

Appendix G: Electricity Cost Calculations

Battery-Electric CHE Annual Fuel Cost Calculation

Annual fuel costs for each battery-electric CHE type are calculated using the following equation:

$$\text{Fuel Price (\$ per year)} = \text{Electric charging demand (kW)} \times \text{charging hours per year (h)} \times \text{Electricity rate } \left(\frac{\$}{\text{kWh}} \right)$$

Where,

$$\text{Charging hours per year (h)} = \frac{\text{CHE annual activity (h)}}{\text{Electrical equipment durability (h)}} \times \text{Charging time (h)}$$

- Electric charging demand (kW) values are from the Dynamic Energy Forecasting Tool (DEFT).¹
- Charging hours per year (h) are calculated based on CHE annual activity and electrical equipment durability and charging time.
- CHE annual activity is from the CARB inventory.²
- Electrical equipment durability and charging time are from DEFT.
- According to the 2024 California Energy Commission (CEC) Integrated Energy Policy Report, the statewide average electricity rate will stabilize at around \$0.27/kWh from 2025 going forward for commercial uses.³ For this analysis, an electricity rate of \$0.27/kWh is applied.

Fuel costs for each diesel-powered CHE type are calculated using the following equation:

$$\text{Fuel price (\$ per year)} = \text{fuel efficiency } \left(\frac{\text{Gallon}}{\text{h}} \right) \times \text{operating hours per year (h)} \times \text{Diesel costs } \left(\frac{\$}{\text{Gallon}} \right)$$

¹ EPRI, "2023 Technical Report: Zero-Emission Planning and Grid Assessment for the Port of Los Angeles," June 29, 2023. <https://www.epri.com/research/products/000000003002025783>.

² CARB, "2022 Cargo Handling Equipment Emissions Inventory," December 2022. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022%20CHE%20Emission%20Inventory%20Document_6April2023.pdf.

³ CEC, "2024 Integrated Energy Policy Report Update," October 2025. <https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2024-integrated-energy-policy-report-update>.

Operating hours per year are from the CARB CHE inventory.⁴ Diesel costs are derived from the CEC IEPR and adjusted for red-dyed diesel pricing by excluding taxes applicable to on-road diesel, resulting in a cost of \$4.13 per gallon for the year 2025.⁵ Some terminal operators who negotiate prices for diesel purchased in bulk reported paying approximately \$3.00 per gallon. Staff cannot confirm whether all seaport terminals and intermodal railyards receive the same fuel pricing as these operators. Therefore, diesel fuel costs are presented as a range of \$3.00 to \$4.13 per gallon. This range is intended to represent the variability in diesel procurement practices across facilities, without attributing specific pricing to any individual operator.

Grid-Electric CHE Annual Fuel Cost Calculation

Annual fuel costs for each grid-electric CHE type are calculated using the following equation:

$$\text{Fuel Price (\$ per year)} = \text{Electric charging demand (kW)} \times \text{charging hours per year (h)} \times \text{Electricity rate } \left(\frac{\$}{\text{kWh}} \right)$$

Where,

$$\text{Charging hours per year (h)} = \text{CHE annual activity (h)}$$

- The electric charging demand (kW) is sourced from DEFT.⁶
- Since grid-electric CHE is plugged in during operation, charging hours per year (h) are the same as the annual activity.
- CHE annual activity is derived from the CARB inventory.⁷
- The same electricity rate used in the battery-electric CHE cost calculations is applied.

Fuel cost calculations for diesel-powered CHE are also the same as in the battery-electric CHE cost calculations.

⁴ CARB, "2022 Cargo Handling Equipment Emissions Inventory," 2022.

https://ww2.arb.ca.gov/sites/default/files/2023-04/2022%20CHE%20Emission%20Inventory%20Document_6April2023.pdf.

⁵ CEC, "2024 Integrated Energy Policy Report Update," October 2025. <https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2024-integrated-energy-policy-report-update>.

⁶ EPRI, "2023 Technical Report: Zero-Emission Planning and Grid Assessment for the Port of Los Angeles," June 29, 2023. <https://www.epri.com/research/products/000000003002025783>.

⁷ CARB, "2022 Cargo Handling Equipment Emissions Inventory," December 2022. Accessed January 22, 2025. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022%20CHE%20Emission%20Inventory%20Document_6April2023.pdf.