# Electrification Analysis: Manhattan Beer

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Manhattan Beer Distributors is a beverage delivery company operating in Manhattan and the Bronx. Logging devices were installed in seventeen vehicles and operational data was collected between August 2022 and October 2022. Two types of vehicles were included in data collection: seven tractors and ten bay trucks. The deployment statistics are summarized in Table 1.

| Location | Number | Types | Vocation | Duration | Miles |
|---|---|---|---|---|---|
| New York City, NY | 17 | Tractors, Bay Trucks | Beverage Delivery | Aug–Oct. 2022 | 7,689 |

Table 1: Deployment Overview

## Duty Cycle Analysis

In this section, we discuss the duty cycle characteristics of the Manhattan Beer fleet. Figure 1 illustrates the distributions over vehicle speed and distance disaggregated across the two vehicle types. Although bay trucks are slightly faster than tractors on average, driving speeds and distances are generally low across the fleet. Low speeds and short travel distances suggests the fleet is amenable to electrification, as commercially available batteries and charging infrastructure are capable of meeting the fleet's energy needs.

Figure 2 depicts the distributions over engine run time and idle time for vehicles in the fleet. Engine run times are short, averaging 3 hours per day, and vehicles spend nearly half their time at idle. This suggests that vehicles have substantial charging flexibility and that potential for idling emissions and energy expenditure reduction is meaningful. Table 2 provides further information on the fleet's duty cycle characteristics, listing statistics for various duty cycle parameters for each type of fleet vehicle.

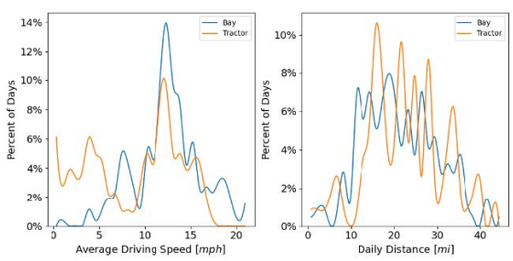


Figure 1: Distributions over driving speed (left) and daily distance (right), disaggregated across vehicle types.

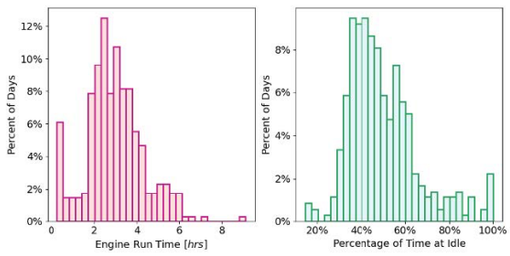


Figure 2: Distributions over engine run time (left) and time at idle (right)

## Charging Analysis

In this section, we discuss the fleet's electrification potential. Figure 3 shows the distribution over charging opportunities for vehicles in the fleet, while Figure 4 shows the number of vehicles whose mobility needs can be satisfied given various choices of battery size and charging rate. We find that the majority of vehicle stops exhibit some charging potential, and that there are reliably opportunities for delayed or slow charging. Furthermore, even modest infrastructural choices (e.g., a battery size of 220kWh and a charger with an output power of 70kW) are sufficient to satisfy vehicle mobility needs.

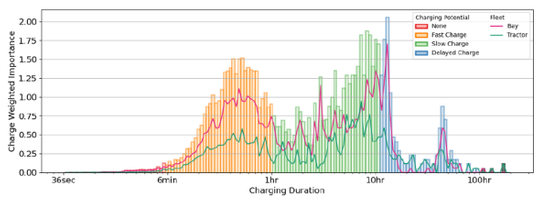


Figure 3: Charging opportunities

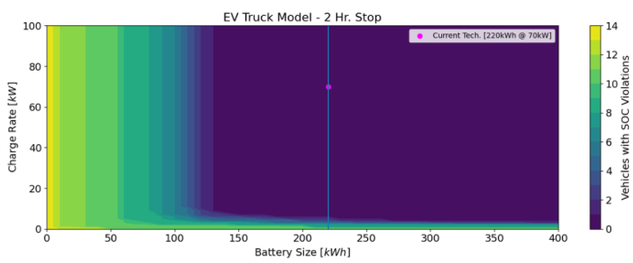


Figure 4: Electrification potential

## Conclusion

The fleet shows substantial electrification potential, as daily driving distances (below 50 miles) and short and average speed is low (below 22mph). Such duty cycle needs can often be met by even modestly sized battery and charging infrastructure. Furthermore, vehicles spend nearly half of their time at idle and fuel efficiency is low (2 mpg on average), suggesting that electrification can improve energy efficiency. Lastly, these vehicles operate in vulnerable communities where reductions in tailpipe emissions due to electrification may be particularly impactful.

## Acknowledgment

The authors would like to thank Manhattan Beer Distributors and the National Renewable Energy Laboratory communications team for their assistance in creating this report. This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy LLC for the U.S. Department of Energy (DOE) under Contract No. DE- AC36-08G028308.

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NREL/FS-5400-90704 • August 2024