Evidence from a variety of research studies indicates that e-bicycling, more so than conventional bicycling, substitutes for car travel. In Europe, studies examined the effects of intervention programs such as those in which people were loaned an e-bike for weeks to months or given a subsidy for buying an e-bike. These studies showed that approximately 35-50% of e-bike trips would have been made by car if an e-bike had been unavailable. A few outlier studies show a wider spread of car substitution effects—as low as 18% for all trips and as high as 94% for commute trips. In North America, the motivation for replacing car trips is a commonly reported reason for buying an e-bike, but only a few studies quantify the car substitution rate, ranging from 11 to 46%. More difficult to measure is the relationship between e-bicycling and vehicle miles traveled (VMT). In North America, evidence for VMT reduction from e-bike use is scant. A literature search identified only one study that quantifies the reduction at the trip level (i.e., 9.3 miles of reduced VMT per e-bike trip on average). A study from Sweden reported a wider range of 1 to 8.5 miles of VMT reduced per e-bike trip. Evidence from European cities suggests a range of 1.2 to 5.5 VMT reduced per day for individuals who own an e-bike.

E-bike substitution rates as a percentage of VMT among e-bike users (i.e., the relative amount of decreased VMT from e-bicycling) varies widely across Europe. Two studies showed about 1.6 to 5.2% of VMT among e-bike users is substituted by e-bike. However, in some cities with small targeted programs, those numbers are much greater (e.g., 20% in Brighton, UK and 33% in Utrecht, NL). The breadth of findings suggest that pilot programs and evaluations would be needed to predict the total VMT reductions resulting from e-bike incentives in California. Nonetheless, evidence is strong that e-bike travel can have a measurable effect on reducing car travel.

E-bike incentive programs are rare in the U.S. but are widespread in Europe. In Europe, e-bike incentive programs exist at the national, regional, and local levels, and tend to have the following characteristics:

- Time or quota limited earmark (commonly pilot projects that expire)
- Monetary incentives ranging from 20-33% of e-bike sale prices with caps from 100 to 1000 Euros

Governments at various levels often choose additional regulations, such as:

- Providing concurrent incentives to sell vehicles (e.g., Paris, FR)
- Providing specific incentives for upgrading conventional bikes (e.g., Paris, FR)
- Providing the incentive only to current car owners or car commuters (e.g., Utrecht, NL)
- Requiring the e-bike be used for commuting (through employer-based programs)
- Excluding certain types of e-bikes (e.g., mountain e-bikes and throttled e-bikes)
- Providing added or specific incentives for cargo e-bikes (e.g., Oslo, NO)
- Providing incentives through employers

Providing financial incentives to purchase e-bikes will help with adoption but should be coupled with other strategies. Infrastructure and programs to encourage conventional bicycling are likely to help e-bicycling as
Research Findings (continued)

well. However, unlike conventional bicycle costs, e-bike costs are one of the strongest barriers to adoption. In addition, experience and knowledge of e-bicycling is important for prospective e-bicyclists to increase their willingness to pay for an e-bike. With preliminary evidence that e-bikeshare services increase awareness of e-bicycling, it is possible that demand for owning e-bikes will grow as e-bikeshare services grow. At the same time, e-bikeshare services themselves may be another pathway for e-bicycling to substitute for VMT. However, most evaluations of e-bike travel reducing VMT is limited to people owning private e-bikes, so incentivizing e-bike ownership is a good place to start.

Policy Considerations for California

In California, an incentive program could be implemented in many forms such as a rebate to the buyer or a subsidy to e-bike dealers. Evaluating participants’ VMT reductions will be challenging but can be done with before-and-after travel surveys including data from passive GPS recording and odometer readings. The incentive amount in Europe (i.e., 20-33% of purchase price) may be a good starting point for California; however, incentive caps may need to be different from those in Europe given the recent rise in e-bike retail prices. Also, e-bikes have numerous co-benefits (e.g., improving access to jobs and increasing physical activity) and should be considered in any cost-benefit analysis of an e-bike incentive program.

This policy brief was made possible through funding received by the University of California Institute of Transportation Studies (UC ITS) from the State of California via the Public Transportation Account and the Road Repair and Accountability Act of 2017. Established by the Legislature in 1947, UC ITS has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA.

DOI: 10.7922/G2CS3J1N