



Natural Gas Vehicles for America

Natural Gas is the #1 Alternative Fuel Option for Passenger Transport... 5 Things to Know

Busworld Academy * January 13, 2020 * Omaha, NE





#1 – Natural Gas is the Real World Alt Fuel Workhorse for Every Passenger Transport Application

Proven. Tested. Deployed.

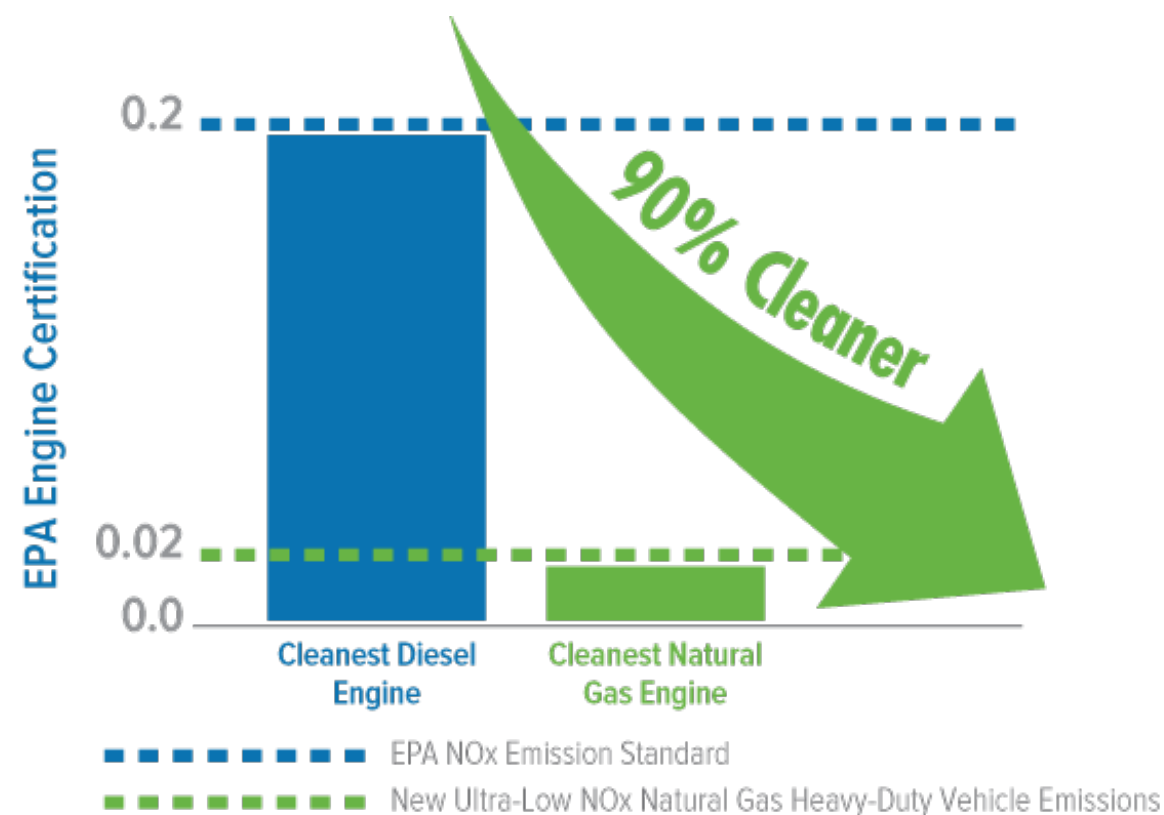




#2 - The cleanest heavy-duty truck engine in the world is powered by natural gas

» And natural gas produces lower NOx emissions in decreased duty cycles. (i.e., slower speeds, idling, stop-and-go traffic):

- **0.01 g/bhp-hr result for NGVs vs. 5x higher for diesel**, *UC Riverside Study at CA Ports, November 2016*
- **7x higher in urban settings for diesel**, *International Council on Clean Transportation (ICCT) Study of Line Haul Trucking, November 2019*

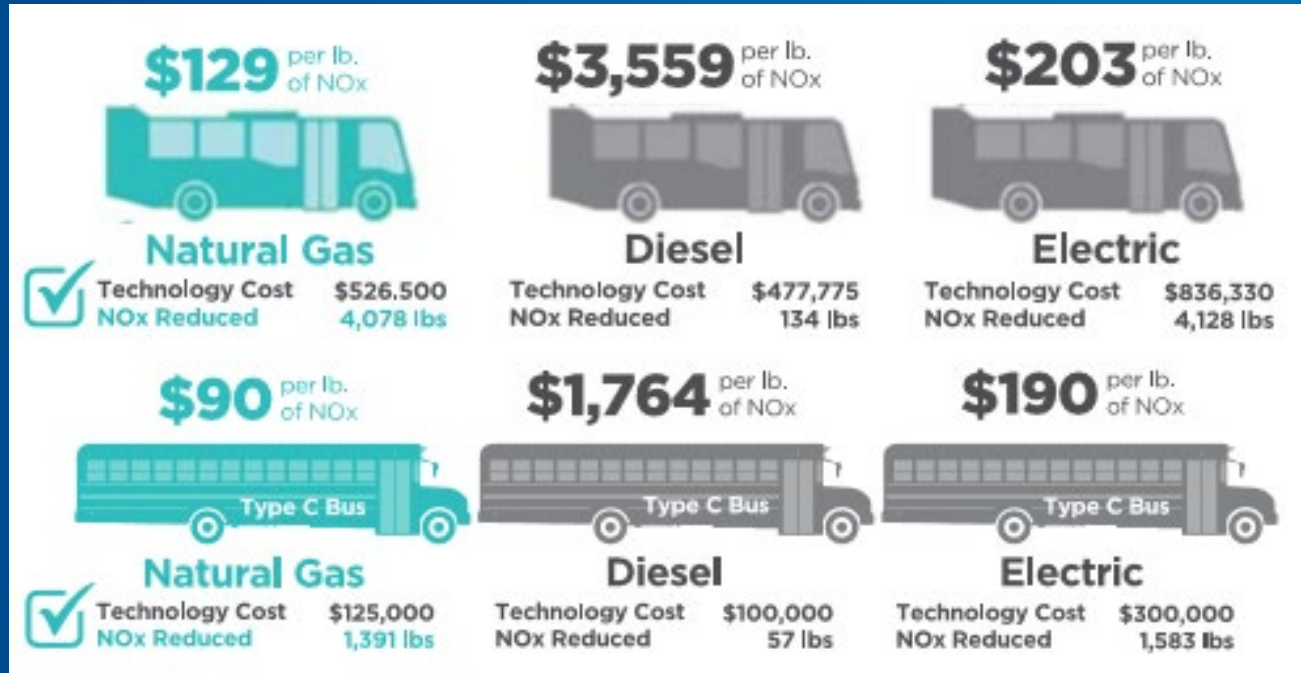


Every Cummins Westport Ultra-Low NOx engine (11.9, 8.9, 6.7 Liters) is certified by the EPA and CARB to a 0.02 g/bhp-hr standard, which is:

- 90% cleaner than the EPA's current NOx standard
- 90% cleaner than the cleanest diesel engine

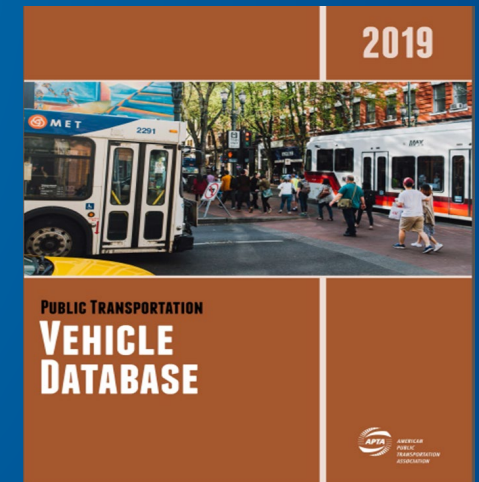


#3 - NG Buses Deliver the Largest & Most Cost-Effective NOx Emissions Reductions



Source: Emission comparisons are based on results using Argonne National Laboratory's HDVEC tool (<https://afleet-web.es.anl.gov/hdv-emissions-calculator/>) and include modeling of new low-NOx natural gas engines and the diesel in-use emissions option.

Combined Percentages - 2019				
Includes Bus, Commuter Bus and Rapid Transit				
	Existing	Built in 2018	Ordered	Potential
NG Total	10724	778	689	578
All Bus Total	38778	2104	2500	2122
NG %	28%	37%	28%	27%



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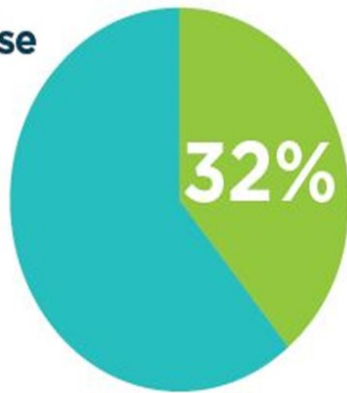


#4 - RNG is the most sustainable transportation fuel available today

2018 NGV Fuel Use

In 2018, **32%**, of all on-road fuel used in natural gas vehicles was RNG

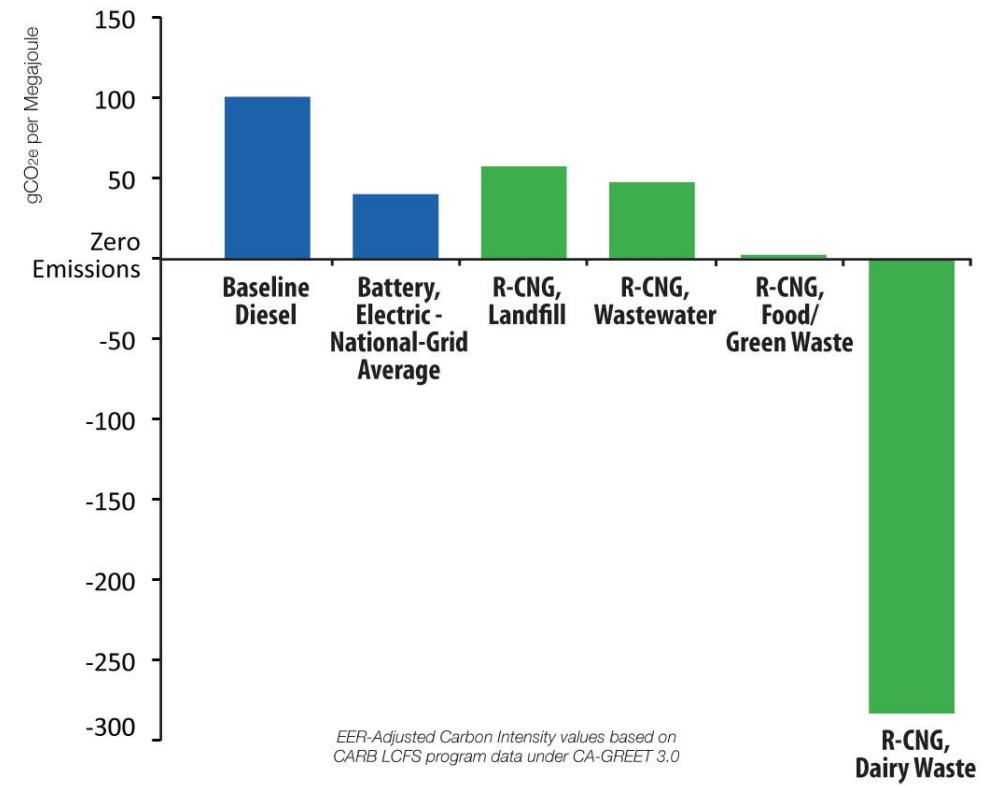
- Total NGV Fuel Use
645 Million GGE
- RNG Component
204 Million GGE



Electric vs. Diesel vs. RNG: Carbon Intensity of Transportation Fuels



RNG offers significant reductions in carbon intensity



Source: EER Carbon-Intensity values based on CARB LCFS program data under CA-GREET 3.0



#5 – Natural Gas is Poised to Make Out Well in EPA's Upcoming Cleaner Trucks Initiative

Stricter New Federal HD Emissions Are Coming



U.S. EPA

@EPA



The Cleaner Trucks Initiative rulemaking will establish new, more stringent emission standards for NO_x & other pollutants for highway heavy-duty engines. EPA is seeking input from the public and interested stakeholders. More:

epa.gov/newsreleases/e...



"Through the Cleaner Trucks Initiative, we will modernize heavy-duty truck engines, improving their efficiency and reducing their emissions, which will lead to a healthier environment."

– EPA Administrator Andrew Wheeler



- To take effect starting 2027
- Possible credits for early compliance
- To include overhaul of testing protocols and certification requirements to address real world, in-use emissions
- Unlikely to require a full 90% reduction – from 0.2 to 0.02 g/bhp-hr standard
- Natural gas will continue to have sizable advantage

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Driving Down Emissions with Renewable Natural Gas



Proven natural gas vehicle is 90% cleaner than EPA standards. Fueling biomethane (RNG) improves even further. Waste captured and conditioned, yields ultra-carbon-neutral, or carbon-negative lifecycle.

2018 NGV Fuel Use

In 2018, 32%, of all on-road fuel used in natural gas vehicles was RNG.

Total NGV Fuel Use
645 MBtu GGE
RNG Component
204 MBtu GGE

Lowering greenhouse gas emissions equivalent to removing 1,539,565 gasoline passenger cars from our roads for one year.

Reducing CO₂ emissions equivalent to 815,950,377 gallons of gasoline or 712,313,451 gallons of diesel consumed.



Cleaner Air Starts with Cleaner Trucks



Heavy-duty trucks and buses are the #1 sources of urban emissions.

74%

3 out of 4 heavy-duty trucks on our roads today are not certified to EPA's latest NOx standard.

Source: DTT Analysis of 145 vehicles in Operation Data, December 2018

Go Carbon-Free with Renewable Natural Gas

When Renewable Natural Gas captured from agricultural, food, landfill or wastewater is used as transportation fuel, even greater CO₂ and greenhouse gas emission reductions are achieved, up to 125% lower than the cleanest diesel.

RNG is carbon-neutral, even carbon-negative. Up to -103.3 EER-Adjusted Carbon Intensity.

Source: California Air Resources Board, February 2017.

RNG Use is Growing Rapidly

32% of natural gas used in on-road transportation in 2018 was RNG, a 577% increase since 2014.

Source: Total Natural Gas in Transportation Pipeline Demand from U.S. EIA's Annual Energy Outlook (2018). RNG numbers derived from U.S. EIA's RNG Importing.

Natural Gas is NOW

Heavy-Duty = Heavy Impact

Replacing 1 traditional diesel-burning heavy-duty truck with 1 new ultra Low-NOx natural gas heavy-duty truck is the emissions equivalent of removing 119 traditional combustion engine cars off our roads.

Source: <https://www.epa.gov/vehicles/cleaner-trucks>

Unlike trucks and buses, passenger vehicles sit idle 95% of the time.



The Cleanest Heavy-Duty Truck Engine in the World is Powered by Natural Gas

90% cleaner than EPA's current NOx emissions requirement, 90% cleaner than the cleanest diesel engine.

Source: U.S. Environmental Protection Agency and California Air Resources Board, 2018.

In real-life study, natural gas engines emitted lower NOx emissions than certified diesel engines emitted for more than their EPA certifications.

Source: University of California, Irvine testing of heavy-duty trucks in port applications, November 2018.

Natural Gas Makes Sense

Compared to expensive electric or fuel cell technologies still in development, investing in natural gas vehicles is the most cost-efficient solution, delivering more new vehicles and far more emission reductions than any other available alternative.

right here, right now, today.



Why wait? Get clean air and combat climate change today with natural gas vehicles. Learn more and view our introductory video at www.ngvamercia.org.

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WHY NGV? ENVIRONMENT VEHICLES FUEL POLICY OPPORTUNITIES



ENVIRONMENT

If we want cleaner air, we need cleaner vehicles.

Natural Gas Vehicles are 90% cleaner than the EPA's current NOx standard and emit up to 21% fewer GHG emissions than comparable gas and diesel vehicles. When fueling with Renewable Natural Gas, GHG emissions can be reduced up to 125%.

[Learn More](#)



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Your source for all NGV industry news & information

Daniel Gage

President

dgage@ngvamercia.org



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