

Appendix F: Climate Reduction Methods

Analysis of the Scooter User Survey suggests that e-scooters facilitate mode shift, most notably away from walking and taking single occupancy vehicles. Examination of combined self-reported data from the Scooter User Survey suggests that if an e-scooter had not been available for their last trip, then the trip would not have occurred (6.9%) or users would have instead made the trip by walking (36.3%); riding a personal bike, personal scooter, or BIKETOWN (7.9%); taking transit (8.7%); taking a single occupancy vehicle, like a personal vehicle, taxi, or Uber and Lyft (35.7%); taking a shared Uber or Lyft ride (2%); or, another option that did not fit into any of these categories (1.2%) (see Table A). Comparing these percentages to the total number of scooter miles traveled during the e-scooter pilot (801,887 mi.), we estimate that e-scooters replaced approximately 423,437 miles of walking, biking, and transit and 285,895 vehicle miles that would have been traveled in single occupancy vehicles (see Table B). Given the geographic distribution of e-scooter rides during the pilot, it is reasonable to expect that many of those miles would have occurred in the Central City and Inner Eastside, areas which experience traffic congestion issues. Using the U.S. Environmental Protection Agency’s average CO₂ emissions per vehicle mile, we estimate that during the 120-day e-scooter pilot, e-scooters helped prevent automobiles from emitting approximately 122 metric tons of CO₂, which is equivalent to eliminating approximately 27 typical passenger vehicles from the road for one year (see Table C).

While these findings are promising, it is important to note three key limitations to this analysis. First, whether survey respondents would behave in accordance with what they stated in the survey is unknown. Second, without occupancy data on the number of shared Uber and Lyft rides (i.e. 2 or more riders), we assumed that 10 percent of those rides would have been shared and 90 percent would have been single occupancy vehicle rides. Third, we simply do not have the data necessary to account for the emissions associated with e-scooter companies’ business models. This includes data about emissions associated with e-scooter companies’ supply chains, manufacturing processes, charging and deployment operations, their waste stream, or more. Without these data, it seems reasonable to assume that if those emissions were accounted for, then they could potentially offset any of the greenhouse gas reductions modeled above. Clearly, more data are needed to determine whether or how e-scooters contribute to Portland’s adopted policy goals of reducing air pollution, including climate pollution.

Table A: E-Scooter Mode Shift		
Total e-scooter miles traveled		801,887.8
If an e-scooter had not been available for your last trip, how would you have made that trip?	Combined survey response	Total # Miles by mode
Driven a personal vehicle, car share, or other motor vehicle	17.7%	142,243
Other	1.2%	9,259
Ridden a personal bike	4.1%	32,750

Ridden a personal scooter	0.2%	1,693
Ridden as a passenger in a vehicle and dropped off by a friend, family member, or other person	1.5%	11,674
Ridden BIKETOWN	3.6%	28,540
Taken a bus/MAX/Streetcar	8.7%	69,685
Taken a taxi, or Uber and Lyft (TNC)	19.9%	159,613
Walked	36.3%	290,769
Would not have made the trip at all	6.9%	55,660
	100.00%	801,887

Table B: Mode shift as it relates to Portland's people movement strategy

Transportation hierarchy for people movement	# miles by mode if not for e-scooters	Note
Walking	290,769	
Biking	62,983	Aggregate of Personal bike, Personal scooter and BIKETOWN
Transit	69,685	
Fleets of autonomous vehicles that are electric and shared	0	
Other shared	15,961	Assuming 10% of Taxi and TNC rides are "shared"
SOV	285,895	Aggregate of Driven a personal vehicle and 90% of Taxi and TNC rides
Other	9,259	
No trip at all	55,660	

Table C: Estimated climate benefits of e-scooters

Emission Calculations		Note
# Vehicle Miles Traveled (VMT) eliminated	301,856	Combined VMT for "SOV" and "Other shared"
Avg CO2 emissions per mile (grams, avg. passenger vehicle)	404	Per US EPA
Total CO2 emissions eliminated (grams)	121,949,883	
Conversion - Grams per metric ton	1,000,000	
Total metric tons of CO2 emissions eliminated	121.95	
# metric tons of CO2 that typical passenger vehicle emits per year	4.6	Per US EPA
Estimated # of passenger cars eliminated	27	

Source: <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>