The Growing Carbon Footprint of Ride-Hailing in Massachusetts

Metropolitan Area Planning Council

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Ride-hailing services such as Uber and Lyft have seen rapid and widespread growth across Massachusetts. These services provided 81 million trips in the state in 2018[1], a 25 percent increase over the prior year. The explosive growth of this new form of mobility raises important concerns about impacts on congestion, safety, transportation finance, and Greenhouse Gas Emissions (GHGs) across the state.

Using data recently released by the MA Department of Public Utilities (DPU), MAPC estimates that ride hailing had a net carbon footprint of nearly 100,000 metric tons in 2018, adding about 0.5 percent to the total carbon emissions for all passenger transportation across the state. If growth in ride-hailing emissions continues unchecked, it will make it very difficult for the state to meet its emissions reduction targets.

The impact of this industry on transportation finance continues to grow as well. MAPC estimates the MBTA lost $23 million in fare revenue in 2018 as travelers opted for ride-hailing instead of transit; but the per-ride surcharge produced only $3.4 million in new state revenue. The magnitude of these impacts and their rapid growth in just one year demonstrates that the Commonwealth must do more to better understand ride-hailing services, reduce their carbon footprint, and align revenue with impacts.

Estimated Greenhouse Gas Emissions

To date, a small body of research has attempted to quantify the relationship between ride-hailing, Vehicle Miles Traveled (VMT) and GHG emissions. One recent report[2] analyzed and compared thirteen studies that researched this issue and concluded that ride-hailing is likely to increase VMT and associated GHG emissions for a variety of reasons. Researchers posit that these increases may result from induced trip generation; empty travel to pick up passengers; and substitution of ride-hailing for trips that would have been made by taking public transit, walking, or bicycling. However, there has been little progress in estimating the total magnitude of increased GHG emissions associated with ride-hailing.

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1 Department of Public Utilities, 2018 Data Report – Rideshare in Massachusetts. https://tnc.sites.digital.mass.gov

2 The Effects of Ride-Hailing Services on Travel and Associated Greenhouse Gas Emissions, National Center for Sustainable Transportation, April 2018.

There is good reason to be concerned about the climate impacts of ride-hailing. Transportation is the largest and fastest-growing producer of GHG emissions. In Massachusetts, 43 percent of GHG emissions in 2016 came from transportation infrastructure and vehicles.[3] Nearly half of this contribution (20 percent of total GHG emissions, or approximately 15 million metric tons of CO2 equivalents) came from passenger vehicles alone[4] (the rest of the emissions are attributable to light- and heavy-duty trucks, aviation, and rail.)

Ride hailing constitutes an increasing share of passenger transportation travel. Between 2017 and 2018, the number of ride-hailing trips grew from 64.8 million to 81.3 million, a 25 percent increase across the Commonwealth. MAPC's 2018 report Share of Choices[5] estimated that ride hailing comprised approximately 1.3 percent of all trips in the MAPC region in 2017. Using new data recently released by the DPU, we estimate that the ride hailing "mode share" climbed to 1.7 percent of all trips in the region in 2018.

The newly available data include average trip mileage based on municipality of origin, also allowing us to produce the first estimates of net GHG emissions generated by ride-hailing trips in Massachusetts. These data show that ride-hailing "revenue miles" for passenger trips totaled almost 400 million miles statewide 2018. Based on this figure, we estimate that ride-hailing trips consumed over 18 million gallons of gasoline and produced a total of 163,300 metric tons of CO2 equivalents in 2018.[6] Of course, not all of these are 'new' emissions, since many trips would have been made by car anyway even if ride-hailing were not available. MAPC's report Fare Choices[7] used survey data to conclude that approximately 60 percent of ride hailing trips would have been taken by transit, walking, or biking, or would not have happened at all, if ride-hailing were not available. After accounting for this mode shift from less carbon-intensive modes, we estimate that the net carbon footprint of ride hailing was 96,340 metric tons of CO2 equivalents in 2018. This is a conservative estimate as it does not include times ride-hailing vehicles spend deadheading or driving while waiting for trips to be assigned.

This net carbon footprint is approximately 0.6 percent of the carbon emissions estimated for the MA passenger vehicle fleet in 2016. In other words, even as the state is working to implement policies that will encourage more sustainable modes of transportation, it is experiencing rapid growth in an industry that is adding to the carbon impact of the state.

Fiscal Impacts

MAPC previously estimated that as ride-hailing services attract passengers who would otherwise pay cash or stored value for a transit trip, the MBTA loses $0.35 in revenue per ride-hailing trip. Applying this cost to the approximately 67 million ride-hailing trips originating in Inner Core communities in 2018, we estimate that the MBTA has lost approximately 23.4 million in revenue as a direct result of ride-hailing. After accounting for the five-cent portion of the ride-hailing trip assessment directed to the Commonwealth Transportation Fund ($3.35 million), we estimate the net revenue impact to the state's transportation system is a loss of at least $20.03 million.

3 https://www.mass.gov/service-details/ma-ghg-emission-trends

4 Choices for Stewardship: Recommendations to Meet the Transportation Future, Commission on the Future of Transportation in the Commonwealth, 2019. https://www.mass.gov/orgs/commission-on-the-future-of-transportation

5 Share of Choices: Further Evidence of the Ride-Hailing Effect in Metro Boston and Massachusetts, MAPC, May 2018. http://www.mapc.org/wp-content/uploads/2018/06/Share-of-Choices-PDF_Edited.pdf

6 US EPA Greenhouse Gas Equivalences Calculator https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

7 Fare Choices: A Survey of Ride-Hailing Passengers in Metro Boston, MAPC, February 2018. http://www.mapc.org/wp-content/uploads/2018/02/Fare-Choices-MAPC.pdf

Conclusions

This brief analysis of new information about ride-hailing in Massachusetts suggests three conclusions:

1. **Unchecked growth in ride-hailing will make it hard to reach the state's climate goals.**
2. **The industry is still net negative for state transportation finances.**
3. **We don't have nearly enough information to really know what the impacts are.**

The results of the analysis reinforce the need for many of the policy recommendations that MAPC has already identified, including:

- Changing the assessment fee structure so that it raises more revenue and promotes shared-trips
- Providing incentives for ride-hailing drivers to use electric or zero-emission vehicles.
- Maximize the efficiency of pick-up and drop-off locations.
- Requiring the provision of additional data about trip locations, vehicles, and non-revenue mileage, among other characteristics

Methods

MAPC calculated GHG emissions by using the number of trips per municipality, and the average miles per trip reported by the Department of Public Utilities (DPU) for 2018.[8] We then applied findings from our recent Fare Choices report that almost 60 percent of ride-hailing trips would have used a non-polluting travel mode if ride-hailing were not an option.[9] The survey on which that estimate is based was conducted primarily in the MBTA service area, so it may overestimate the mode shift from transit to ride hailing in areas lacking any transit service. However, only 3.4 percent of trips originated in a municipality served neither by the MBTA or a regional transit agency.

This factor is the estimated proportion of ride-hailing trips that are replacing a travel mode with no net carbon impact for each trip. MAPC then estimated the total ride-hailing travel miles that are replaceable for each municipality and calculated a summary for the state.

Replaceable TNC miles = 0.59 (proportion replaceable) × number of trips × average miles per trip

GHG values were then estimated as a metric ton CO2 equivalence by applying the following formula as recommended by the U.S. EPA.[10]

8.89 × 10-3 metric tons CO2/gallon gasoline × 1/22.0 miles per gallon car/truck average × 1 CO2, CH4, and N2O/0.988 CO2

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4.09 × 10-4 metric tons CO2e/mile

8 Transportation Network Company (TNC) Division of the Department of Public Utilities https://tnc.sites.digital.mass.gov data and metadata retrieved on 05/14/2019 as excel spreadsheet.

9 Approximately 42 percent of ride-hailing trips would have been taken via transit if ride-hailing were not available, 12 percent would have walked or biked, and five percent would have not made the trip at all.

10 U.S. EPA greenhouse gases equivalencies calculator-- calculations and references, https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references