

Senate Bill 671 Workgroup



Friday, December 9, 2022
10:00 am – 11:00 am
Via GoToWebinar

Agenda



- Update from the Otay Mesa Listening Session
- Overview of draft methodology for identifying the number of stations needed
- Information about February 9th in-person Freight Data and Modeling workgroup meeting

Update from the Otay Mesa Listening Session on November 30, 2022



Draft Methodology for Identifying Number of Stations Needed



Estimate Number of Vehicles

(EXAMPLE NUMBERS ONLY)

| Hydrogen Fuel Cell Electric Trucks | | | |
|------------------------------------|--------------------|-----------------------------------|-------------------------|
| CARB Vehicle Class Type | Number of Vehicles | Percent of Total that is Hydrogen | Total Hydrogen Vehicles |
| | 2024 | | |
| FCEV Class 4-7 (T6TS) | 3,647 | 10% | 365 |
| FCEV Class 4 | 709 | 10% | 71 |
| FCEV Class 5 | 940 | 10% | 94 |
| FCEV Class 6 | 1,569 | 10% | 157 |
| FCEV Class 7 | 588 | 30% | 176 |
| FCEV Class 8 | 1,733 | 30% | 520 |
| FCEV Class 7 Tractor Day Cab | 99 | 70% | 69 |
| FCEV Class 8 Tractor Day Cab | 653 | 70% | 457 |
| FCEV Class 8 Tractor Sleeper Cab + | 1,192 | 70% | 834 |

- Use CARB and/or CEC zero-emission vehicle estimates
- Enter a percent split between electric and hydrogen vehicles
- Create multiple scenarios

Estimate Total VMT

(EXAMPLE NUMBERS ONLY)

| Hydrogen Fuel Cell Electric Trucks | | | |
|------------------------------------|-------------------------|--------------------------------|---|
| CARB Vehicle Class Type | Total Hydrogen Vehicles | Average Annual Per Vehicle VMT | Average Total Annual VMT (total vehicles * ave annual VMT) |
| FCEV Class 4-7 (T6TS) | 365 | 26,840 | 9,787,356 |
| FCEV Class 4 | 71 | 26,840 | 1,902,486 |
| FCEV Class 5 | 94 | 26,840 | 2,523,398 |
| FCEV Class 6 | 157 | 26,840 | 4,211,290 |
| FCEV Class 7 | 176 | 52,865 | 9,323,957 |
| FCEV Class 8 | 520 | 52,865 | 27,486,728 |
| FCEV Class 7 Tractor Day Cab | 69 | 52,865 | 3,667,730 |
| FCEV Class 8 Tractor Day Cab | 457 | 118,610 | 54,191,170 |
| FCEV Class 8 Tractor Sleeper Cab + | 834 | 118,610 | 98,948,544 |

- For hydrogen, multiply average annual VMT per vehicle by total vehicles to get total VMT

| Hydrogen Fuel Cell Electric Trucks | | | | | | |
|------------------------------------|-------------------------|-------------------|--|--|---------------------------------------|--|
| CARB Vehicle Class Type | Total Hydrogen Vehicles | Efficiency (mpkg) | Average Total Annual VMT (total vehicles * ave annual VMT) | Average Annual Fuel Needed (kg of hydrogen) (efficiency / total VMT) | Average Station Capacity (kg per day) | Number of Stations Needed (ave annual fuel/250 operating days a year/average station capacity) |
| FCEV Class 8 Tractor Day Cab | 457 | 7 | 54,191,170 | 7,741,596 | 4,000 | 8 |
| FCEV Class 8 Tractor Sleeper Cab + | 834 | 7 | 98,948,544 | 14,135,506 | 4,000 | 14 |

Estimate Total Hydrogen Stations Needed (EXAMPLE NUMBERS ONLY)

- Estimate vehicle efficiency
- Divided total VMT by efficiency (like dividing VMT by miles-per-gallon to see how much gas is needed)
- Estimate station capacity
- Divide annual fuel needs by vehicle operating days and station capacity to get stations needed

Use CEC HEVI-LOAD Estimates for Battery Electric Chargers Needed

Table 27 - HEVI-LOAD Infrastructure Results for 112,000 BEVs in 2030 and 289,000 BEVs in 2035¹⁰⁵

| Charger Power Level | 2030 | | | 2035 | | |
|---------------------------|--------------------------------------|---------------------|-------------------|--------------------------------------|---------------------|-------------------|
| | Number Chargers (% Depot / % Public) | Charging Energy (%) | Charging Time (%) | Number Chargers (% Depot / % Public) | Charging Energy (%) | Charging Time (%) |
| 19; 25 kW | 9,509 (100 / 0) | 2.74 | 21.69 | 24,638 (100 / 0) | 2.29 | 19.94 |
| 50; 75 kW | 12,174 (87 / 13) | 7.56 | 37.45 | 31,529 (88 / 12) | 6.46 | 36.38 |
| 100; 150 kW | 33,558 (96 / 4) | 29.15 | 2.42 | 90,599 (97 / 3) | 27.34 | 2.85 |
| 225; 250; 300 kW | 12,257 (82 / 18) | 20.17 | 23.71 | 31,362 (85 / 15) | 19.10 | 24.40 |
| 350; 450; 500 kW | 9,882 (83 / 17) | 18.92 | 9.20 | 25,190 (86 / 14) | 18.19 | 10.10 |
| 750; 900; 1,000; 1,050 kW | 1,112 (0 / 100) | 7.77 | 5.46 | 2,499 (0 / 100) | 8.88 | 6.25 |
| 1,200; 1,400; 1,600 kW | 1,498 (0 / 100) | 13.69 | 0.07 | 3,809 (0 / 100) | 17.73 | 0.09 |
| Total | 79,990 (88 / 12) | 100 | 100 | 209,626 (90 / 10) | 100 | 100 |

Figure 29 shows the total statewide network requirements to support MD/HD BEVs from 2020 to 2037. By 2037, 346,000 MD/HD BEVs will need about 258,000 chargers of varying power levels. Charging power levels of 19 kW (11 percent of connectors), 50 kW (12 percent), 100 kW (22 percent), 150 kW (22 percent), 250 kW (11 percent), and 350 kW (11 percent) dominate the 2037 network.

Identify # of Depot & Public Chargers

(EXAMPLE NUMBERS ONLY)

2030

| Estimated Total Depot Chargers | | Estimated Total Public Chargers | |
|--------------------------------|-----|---------------------------------|-----|
| 10,050.74 | 82% | 2,206.26 | 18 |
| 8,202.06 | 83% | 1,679.94 | 17 |
| - | 0% | 1,112.00 | 100 |
| - | 0% | 1,498.00 | 100 |
| 18,252.80 | | 6,496.20 | |

Multiply total chargers by CEC percents of depot and public chargers to get number of depot chargers and number of public chargers

Estimate Number of Battery Electric Stations

(EXAMPLE NUMBERS ONLY)

| 2030 | | | | | |
|---------------------------------------|-----|--------------------------------|---------------------------------|------|---------------------------------|
| Estimated Total Depot Chargers | | Estimated Total Depot Stations | Estimated Total Public Chargers | | Estimated Total Public Stations |
| 10,050.74 | 82% | 670.05 | 2,206.26 | 18% | 367.71 |
| 8,202.06 | 83% | 546.80 | 1,679.94 | 17% | 279.99 |
| - | 0% | - | 1,112.00 | 100% | 185.33 |
| - | 0% | - | 1,498.00 | 100% | 249.67 |
| 18,252.80 | | 1,216.85 | 6,496.20 | | 1,082.70 |
| | | | | | 2,300 |
| Estimated chargers for public station | | | 6 | | |
| Estimated chargers for depot charging | | | 15 | | |

- Estimate average number of chargers at depot stations and public stations
- Divide total chargers by chargers per station to get number of stations

February In-Person Freight Data and Modeling Workgroup Meeting

February 9, 2023 @ California
Department of Public Health





Next Meeting: January 13, 2022





Thank you!