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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

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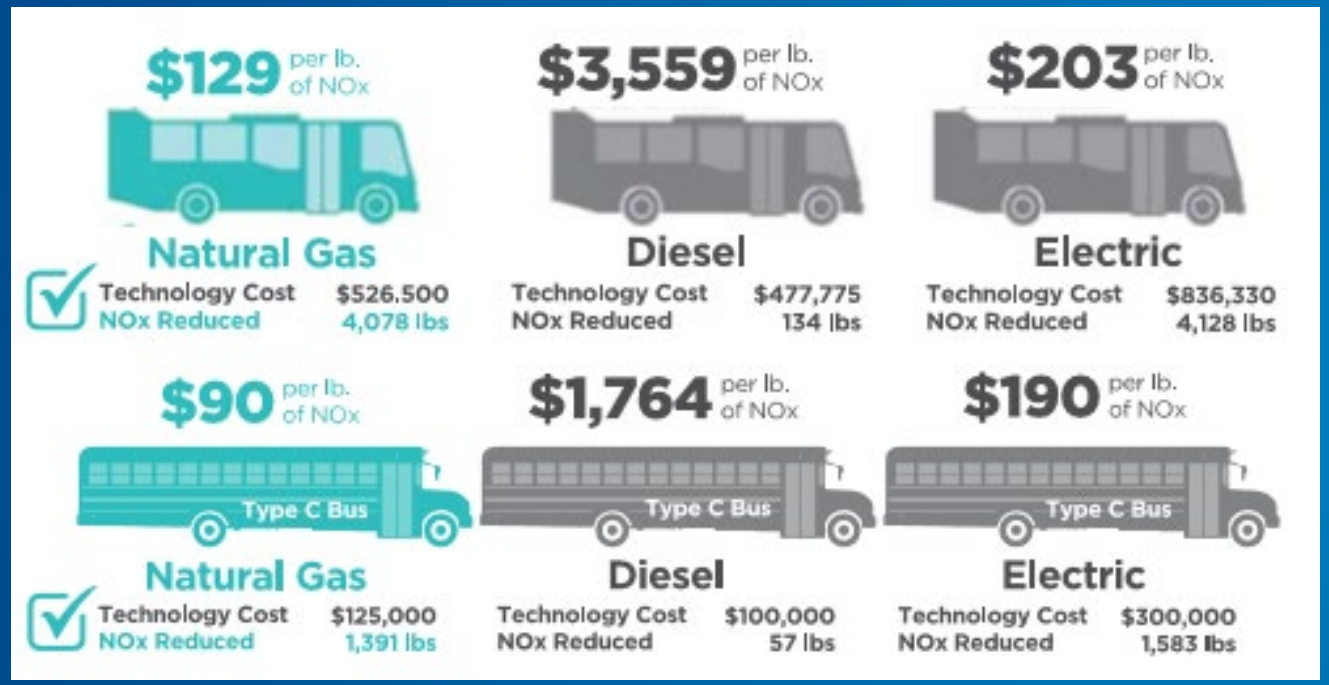
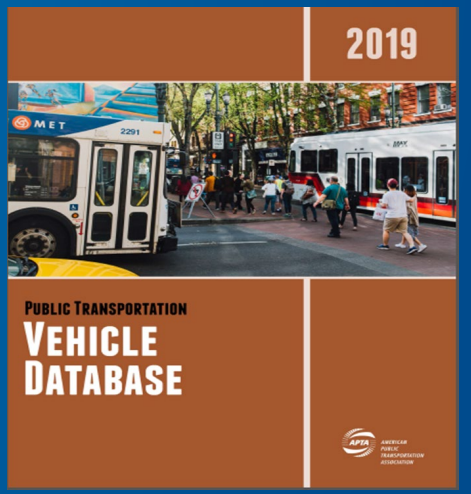
#3 - NG Buses Deliver the Largest & Most Cost-Effective NOx Emissions Reductions



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%

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.



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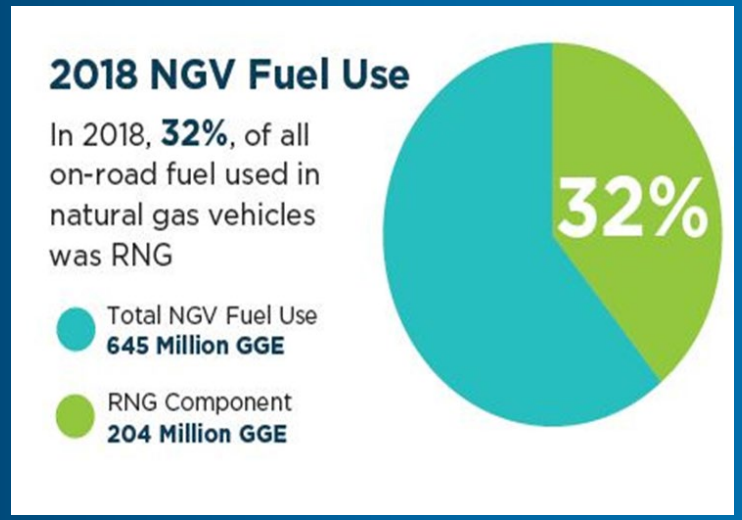
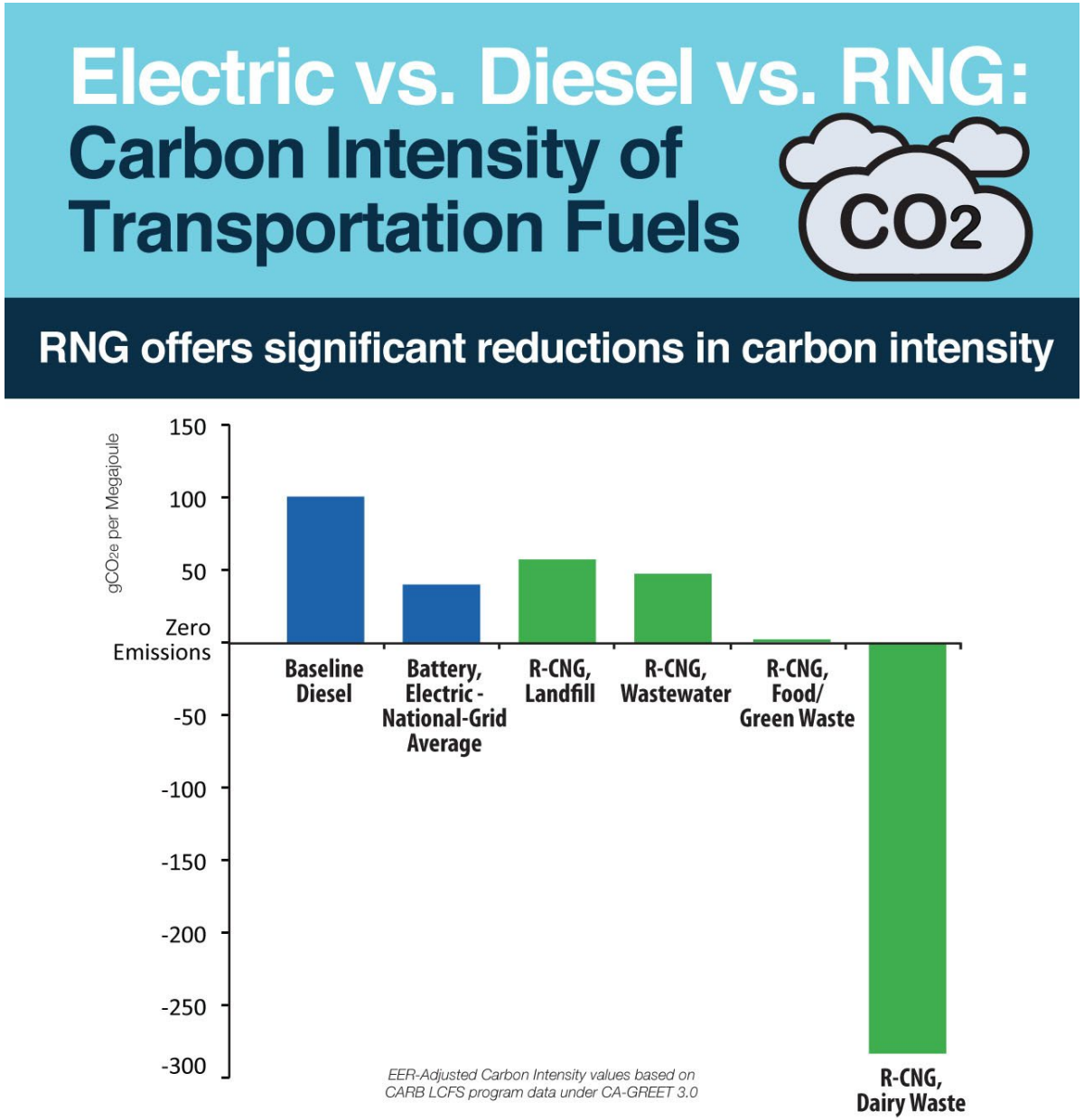
#4 - RNG is the most sustainable transportation fuel available today





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

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

Stricter New Federal HD Emissions Are Coming

- 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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