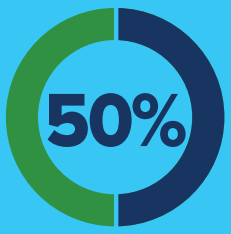
Next Generation Heavy-Duty Natural Gas Engines Fueled by Renewable Natural Gas

The Critical Need to Transform Heavy-Duty Transportation Emissions

Nearly 40% of Americans live in areas that are out of compliance with federally mandated standards for healthy air—9 out of 10 of the nation's most ozone-polluted counties are in California. Living in areas with poor air quality increases the risk of asthma, lung cancer, heart disease, and premature death.

HDVs contribute approximately 50% of America's smog-precursor emissions and 20% of transportation-related GHG emissions. Air quality regulators, including the California Air Resources Board (CARB) and South Coast Air Quality Management District have stated that getting to healthy air will require the immediate deployment of HDVs that meet CARB's lowest-tier optional low-NOx emission standard (0.02 g/bhp-hr NOx).

125 Million
Americans live in areas with unhealthy air quality



of smog-precursor emissions
are from on-road HDVs

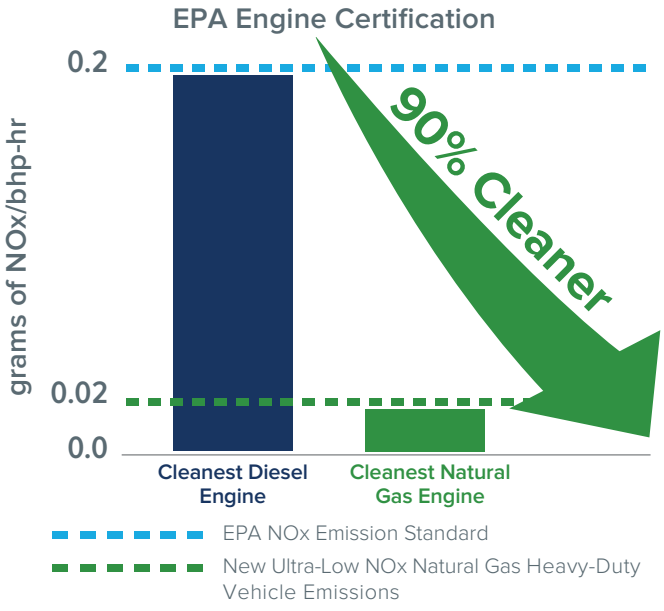
The Cleanest Available HD Engine Technology

Cummins Westport's 8.9 liter ISL G NZ engine is the world's first heavy-duty engine certified to meet CARB's lowest-tier optional low-NOx emission standard of 0.02 g/bhp-hr NOx. The company will have its near-zero 11.9 liter / 400 HP engine available in early 2018 (the ISX12 G NZ).

An on-road HDV with this ultra-low NOx natural gas engine is:

90% Cleaner
than the EPA's current HD NOx emission standard

HD BEV Equivalent
based on comparing NOx emissions associated with HD BEV charging (even in states like CA, OR, and WA, that have the cleanest electrical grids in the nation)



Learn more by visiting www.ngvgamechanger.com

The Lowest Carbon Intensity Fuel

Renewable natural gas (RNG) is an ultra-low-carbon fuel produced by harnessing methane emitted from landfills, wastewater treatment plants, and other organic waste streams.

Key benefits of RNG as a transportation fuel include:

40-125% GHG Reductions
(varies by feedstock)

Fully Interchangeable
with fossil natural gas

Economic Development
and job creation throughout California

Carbon Intensity Rating of Key Transportation Fuels

Transportation Fuel	EER-Adjusted Carbon Intensity
Diesel (conventional)	102.01
Natural gas (conventional)	88.60
Hydrogen (from natural gas)	55.61
Electricity (California grid)	38.95
RNG - Landfill gas	33.89 to 65.64
RNG - Wastewater biogas	8.61 to 34.36
RNG - Food/green waste biogas	-25.48
RNG – Dairy biogas (prospective)	-303.30

Source: www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm, CARB, February 2017. Adjusted for heavy-duty truck applications.

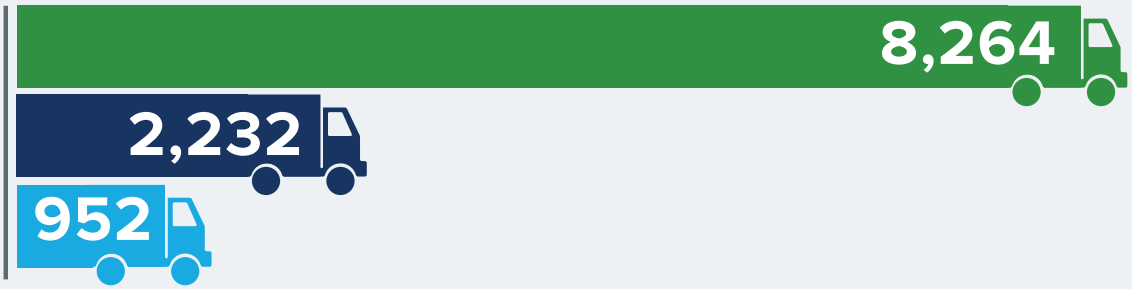
The Most Cost-Effective Path to NOx and GHG Reductions

There are three types of fuel-technology HDV platforms that can achieve zero or near-zero emissions; however, Ultra-Low NOx HD NGVs fueled by RNG are the only fully commercial option available today. The graphs below show the impacts of a hypothetical investment of $500 million in government incentive funds in these three technology/fuel pathways.

Number of Trucks Incentivized

4x more
than battery-electric trucks

9x more
than fuel cell trucks

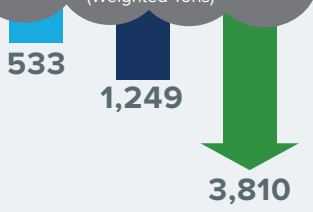


Ultra-Low NOx HD NGVs + RNG (100% Landfill Gas)

Electric Drive System + Battery Power (California Grid Mix)

Electric Drive System + Hydrogen Fuel Cell (33% renewable H2)

Criteria Pollutant Reductions vs Baseline Diesel
(Weighted Tons)

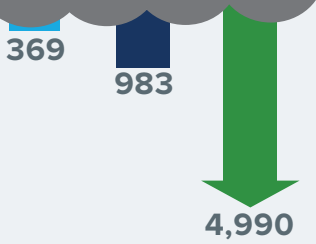


3x more
than battery-electric trucks

8x more
than fuel cell trucks

Calculations are based on emissions and vehicle activity data from CARB EMFAC 2014. Weighted emissions = NOx + 20*PM10 = ROG.

WTW GHG Reductions vs Baseline Diesel
(Thousand MT CO2e)



5x more
than battery-electric trucks

14x more
than fuel cell trucks

GHG emissions are based on illustrative fuel pathways calculated by CARB Staff using CA-GREET 2.0.

Incentive amounts are based on the incremental purchase cost of advanced HD short haul trucks over a baseline diesel truck. The cost effectiveness calculation uses Moyer program capital recovery factors based on typical retention period of first owner.

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