Alternative Vehicles in Last Mile Freight

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Organization Description: The PI's of this project are from the University of Tennessee and are affiliated with the Center for Transportation Research. The multidisciplinary group includes faculty from Engineering, Economics, and Business. The proposed research falls within the scope of the Light Electric Vehicle Education and Research (LEVER) Initiative, a joint research program hosted by the University of Tennessee, Portland State University, and Monash University. This Initiative includes strong industry partnerships as well. One of the key research thrust areas of LEVER is assessing the opportunities of LEVs for urban freight.

Project Scope: While little research into the use of LEVs as a tool for urban freight delivery exists, several companies are currently employing LEVs or other emerging vehicles to fulfill urban freight delivery needs. Moreover, several innovative international companies have developed vehicles (e.g., Twizy Cargo and Arcimoto Deliverator) and operating procedures in urban contexts. For example, Gnewt has focused solely on serving last-mile freight needs in Europe using innovative electric vehicles along with innovative techniques, like micro-hubs and mobile-crossdock facilities. B-Line in Portland, Oregon uses electric trikes and has made over 35,000 deliveries, avoided 82 metric tons of CO_2 emissions, and avoided over 90,000 delivery miles since it's founding in 2008. Other delivery companies around the United States such as UPS and Sol Chariots are employing bicycles, electric trikes, and golf carts to assist in delivery of packages, especially during peak delivery seasons.

Extensive additional research into the role of Light Electric Vehicles as tools for urban freight delivery is still needed. Foremost among these is the need to investigate the benefit of using LEVs as opposed to traditional delivery vehicles in terms of cost, safety, reliability, efficiency, and environmental impact. Investigation into the role of public policy to promote LEV usage, ensure safety, provide adequate facilities for larger LEVs, include LEVs in urban freight planning, and provide incentives for using LEVs as an alternate to replace heavier trucks is required. Feasibility studies are also critical in order to determine the optimum land use, roadway design, density, and consumer demand requirements for different urban freight delivery models, including studying the scenarios that are best for traditional delivery vehicles and which are best for LEVs.

Expected Results: Through this research, we will inventory existing and emerging vehicle types to assess their capabilities for complementing urban freight needs. Next we hope to identify freight-oriented policies that enable safe, efficient, and environmentally friendly freight modes, particularly focusing on opportunities and barriers toward using alternative vehicles. Through an empirical analysis of Portland Oregon's B-Line system, we will assess operational efficiencies and capabilities of electric trikes for goods delivery and simulate opportunities to scale such operations up under experimental design and policy scenarios. We hope the findings will enable cities to nurture the use of alternative vehicles to reduce the negative impacts of urban deliveries on cities.