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RESEARCH REPORT

Unsettled Issues Regarding First- and Last-mile Transport

Jody E. Muelaner, PhD

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About the Editor

Dr. Jody E. Muelaner is a chartered mechanical engineer with a background in metrology, aerospace manufacturing, and machine design. He now specializes in writing about technical topics in a way that the target audience can easily understand.

His writing has included technical reports for Rolls-Royce and Airbus, peer-reviewed journals, UK Government reports, as well as magazines and websites. He has published several hundred articles and recieved the Sage Best Paper Award in 2010.

Starting out in machine design, Dr. Muelaner initially worked on sawmills, waste processing machinery, domestic appliances, and medical devices. After moving into metrology, his research focused on modeling and optimizing uncertainty in manufacturing systems, enabling right-first-time assembly, and the design of innovative laser instruments. He founded Muelaner Engineering Ltd. in 2018 to provide consultancy and technical writing services within advanced manufacturing and sustainable transport. Dr. Muelaner lives with his family in Bristol.

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Abstract

Sustainable first/last/only-mile (FLO-mile) transport is the key to sustainable travel. It could directly replace private car use for short urban journeys, which account for 1% of global greenhouse gas emissions. More importantly, it could enable public transport to be used for longer journeys, which account for 6% of emissions.

Active travel, such as walking and cycling, has the lowest emissions and—vitally—also gives huge economic benefits that pay for the required infrastructure many times over. When active travel is part of a society's culture, people are far more likely to get regular exercise. This means less medical treatment and fewer unproductive years with chronic illness. In countries with established cycling cultures, these activity-related benefits boost gross domestic product by multiple percentage points. This alone could pay for the decarbonization of every other area of the economy.

Ridesharing is generally not a good solution: it currently involves very high emissions, and its electrification will be constrained by critical metal supply and congestion. However, ridesharing may have a limited role, such as enabling disabled users to access public transport. E-scooters have lower emissions than cars and many other forms of public transport while having higher emissions than active travel or electrified buses. They do not provide activity-related health benefits. However, e-scooters can have an important role in encouraging greater uptake of FLO-mile transport.

A mass switch to more sustainable modes of transport requires these modes to offer better perceived value. This involves a more convenient user experience at a lower cost. The first step is to end the hidden subsidies on damaging forms of transport—whereby society covers the costs of reduced productivity, health care, and welfare for those made sick by inactivity, air pollution, and accidents. Infrastructure must then be created to provide comprehensive, efficient, and attractive routes for active travel.

Shared mobility services, both cycles and e-scooters, are becoming more popular and can help to encourage greater adoption. However, shared mobility involves much higher lifecycle emissions, including manufacture, redistribution, and service operations and station construction. Privately owned cycles should, therefore, be prioritized. A currently underexploited configuration is the privately owned folding e-bike. These can be readily taken with the user into buildings and onto public transport.

NOTE: SAE EDGE™ Research Reports are intended to identify and illuminate key issues in emerging, but still unsettled, technologies of interest to the mobility industry. The goal of SAE EDGE™ Research Reports is to stimulate discussion and work in the hope of promoting and speeding resolution of identified issues. SAE EDGE™ Research Reports are not intended to resolve the challenges they identify or close any topic to further scrutiny.

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