

Testimony
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Before the Senate Committee on Energy and Natural Resources
On “Opportunities and Challenges Associated with America’s Natural Gas
Resources”

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My name is Paul Kouroupas. I am the Vice President of Public Policy of VNG.CO (VNG), a start-up compressed natural gas refueling infrastructure company based in Bala Cynwd, Pennsylvania. VNG offers a nationwide retail CNG fueling program to support the widespread use of light-duty natural gas vehicles (NGVs). VNG will install, operate and maintain CNG fueling equipment, co-located within existing retail gasoline stations. VNG will initially deploy its compressed natural gas pumps to support fleets with CNG fueling services in the retail market and ultimately expand its deployment to support the mass-market consumer segment.

Summary

The purpose of the present hearing is to “explore opportunities and challenges associated with America’s natural gas resources.” By and large, the current discussion has focused on the benefits of low-cost natural gas for chemical and manufacturing companies, as well as the benefits (and potential costs) of allowing gas producers to export this resource overseas. While these opportunities are considerable and certainly merit discussion, this focus misses the greatest opportunity for natural gas to improve our economy, environment, and national security **while also benefitting American consumers directly**: the potential of natural gas to fuel light-duty vehicles on a mass-market basis, which could be our most potent weapon in the fight to eliminate U.S. dependence on foreign oil.

On behalf of VNG, I am pleased to share with the members of the Committee our company’s perspective on the unique benefits of using natural gas to fuel light-duty NGVs as well several minor regulatory changes that can unleash these benefits for the American economy.

- **NGVs provide *direct* benefits to consumers:** Development of the light-duty NGV market allows Americans to *directly* benefit from the shale revolution, instead of limiting direct benefits to manufacturers, trucking fleets, or exporters. With natural gas priced 40% below gasoline for a gallon equivalent, the average U.S. household that currently spends \$3,000 per year on gasoline could save \$1,200 per year on fuel costs with natural gas.

- **The greatest mass-market potential of any alternative fuel:** With over 15 million light-duty NGVs on the road worldwide, NGVs are an established technology, and the shale gas revolution gives America unprecedented potential to commercialize them on a mass-market basis. The National Petroleum Council of the U.S. Department of Energy last year released a comprehensive report analyzing alternative fuels and concluded that NGVs have the potential to achieve 17% of new light-duty vehicle sales by 2020 – far higher than other alternatives, which face significant technological obstacles and higher costs.
- **International clean energy technology leadership:** Development of the domestic market for light-duty NGVs can help U.S. automakers lead in the burgeoning international NGV market, which is already growing rapidly in countries like Germany, Italy, Brazil, and Argentina. NGVs can also serve as a platform for innovation and development of renewable natural gas (RNG) and hydrogen fuel cell technologies, gaseous fuels which can dramatically reduce transportation GHG emissions.

Despite this unique potential, light-duty NGVs have received relatively little attention from policymakers, and this technology still suffers from an uneven playing field compared to other transportation alternatives like electric vehicles (EVs) and biofuels. As the Committee considers the various opportunities and challenges associated with America’s natural gas abundance, the light-duty NGV market ought to be included in the discussion as perhaps the greatest opportunity of all, and lawmakers should seek to provide NGVs with a level playing field compared to other alternative fuels. There is substantial private investment in compressed natural gas (CNG) fueling infrastructure and automakers are beginning to offer a growing breadth of vehicles that run on CNG. By leveling the playing field for NGVs, Congress will encourage additional private investment.

The Light-Duty NGV Opportunity

The ability of natural gas to serve as a fuel for heavy-duty fleets has been well known to policymakers for many years, but these vehicles consume just a quarter of the total on-road fuels in the U.S.¹ Thanks to the vast new low-cost gas supplies unlocked by the shale drilling revolution, it is now possible to consider the potential to bring the benefits of natural gas fuel to the light-duty cars, vans, SUVs and pickups that are driven by U.S. business and government fleets as well as families that consume 75% of U.S. on-road fuels.

Despite a relative lack of policy support, U.S. automakers and natural gas refueling infrastructure providers like VNG have already recognized the

¹ Energy Information Administration. “Annual Energy Outlook.” 5 Dec 2012
<http://www.eia.gov/forecasts/aeo/er/index.cfm>

enormous opportunity represented by the light-duty NGV market. GM and Chrysler have both introduced new bi-fueled² NGV versions of popular pickup truck models for fleet customers, and VNG is working to develop the kind of retail-oriented fueling infrastructure for these fleets that will also seed the market for future mass-market consumers. Furthermore, natural gas producers like Chesapeake and Encana are making their own efforts to promote widespread adoption of natural gas in recognition of the fact that this market could be vital to the long-term profitability of the U.S. gas drillers.

While progress is already being made by the private sector in developing the light-duty NGV market, greater policymaker understanding of NGVs and support for a level playing field for them will help this market achieve its full potential sooner.

Light-Duty Vehicles Are Chief Driver of Oil Dependence

Transportation accounts for 70% of U.S. oil consumption and 30% of greenhouse gas emissions, making it a critical sector to address in the pursuit of U.S. energy independence and climate change goals. And, while other sectors of the economy (including power, manufacturing, and home heating) have moved away from oil use over the past three decades, the transportation sector is still almost completely dependent on gasoline and diesel, leaving U.S. businesses, government, and households at the mercy of volatile global markets. Increasing domestic production of unconventional oil is a welcome development, but it does not affect our vulnerability to global price swings, nor is it sufficient to significantly reduce global prices.

Light-duty vehicles (including cars, SUVs, vans, and pickups) are the main source of this dependency, accounting for 75% of on-road transportation fuel use in the U.S. According to new data from the EIA, the average American household spent nearly \$3,000 on gasoline to fill these light-duty vehicles last year – nearly 4% of household pretax income, the highest level in three decades.³ Addressing the near-total dependence of light-duty vehicles on oil must remain a central priority of U.S. energy policy, for the sake of the economy, our national security, and the environment.

Other Alternatives Are Falling Short of Expectations

While policymakers have touted various preferred alternative fuel technologies in recent years, these technologies have failed to make an impact thus far and may not for the foreseeable future.

² Bi-fuel natural gas vehicles are capable of running the same internal combustion engine on either gasoline or natural gas. Retaining a gasoline tank while the natural gas refueling infrastructure is being developed eliminates drivers' "range anxiety."

³ U.S. Energy Information Administration. "U.S. household expenditures for gasoline account for nearly 4% of pretax income." 4 Feb 2013. <http://www.eia.gov/todayinenergy/detail.cfm?id=9831>

- **Electric Vehicles:** Sales of the Chevy Volt and Nissan Leaf in 2012 were less than half of automaker projections, combining for less than 35,000 sold nationwide.⁴ The Administration, a staunch backer of EV technology in the 2009 stimulus bill, recently acknowledged the struggles of the industry and backed off its 2011 goal of having one million plug-in electric vehicles on U.S. roads by 2015.⁵ In fact, some industry observers believe that EVs will not be able to overcome the cost and recharging issues that limit their appeal to consumers until there is a new breakthrough in battery technology – which could be decades away.⁶
- **Cellulosic Biofuels:** Both the current and previous Administrations have hailed the potential of cellulosic biofuels made from non-food feedstocks to provide a sustainable source of renewable transportation fuel. However, this technology faces fundamental challenges in cellulosic feedstock production and distribution as well as the high cost of processing these feedstocks into fuels, which have prevented any significant commercial volume of these fuels from being produced despite government mandates for millions of gallons per year under the Renewable Fuels Standard.⁷ Indeed, a district court recently vacated EPA’s 2012 requirement for cellulosic biofuels due to a lack of availability.⁸

While both EV and advanced biofuels technologies may hold merit in the long term, the fact is that both face substantial near-term technological barriers to their success. The seriousness and urgency of our near-total transportation dependence on oil requires a focus on solutions that are ready to make a difference today – not technology gambles that may or may not become a viable solution five or ten years down the road.

“Larger, Faster, Earlier” Impacts for Light-Duty NGVs

In contrast to EVs and biofuels, NGVs are the only alternative fuel solution to offer a ready technology at an affordable price – today. Natural gas can save drivers up to 40% on fuel costs (or \$1,200 per year based on average household gasoline expenses of \$3,000), and our vast shale reserves guarantee stable,

⁴ Eisenstein, Paul. “Are battery-powered cars losing their charge?” Autoblog. 6 Dec 2012. <http://www.autoblog.com/2012/12/06/are-battery-powered-cars-losing-their-charge/>

⁵ Rascoe, Ayesha and Deepa Seetharaman. “U.S. backs off goal of one million electric cars by 2015.” Reuters. 31 Jan 2013. <http://www.reuters.com/article/2013/01/31/us-autos-greencars-chu-idUSBRE90U1B020130131>

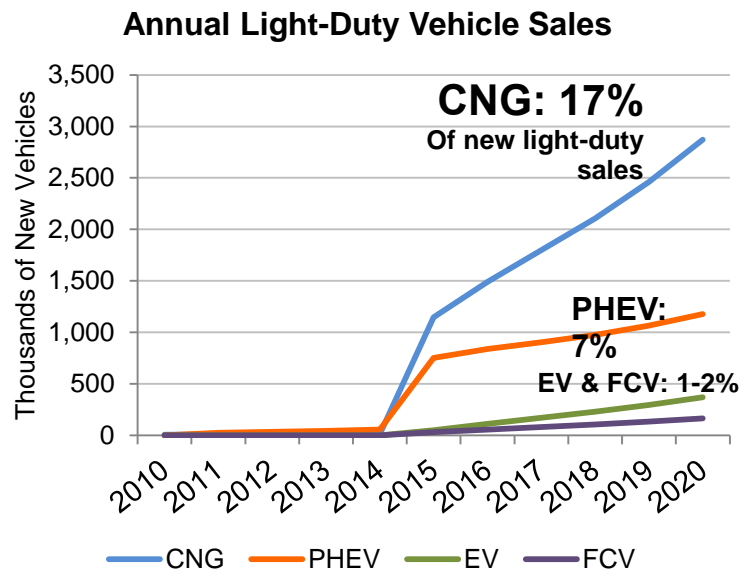
⁶ Borenstein, Seth. “What holds energy tech back? The infernal battery.” Associated Press. 22 Jan 2012. <http://bigstory.ap.org/article/what-holds-energy-tech-back-infernal-battery>

⁷ Congressional Research Service. “Renewable Fuel Standard (RFS): Overview and Issues.” 23 Jan 2012. <http://www.fas.org/sqp/crs/misc/R40155.pdf>

⁸ Green Car Congress. “DC Circuit court vacates 2012 cellulosic RFS standard, affirms 2012 advanced biofuel standard.” 27 Jan 2013. <http://www.greencarcongress.com/2013/01/api-20130127.html>

low-cost domestic supplies for decades. Light-duty NGVs are also a proven technology with no ‘learning curve’ similar to electric vehicles (EVs) – indeed, there are over 15 million light-duty NGVs on the road worldwide in countries in Europe, Asia, and South America.⁹ Since the engine and performance is the same, natural gas can power any sort of vehicle that currently uses gasoline, and fleets and consumers can continue to buy the vehicles they like and need.

These advantages were recognized in a landmark new comprehensive study of alternative fuel technologies by the National Petroleum Council of the U.S. Department of Energy. According to this “Future Transportation Fuels” report, NGVs have potential for “larger, earlier, and faster” impacts on U.S. oil dependence compared to other alternatives due to a lack of technological barriers combined with the economic rationale presented by fuel savings. In the composite “best case” scenario developed by the NPC, light-duty NGVs were able to achieve a 17% share of new light-duty vehicle sales by 2020 – double the share of plug-in hybrid electrics (PHEVs) and pure EVs *combined*.¹⁰



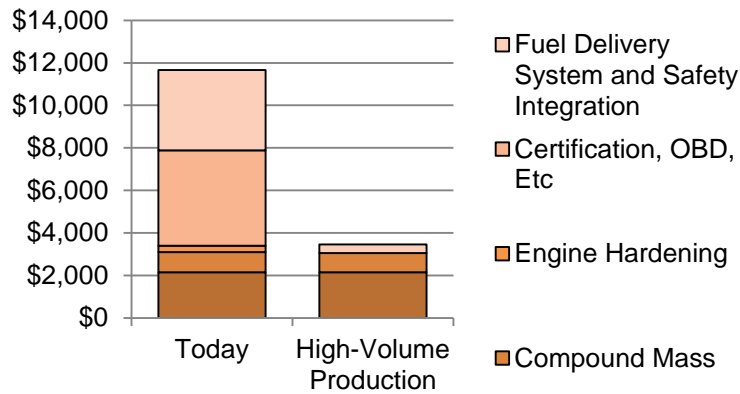
A key finding of the NPC report is the potential for rapid cost reductions in the incremental costs of NGVs compared to gasoline vehicles through simple manufacturing economies of scale. While today’s NGV incremental costs in the U.S. may be \$10,000 or more, this is due to the inefficiencies of low-volume conversions, and not due to the use of expensive components (as is the case with EVs, whose even greater incremental costs are due to costs of lithium-ion batteries, which are already mass produced). The NPC projects that incremental

⁹ Gas Vehicles Report. <http://www.ngvjjournal.com/en/magazines/the-gvr/download/3523/11378/26>

¹⁰ National Petroleum Council. “Future Transportation Fuels Study.” Aug 2012. <http://www.npc.org/FTF-80112.html>

costs could be reduced by 2/3rds in the near term with a move to high-volume, assembly-line production of 100,000 vehicles/year.

Current and Projected Incremental Cost for NGV Pickup



The European experience clearly shows that rapid cost reductions of this magnitude are possible. Indeed, in Italy, Fiat already sells some bi-fuel models at an incremental cost of less than \$3,000, and Opel (the European arm of GM) is offering rebates that can completely eliminate incremental costs.¹¹ This ability to achieve incremental cost reductions in the near term without need for any technological advances is key to understanding the vastly greater potential of NGVs compared to other alternatives, as it gives NGVs a realistic path towards mass-market viability – *without the need for long-term subsidies*. EVs and advanced biofuels simply cannot claim a similar path, as both depend on subsidies and technological breakthroughs which may or may not materialize even in the long term.

An Opportunity for U.S. Companies to Lead in Key Clean Energy Technologies

NGVs may be an established technology compared to EVs and biofuels, but the global market for these vehicles is just beginning to realize its potential. U.S.-developed shale gas drilling technology is being exported to countries all over the world, helping to usher in what the International Energy Agency has called a “Golden Age of Gas.”¹² By establishing America as the center of development for NGVs in the years ahead, U.S. automakers will be positioned to take advantage of new opportunities in overseas markets in Asia, Europe, and South America that are just beginning to develop their shale gas resources.

¹¹ Ebhardt, Tommaso and Craig Trudell. “Gasoline Sticker Shock Fuels Fiat Natural Gas Auto Sales.” Bloomberg. 17 Sept 2012. <http://www.bloomberg.com/news/2012-09-17/gasoline-sticker-shock-fuels-fiat-natural-gas-auto-sales.html>

¹² International Energy Agency. “Are we entering a golden age of gas?” World Energy Outlook 2011. <http://www.worldenergyoutlook.org/goldenageofgas/>

NGVs are also a platform for the development of even cleaner, ultra-low-carbon transportation fuels and technologies that will be needed to combat climate change. NGVs can fuel on biogas (or renewable natural gas, or “RNG”) captured from landfills, wastewater plants, and other sources, resulting in ultra-low lifecycle GHGs of 90% below gasoline or less.¹³ Moreover, unlike cellulosic biofuels mandated in the RFS, biogas is a renewable fuel derived from non-food feedstocks that is being produced and used in commercial applications today.¹⁴

In the longer term, natural gas will also facilitate the development of hydrogen fuel cell vehicles (FCVs) due to numerous fuel storage and refueling infrastructure synergies between these gaseous fuels.¹⁵ FCVs are a crucial technology for meeting long-term climate change goals, combining the zero-emission performance of EVs with the gasoline-like range and refueling characteristics of NGVs.

In comments on the 2017-2025 light-duty vehicle regulations,¹⁶ VNG argued that the development of the light-duty NGV market would reduce several specific “near-term market barriers to FCV adoption” identified by EPA and NHTSA, including:

- **Refueling Infrastructure:** NGV refueling stations use most of the same hardware used to dispense hydrogen fuel, enabling them to be adapted to supply hydrogen or even hydrogen-natural gas blends in the future;
- **Fuel Cost:** Hydrogen produced through the steam reforming of natural gas is the lowest-cost method of distributed hydrogen production available today;
- **Vehicle Cost:** Natural gas and hydrogen also share gaseous storage technologies, and innovations and cost improvements for advanced on-board storage and fuel management technologies for NGVs will benefit FCVs as well.

The EPA acknowledged these linkages in its rationale for giving NGVs additional “advanced technology” multiplier incentives in the new 2017-2025 light-duty

¹³ National Petroleum Council. “Renewable Natural Gas for Transportation.” 1 Aug 2012. http://www.npc.org/FTF_Topic_papers/22-RNG.pdf

¹⁴ Energy Vision. “Renewable Natural Gas: The Solution to a Major Transportation Challenge.” 2012. <http://energy-vision.org/wordpress/wp-content/uploads/2012/05/EV-RNG-Facts-and-Case-Studies.pdf>

¹⁵ Cannon, James S. “Natural Gas: An Essential Bridge to Hydrogen Fuel Cell Vehicles.” January 2012. <http://vng.co/wp-content/uploads/2012/05/Natural-Gas-An-Essential-Bridge-To-Hydrogen-Fuel-Cell-Vehicles.pdf>

¹⁶ VNG.CO. “Comments of VNG.CO.” 6 Feb 2012. <http://vng.co/wp-content/uploads/2012/05/Natural-Gas-As-Essential-Bridge-To-Hydrogen-Fuel-Cell-Vehicles-With-Comments.pdf>

vehicle regulations, and cited VNG's comments as well as those of Natural Gas Vehicles for America in support of this decision.¹⁷

Maximizing Domestic Benefits of the U.S. Gas Boom

Despite concerns expressed by some parties over potential increases in natural gas demand from NGVs or LNG exports, the reality is that the shale gas revolution has unlocked an enormous amount of natural gas supply capacity that can be tapped at relatively low costs.

- A recent study by (hearing witness) Dr. Kenneth Medlock III of the James Baker III Institute for Public Policy¹⁸ finds that shale gas supplies have effectively increased the elasticity of domestic gas supplies fivefold. Thus, the long term price of gas will remain between \$4-\$6 per MCF for “decades” even with substantial increases in demand.
- Chesapeake Energy has similarly noted that, based on the production economics of current domestic gas plays, the U.S. could add gas production sufficient to meet the fuel needs of 2/3rds of the *entire domestic* light- and heavy-duty transportation fleet while maintaining long-term natural gas prices of less than \$7 per MCF – still low by historic standards.

When considering the “opportunities and challenges” for natural gas, light duty NGVs offer the opportunity to save consumers an average of \$1,200 per year on their fuel costs, reduce greenhouse gas emissions by 24% (and up to 90% with renewable natural gas), and achieve energy independence by replacing oil use in the vehicles consuming 75% of on-road transportation fuels. And if the domestic NGV market develops robustly, natural gas producers will have strong domestic demand for their product, reducing the incentive to export natural gas – and its economic, environmental, and energy security benefits – overseas.

Policy Changes to Level the Playing Field for NGVs

Policymakers can realize this vision for light-duty NGVs simply by providing them with a level playing field to compete with other alternative fuel technologies, potentially including the following steps:

- **Remove Regulatory Barriers:** While the new 2017-2025 light-duty vehicle regulations promulgated by EPA and NHTSA take important steps towards

¹⁷ Federal Register. “2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas and Corporate Average Fuel Economy Standards; Final Rule.” 15 Oct 2012. P. 62814.
<http://www.gpo.gov/fdsys/pkg/FR-2012-10-15/pdf/2012-21972.pdf>

¹⁸ Medlock, Dr. Kenneth. “U.S. LNG Exports: Truth and Consequences.” August 2012.
http://bakerinstitute.org/publications/US%20LNG%20Exports%20-%20Truth%20and%20Consequence%20Final_Aug12-1.pdf

creating a level playing field for NGVs, they still face arbitrary and unfair obstacles under the CAFE program due to outdated legislative restrictions intended to limit credits for E85 flex-fuel vehicles. Legislation is necessary to harmonize treatment for NGVs, granting them the fair, no-cost regulatory incentives that EPA and NHTSA have already said they deserve.

- **Tax Credit Parity for NGVs:** EVs currently benefit from tax credits of up to \$7,500 per vehicle included in the 2009 stimulus bill, while light-duty NGVs receive no tax credits. As detailed in the NPC report, although NGVs do not face the same long-term cost obstacles as EVs (which are unique to EV dependence on expensive lithium-ion battery packs), incremental NGV costs are high today simply due to low production volumes. The current Administration has previously advocated for identical tax credits for both EVs and NGVs,¹⁹ and such a level playing field would help increase NGV demand and bring down prices in the near term.
- **Federal Vehicle Fleets:** Federal vehicle fleets should be leaders in adopting light-duty NGVs, which would save taxpayer money through lower fuel costs, help reduce vehicle costs for consumers and businesses through increasing production economies of scale, and support the private sector development of retail-oriented CNG refueling networks for public use. However, current federal fleet procurement of alternative fuel vehicles is focused almost entirely on flex-fuel E85 vehicles due to their low incremental costs – despite the fact that these vehicles may end up costing *more* over their lifetime due to E85 costs that are higher than gasoline on a per-BTU basis. E85 also yields fewer environmental and energy security benefits than natural gas. Federal fleets should be required to evaluate the lifecycle costs and benefits of all fleet purchases, which would reward the superior cost savings and environmental performance of NGVs.
- **Alternative Fuel Standard:** The current RFS, which as noted calls for unattainable volumes of cellulosic biofuels that do not yet exist, is broken and unfairly focuses only on biofuels. Expanding this program to an “Alternative Fuel Standard” would allow refiners to meet requirements with credits generated by *any* alternative fuel that reduces GHG emissions by 20% or more – including CNG and electricity as well as biofuels. This type of “fuel neutral” policy would encourage much more rapid progress towards energy independence goals than the current biofuel-only RFS.

VNG played an active role in facilitating recent progress on the regulatory treatment of NGVs by EPA, and is recommending Congress take additional action to address these issues that cannot be addressed simply through administrative action.

¹⁹ The White House. “Fact Sheet: All-of-the-Above Approach to American Energy.” 7 March 2012. <http://www.whitehouse.gov/the-press-office/2012/03/07/fact-sheet-all-above-approach-american-energy>

VNG appreciates the opportunity to submit this testimony and looks forward to working with the Committee and other policymakers to support the light-duty NGV market, which will reduce the cost of driving for American households and businesses, reduce climate change impacts for transportation, and help this country achieve energy independence. If you have any questions or would like additional information, please contact me at pkouroupas@vng.co (973-886-7675).