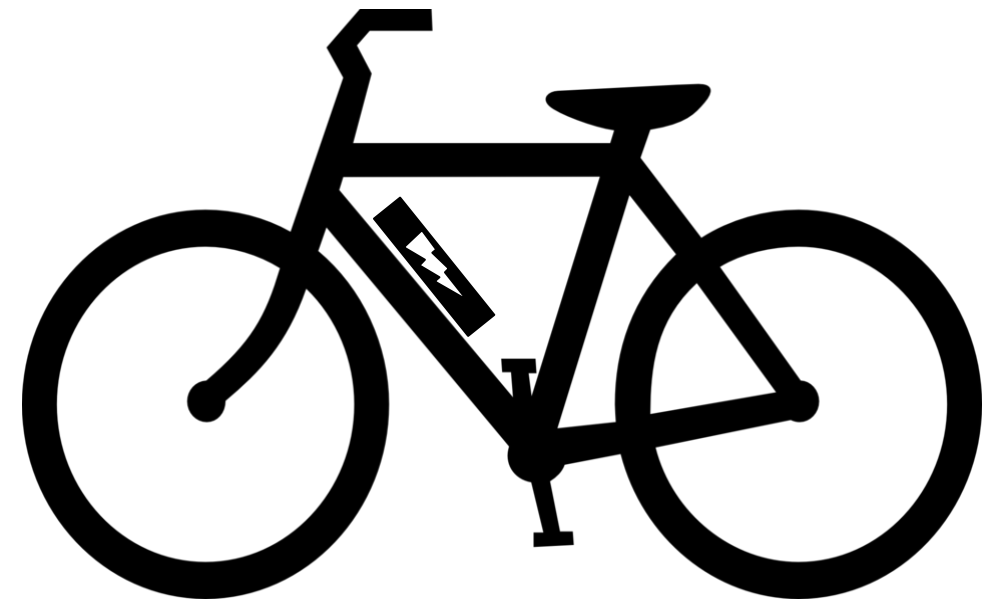


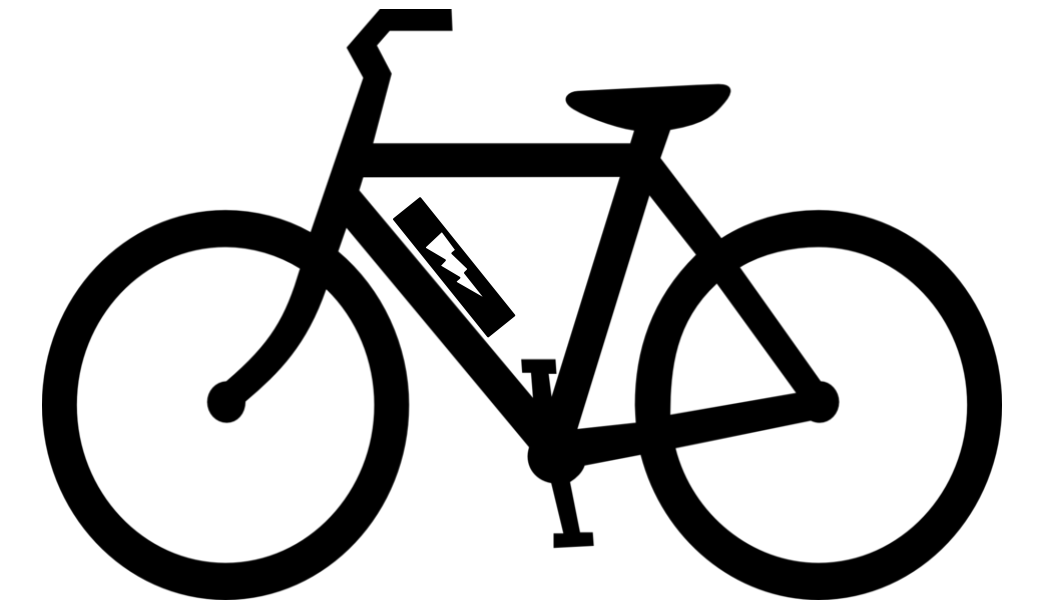
Feasibility Assessment of Electric Bicycles in Centre Region, Pennsylvania



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DRAWDOWN



Electric bicycles, or e-bikes are a lower-emission alternative to internal combustion engine (ICE) vehicles. E-bike adoption was identified by Project Drawdown as one of the top 80 solutions for reversing climate change.¹

Objectives

- Develop a framework for community-level feasibility assessments of e-bike adoption as a lower-emission transportation alternative to ICE vehicles
- Present a case study for Centre Region, PA

Methodology

Examine the following five key factors of e-bike adoption through literature review, cost analysis, and correspondence with local experts: policy, safety, household costs, infrastructure, and municipal costs.

Current Level of Adoption

- 4,731 bikes currently registered in the Centre Region; 7 are tagged electric²
- University Park campus utilizes Zagster bike share²



Figure 1: Zagster bikes parked on their rack



Figure 2: Bikes parked on a municipal rack in State College Borough

Policy

State Law:

- Definition of “pedalcycle” includes “pedalcycles with electric assist, meaning that e-bikes with a motor no larger than 750 watts and a top speed no higher than 20 mph are granted the same rights as manual bicycles³
 - E-bikes do not have to be insured nor inspected³

Centre Region Policy:

- E-bikes conforming to the state standard are explicitly permitted⁴

Infrastructure

Current Trends:

- Bicyclists report that a lack of off-street bikeways discourages them from riding more frequently⁵
 - Most common type of bikeway is shared use path⁴
- E-bike riders are deterred by insufficient secure and covered parking^{5,6,7}
 - Almost all parking is on bike racks⁷

Safety

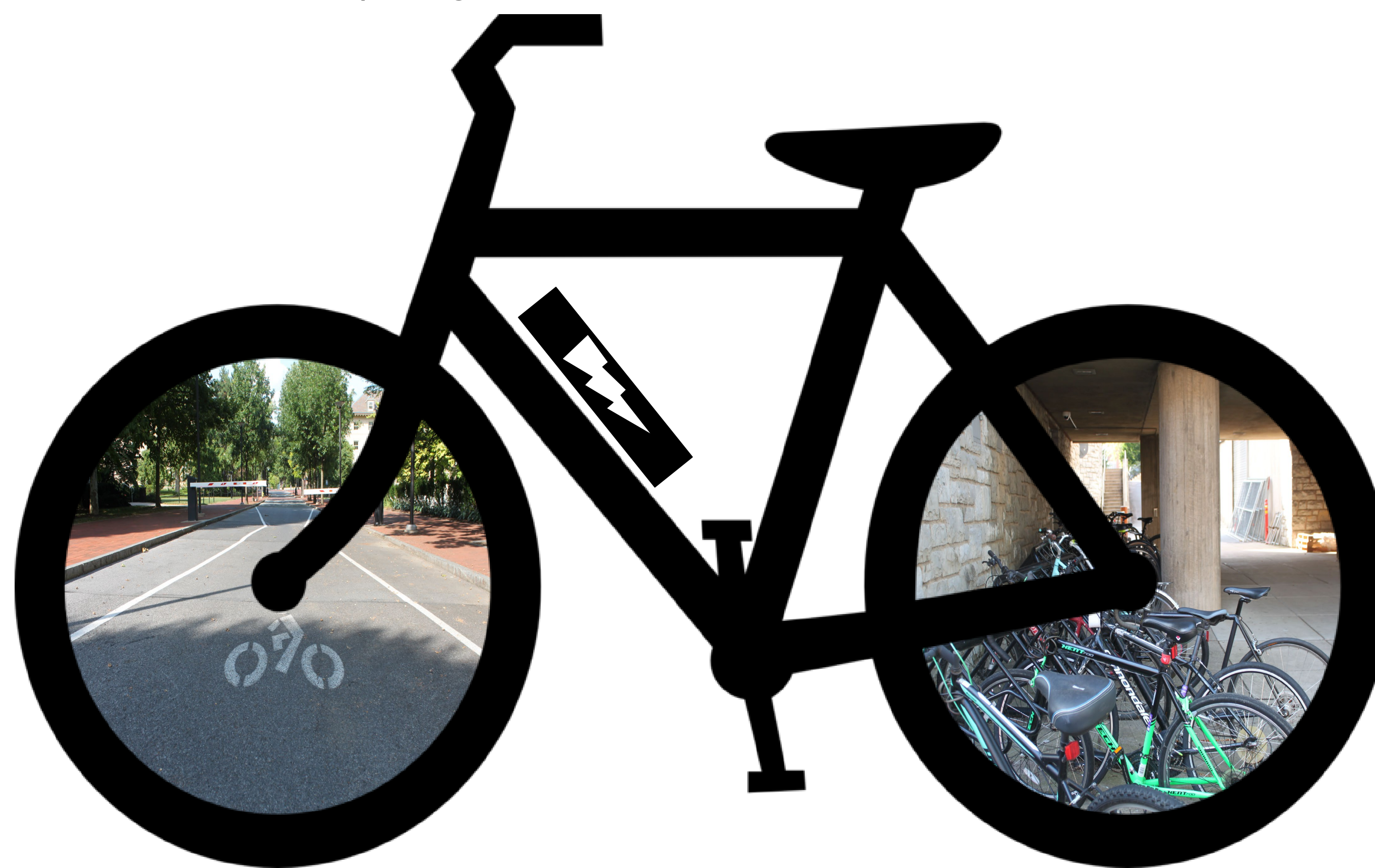
Current Trends:

- Very low crash rate: 143 crashes per 10,000 riders in 2016;⁸ 20 bicycle-involved crashes in 2017⁹⁻¹¹
- Most crashes are angle type – vehicles on opposite roadways collide at a junction⁹⁻¹¹

“Safety in Numbers”

- Studies indicate that the more bicyclists on the road, the safer each bicyclist, as vehicle drivers grow used to them^{12,13}
- Suggests that widespread adoption of e-bikes will continue to improve cyclist safety.^{12,13}

The Centre Region is a strong candidate for the adoption of e-bikes as an alternative to ICE vehicles due to...



...e-bike-friendly policies, low crash rates, and budgets that can accommodate, and benefit from, an e-bike purchase.

Household Costs

Two models were selected for cost analysis:

- **Binelli B1¹⁴:**
 - Available through The Bicycle Shop
 - Estimated annual cost of ownership: **\$353.21**^{14,16-19}
- **Gazelle Medeo T9 HMB¹⁵:**
 - Available through Eddie's Bicycles and Hockey Equipment
 - Estimated annual cost of ownership: **\$487.49**¹⁵⁻¹⁹

These figures compare to the \$8,494 annual transportation expenses of households in the Northeast region, approximately \$1,665 of which is spent on fuel alone.²⁰

Table 1: Components of cost estimates for selected e-bike models

E-bike Model	Binelli B1	Gazelle Medeo T9 HMB
List price (present worth)	\$1,299.95	\$2,499.00
Maintenance cost over lifetime (present worth)	\$808.43	\$808.43
Electricity cost over lifetime (present worth)	\$64.33	\$71.48
Battery replacements (2)	\$1,000.00	\$1,000.00
TOTAL	\$3,172.71	\$4,378.91
Annual cost (annual worth)	\$353.21	\$487.49

Municipal Costs

The costs of maintaining bicycle infrastructure are shared among the municipal governments, Penn State, homeowners' associations, and private land owners.⁴

Table 2 provides cost estimates from the Federal Highway Administration and Borough of Chambersburg for several types of bicycle infrastructure projects.^{21,22}

Municipalities may also cover costs of bicycle education programs.⁴

Acknowledgments

We would like to thank Trish Meek and Jim May at the Centre Regional Planning Agency and Cecily Zhu at Penn State Transportation Services for their help finding local resources.

References

Please see the handout provided for a full list of references, and our working paper for further details.

Table 2: Cost estimates for municipal bicycle infrastructure projects

Infrastructural Project	FHA Average Cost	FHA Median Cost	Chambersburg Cost Estimate
Bike Rack	\$660 each	\$540 each	\$150-\$750 each
Bike Locker	\$2,090 each	\$2,140 each	\$1,300-\$2,000 each
Sign	\$300 each	\$220 each	\$25-\$50 each
Bike Lane	\$133,170 per mile	\$89,470 per mile	N/A
Signed Bike Route	\$25,070 per mile	\$27,240 per mile	N/A
Shared Lane / Bike Pavement Marking	\$180 each	\$160 each	N/A