United States House of Representatives
Select Committee on the Climate Crisis

Hearing on June 30, 2021
"Transportation Investments for
Solving the Climate Crisis"

Questions for the Record

Robert Bryce
Research Fellow
Foundation for Research on Equal Opportunity

The Honorable Anthony Gonzalez

1. **The United States continues to be the world leader in production of natural gas, though we fall behind other countries in use of natural gas for transportation. Increased use of natural gas in transportation will not only clean our air and reduce our emissions, it will use a clean energy source that is domestic, abundant, and runs in engines manufactured in the United States, which is the cleanest heavy-duty engine in the world. What role do you see natural gas playing in our clean transportation future?**

Answer: Natural gas is a clean-burning fuel that emits almost no criteria pollutants and emits less CO2 during combustion than refined oil products. And while nat gas has made inroads in the transportation sector, it has only captured about 4% of the domestic transportation fuel market. Refined oil products have about 90% of the domestic market. See: https://www.eia.gov/energyexplained/use-of-energy/transportation.php

Various companies have sought to use more nat gas in the form of CNG or LNG in fleet vehicles. This option could become more attractive over time if nat gas retains a cost advantage over refined oil products.

2. **Renewable Natural Gas (RNG) is naturally-occurring biomethane captured from farms, landfills, and wastewater facilities and used in the cleanest heavy-duty engines in the world, which are 90% cleaner than the cleanest diesel trucks and 90% cleaner than the latest EPA standard. The United States has increased production of renewable natural gas over 267% in the past five years and RNG use in transportation reduced 3.5 million tons of CO2 equivalent in 2020 alone. When used in transportation, RNG can be carbon neutral or carbon negative, depending on the feedstock. It also removes emissions from dairies and other necessary agricultural activities. Considering that RNG is cleaner than battery electric vehicles and relies less on foreign supply chains, are you concerned with the push toward electrification, rather than policies that utilize RNG and other innovative fuels?**

Answer: As I pointed out in my testimony, I am very concerned about the headlong rush to electrify transportation given the many problems with affordability, resilience, and supply chains. See: https://docs.house.gov/meetings/CN/CN00/20210630/112853/HHRG-117-CN00-Wstate-BryceR-20210630.pdf

RNG does have some advantages over conventional natural gas, including its lower CO2 emissions. However, we must be clear about the issue of scale. Last year, total RNG production in the US was about 50 trillion Btu. See: https://www.russoonenergy.com/sites/default/files/RussoMay2020WileyColumn.pdf. That is roughly equal to 1/100 of the quantity of gas needed to supply the U.S. residential sector, which now consumes about 5 trillion cubic feet of gas (roughly 5 quadrillion Btu) per year. Some reports are projecting that RNG production will grow rapidly over the coming years. See: https://www.biocycle.net/rapid-expansion-of-the-u-s-rng-industry/. But even if we see a doubling or tripling of RNG production, the overall output will remain relatively small compared to total US demand.

In addition, it's not clear how much RNG can be profitably produced in the US. The constraints on its growth including the availability of suitable production facilities, which often depend on confined animal feeding operations or municipal solid waste facilities.

3. **A recently published review of existing studies evaluated natural gas and electric buses and found that natural gas buses are more affordable, more reliable and deliver greater environmental benefit than electric buses. A comparison of natural gas versus electric refuse trucks also found that refuse collection using ultra-low-NOx natural gas trucks fueled with renewable natural gas (RNG) reduces more criteria pollutant (NOx) and greenhouse gas (GHG) emissions than collection using a battery electric alternative, at a much lower cost. Isn't it a better investment of taxpayer funds to reduce emissions through deployment of NGVs fueled by RNG rather than investing in more costly, less-effective electric vehicles?**

Answer: I am not familiar with the studies being referenced. That said, the use of natural gas in fleet vehicles can result in significant reductions in operating costs and criteria pollutants. Natural gas helps decarbonization because it emits about half as much carbon dioxide during combustion as diesel fuel or fuel oil. See: http://naturalgas.org/environment/naturalgas/

Furthermore, the maintenance regimes, longevity, and operating costs for fleets that use conventional NG are well known. As mentioned in the previous question, RNG has the potential to displace some conventional NG, but it remains unclear how big the RNG market might become.

All-electric buses and trucks may have some merits, but some of the value of the all-electric vehicles could be matched by the use of hybrid-drive systems which do not need expensive recharging infrastructure. In addition, it remains to be seen how manufacturers and buyers of all-electric vehicles – including heavy-duty EVs – will manage those vehicles once their batteries

are depleted. Many EVs use lithium-ion batteries which are notoriously difficult to recycle. Indeed, about 99 percent of all lead-acid batteries are now being recycled. By contrast, in 2018, only about 3 percent of lithium batteries were being recycled. See: https://www.latimes.com/business/technology/la-fi-lithium-ion-battery-recycling-20180316-story.html

In summary, over the past century, the US transportation sector has been fueled almost exclusively by refined oil products. That dependence is due to oil's high energy density, relatively low cost, fast refueling time, and ease of storage and handling. All-electric vehicles have been around since the days of Thomas Edison and Henry Ford. EVs are making inroads in the marketplace, but their adoption and deployment at large scale – that is, in the tens of millions of vehicles – will likely take decades and will depend on expensive upgrades to the electric grid and the mining of vast amounts of critical minerals like copper, lithium, cobalt, and rare earths.