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Electric Assisted Bikes (E-bikes) Show Promise in Getting People out of Cars

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Issue

For over a decade, California has offered incentives towards the purchase of zero-emission vehicles as part of the state's broader effort to reduce greenhouse gas emissions. Expanding California's incentive program for zero-emission vehicles to include electric assisted bikes (e-bikes) has been a point of recent discussion. The following summarizes the existing evidence on the effects e-bicycling has on car travel, characteristics of e-bike incentive programs, and opportunities for increasing e-bicycling in California.

Research Findings

Evidence from a variety of research studies indicates that e-bicycling, more so than conventional bicycling, substitutes for car travel.^{1,2} 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.³⁻⁸ A few outlier studies show a wider spread of car substitution effects—as low as 18% for all trips⁹ and as high as 94% for commute trips.¹⁰ In North America, the motivation for replacing car trips is a commonly reported reason for buying an e-bike¹¹ but only a few studies quantify the car substitution rate, ranging from 11 to 46%.^{1,11,12}

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).¹¹ A study from Sweden reported a wider range of 1 to 8.5 miles of VMT reduced per e-bike trip.⁵ Evidence from European cities suggests a range of 1.2 to 5.5 VMT reduced per day for individuals who own an e-bike.^{2,5,13-15}

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.^{9,16} However, in some cities with small targeted programs, those numbers are much greater (e.g., 20% in Brighton, UK¹⁷ and 33% in Utrecht, NL¹⁸). 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.¹⁹ 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 Euros¹⁰

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)^{10,20}
- 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)¹⁰
- Providing incentives through employers¹⁰

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.²¹ However, unlike conventional bicycle costs, e-bike costs are one of the strongest barriers to adoption.^{22,23} In addition, experience and knowledge of e-bicycling is important for prospective e-bicyclists to increase their willingness to pay for an e-bike.²⁴ With preliminary evidence that e-bikeshare services increase awareness of e-bicycling,²⁵ 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 jobs²⁶ and increasing physical activity^{9,13,27-29}) and should be considered in any cost-benefit analysis of an e-bike incentive program.

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