



Natural Gas Vehicles for America

400 North Capitol Street, N.W.  
Suite 450  
Washington, D.C. 20001  
ngvamerica.org

**Daniel Gage**  
President  
**dgage@ngvamerica.org**  
202.824.7397 office  
202.824.9166 fax

January 7, 2021

The Honorable Gavin Newsom  
Governor, State of California

The Honorable Jared Polis  
Governor, State of Colorado

The Honorable Ned Lamont  
Governor, State of Connecticut

The Honorable Muriel Bowser  
Mayor, District of Columbia

The Honorable David Ige  
Governor, State of Hawaii

The Honorable Janet Mills  
Governor, State of Maine

The Honorable Larry Hogan  
Governor, State of Maryland

The Honorable Charles D. Baker  
Governor, Commonwealth of MA

The Honorable Phil Murphy  
Governor, State of New Jersey

The Honorable Andrew Cuomo  
Governor, State of New York

The Honorable Roy Cooper  
Governor, State of North Carolina

The Honorable Kate Brown  
Governor, State of Oregon

The Honorable Tom Wolf  
Governor, Commonwealth of PA

The Honorable Gina M. Raimondo  
Governor, State of Rhode Island

The Honorable Phil Scott  
Governor, State of Vermont

The Honorable Jay Inslee  
Governor, State of Washington

**RE: Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding**

Dear Governors and Mayor:

Natural Gas Vehicles for America (NGVAmerica) and its members commend the Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding (MOU) Signatory States and the District of Columbia for their leadership and coordinated action to reduce greenhouse gases (GHG), nitrogen oxides (NOx), particulate matter (PM) and other toxic air emissions.

Your leadership on this issue is important because climate change is cumulative. The longer we wait, the harder it gets to solve. And your MOU recognizes the need to immediately employ the use of commercially available low-NOx natural gas vehicles today to achieve their proven steep emissions reductions while additional advanced technologies are developed, tested, and finally commercialized.

NGVAmerica is the national trade organization dedicated to the development of a growing, profitable, and sustainable market for vehicles and carriers powered by clean, affordable and abundant geologic or renewable natural gas (RNG). Our 200-plus member companies produce, distribute, and market natural gas and biomethane, manufacture and service natural gas vehicles, engines, and equipment, and operate fleets powered by clean-burning gaseous fuels across North America.

NGVAmerica endorses strategies that support the transition to low-carbon transportation fuels, including geologic natural gas and RNG. Converting your medium- and heavy-duty vehicle transportation network to natural gas provides a readily available, proven and cost-effective solution to accelerate the transition to a low-carbon transportation future. Further, cap-and-invest program resources dedicated to natural gas technologies would significantly and immediately benefit all communities by maximizing the displacement of older, higher emitting trucks and buses, including those higher emitting vehicles that operate in communities that are underserved by current transportation options and overburdened by urban pollution.

Increased use of natural gas as a transportation fuel provides immediate and significant criteria and toxic air pollutant reductions. The cleanest commercially available heavy-duty engines in the world are powered by natural gas now and for the foreseeable future. Designed, built, and manufactured in America by Cummins Westport, these engines are certified to a 0.02 g/bhp-hr. standard, achieving emissions performance that is 90 percent cleaner than the EPA's current NOx emissions requirement for the cleanest diesel engines. And in real-life studies, these engines have proven that their in-use emissions of NOx are actually lower than their EPA certification whereas diesel engines have been found to exceed their less stringent certification by up to 9 times at speeds under 35 miles per hour.<sup>1</sup>

Moreover, if RNG is used, life cycle GHG emissions from natural gas vehicles (NGVs) are reduced further producing the most carbon-negative Low Carbon Fuel Standard option (including electricity and hydrogen) per California's carbon intensity data (please see the "Make the Most Impact on Both GHG and NOx Emissions Reductions" section of the Appendix to this letter). And new NGV technologies continue to be developed such as the new hybrid compressed natural gas and electrified power train Class 8 trucks. Why settle for a ZEV tailpipe emissions goal when you could achieve a Net Zero life cycle and tailpipe emissions goal?

Fueling with RNG also reduces the issues of waste disposal and creates new economic development for energy created from wastewater treatment, landfills, animal waste and other methane sources and significantly improves air quality by reducing the amount of methane released. Please see the "Decarbonize Transportation" flyer regarding RNG for more information at the NGVAmerica website: <https://www.ngvamerica.org/wp-content/uploads/2020/04/NGV-RNG-Decarbonize-FINAL-April-2020.pdf>

Amazon, UPS, Waste Management, Republic Services, PepsiCo/Frito Lay, Anheuser-Busch, New York MTA, Los Angeles World Airports Buses, City of Los Angeles, City of Fresno Transit, LA Metro Transit, NY Centro, Denver International Airport, City of Fort Collins Transit, New York's Hunts Point fleet Industries and many other fleets recognize the exponential impact of using biomethane for emissions reductions, while improving their business' bottom line. See the reasons to use biomethane in the *Maximize Clean Transportation Investment* study at <https://www.ngvamerica.org/vehicles/transit/>.

The Multi-State MOU language rightly recognizes the need for low-NOx near-zero medium- and heavy-duty vehicles to be used now, as noted here:

*"Whereas, electrification of the transportation sector is essential to achieve the GHG emission reductions needed to avoid the worst effects of climate change, **and in conjunction with the introduction of low-NOx heavy duty trucks, to reduce harmful emissions of NOx, particulate matter, and toxic air contaminants that adversely impact public health;**"*

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<sup>1</sup> University of California, in-use testing of heavy-duty trucks in port applications, November 2016.

NGVAmerica fully agrees with the expressed imperative to deploy low-NOx heavy-duty trucks and offers that natural gas trucks, especially those using RNG must be a key component to any strategy if these reductions are to occur in any reasonable time frame to improve the areas of greatest need. Policies and programs that encourage and incentivize the adoption of low-NOx trucks in the near term are necessary to expedite the needed emissions reductions today.

California's Governor Newsom in issuing Executive Order N-79-20 regarding the state goal of 100% zero emission vehicles also indicated that the technology may not be ready for medium- and heavy-duty vehicles by 2045 and so included the words "where feasible" in multiple locations in the Order. One example follows: *"It shall be a further goal of the State that 100 percent of medium- and heavy-duty vehicles in the state be zero-emission by 2045 for all operations **where feasible**..."* It is highly likely that zero emission tailpipe vehicles will never be practical for all medium- and heavy-duty vehicles, but with RNG even hard to electrify medium- and heavy-duty vehicle applications can be net zero emission now if the focus goes beyond tailpipe emissions. The MOU should continue to include a role for natural gas low-NOx trucks, include a greater role for natural gas and other low-carbon fuels that deliver carbon-neutral or greater greenhouse gas reductions, and also with respect to the adoption of zero emission vehicles, recognize that this should only be pursued "where feasible."

Replacing just one traditional diesel-burning heavy-duty truck with one new ultra low-NOx natural gas truck is the emissions equivalent of removing 119 traditional combustion engine cars off our roads. Heavy-duty equals heavy impact. NGVs reduce the most NOx for each dollar spent as shown in the "Invest Impactfully – Emissions Reductions Using Cost-Effective Solutions" section in the Appendix to this letter – a Class 8 NGV Truck costs \$27 to reduce a pound of NOx while a Class 8 EV Truck costs \$51 to do the same (\$129 for a NGV Transit Bus and \$203 for an EV).

Your leadership in recognizing that there are several viable vehicle technologies to reduce emissions will go a long way toward ensuring that real progress is made toward accomplishing critical emissions reduction goals in the given time frames. Net Zero Emission Vehicles producing **Net Zero Now** and for the future is the responsible and visionary path to take and we encourage you to lead the way.

NGVAmerica welcomes the opportunity to provide further information and analysis on the environmental and economic benefits of natural gas vehicles. Please contact Jeff Clarke, NGVAmerica General Counsel & Regulatory Affairs Director at 202.824.7364 ([jclarke@NGVAmerica.org](mailto:jclarke@NGVAmerica.org)), or Sherrie Merrow, NGVAmerica State Government Affairs Director at 303.883.5121 ([smerrow@NGVAmerica.org](mailto:smerrow@NGVAmerica.org)) to set up a meeting and for additional information.

Sincerely,

Daniel J. Gage, President, **NGVAmerica**

Ashley Remillard, Vice President, Legal, **Agility Fuel Solutions**

Vince Tomasso, President, **Air & Gas Technologies, Inc.**

Grant Zimmerman, CEO, **Amp Americas**

Andrew West, CEO, **American Natural Gas, LLC**

Stuart Saulters, Vice President of Government Relations, **American Public Gas Association**

Jared Hightower, Vice President of Sales, **ANGI Energy Systems, LLC**

Bruce Winchester, Executive Director, **Canadian Natural Gas Vehicle Alliance**

Kevin, McCrackin, Vice President, Marlin Gas Services, Assistant Vice President, **Chesapeake Utilities**

Barry P. Carr, Executive Director, **Clean Communities of Central NY**

Mitchell W. Pratt, COO and Corporate Secretary, **Clean Energy Fuels**

Dr. Jeffrey Seisler, CEO, **Clean Fuels Consulting**

Anthony Muzzin, Manager of Business Development, **DTE Gas**

Peter Moreno, Business Development Manager, **Elizabethtown Gas**

Ronald J. Gulmi, Managing Director, **Emerald Alternative Energy Solutions, Inc.**

Colin Messer, President, **Energy Technology Training**

Reb Guthrie, Principal & Project Manager, **Fuel Solutions, Inc.**

Erik Neandross, CEO, **Gladstein, Neandross & Associates**

Brad Douville, President & CEO, **Greenlane Renewables**

Ted Barnes, P.E., **GTI**

Arthur Holbert, Senior Sales Manager, **Hanwha Advanced Materials**

Paul Shaffer, Executive Vice President, **Landi Renzo USA**

Michael Zimmerman, General Manager, **Momentum Fuel Technologies**

Alan Garcia, Senior Director, **NW Natural**

Rita Hansen, CEO, **Onboard Dynamics**

Scott Minton, Director of Business Development, **OnCue Marketing, LLC**

Douglas D. Olenick, Product Manager, CleanEnergy Fueling Products, **OPW Fueling Components, L.L.C.**

Craig E. White, President and Chief Executive Officer, **Philadelphia Gas Works**

Derrek Weaver, Executive Vice President, **Rush Enterprises**

Robert L. Russell, President, **Russell Energy Corporation**

Sam Thigpen, Chief Executive Officer, **Sapphire Gas Solutions**

Karel Kapoun, General Manager Renewable Natural Gas, **Shell Energy**

Rasha Prince, Director, Customer Energy Solutions, **SoCalGas**

Todd Gordon, Director, Business Development, **South Jersey Gas**

Norman Herrera, CEO, **Sparq Natural Gas, LLC**

Susan Shifflett, President, **Texas Natural Gas Vehicle Alliance**

Aaron Lay, Vice President, **TruStar Energy**

Abas Goodarzi, President, **US Hybrid**

Michael Kiely, President, U.S. Government Affairs, **UPS**

Scott Hanstedt, Director of Sales, **U.S. Gain, a division of U.S. Venture, Inc.**

Jim Arthurs, EVP, **Westport Fuel Systems**, Board Chair, NGVAmerica

Christopher B. Hanners, Sales Director, North American High Pressure, **Worthington Industries**

James Mora, President, **X3CNG Colorado LLC**

## APPENDIX

### **NGVAmerica Member Letter to States and DC on their Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding**

NGVAmerica endorses strategies that support the transition to low-carbon transportation fuels, including geologic and renewable natural gas (RNG). Converting medium- and heavy-duty vehicle transportation networks to natural gas provides a readily available, proven and cost-effective solution to accelerate the transition to a low-carbon transportation future. Further, cap-and-invest program resources dedicated to natural gas technologies would significantly and immediately benefit all communities by maximizing the displacement of older, higher emitting trucks and buses, including those higher emitting vehicles that operate in communities that are underserved by current transportation options and overburdened by urban pollution.

#### **Cleaner Air Starts with Cleaner Trucks and Buses**

Increased use of natural gas as a transportation fuel provides immediate and significant criteria and toxic air pollutant reductions. Fact: the cleanest commercially available heavy-duty engine in the world is powered by natural gas now and for the foreseeable future. Designed, built, and manufactured in America by Cummins Westport, this engine is certified to a 0.02 g/bhp-hr. standard, making it 90 percent cleaner than the EPA's current NO<sub>x</sub> emissions requirement and 90 percent cleaner than the cleanest diesel engine. And in real-life studies, these engines emitted lower NO<sub>x</sub> emissions than certified.<sup>2</sup>

Replacing just one traditional diesel-burning heavy-duty truck with one new ultra-low-NO<sub>x</sub> natural gas truck is the emissions equivalent of removing 119 traditional combustion engine cars off our roads. Heavy-duty equals heavy impact.

#### **Make the Most Impact on Both GHG and NO<sub>x</sub> Emissions Reductions**

Natural gas engines also offer significant climate change benefits. Compared to diesel, natural gas engines fueled with geologic natural gas reduce CO<sub>2</sub> and GHG emissions by up to 17 percent. When fueled with renewable natural gas (RNG or biomethane) captured from agricultural, food, landfill or wastewater feedstocks, even greater CO<sub>2</sub> and greenhouse gas benefits are achieved.

The Argonne National Lab's GREET model indicates that landfill RNG has 1,637 CO<sub>2</sub> equivalent g/GGE and geologic CNG has 8,767 CO<sub>2</sub> equivalent g/GGE, while U.S. average electricity generation for charging electric vehicles is 16,604 CO<sub>2</sub> equivalent g/GGE.

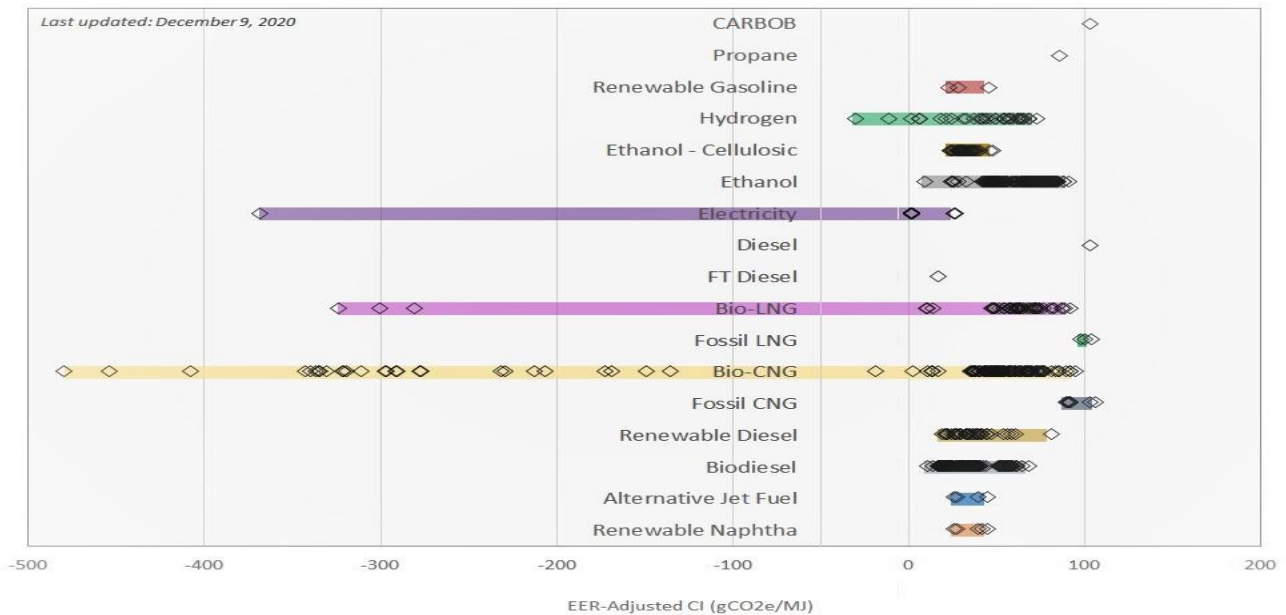
According to the California Air Resources Board (CARB) recently released Carbon Intensity (CI) scores for fuels, there are already four net zero emission vehicle (NZEV) types of fuel – renewable electricity, renewable hydrogen, renewable compressed natural gas and renewable liquefied natural gas. As can be seen in the chart below,<sup>3</sup> Natural gas-powered trucks and buses provide by far the best commercially available and deployable alternative fuel option for the heavy-duty sector.

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<sup>2</sup> University of California, in-use testing of heavy-duty trucks in port applications, November 2016.

<sup>3</sup> California Air Resources Board, December 9, 2020.

### Carbon Intensity Values of EER-Adjusted Certified Pathways (2020)



Near-zero engines are proven, cost-effective and available today for medium- and heavy-duty vehicles. Moreover, if RNG is used, life cycle greenhouse gas emissions from natural gas vehicles (NGVs) are reduced further. Fueling with RNG also creates new economic development for energy created from wastewater treatment, landfills, animal waste and other methane sources and significantly increases air quality by reducing the amount of methane released. Please also see the “Decarbonize Transportation” flyer regarding RNG at the NGV America website: <https://www.ngvamerica.org/wp-content/uploads/2020/04/NGV-RNG-Decarbonize-FINAL-April-2020.pdf>.

Further, investing state resources including funding biomethane technologies would significantly and immediately benefit all communities by maximizing the displacement of older, higher emitting trucks and buses, including those higher emitting vehicles that operate in communities that are underserved by current transportation options and overburdened by urban pollution.

### Address Noise Pollution

Natural gas vehicle technology affordably addresses noise pollution in urban neighborhoods. A U.S. Department of Energy study identified significant noise reduction benefits as a motivator for many refuse collection truck operators in accepting the technology, citing up to 10 decibels quieter than their diesel counterparts.<sup>4</sup> A 2016 in-use study of diesel and CNG urban transit buses in Serbia found considerable reductions in noise pollution when powered by CNG.<sup>5</sup>

### Invest Impactfully – Emissions Reductions using Cost-Effective Solutions

Investments in ultra low-NOx near-zero emission natural gas vehicle technologies greatly impact communities, especially the underserved and marginalized communities in metropolitan and industrial areas. With vehicle costs close to that of diesel and fuel price differentials of up to \$1.50 less than diesel

<sup>4</sup> U.S. Department of Energy, *Case Study – Compressed Natural Gas Refuse Fleets*, February 2014.

<sup>5</sup> Milojevic, Sasa, “CNG propulsion system for reducing noise of existing city buses,” *Journal of Applied Engineering Science*, January 2016.

per DGE, natural gas transportation provides the largest and most cost-effective reductions in transportation-related pollutants than any other powertrain option commercially available today or near term.<sup>6</sup>

The Argonne National Laboratory’s (ANL) AFLEET tool should be used to calculate vehicle / fuel type emissions since this tool has recently been updated to include current data on all vehicles and fuels including in-use emissions data. The chart below illustrates current cost and emissions calculations for four types of vehicles and three types of fuel/power using the AFLEET tool (Note: numbers in chart are rounded).

<b>Cost &amp; Emissions Calculations Using Current Data Factors</b>				
	<b>Class 8 Truck</b>	<b>Refuse Truck</b>	<b>Transit Bus</b>	<b>School Bus</b>
<b>Natural Gas</b>	<b>\$27 per lb of NOx</b> Vehicle Cost - \$150,000 NOx Reduced - 5582 lbs	<b>\$69 per lb of NOx</b> Vehicle Cost - \$300,000 NOx Reduced - 4375 lbs	<b>\$129 per lb of NOx</b> Vehicle Cost - \$526,500 NOx Reduced - 4078 lbs	<b>\$90 per lb of NOx</b> Vehicle Cost - \$125,000 NOx Reduced - 1391 lbs
<b>Diesel</b>	<b>\$58 per lb of NOx</b> Vehicle Cost - \$100,000 NOx Reduced - 1716 lbs	<b>\$496 per lb of NOx</b> Vehicle Cost - \$270,000 NOx Reduced - 544 lbs	<b>\$3559 per lb of NOx</b> Vehicle Cost - \$477,775 NOx Reduced - 134 lbs	<b>\$1764 per lb of NOx</b> Vehicle Cost - \$100,000 NOx Reduced - 57 lbs
<b>Electric</b>	<b>\$51 per lb of NOx</b> Vehicle Cost - \$290,000 NOx Reduced - 5715 lbs	<b>\$151 per lb of NOx</b> Vehicle Cost - \$670,000 NOx Reduced - 4423 lbs	<b>\$203 per lb of NOx</b> Vehicle Cost - \$836,330 NOx Reduced - 4128 lbs	<b>\$190 per lb of NOx</b> Vehicle Cost - \$300,000 NOx Reduced - 1583 lbs

By investing in affordable NGVs, communities and fleets can replace more dirty buses and trucks faster with cleaner alternatives, effectively achieving greater clean air and GHG emissions reductions and impacting more residents in frontline neighborhoods at a much lower cost than if focusing on ultra-expensive battery-electric technology that remains commercially-unavailable or scalable at the medium- and heavy-duty levels. Renewable natural gas is a ready-now solution.

Amazon, UPS, Waste Management, Republic Services, PepsiCo/Frito Lay, Anheuser-Busch, New York MTA, Los Angeles World Airports Buses, City of Los Angeles, City of Fresno Transit, LA Metro Transit, NY Centro, Denver International Airport, City of Fort Collins Transit, New York’s Hunts Point fleet Industries and many other fleets recognize the exponential impact of using biomethane for emissions reductions, while improving their business’ bottom line. See the reasons to use biomethane in the *Maximize Clean Transportation Investment* study at <https://www.ngvamerica.org/vehicles/transit/>.

For example, in May of 2019 UPS announced that it will purchase 170 million gallon equivalents over 7 years that will reduce GHG emissions by more than 1 million metric tons, and in October UPS announced the order of 6,000 heavy duty NGV RNG trucks to double the size of their NGV fleet. In February 2020, UPS increased its RNG commitment to a total of 250 million gallon equivalents over 7 years.

Meanwhile, Waste Management has converted approximately 9,000 of its 17,000 collection vehicles to natural gas, resulting in the largest heavy-duty natural gas truck fleet of its kind in North America. Over 40 percent of Waste Management’s natural gas fleet currently is fueled with RNG produced from landfill biogas, supporting its long-term strategy of creating a near-zero emissions collection fleet. More than 39 percent of all fuel consumed by NGVs in the U.S. today is RNG, and a growing number of fleets are taking advantage of vehicles that are available now at comparable life cycle costs to diesel vehicles and that provide transformational GHG and tailpipe emissions reductions.

<sup>6</sup> <https://www.ngvamerica.org/environment/>.

As such, investments in RNG-fueled trucks and transit buses servicing ports, cities, and densely populated neighborhoods are the most immediate and fiscally-responsible investment to clean our air and combat climate change. Communities get more clean vehicles having greater clean air and climate impact for the money with natural gas than with any other alternative fuel option, especially electric. No other transportation fuel is as sustainable, adaptive, and competitive across all applications and vehicle classes. And heavy-duty natural gas trucks are not demonstration science projects; they are proven, scalable, and on U.S. roads today. We will not meet emissions reduction goals or time frames without using natural gas.

### **Natural Gas Pays Its Way and Provides Economic Opportunity**

Natural gas fueling pays into the federal highway trust fund and is ready-right-now technology. It is road-tested and backed by a mature network of manufacturers, servicers, and suppliers coast-to-coast. An established refueling infrastructure of 2,000 stations already exists.

It is also important to note that while 34 U.S. states produce geologic natural gas, the potential to produce RNG exists in every U.S. state and the District of Columbia by taking the problem of fugitive methane gas created from organic waste, capturing it, then using it to fuel traditionally heavy-carbon freight and transit transportation applications. In addition to its clean air and climate benefits, the development of RNG facilities also supports the agriculture industry with new revenue streams, addresses many cities' solid waste issues, and impacts watershed management efforts and nitrogen runoff concerns. With these positives, the demand for RNG production is growing and new RNG facility development projects are increasing rapidly.

### **100% Domestic Fuels**

Geologic and renewable natural gas are 100 percent domestic fuels, unlike limited electric vehicle battery components that are controlled by foreign interests and mostly sourced from conflict countries like the Democratic Republic of the Congo and China. The U.S. EPA recognizes the value of RNG and includes it in the EPA Renewable Fuel Standard (RFS) federal incentive. Similarly, several states have implemented low carbon fuel standards (LCFS) that promote the use of RNG and other renewable fuels.

### **Reduce Emissions Now and in the Future**

Nearly five of every ten Americans live in communities with dangerously dirty air. According to the American Lung Association, that number continues to rise, from 125 million in 2017 to 150 million today.<sup>7</sup> Cap-and-invest program investments in natural gas vehicle technologies offer the most proven, cost-effective, and immediate way to promote a low-carbon transportation future, clean our air, and provide more affordable, accessible, and reliable transportation opportunities for marginalized and underserved communities.

The Multi-State MOU language clearly recognizes the need for low-NOx near-zero medium- and heavy-duty vehicles to be used now by saying:

***"Whereas, electrification of the transportation sector is essential to achieve the GHG emission reductions needed to avoid the worst effects of climate change, and in conjunction with the introduction of low-NOx heavy duty trucks, to reduce harmful emissions of NOx, particulate matter, and toxic air contaminants that adversely impact public health;"***

NGVAmerica fully agrees with this imperative for low-NOx engine use and offers that natural gas vehicles, especially those using RNG must be a key component to any strategy if these reductions are to occur in any

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<sup>7</sup> American Lung Association, *State of the Air Report*, April 2020.



reasonable time frame to improve the areas of greatest need. Policies and programs that encourage and incentivize the adoption of low-NOx trucks in the near term are necessary to expedite the needed emissions reductions today.

California's Governor Newsom in issuing his recent Executive Order N-79-20 regarding the state goal of 100% zero emission vehicles also indicated that the technology may not be ready for medium- and heavy-duty vehicles by 2045 and so included the words "where feasible" in multiple locations in the Order. One example follows: *"It shall be a further goal of the State that 100 percent of medium- and heavy-duty vehicles in the state be zero-emission by 2045 for all operations **where feasible**..."* It is highly likely that zero emission tailpipe vehicles will never be practical for all medium- and heavy-duty vehicles, but with RNG even hard to electrify medium- and heavy-duty vehicles can be net zero emission now if the focus goes beyond tailpipe emissions.