cost_per_bus_analysis

July 2, 2024

1 Bus Procurement Cost Analysis

1.1 Summary

This analysis examines the cost of buses for transit agencies across the county. Specifically, to observe the variation of bus cost for propulsion type with a focus on Zero Emission Buses (ZEB).

Data was compiled from three data sources: 1. FTA Bus and Low- and No-Emission Grant Awards press release (federally funded, nationwide data) 2. TIRCP project data (state-funded, California only data) 3. DGS usage report for all procurements from California agencies purchasing from New Flyer and Portera Inc..

The initial dataset included nearly 300 projects. It was reduced to 88 projects after applying criteria to exclude non-bus related work. Projects involving the construction of new facilities, training programs, or the procurement of non-bus items such as trains and ferries were excluded. The final dataset comprised only projects focused on bus procurement.

These projects were aggregated against propulsion type and bus size type, and categorized by ZEB and non-ZEB.

Breakdown of each data souce showing the total buses and cost for each source:

source

bus_count

total_cost

cost_per_bus

dgs

236.0

250112853

1059800

fta

883.0

391257025

443099

tircp

233.0

187250513

803650

Grand Total

1352.0

828620391

612884

ZEB projects are categorized into the following propulsion types: - zero-emission (not specified) - electric (not specified) - battery electric - fuel cell electric

Non-ZEB projects include the following propulsion types: - compressed natural gass (CNG) - ethanol - low-emission (hybrid, propane) - diesel - gas

---

2 Summary Charts and Tables

Summary of cost by ZEB propulsion types

	prop_type	bus_count	total_cost	cost_per_bus
0	BEB	163.0	167232489	1025966
1	FCEB	102.0	120951335	1185797
2	electric (not specified)	44.0	56678000	1288136
3	zero-emission bus (not specified)	143.0	128156513	896199
4	Grand Total	452.0	473018337	1046500

Summary of cost by non-ZEB propulsion types *

	prop_type	bus_count	total_cost	cost_per_bus
0	CNG	252.0	176039140	698568
1	ethanol	9.0	1006750	111861
2	low emission (hybrid)	145.0	91824361	633271
3	low emission (propane)	44.0	8403969	190999
4	mix (zero and low emission)	125.0	36775430	294203
5	Grand Total	575.0	314049650	546173

*The remaining buses did not specify a propulsion type

2.1 Which agencies had the highest and lowest ZEB cost per bus?

Max cost_per_bus

	transit_agency	prop_type	total_cost	bus_count	cost_per_bus
76	University of California - San Diego	BEB	4134000	2.0	2067000

Min cost_per_bus

```
   transit_agency                          prop_type  total_cost  bus_count  \
45  City of Wasco  zero-emission bus (not specified)     1543000        3.0

    cost_per_bus
45        514333
```

2.2 Which agencies procured the most and least amount of ZEBs?

Max bus_count

```
                 transit_agency                          prop_type  \
44  City of Los Angeles (LA DOT)  zero-emission bus (not specified)

    total_cost  bus_count  cost_per_bus
44   102790000      112.0        917767
```

Min bus_count

```
                      transit_agency prop_type  total_cost  bus_count  \
70  SLO TRANSIT (SAN LUIS OBISPO, CA)       BEB      847214        1.0
82            City of San Luis Obispo       BEB      859270        1.0

    cost_per_bus
70        847214
82        859270
```

2.3 Which agencies had the most and least total ZEB cost?

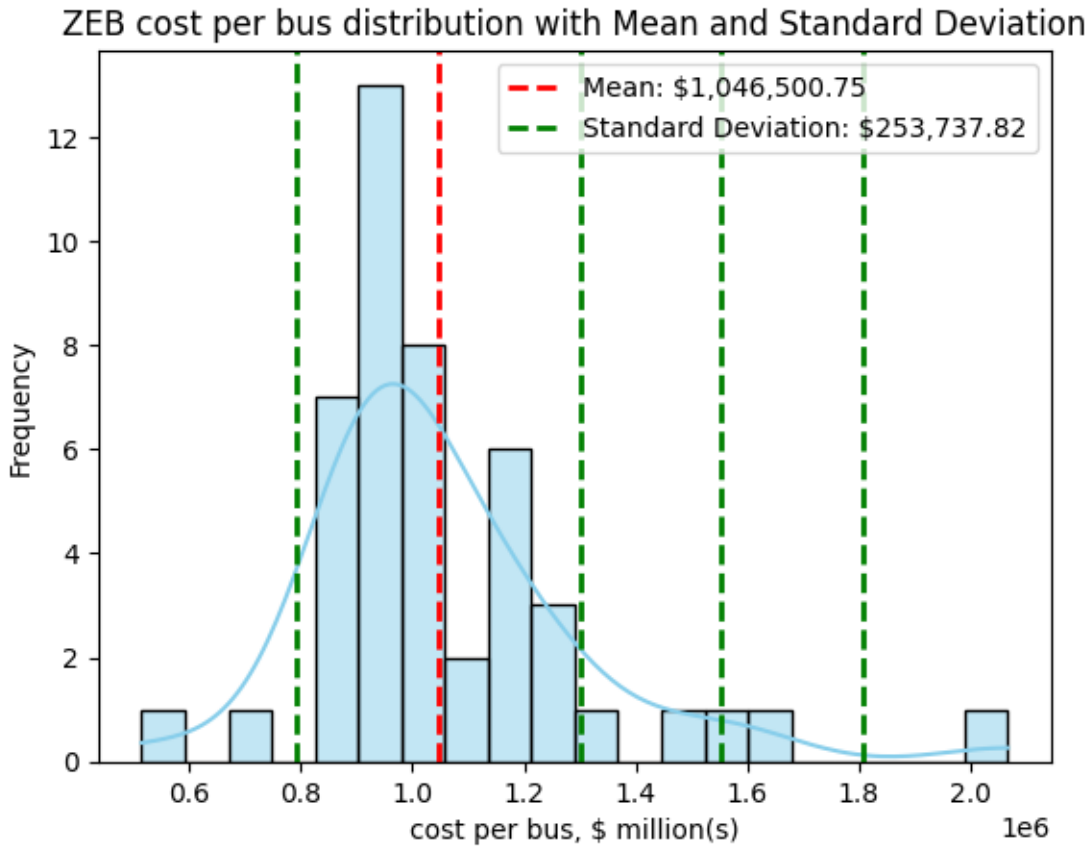
Max total_cost

```
                 transit_agency                          prop_type  \
44  City of Los Angeles (LA DOT)  zero-emission bus (not specified)

    total_cost  bus_count  cost_per_bus
44   102790000      112.0        917767
```

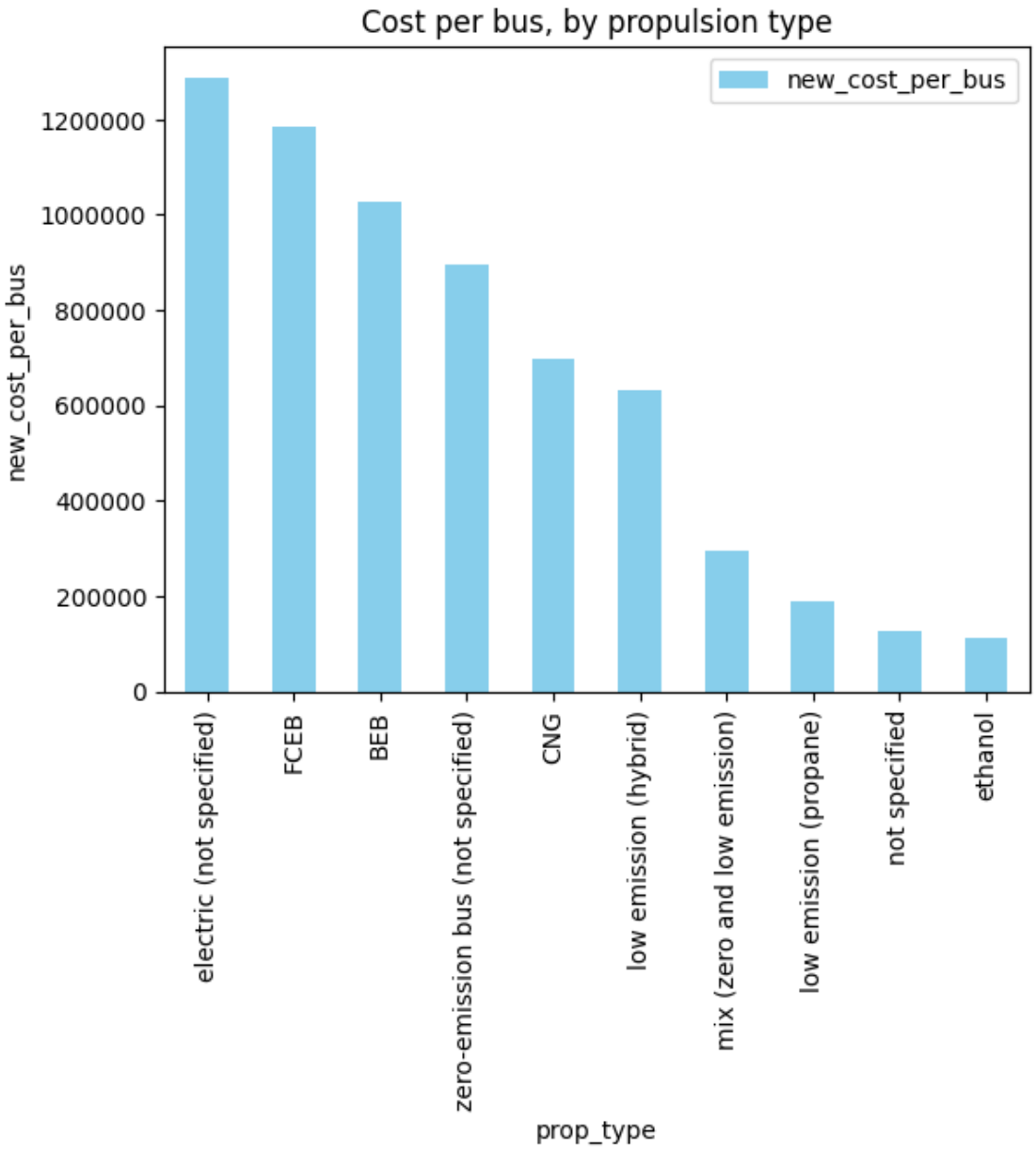
Min total_cost

```
                      transit_agency prop_type  total_cost  bus_count  \
70  SLO TRANSIT (SAN LUIS OBISPO, CA)       BEB      847214        1.0

    cost_per_bus
70        847214
```

2.4 What is the distribution of ZEB cost?



2.5 What is the cost per bus compared against all propulsion types?

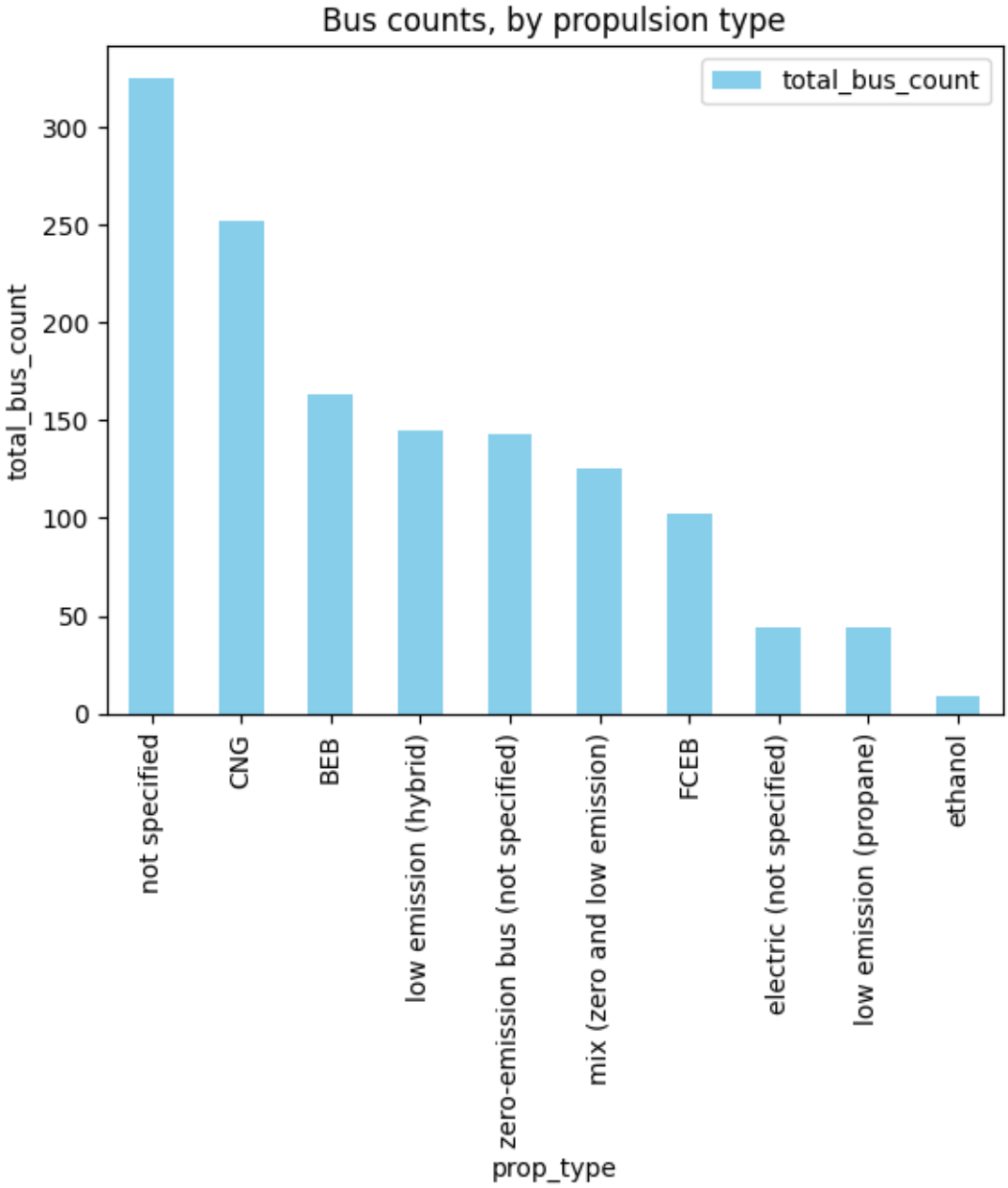


None

	prop_type	new_cost_per_bus
3	electric (not specified)	1288136
2	FCEB	1185797
0	BEB	1025966
9	zero-emission bus (not specified)	896199
1	CNG	698568
5	low emission (hybrid)	633271

```
7        mix (zero and low emission)           294203
6             low emission (propane)           190999
8                       not specified           127853
4                             ethanol           111861
```

2.6 What is the total bus counts compared to each propulsion type?

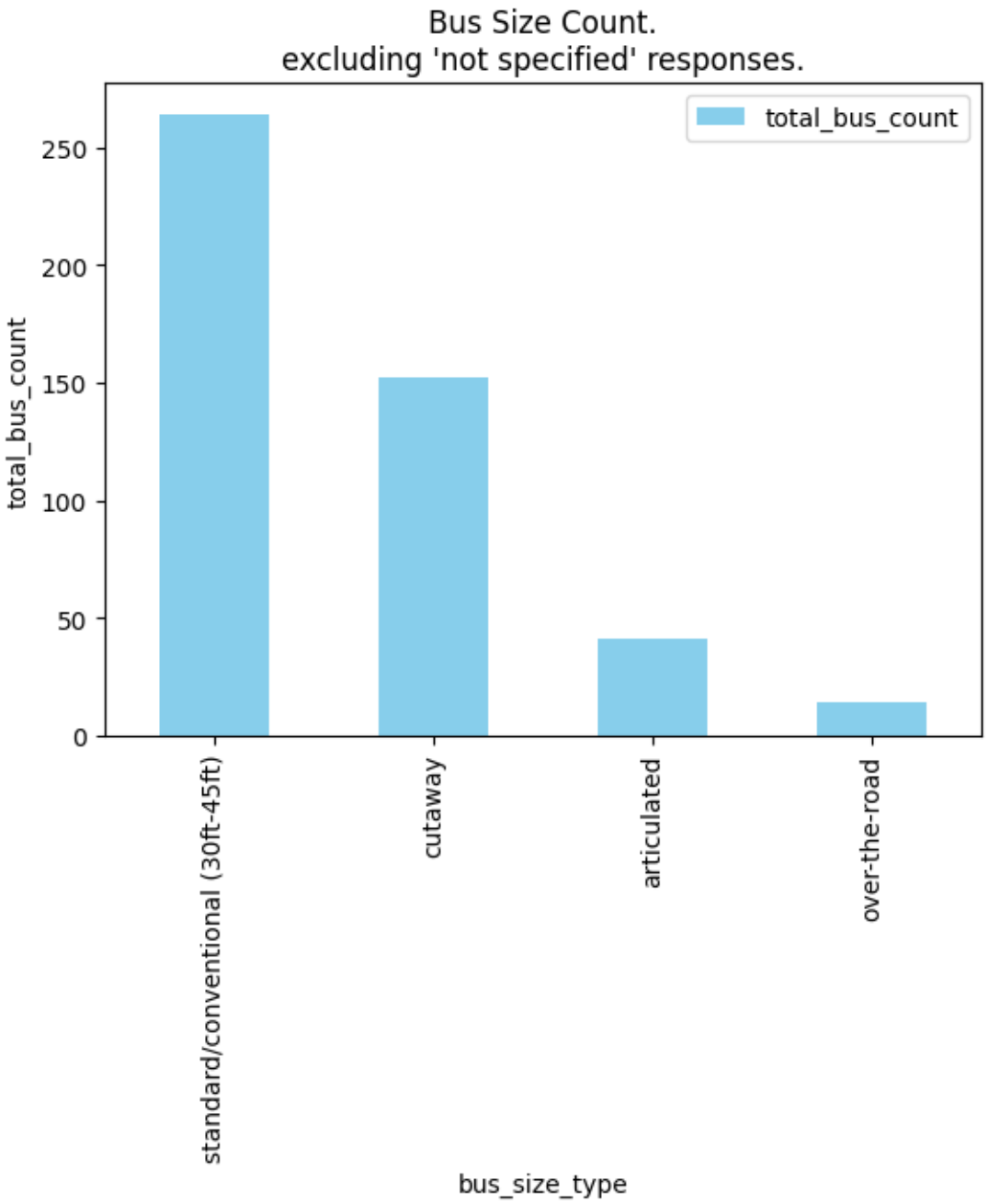


None

prop_type total_bus_count

8	not specified	325.0
1	CNG	252.0
0	BEB	163.0
5	low emission (hybrid)	145.0
9	zero-emission bus (not specified)	143.0
7	mix (zero and low emission)	125.0
2	FCEB	102.0
3	electric (not specified)	44.0
6	low emission (propane)	44.0
4	ethanol	9.0

2.7 What is the total bus counts compared to each bus size category?




```
None
```

	bus_size_type	total_bus_count
0	articulated	41.0
1	cutaway	152.0
2	not specified	881.0

```
3                       over-the-road             14.0
4  standard/conventional (30ft-45ft)            264.0
```

2.8 What is the breakdown of ZEB Propulsion Type and Bus Size Category?

```
                                                                bus_count  \
prop_type                          bus_size_type
BEB                                articulated                      12.0
                                   standard/conventional (30ft-45ft)     151.0
FCEB                               not specified                    29.0
                                   standard/conventional (30ft-45ft)     73.0
electric (not specified)           articulated                      29.0
                                   not specified                    15.0
zero-emission bus (not specified)  not specified                   143.0

                                                                total_cost ␣
 ↪\
prop_type                          bus_size_type
BEB                                articulated                    18759576
                                   standard/conventional (30ft-45ft)   148472913
FCEB                               not specified                    38070971
                                   standard/conventional (30ft-45ft)    82880364
electric (not specified)           articulated                      39478000
                                   not specified                    17200000
zero-emission bus (not specified)  not specified                   128156513

                                                                cost_per_bus
prop_type                          bus_size_type
BEB                                articulated                      1563298
                                   standard/conventional (30ft-45ft)       983264
FCEB                               not specified                    1312792
                                   standard/conventional (30ft-45ft)     1135347
electric (not specified)           articulated                      1361310
                                   not specified                    1146666
zero-emission bus (not specified)  not specified                    896199
```

2.9 Conclusion

Based on these findings, The average cost of a ZEB, throughout the US, is ~$1,000,000, roughly twice the price of a conventional, non-ZEB. The variance in cost depends mainly on the options the Trasnit Agencies chooses. Highly optioned/customized buses contribute to high cost. Unfortunately, analyzing the cost of configuable options is outside the scope of data provided.