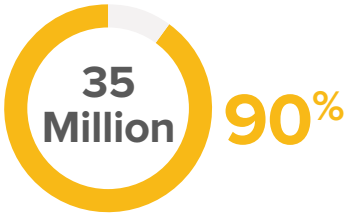
California Natural Gas Vehicle Partnership

California has the worst air pollution in the nation and diesel trucks are largely to blame.

Heavy-duty diesel trucks are the backbone of California's thriving goods movement economy, but they also deliver a lot of negative impacts to the state.

#1 Source of Urban Air Pollution & Growing Source of GHG Emissions

Largest single source of emissions:
- Oxides of nitrogen (NOx)
- Diesel particulate matter (DPM)
- Greenhouse gas (GHG)



The Majority of Californians Live With Smog & Unhealthy Air[1]

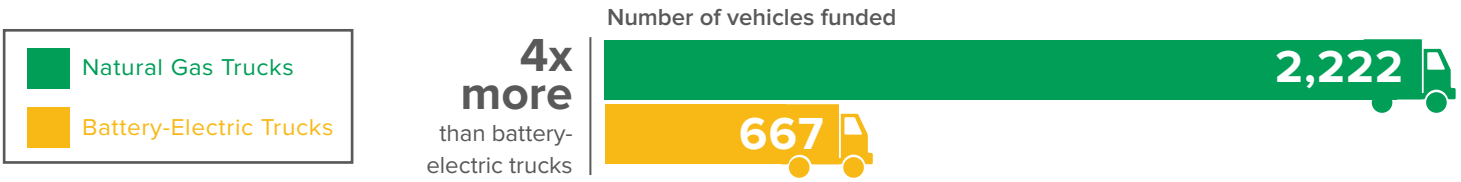
Contribute to a range of health issues:
- Respiratory issues (asthma, cancer)
- Heart disease
- Premature death

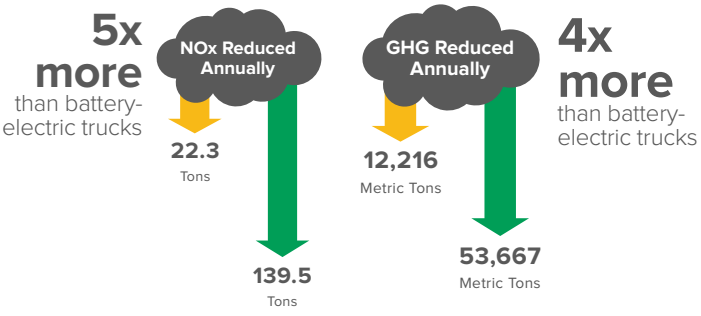
Fast Approaching Federal Deadlines to Achieve Healthy Air

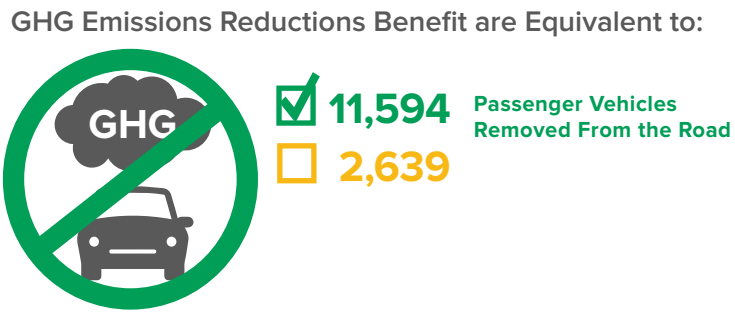
Failure to meet deadlines could lead to:
- Fines and penalties
- Withholding of billions of dollars of federal highway funds

What could we achieve with a $100 million investment?

Reducing diesel truck emissions is the only way that California can meet its clean air objectives. The state must find a way to get as many diesel trucks off the road as possible, and as quickly as possible, while ensuring industry can continue to thrive and grow the economy. The graphic below shows what a hypothetical $100 million government investment could achieve when using one of California's most popular funding programs (HVIP).[2]







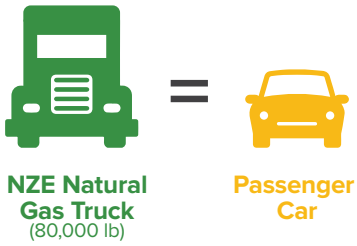
Key Takeaways

- ✓ Natural gas trucks are one of the best options to help California achieve clean air and climate change mitigation as quickly, effectively, and efficiently as possible.
- ✓ Prioritizing incentive funding to facilitate large volume deployments of clean transportation technologies that get the most "bang for the buck" is critical to meeting near term air quality goals and protecting human health.

Major Benefits of Natural Gas Trucks and Renewable Natural Gas (RNG)

1 Natural gas truck emissions are practically undetectable.

It's true that natural gas trucks still produce tailpipe emissions, but the most harmful emissions—the ones that immediately impact human health and the environment—are so low that they are called "near zero emission" trucks. These emissions from HD NGVs are in fact so low that they are comparable to the emissions that come out of the tailpipe of a typical light-duty gasoline car on the market today – a truly amazing feat for an 80,000 lb. truck!



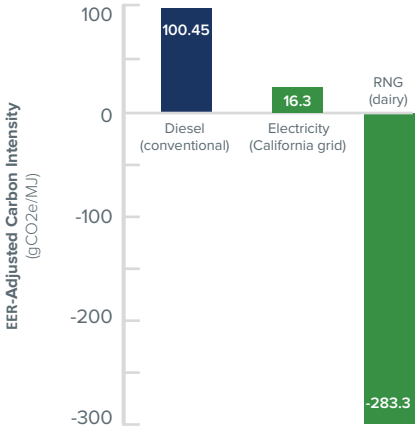
Equivalent NOx Emissions/Mile [6]

2 Using RNG enables fleets to go beyond carbon neutrality and save money.

The natural gas that fuels vehicles can be produced from a variety of renewable sources including wastewater treatment plants, food and green waste, landfills, dairies, and farms.

Producing natural gas from these renewable sources provides an unmatched opportunity to capture the methane – which is a greenhouse gas – that would have otherwise been emitted into the atmosphere through each source's natural decomposition cycle. By capturing this methane and using it to displace diesel fuel in a HD truck, RNG can have a "negative" carbon intensity (i.e., beyond carbon neutrality). A 2020 report from Lawrence Livermore National Labs found that for California to achieve its 2045 carbon neutrality goals, investments in carbon negative actions will be required[3]. RNG is readily available to achieve such actions, today.

Not only are fleets using low carbon RNG helping to immediately reduce large volumes of climate change gases, they are also able to further lower their fuel cost via the financial credits afforded under the federal RIN Program and California's LCFS Program.



3 The U.S. can produce large volumes of RNG.

More than 75% of natural gas used for transportation in California already comes from renewable sources[4]. The production of renewable natural gas (RNG) in California continues to grow significantly. Additionally, a recent study confirmed that the total amount of RNG available in the U.S. could ultimately offset 75% of all current diesel fuel used in the national transportation sector.[5]

The U.S. could replace <75% of diesel fuel used for transportation with RNG[4]

4 Natural gas trucks give us the ability to tackle air pollution in California today.

HD NGVs are commercially available **today** from 10 different major truck manufacturers—including Freightliner, Volvo, Kenworth, Mack, Peterbilt, and others. With these well-established brands also comes robust sales and service networks ready to support HD NGVs, especially in California where this clean air technology has been increasingly and successfully used for more than two decades.

Given HD NGV's widespread commercial availability, proven operations, and with the entire support ecosystem already in place, the continued scaling up deployments of this clean air technology can take place immediately – an extremely important issue when trying to reduce emissions as quickly as possible.

175,000+ HD NGVs
are in operation across the U.S.

[1] American Lung Association, 2019 State of the Air Report. https://www.lung.org/media/press-releases/20th-sota-ca
[2] This emissions analysis in based on:
- The California Air Resources Board's assumptions from their FY19-20 funding plan, including using the average carbon intensity of RNG consumed in California in 2016 based on LCFS data.
- 2018 Feasibility Assessment for Cargo-Handling Equipment, September 2019. https://www.gladstein.org/wp-content/uploads/2019/09/Final-CHE-Feasibility-Assessment_August-2019-Master.pdf
- California Air Resources Board, 2019-2020 Clean Transportation Incentives Funding Plan, Appendix A. https://ww2.arb.ca.gov/sites/default/files/2019-09/fy1920fundingplan-appa.pd

[3] Getting to Neutral: Options for Negative Carbon Emissions in California, January 2020. https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf
[4] Calculation based on California Air Resources Board 2018 Low Carbon Fuel Standard Data.
[5] American Gas Foundation, December 2019, Renewable Sources of Natural Gas: Supply & Emission Reduction Assessment Study. https://www.gasfoundation.org/wp-content/uploads/2019/12/AGA_3894-RNG-2-Pager_V-11.pdfs
[6] Based on testing conducted by the University of California at Riverside on a 12L NZ natural gas engine (https://ucrtoday.ucr.edu/wp-content/uploads/2018/08/CWI-LowNOx-12L-NG_v03.pdf) which showed NOx emissions ranging from 0.02 to 0.11 g/mi. By comparison, the average MY2020 passenger car has NOx emissions of 0.025 g/mi (per EMFAC 2017).