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ASSESSING THE ENVIRONMENTAL IMPACT OF MICROMOBILITY: CONTRIBUTIONS FOR THE DEVELOPMENT OF A GUIDE FOR CITIES

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CHALLENGE

Cities and sharing fleet operators face the challenge that micromobility GHG emission information is not sufficiently standardized.

GOAL

Standardizing micromobility GHG emission assessments.

By cooperating with experts and on the field, the New Urban Mobility (NUMO) alliance created a guide on how to create, interpret and use LCA data to help cities evaluate the environmental impact of shared micromobility.

Who was involved in the development of the guide?

The guide was developed by NUMO alliance and written by Leah Lazer in cooperation with a working group on life cycle emissions assessments, a collaborative body of over 30 members representing city governments, micromobility operators, and subject matter experts from the United States and Europe.

What is micromobility?

Forms of mobility that may be electrically motorized but are not classified as conventional motorized individual transport and typically do not exceed maximum speeds of 45 km/h. They are often used in urban areas and appear in shared-use business models.

Examples:
e-scooters, e-mopeds, e-bikes or cargo-bikes.

APPROACHES

1 Compare Micromobility Operators to Each Other

vs.

Use the checklist to guide LCA development

STANDARDS, SCOPE, AND BOUNDARIES

- ✓ Prepared in accordance with ISO 14040:2006 and ISO 14044:2006
- ✓ Uses the system boundary of “cradle-to-grave”
- ✓ Uses the functional unit of “one passenger-mile/-kilometer of riding a [vehicle model] operated by [operator name] in [location] in [year].”
- ✓ The LCA may be prepared by the operator or by a third-party consultant or academic
- ✓ Cities may prefer LCAs that have been critically reviewed by a third party for compliance with ISO standards

INPUTS AND ASSUMPTIONS

- ✓ Contains input data that conform to ISO 14044 data quality requirements and data quality indicators as reliability, temporal correlation etc.
- ✓ Uses data which is determined with best practices for LCA inputs (see table 1)
- ✓ Uses a high-quality database for background data and is transparent about which database was used
- ✓ Uses high-quality databases and tools for impact assessment

OUTPUTS

- ✓ Includes a breakdown of emissions by life cycle phases (see figure 2)
- ✓ Includes information about the type and amount of uncertainty in the LCA

Figure 1: Shortened version of checklist for micromobiilty life cycle emission assessments
Source: Assessing the Environmental Impact of Shared Micromobility Services: A Guide for Cities [1]

Consider the whole life cycle

Raw material extraction	Production
Transport of raw materials	
Manufacturing	
Transport of manufactured vehicle	
Vehicle use	Use
Maintenance and repair	
Servicing	
Infrastructure use	
Infrastructure maintenance and repair	
Dismantling and deconstruction	End-of-Life
Transport	
Waste processing	
Disposal	
Reuse	Benefits beyond the System Boundaries
Recovery	
Recycling	

Figure 2: Life Cycle Stages for Life Cycle Emissions Assessments for Shared Micromobility Services
Sources: Assessing the Environmental Impact of Shared Micromobility Services: A Guide for Cities [1], adapted from European Standards (2019) [2]; ISO (2017) [3]; de Bortoli (2021) [4]

Use best practices for LCA inputs

INPUT	DESCRIPTION	BEST PRACTICE FOR DETERMINING INPUT
Vehicle Components	What parts and materials are used in the vehicle (i.e., percent aluminium by weight)?	In order of preference: 1. Bill of material from the operator based on dismantling the vehicle 2. Bill of material from the manufacturer
Vehicle Utilization	How intensively are the micromobility vehicles used (i.e., miles per week)?	In order of preference: 1. Real-world data on a company’s operation in that city 2. Real world data on a company’s operation in a city with similar characteristics in terms of population, density, road design, weather, mobility patterns, etc. 3. Real-world data on other micromobility operators’ operations in that same city or a similar city based on academic studies or other non-proprietary data

Table 1: Extract from Best Practices for Determining LCA Inputs
Source: Assessing the Environmental Impact of Shared Micromobility Services: A Guide for Cities [1].

2 Compare Micromobility to Other Transportation Modes

vs.

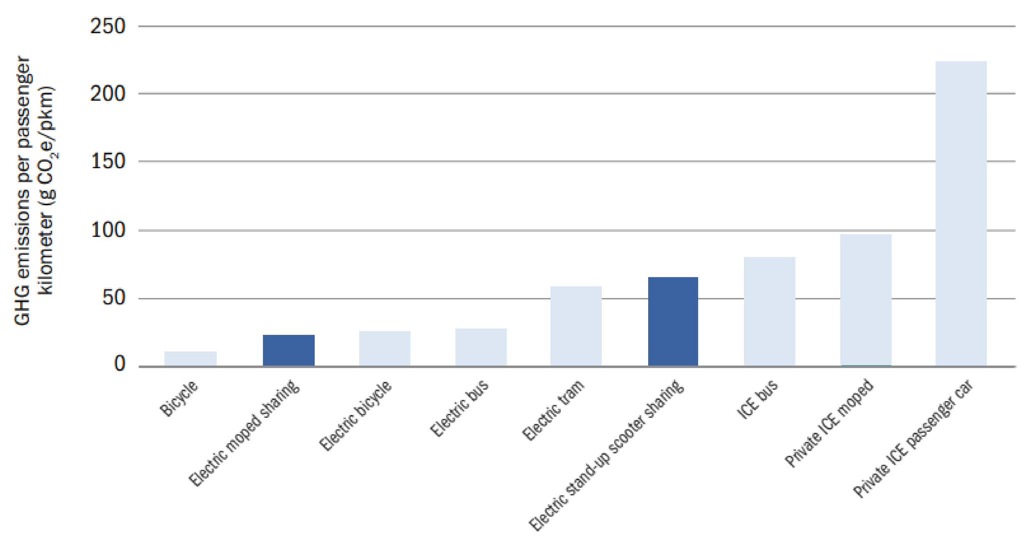

Figure 3: Life cycle GHG emissions of various transport modes
Source: Schelte et al. 2021 [5].

The GHG emissions of different transportation modes vary significantly depending on use cases, scope of analysis, vehicle and other factors.

3 Estimate the Net GHG Emissions Impact of Micromobility

CO_2

Two Options

1. **Consequential Life Cycle Assessment**
   Environmental impact of the production and use of a product as compared to a scenario in which that product does not exist
2. **Estimating Emissions from Shifted Trips**
   Conduct user surveys regarding the modes that micromobility replaced

SCAN TO READ THE FULL GUIDE!

HTTPS://WWW.NUMO.GLOBAL/RESOURCES/MICROMOBILITY-EMISSIONS-LIFE-CYCLE-ASSESSMENT-GUIDE

REFERENCES

(1) Lazer, L. April 2023. “Assessing the Environmental Impact of Shared Micromobility Services: A Guide for Cities.” Washington, DC: New Urban Mobility alliance and World Resources Institute. https://www.numo.global/resources/micromobility-emissions-life-cycle-assessment-guide/.

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(5) Schelte, N., S. Severengiz, J. Schünemann, S. Finke, O. Bauer, and M. Metzen. 2021. “Life Cycle Assessment on Electric Moped Scooter Sharing.” Sustainability 13 (15): 8297. https://doi.org/10.3390/su13158297.