VNG®

484 Norristown Road - Suite 122
Blue Bell, PA 19422
Tel: 610.709.5500
Fax: 610.415.5585
www.vng.co

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Hon. John Shimkus
Chair, House Committee on Energy and Commerce – Subcommittee on Environment

Hon. Paul Tonko
Ranking Member, Committee on Energy and Commerce – Subcommittee on Environment

Comments by VNG
Regarding the March 7 Hearing to
Examine the Examine the Future of Transportation Fuels and Vehicles

Dear Reps. Shimkus and Tonko:

VNG.co LLC is a developer of compressed natural gas (CNG) fuel dispensing infrastructure for light- and medium-duty natural gas vehicles (NGVs). We applaud the Committee for devoting time to the important topic of transportation fuels and vehicles and we recommend natural gas and renewable natural gas (RNG) should be considered as important mainstream transportation fuels and NGVs recognized as unique vehicles which can help America improve our air quality and reduce our reliance upon petroleum based fuels.

NGVs are in some ways a much more mature and established compared to electric vehicles (EVs) and hydrogen fuel cell vehicles (HFCVs). There are over 22 million NGVs on the road globally, and, while only 150,000 are in the U.S., they are playing an increasingly prominent role in transit bus and refuse truck fleets in municipalities nationwide. However, it would be a mistake to assume that NGV technology hasn't improved significantly in recent years, or that there aren't significant untapped opportunities for further advancement. We therefore urge the Committee to include NGVs in its consideration of the future of transportation fuels and vehicles.

Renewable Natural Gas – A "Waste-to-Wheels" Emissions Game-Changer

Since 2013, there has been a dramatic transformation of the lifecycle emissions profile of NGVs due to the rapid adoption of RNG in the transportation sector. RNG, also known as biogas or biomethane, captures methane produced from a variety of sources including landfills, dairy and livestock operations, and wastewater treatment plants. Once impurities are removed, this methane can be used as a perfect substitute for fossil natural gas, including distribution in the existing natural gas pipeline system and use in NGVs.

Since methane is a powerful greenhouse gas, the use of RNG can achieve massive emission reductions on a CO2-equivalent basis when used as a transportation fuel. While lifecycle emissions can vary significantly depending on the pathway for RNG production, according to the most recent values for the California Low Carbon Fuel Standard (LCFS) it can yield emission cuts of between 50% and *400%*[1] - in other words, NGVs powered by RNG can be carbon *negative*, potentially yielding even greater emissions benefits than an electric vehicle powered entirely by solar or wind energy.

These emissions aren't a theoretical possibility. In fact, RNG fueling is increasingly the norm for NGVs thanks to the federal Renewable Fuel Standard (RFS) and the California Low Carbon Fuel Standard (LCFS). These programs have emerged as powerful economic drivers for RNG use in transportation, thanks to the reclassification of RNG as a cellulosic biofuel by EPA[2] as well as CARB's ranking of it as the lowest GHG fuel on the market. [3] Today, the value of these RFS and LCFS credits has made RNG commercially competitive with fossil natural gas.[4]

This economic driver has led to the very rapid increase in the production and sale of RNG fuel to the transportation sector – particularly in California, where fuel retailers can benefit from sales of both LCFS and RFS credits and where there are the largest number of NGVs and natural gas fueling stations. According to the RNG Coalition, over 60% of NGV fueling in California and 35% nationally comes from RNG.[5] With this trajectory of RNG growth, the emissions benefits of NGVs today are already at least as powerful as EVs and likely even greater.

Future NGV Technologies Promise Best Emissions Path for ICEs

Going beyond today's NGV technology, there is enormous untapped potential for natural gas to deliver even greater environmental and fuel economy benefits in the future. As the highest-octane, cleanest hydrocarbon fuel, natural gas has very favorable physical properties for unsurpassed performance from an internal combustion engine – if automakers are sufficiently incentivized to invest in developing this fuel to its full potential.

Natural gas has 130 octane, far beyond what gasoline – even ethanol-blended gasoline – can provide. In the "Advancing Technologies for America's Transportation Future" study, the National Petroleum Council projected that this could yield fuel economy up to double that of conventional vehicles when combined with direct injection technologies that fully utilize the properties of

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[1] CALIFORNIA AIR RESOURCES BOARD, LCFS Pathway Certified Carbon Intensities. Nov. 2017. https://www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm.
[2] "Renewable Fuel Pathways II Final Rule to Identify Additional Fuel Pathways under Renewable Fuel Standard Program Documents." ENVIRONMENTAL PROTECTION AGENCY. July 18, 2014. https://www.epa.gov/renewable-fuelstandard-program/renewable-fuel-pathways-ii-final-rule-identify-additional-fuel-0
[3] Staff Report, CALIFORNIA AIR RESOURCES BOARD, Proposed Re-Adoption of the California Low Carbon Fuel Standard (Dec. 2014), https://www.arb.ca.gov/regact/2015/lcfs2015/lcfs15isor.pdf
[4] *The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute*, UC DAVIS INSTITUTE OF TRANSPORTATION STUDIES, June 2016. https://www.arb.ca.gov/research/apr/past/13-307.pdf
[5] Patrick Couch, *RNG in California: More Than You Think*, FLEETS AND FUELS (Apr. 20, 2016), http://www.fleetsandfuels.com/fuels/cng/2016/04/rng-in-california-more-than-you-think/. [18] *Id.* [19] Alternative Motor Fuels Act of 1988, Public Law 100-494, 102 Stat. 2441.

CNG.[6] The leading CNG conversion company, Westport Innovations, is already investigating the potential for natural gas-fueled advanced powertrains that exploit these properties for pickup trucks, with a turbocharged direct injection platform that could reduce carbon emissions by at least 30%.[7]

The potential environmental benefits of CNG aren't limited to greenhouse gases. In 2015, Cummins Westport International (CWI) introduced a heavy-duty CNG engine that was the first engine of any kind to meet the California Air Resources Board (CARB) optional low-NOx emission standard of 0.02 g/bhp-hr NOx – 90% below the 2010 EPA certification level. [38] Owing to the inherently cleaner chemistry of natural gas compared to petroleum-based fuels, similar improvements in performance for NOx emissions could likely be achieved for light-duty vehicles given sufficient automaker interest and investment. While NOx emissions are much lower for gasoline-fueled vehicles compared to diesel vehicles, they are still significant, making this a major untapped opportunity to address smog-forming emissions on our roads.

"Bridge to Hydrogen" Needed More Than Ever

Since the earliest days of HFCV development, it has been recognized that there are numerous technical synergies between the development and commercialization of NGVs and HFCVs owing to the physical similarities between methane and hydrogen. In its 2012 light-duty vehicle rulemaking, EPA wrote that "CNG investments have the potential to facilitate the introduction of hydrogen FCVs in several respects," including innovations in advanced storage materials and tube trailer designs, improved designs for compressors and fuel dispensers, and on-site production of hydrogen from natural gas feedstock. VNG helped to lay out this rationale in a white paper, "NGVs: An Essential Bridge to Hydrogen," commissioned from the consultancy Energy Futures.[8]

As a CNG infrastructure developer, VNG is particularly aware that some of the strongest synergies between these fuels are in the area of fueling station development. Both CNG and hydrogen fueling stations require the same types of equipment, including compressors, high-pressure storage tanks, and gaseous fuel dispensers. Shared standards, equipment designs, production and operational economies of scale, and technology innovations in this area could simultaneously drive down costs for both fuels. The September 2014 report "Transitioning the Transportation Sector: Exploring the Intersection of Hydrogen Fuel Cell and Natural Gas Vehicles" by the Sandia National Laboratory[9] goes further, with a concept design for a combined hydrogen and natural gas fueling station that "could improve operational expenditures and also take advantage of common supply chains."

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[6] Report, NATIONAL PETROLEUM COUNCIL, *Advancing Technology for America's Transportation* (2012), http://www.npc.org/reports/trans.html.

[7] *Methane: The Performance Fuel*, WESTPORT INNOVATIONS (October 2015) https://cleancities.energy.gov/files/u/news_events/document/document_url/128/Brad_Douville___Westport_NGVTF_.pdf 38 *Game-Changer: Next Generation Heavy Duty Natural Gas Engines Fueled By Renewable Natural Gas*, GLADSTEIN, NEANDROSS AND ASSOCIATES (May 2016), http://ngvgamechanger.com/pdfs/GameChanger_FullReport.pdf

[8] *Natural Gas: An Essential Bridge to Hydrogen Fuel Cell Vehicles,* ENERGY FUTURES (2011) http://vng.co/wpcontent/uploads/2012/05/Natural-Gas-An-Essential-Bridge-To-Hydrogen-Fuel-Cell-Vehicles.pdf

[9] *Transitioning the Transportation Sector: Exploring the Intersection of Hydrogen Fuel Cell and Natural Gas Vehicles*, SANDIA NATIONAL LABORATORY (2014), https://energy.gov/sites/prod/files/2015/02/f19/2015-01_H2NG-ReportFINAL.pdf 41 *Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues*, NATIONAL RENEWABLE ENERGY LABORATORY (2013), http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/blending_h2_nat_gas_pipeline.pdf

Fuel production is another key synergy, particularly for the production of renewable hydrogen – a requirement for hydrogen fueling in California, the leading adopter of HFCVs. RNG is an ideal feedstock for renewable hydrogen production via steam methane reforming (SMR) technology, but the market for HFCVs is currently too small to drive widespread development of these resources. As discussed previously in these comments, RNG-fueled NGVs are building the market and growing demand for this ultra-low carbon renewable feedstock in the near term, ensuring sufficient supplies of RNG for renewable hydrogen production in the longer term.

The Importance of NGVs in the Current Market Context

These present and future advances in NGV technology and the ability to incorporate renewable fuels such as RNG are particularly important to consider in the context of an auto market that has also changed significantly in recent years. Low gasoline prices have encouraged U.S. consumers to gravitate towards the purchase of larger and less fuel-efficient vehicles. After the Great Recession of 2008 decimated all classes of vehicle sales as well as oil prices, light truck sales have rebounded much more strongly than passenger vehicles and are approaching all-time highs and a market share of over 60%.[4] And even if gasoline prices rise again, these large light duty vehicles will always account for a sizable part of the market due to their unique ability to meet specific consumer and business needs.

Unfortunately, EVs and HFCVs are almost exclusively an alternative for small cars, and are likely to be so for the foreseeable future. EVs face particular challenges in applications for light trucks and pickups due to the added cost and weight of the battery packs needed to move these larger vehicles, particularly those built for carrying or towing heavy loads. Indeed, there are very few electric light trucks on the market today and no pickups, and in its 2016 technical assessment EPA did not even consider the possibility of electric towing-capable vehicles within the 2025 timeframe.[10]

Pickup trucks are the best-selling vehicles in America, as well as the most important source of profits for the "Big Three" U.S. automakers. Thus, a cost-effective solution to their emissions and petroleum dependence is absolutely essential to ensuring that these companies, their hundreds of thousands of employees, and the millions of consumers and businesses that rely on pickup trucks are not unnecessarily harmed by the agencies' regulations.

Fortunately, and in contrast to electrification, NGVs are ideally suited to be a low-emission, non-petroleum alternative fuel for light trucks and pickups especially. Larger vehicle envelopes provide ample room for CNG storage tanks, and since natural gas offers far greater energy density than batteries, it is much better-suited for moving heavy vehicles. These characteristics are why natural gas has long been the clean fuel of choice for heavy-duty vehicles like transit buses and refuse trucks, and the same logic holds true for the heavier side of the light-duty vehicle spectrum.

Indeed, automakers have demonstrated that NGVs are already a viable commercial technology for pickups. All three U.S. automakers have offered either CNG-equipped or CNG-ready

[10] Draft TAR, supra note 2, at 4-40.

versions of their flagship full-size pickups, including GM's Chevy Silverado,[11] FCA's Dodge Ram,[12] and Ford's F150. In fact, in addition to being the best-selling vehicle of any model, the 2016 Ford F-150 was named Green Car Journal's "Green Car of the Year" in part due to the availability of a CNG prep package as an option.[13]

Ensuring a Portfolio of Future Transportation Fuels and Vehicles

NGVs should be on equal footing with EVs and HFCVs, considering they deliver similar or superior emissions benefits, have significant potential for further technology advancements, and are ready for deployment in high-impact market segments that EVs and HFCVs will not be able to address for years to come.

Unfortunately, current federal policies fail to meet this policy goal, across the board. For example, EPA regulations have undercut Congress's statutory incentives for NGVs and place them at a distinct disadvantage compared to EVs and HFCVs with respect to regulatory incentives. We have attached as Appendix "A" specific recommendations for correcting these regulatory shortcomings and to encourage the production of American Made NGVs.

We urge the Committee work to remedy these shortcomings, and we are eager to meet with policymakers in all parts of government to further this important discussion.

Sincerely,

Robert C. Atkinson
Chief Regulatory Officer
VNG.co
rcatkinson@vng.co
908-447-4201

[11] Brandon Turkus, *2015 Chevy Silverado HD gets CNG option*, AUTOBLOG (Feb. 6, 2014), http://www.autoblog.com/2014/02/06/2015-chevrolet-silverado-hd-cng-official/.
[12] Richard Truett, *Ram will expand lineup of CNG-powered trucks*, AUTOMOTIVE NEWS (Mar. 4, 2015), http://www.autonews.com/article/20150304/OEM05/150309913/ram-will-expand-lineup-of-cng-powered-trucks.
[13] *Fuel Efficiency, Alternative Fuels and Sustainability Earn Ford F-150 2016 Green Truck of the Year Award*, FORD MOTOR CO. (Nov. 19, 2015), https://media.ford.com/content/fordmedia/fna/us/en/news/2015/11/19/ford-f-150-earns2016-green-truck-of-the-year-award.html.

Appendix "A"
Regulatory Recommendations to Incentivize NGV Production

Improving natural gas vehicle (NGV) incentives can be accomplished through simple regulatory reforms. The reforms necessary to achieve this goal are straightforward and fully justified by the game-changing environmental benefits of NGV technology, including the use of renewable natural gas (RNG), the potential for high-efficiency engines, and synergies with hydrogen fuel cell vehicles. We recommend four actions:

- **Restore 0.15 Divisor:** NGV emissions calculations should return to the "0.15 divisor" effective immediately, with emissions calculated as 85% below a gasoline vehicle (as was the case before 2016). This is justified by the game-changing real-world emissions benefits of RNG, and is moreover harmonized with Congressionally-mandated incentives under the CAFE program.

  We recommend reinstating language from the MY 2011-2016 regulations under 40 C.F.R. § 600.510–12, Calculation of average fuel economy and average carbon-related exhaust emissions.

- **Remove Dual-Fuel Design Requirements:** EPA should remove the utility factor requirements for a 2:1 ratio of CNG-to-gasoline range, as well as the requirement for dual-fuel NGVs to only use gasoline when the CNG tank is empty. These unnecessary design requirements add cost and reduce the appeal of these vehicles to consumers, and analogous plug-in hybrid electric (PHEV) vehicles face no such requirements despite having far lower driving range on electricity (<40 miles) compared to the typical natural gas range of a dual-fuel NGV pickup (250+ miles).

  This could be achieved by deleting the requirements in 40 C.F.R. § 600.510–12, Calculation of average fuel economy and average carbon-related exhaust emissions, part (c)(2)(vii)(B) for fuel economy and (j)(2)(vii)(B) for emissions.

- **NGV Pickup Incentive:** EPA has recognized the unique challenges facing full-sized pickups, and natural gas could be the ideal low-emission platform for these vehicles. This could be encouraged by offering a "Natural Gas Pickup" incentive similar to current hybrid-electric and "performance-based" pickup incentives; however, for the natural gas pickup credit, minimum deployment thresholds (10% of all full-size pickups for existing credits) should be eliminated to reflect the greater market challenges faced by NGVs - since, unlike hybrids, they use an alternative fuel.

  This could be accomplished by inserting a new section (c) under 40 C.F.R. § 86.1870–12, CO2 credits for qualifying full-size pickup trucks, titled "Credits for implementation of natural gas technology." The structure of these credits would be similar to those for sections (a) and (b), but without requirements for the "required minimum percent of full size pickup trucks."

- **Recognize Retrofits:** Encouraging retrofits of older gasoline vehicles to run on CNG is slightly more complex, but offers a unique opportunity to reduce vehicle emissions throughout their useful life instead of just at the point of sale. EPA should allow certified converters to "opt in" to the program and generate credits for CNG retrofits and upfits, prorated in proportion to their remaining useful life. Retrofits could also be encouraged by providing credits for CNG "prep packages" that reduce the costs of subsequent conversion to natural gas, as part of the off-cycle credit technologies menu listed at *40 C.F.R. § 86.1869–12, CO2 credits for off-cycle CO2-reducing technologies.*