden County Regional Planning Commission	Winooski, VT	Chittenden Area Transportation Management Association (CATMA)
Portland Bureau of Transportation (PBOT)	Portland, OR	E-Scooter Program
Long Beach Department of Public Works	Long Beach, CA	Go Active Long Beach
New York City Department of Transportation (NYC DOT)	New York, NY	Charge Safe, Ride Safe

Table 2. Micromobility Company Interviewees

COMPANY	EQUIPMENT TYPE(S)
Bird	Scooters, eBikes
Lime	Scooters, eBikes
Lyft	eBikes
Spin	Scooters

For additional information contact:

The Hazardous Materials Info Center

1-800-HMR-4922

(1-800-467-4922)

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PHH50-0218-1124