



Memorandum

To: MassCEC Clean Transportation Team
From: Jesse Way and Alison Felix, MAPC
On: January 14, 2022
Re: School Bus Registration Data Analysis

Introduction

The purpose of this document is to provide a summary and analysis of school bus registration data in Massachusetts. The full dataset has been transmitted to the MassCEC Clean Transportation Team separately in Excel format. This effort is funded through an ACTNow grant from MassCEC and is associated with the deployment of an electric school bus by Highland Electric Fleets in Beverly, MA.

The data were acquired by Brian Foulds through a Public Records Request to MassDOT. The original dataset includes information on the owner and lessee of the bus, number of passengers, vehicle identification number (VIN), garage city, and the fuel type. Brian used a VIN decoder to add information on manufacturer, engine type, and model year.

The MAPC added ownership type, indicating whether the bus is owned or leased by a third-party contractor (Contractor), a school district or municipality (School), or other organization (Other). Other organizations include community groups, after school programs, early education programs, churches, special education collaboratives, boys and girls clubs, YMCAs, martial arts centers, and individuals. The MAPC team also added an indicator to distinguish large buses from small buses and vans. Small buses and vans are defined as those having a passenger capacity of 30 or less, while large buses are defined as those having a passenger capacity greater than 30. The analysis evaluates large and small buses separately because these fleets often have different characteristics and use-cases.

Findings

Ownership

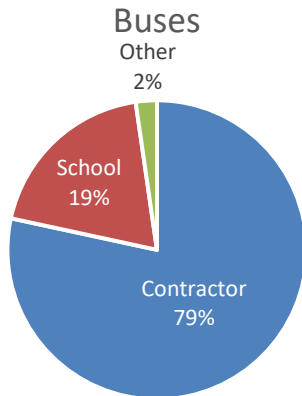
There were 8,260 school buses registered in Massachusetts as of November 30, 2021. Of these, 6,167 were large buses, while 2,093 were small buses. 79% of large buses are owned¹ by a third-party contractor, while 19% are owned by school districts or municipalities. For small buses and vans, it is much closer to an even split, with 45% owned by third-party contractors and 52% owned by school districts or municipalities (see graphics on next page). There are a small portion of buses owned by other entities, including 2% of large buses and 3% of small buses and vans.

¹ For simplicity, this document refers to ownership as the entity that owns or holds the lease for the bus.

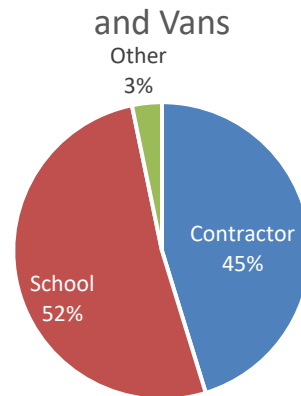
The top nine owners of large school buses in Massachusetts are all third-party contractors, together accounting for about half of all large buses. The two largest owners, First Student Inc and NRT Bus Inc, account for nearly 25% of large buses in Massachusetts. The City of Boston is the largest municipal or school district owner of large school buses, accounting for less than 3% of large buses in Massachusetts.

The City of Boston is the largest owner of small school buses and vans in Massachusetts, accounting for over 25%. NRT Bus Inc and First Student are the two next largest owners of small school buses and vans, accounting for a combined 23%. Altogether, NRT Bus Inc and First Student Inc combine to own nearly a quarter of all school buses in Massachusetts.

Owner or Lessee of Large Buses

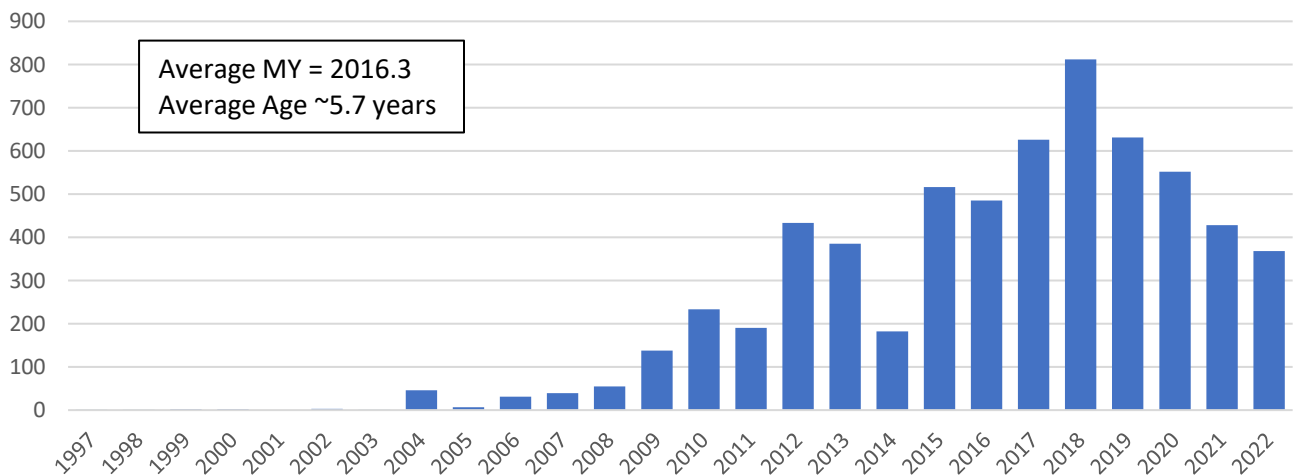


Owner or Lessee of Small Buses and Vans



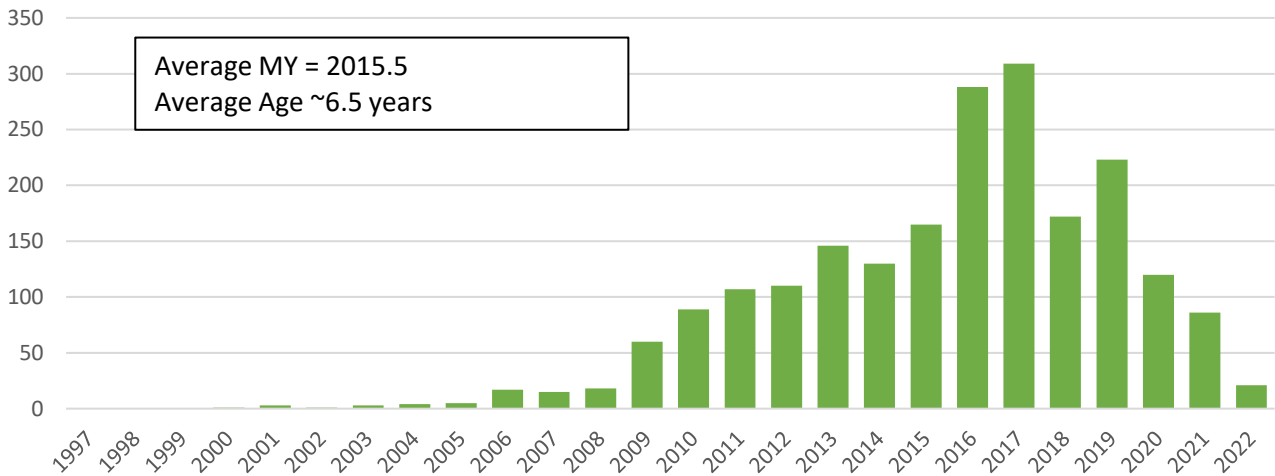
Fleet Age

Model Year of Large Buses



The average model year (MY) of large school buses in Massachusetts is 2016.3, making the average age of large buses in the current fleet roughly 5.7 years. The average model year of small school buses and vans in Massachusetts is 2015.5, making the average age of the current small bus and van fleet roughly 6.5 years.

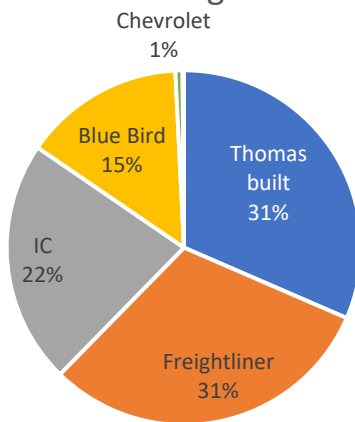
Model Year of Small Buses and Vans



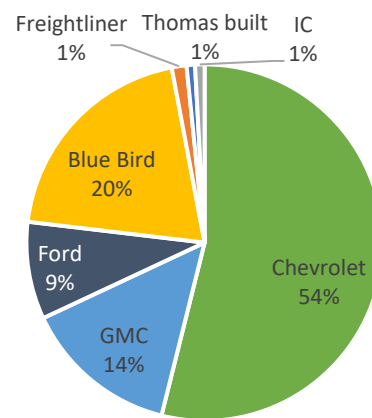
Make

The make of the large bus fleet is split primarily between Thomas Built (31%), Freightliner (31%), IC (22%), and Bluebird (15%), with Chevrolet claiming 1% and GMC and Lion with a fraction of a percent each. The small bus and van fleet is dominated by Chevrolet (54%), followed by Bluebird (20%), GMC (14%), and Ford (9%), with Freightliner, Thomas Built, and IC each capturing about 1%.

Make of Large Buses



Make of Small Buses and Vans



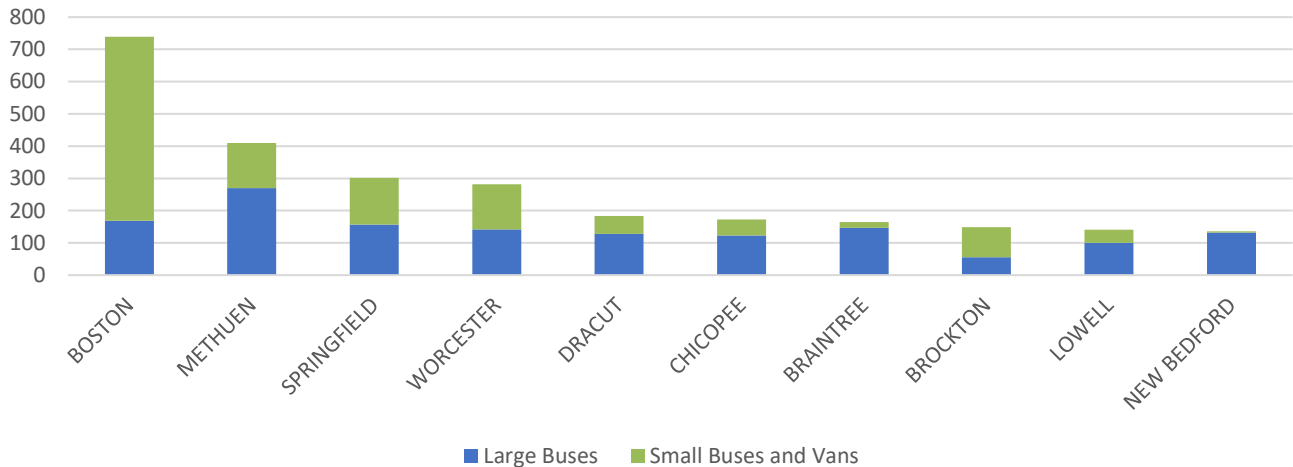
Garage Location

The garage locations of small school buses and vans are more concentrated than large school buses. Boston garages 27% of all small buses and vans. Springfield, Worcester, Methuen, and Brockton account for an additional 25% of small buses and vans, meaning that over 50% of small buses and vans are garaged in just five municipalities. The next seven municipalities garaging the most small buses and vans² account for an additional 15%, resulting in two-thirds of small buses and vans garaged in just twelve municipalities.

² Dracut, Chicopee, Holyoke, Lynn, Lowell, Osterville, and Westfield.

Methuen garages the most large school buses, but only accounts for 4% of all large buses.³ The 10 municipalities garaging the most large buses⁴ account for about a quarter of all large school buses. To capture 50% of all large buses, 33 municipalities need to be aggregated.

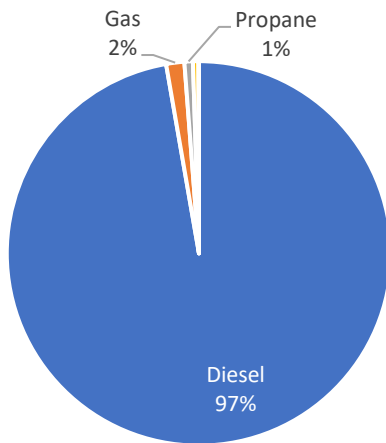
Top 10 Garage Locations of School Buses



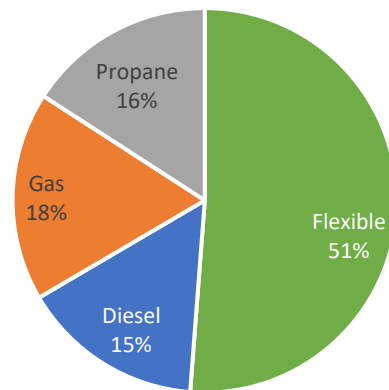
Fuel Type

97% of large school buses use diesel fuel, while 2% use gas, 1% use propane, a fraction of a percent are flex fuel and only 3 buses are electric. 51% of small buses and vans are flex fuel, while the rest are relatively evenly split between gas (18%), propane (16%), and diesel (15%). Flex fuel vehicles typically use gasoline, but can also use e85, a fuel comprised of 85% corn-based ethanol and 15% gasoline. It is likely these vehicles consume gasoline, as there are only five e85 fueling stations in Massachusetts.⁵

Fuel Type of Large Buses



Fuel Type of Small Buses and Vans



³ The MAPC team hypothesizes that the high number of buses garaged in Methuen and Dracut are buses that are operated in New Hampshire, but registered and garaged in Massachusetts. Both towns border New Hampshire and neither are near large population centers. New Hampshire has relatively high property taxes, making it more affordable to own land to garage buses in Massachusetts.

⁴ Methuen, Boston, Springfield, Braintree, Worcester, New Bedford, Dracut, Chicopee, Westport, and Ashland.

⁵ https://afdc.energy.gov/fuels/ethanol_locations.html#/find/nearest?fuel=E85

Conclusion

Large school buses will be more impactful to electrify than small school buses and vans because there are about three times as many large buses and they almost all use diesel fuel, which emit more greenhouse gas and criteria pollutant emissions than gasoline or propane. However, it is important to acknowledge the limited scope of targeting municipally owned buses, which only account for about a fifth of all large buses. While this can be an effective approach in the near-term, as school bus technology continues to mature, widescale transition of the school bus fleet will require working with third-party contractors to integrate electric school buses into their fleets. Fortunately, ownership of large school buses is concentrated in a few large operators and garaging of large buses is distributed among several different municipalities, reducing the potential strain on the electric grid as charging for the vehicles become more widespread.