

The road to net zero for a 1,000-truck fleet

	RNG	Battery Electric	H2 Fuel Cell
Carbon intensity (CI) A uniform way to compare the total lifecycle of transportation fuels, measured in gCO ₂ e/MJ	-320.25 Average CI for dairy RNG A negative CI value means that more greenhouse gas emissions are avoided than generated.	15.2 Emissions are from the California power grid to charge batteries	10.51 Hydrogen made via electrolysis using 100% renewable electricity and the California power grid
Percentage of fleet Percentage of fleet to be replaced in order to reach or approach net-zero lifecycle fuel emissions	22% Switching only 22% of the fleet to RNG avoids the same amount of emissions as are generated by the remaining diesel trucks.	100% The entire 1,000-truck fleet must transition to battery electric to approach net zero.	100% The entire 1,000-truck fleet must transition to hydrogen fuel cell to approach net zero.
CAPEX Capital investment needed for truck replacements to reach or approach net-zero lifecycle fuel emissions	\$46M	\$478M	\$717M
Cost per metric ton reduced	\$212.03	\$2,317.91	\$3,372.76
Transitional time Number of years it takes to reach or approach net zero, investing the same amount of \$46M per year	1 year	11 years	16 years
Emissions generated during transition period Metric tons of CO ₂ e generated during the time it takes to reach or approach net-zero lifecycle emissions	0	1,084,346	1,611,612
Annual emissions after transition Metric tons of CO ₂ e generated yearly once the fleet transition is completed	-414	10,347 Battery electric never fully reaches net-zero lifecycle emissions unless the grid is 100% renewable.	3,983 Hydrogen never fully reaches net-zero lifecycle emissions unless the grid is 100% renewable.
Land required for solar panels Square miles needed to provide 100% renewable electricity for a 1,000-truck fleet	N/A	469 That's the size of the City of Los Angeles.	1,409 That's 5x the size of New York City.

Assumes Battery Electric and Fuel-Cell trucks achieve the same duty cycle as RNG trucks with a one-for-one replacement of diesel trucks

CAPEX is plus fueling infrastructure and grid upgrades. Grid costs estimated at \$25 per \$1 of charging infrastructure (from UBS Electric Grid Summit)

CI scores are from California Air Resources Board, "Current Fuel Pathways" as of May 2021

Vehicle truck prices are from research by Craig Hallum

Lifecycle emissions based on California carbon accounting



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