

**Written Statement of Tony Satterthwaite**  
**Vice President, President- Distribution Business, Cummins Inc.**

**Hearing on Solving the Climate Crisis: Cleaning Up the Heavy-Duty Vehicles, Protecting Communities**

**U.S. House of Representatives Select Committee on the Climate Crisis**

**July 16, 2019**

Chairwoman Castor, Ranking Member Graves, and members of the Select Committee, thank you for inviting me here today and for your interest in clean technologies for heavy-duty vehicles. My name is Tony Satterthwaite and I am President of the Distribution Business at Cummins. We have been committed to improving technology in our industry. We embraced regulations more than 20 years ago and developed solutions that enabled us to meet standards that reduced particulate emissions in the diesel engine by 90 percent, and NOx by 95 percent while improving fuel-efficiency. Today, I'd like to tell you a bit about that journey, as well as what we think may be possible in the future.

**Cummins Inc.**

Cummins Inc. is a 100-year-old company founded and headquartered in Columbus, Indiana. Since 1919, we've become the largest independent producer of both diesel engines and diverse power solutions in the world, and we've done this through constant technological innovation and by bringing our customers the right power solution at the right time for each unique application.

We also manufacture and supply highly complex components to the transportation and power solutions industries such as turbochargers, fuel systems, filters and aftertreatment systems – all of which has enabled us to build high-performing and efficient products meeting global emission standards.

Cummins products are in a wide range of applications including small passenger trucks, tractor-trailers that move goods across the country, pick-up and delivery trucks, as well as transit and school buses. You will also find our products in refuse trucks, mining equipment, oil-and gas operations, passenger trains and tug boats. Our products also generate electricity in applications from mobile power systems that support our military to critical backup power systems that keep data centers and hospitals up and running 24 hours a day, seven days a week. National Landmarks that many Americans see every day, like Wrigley Field and the Statue of Liberty, also rely on Cummins for their backup power needs.

Simply put, our products need to be dependable and reliable to help our customers do the work they need to do, whether that is hauling critical goods across the country, or delivering our most precious cargo: our children to school. They also need to work hard, capable of carrying very heavy loads and performing in extreme conditions.

We have more than 62,000 employees globally and operate in over 190 countries throughout the world. In the United States, we have manufacturing facilities in Indiana, Minnesota, New York, North Carolina, South Carolina, Tennessee, Wisconsin, California and Oregon. In addition to our manufacturing operations in the United States, we also own all our distributor branches with locations in almost every state.

### **Innovation and the Environment**

The hearing today is well-timed as we are at the forefront of change in the heavy-duty vehicle industry. We are providing a wider variety of products for our customers that are cleaner, more efficient and cost-effective than ever before.

























Cummins has long acknowledged that our company is only as strong as the health of our communities. Nearly four decades ago, Cummins made the decision to embrace tough environmental standards and to use our technological expertise and innovation to drive our business and improve communities, in contrast to the industry approach at the time. In 2006, we set our first facility energy and greenhouse gas goal and joined the U.S. EPA Climate Leaders program – firmly stating our commitment to address climate change. In 2009, Cummins technical and policy leaders wrote a white paper for the National Academy of Sciences addressing the regulation of greenhouse gases in commercial vehicles that served as an important reference for regulators. Recently, in November 2018, EPA announced the Cleaner Trucks Initiative (CTI), which will include a future rulemaking to establish updated standards to address NOx emissions from highway heavy-duty trucks and engines. We strongly support this initiative. This year we are releasing our next companywide sustainability plan including science-based climate goals. Our commitment to addressing the environmental impact of our products and facilities is ingrained in our mission, vision, values and culture.

### **Energy Diversity**

As we look to the future of the heavy-duty transportation sector, we see a sector that is highly complex and one in which we don't believe there will be one technological solution that will meet all needs. Our customers buy heavy duty vehicles for commercial return; they are part of their livelihoods and must be capable of doing the job required at a price that is reasonable. We think clean diesel will remain an important technology for many of our customers for a long time. We will continue to work with regulators to make diesel even cleaner and more efficient than it is today. At the same time, in some applications natural gas or electrified power will make the most sense based on the job to be done or the location where the vehicle is operating.

While diesel technology has captured most of the market in the past, we see a future where diesel, natural gas, battery electric, and even fuel cell and sustainable fuels power our products. The three primary fuels and technologies for heavy-duty vehicles are diesel, natural gas and electric. How and where they are applied depends on a variety of factors. Below is a chart which demonstrates some of the core attributes most important to our customers including technology capability, cost and infrastructure availability.

# A power solution for every need

	<b>CLEAN DIESEL</b>	<b>NATURAL GAS</b>	<b>ELECTRIC</b>
<b>Applications</b>	 All applications from 2.8L – 95L (on- and off-highway and power generation)	 6.7L – 12L on-highway applications and up to 91L in power generation	 Emerging commercial on-highway applications (pickup & delivery & bus markets, forklift)
<b>Cost</b>	 Cost effective and lowest capital cost	  Higher capital costs due to vehicle & infrastructure investment, Cost efficient with NG fueling access	   Economically viable with incentives, but highest initial capital cost (3-5x diesel in many cases), higher operational efficiencies than diesel and natural gas
<b>Emissions</b>	 Particulate and NOx have been reduced by 90+% over the past 25 years; CO2 also reduced	 Near zero emissions and net-zero with renewable natural gas	 Zero tailpipe emissions
<b>Reliability</b>	 Highly reliable and mature technology	 Highly reliable and mature technology	 Not as proven as Diesel and NG but quieter, simpler powertrain with fewer mechanical parts than diesel and NG.
<b>Support network</b>	 Available and easily supported	 Lacks coverage compared to Diesel, but support is expanding, available and easy	 Cummins support growing with product offerings
<b>Infrastructure</b>	 Widely available	 Availability varies regionally	 Limited availability for commercial vehicles
<b>Hybridizing impact</b>	 Hybridizing improves efficiency, reduces emissions and can allow us zero emission transport	 Hybridizing improves efficiency, lowers emissions even further and can allow zero emission transport	 Hybridizing improves range, and increases applicability

*Diesel* – Cummins continues to be a leader in clean diesel technology and understands that for many markets, diesel engines will be the best solution for decades to come. Clean diesel is the combination of today’s ultra-low sulfur diesel fuel, advanced engines and effective emission controls. Together, these elements result in a highly efficient engine, which can achieve extremely low emissions and reduce greenhouse gases (GHGs). Clean diesel benefits from low upfront costs and an existing and mature infrastructure. Combining clean diesel and hybrid technology provides additional fuel efficiency; further improving air quality and reducing carbon footprints, and even enabling a zero emissions operating mode within city limits.

This decade, the 4.9 million new-technology diesel trucks on America’s roads have removed more than 26 million metric tons of NOx and 59 million metric tons of carbon dioxide from the air. Currently, across the United States, more than 36% of all Classes 3-8 registered commercial trucks are of the newest, near-zero generation diesels, and that number grows each year.

We are not done innovating to make diesel engines cleaner and more efficient. Truck and engine manufacturers like Cummins and other stakeholders are hard at work to develop products that meet EPA and NHTSA’s Phase 2 Greenhouse Gas Standards for commercial vehicles. When fully implemented those standards will lower CO<sub>2</sub> emissions by approximately 1.1 billion metric tons; save vehicle owners fuel costs of about \$170 billion; and reduce oil consumption by up to two billion barrels over the lifetime of the vehicles sold under the program. Our ability to meet these goals is supported by cooperative research programs like the SuperTruck program at the Department of Energy. As mentioned above, we are also actively working with EPA, CARB and other stakeholder to take near-zero emissions diesel engines closer to zero through a new engine standard for NOx.

*Natural Gas* – Where infrastructure exists or can be expanded, natural gas is a mature, reliable solution available today that can reduce GHG, NOx, and PM. Renewable natural gas expands on these benefits. While the initial purchase price of a natural gas vehicle is higher than a diesel vehicle, its operating costs are comparable or less than conventional diesel technology.

Cummins Westport has been the leader in providing low emission and efficient natural gas engines to some of this country's largest private and municipal transit and refuse fleets, and on-highway truck and school bus properties reaching global sales of over 60,000 natural gas engines in 2015. Since 2002, Cummins Westport has offered emission leading natural gas engines, meeting or exceeding the most stringent North American engine emission limits set by the US Environmental Protection Agency (EPA).

However, natural gas use is not a viable choice for many heavy-duty applications due to limited infrastructure. Vehicles that return to base daily, like refuse trucks, port vehicles or city buses are ideal applications for natural gas. Given that natural gas vehicles can cost and weigh more than conventional diesel vehicles, policies like the federal excise tax and weight limits can also reduce consumer adoption of these vehicles.

*Battery Electric* – Electrified Power is the newest of Cummins' business segments bringing together all the company's electrification resources with a view to supporting all the segments where Cummins traditionally operates today. Cummins can use a range of cell chemistries suitable for pure electric, hybrid and plug-in hybrid applications.

The adoption of electric vehicle systems for heavy duty transportation is dependent on the availability of charging infrastructure capable of meeting the energy demands of heavy-duty applications. Emissions requirements, government incentives and cost also play a part. A city bus is a great example of an application where electrification technology works today. The duty cycle, with frequent stops and starts, is ideally suited for electrified powertrains and makes this technology viable for reducing emissions in traffic congested areas. Material handling applications are being electrified, reducing emissions in ports, distribution hubs and warehouses. And while the energy density of batteries continues to improve, it is not yet viable for all applications. Currently, the weight of batteries negatively impacts payload capacity, making electric trucks impractical for many applications. Creating hybrid technologies that combine diesel and electric can be part of the solution to help meet regulatory requirements for some applications.

From an economic standpoint, customers will need an electric vehicle system that offers an acceptable return on investment; battery prices must progress to a reasonable level that allows for payback, without the use of incentives. Improvements to charging infrastructure, advances in cell chemistry that allow for increased energy density in combination with fast charging, and greater modularity of battery packs will all help accelerate the adoption of electric and hybrid vehicles. Continued investment in these areas by the Department of Energy can accelerate this development.

In addition to these technologies available today, Cummins is also investing in a variety of other fuels and technologies:

*Hydrogen and Fuel Cell* – Globally, we see increased focus on hydrogen- based technologies and infrastructure. Advancements in fuel cells have made the technology more suitable for commercial use. Improving proton-exchange membrane (PEM) and Solid Oxide (SOFC) fuel cell technology performance characteristics, life, efficiency and cold weather capabilities could make fuel cells a credible alternative for commercial and industrial applications. The application of PEM fuel cells to commercial vehicle applications is exciting, particularly those applications with productivity or longer daily range needs that cannot be accomplished by batteries. Joining the Hydrogen Council Executive Committee has provided a great platform for Cummins to

collaborate with experts and companies with a similar vision of the future. Cummins is participating in the Costa Rica hydrogen ecosystem project by sponsoring a hydrogen fuel cell bus. Phase 1 of the project demonstrated technical feasibility and Phase 2 aims to demonstrate financial viability. Phase 2 will feature a Cummins electric powertrain and a fuel cell electric powertrain in two buses.

*Other Alternative Fuels* – Cummins is investing in enabling its engines and generator sets to use fuel sources that would otherwise be considered waste products, delivering robust power even with fuels like landfill and digester gases. Capturing landfill gas or biogas for processing into fuel suitable for vehicles or gensets has significant benefits. Biomethane – obtained by purifying biogas – that is used as fuel in place of fossil fuels effectively produces less GHG than the fuel it replaced. Biogas can provide a clean, easily controlled source of renewable energy from organic waste materials, replacing fossil fuels with a sustainable carbon neutral fuel option, while can reducing external fossil fuel dependence and promoting energy security.

### **Policy Levers**

Public policy plays an important role in facilitating this energy diverse future for the heavy duty sector. We think the best policies are ones that don't pick winners and losers but focus on desired outcomes. The best technology to solve for a problem today may not be the best in six months or two years – that's why technology neutral policy, free of technology-forcing mandates, is important to ensure communities and customers can continue to make the best choices to meet their performance, commercial and environmental needs and let the technologies compete to determine market solutions.

Federal investment and tax policy also play an important role in spurring innovation. Robust and consistent investment in research and development and investment through grants and public-private partnerships is essential to provide market certainty for consumers, fleets, dealers, manufacturers and suppliers participating in the transition to cleaner technologies.

Encouraging adoption of low-emissions technologies infrastructure investment is critical. Congress should invest in battery electric vehicle charging as well as hydrogen and natural gas fueling infrastructure to help accelerate adoption of these technologies.

Finally, Congress, communities and customers should support low or no-carbon, sustainable fuel choices. The rise of multiple fuels means a poly-fuel future, but each fleet has unique needs. It is important for suppliers to continually produce more sustainable, low or no-carbon fuels, vehicle technologies, and infrastructure that measurably improve well-to-wheels climate impacts and address other relevant sustainability impacts and benefits.

### **Conclusion**

The heavy duty vehicle industry is facing significant change and more is needed to meet our global energy and environmental challenges. Cummins is committed to investing in an energy diverse future where our customers have a broad portfolio of power options – including clean diesel, natural gas, electrified power and even fuel cell technology – so they can choose what works best for them. Enacting policies that promote the power of choice for every market will help ensure that this country and every community within it has the proven technology necessary to meet air quality and climate goals and serve the economy.

Thank you again, for the great honor and privilege to speak to you all today. If I can provide any information to you on behalf of Cummins Inc. I would be honored to discuss this issue or any other issue with you or your staff.

## Appendix

### POLICY RECOMMENDATIONS

As the Committee prepares policy recommendations to address the Heavy-Duty industry, energy diversity can be addressed and encouraged in the following ways:

#### **1. Funding**

Cummins supports robust funding for the Highway Trust Fund (HTF) to ensure dedicated funds for maintaining and improving highway, bridge and transit infrastructure. The following recommendations will ensure energy diversity and parity across all vehicles with a commitment to reliable and consistent funding of the HTF and modernizing the truck fleet with the cleanest, safest available vehicles.

##### **• Policy Recommendations**

- Repeal the 100-year-old 12% federal excise tax on Heavy Duty trucks to incentivize new truck purchases which modernize truck fleets.
- Support a mechanism for equal contribution to the HTF by drivers of all vehicles regardless of power source such as a Vehicle Miles Travelled (VMT) tax.
- Encourage greater public-private partnerships by implementing investment tax credits, raising the cap on private activity bonds and increasing flexibility for the TIFIA program for surface transportation projects so public project sponsors and private investors have the fullest possible range of financing options available.
  - Congress should authorize Qualified Tax Credit Bonds for surface transportation projects under Section 54A of the tax code.
- Extend tax credits that promote energy efficiency and diversity: the fuel cell vehicle tax credit, alternative fuels tax credit, the alternative fuel refueling infrastructure tax credit, and the energy production tax credit (Secs. 6426, 30B, 30C, 45 and 48).
- Ensure favorable treatment of R&D expenditures in the Internal Revenue Code (IRC), including a robust R&D Tax Credit and a fair and efficient system of cost recovery for R&D expenses.

#### **2. Innovation**

Leadership in innovation is one of the most important factors for future of US manufacturing. Innovation makes the country and its businesses more productive, dynamic and competitive. At Cummins, innovation is ingrained in our culture, mission, vision and values. Our commitment to innovation dates back a century, to when Clessie Cummins first applied inventive ideas to improvements that advanced the diesel engine. These recommendations seek to increase support for foundational R&D and position America to compete and thrive globally in the innovation race, and pursue innovation inclusively.

##### **• Policy Recommendations**

- Funding for ARPA-E, EERE, and specifically the DOE Vehicle Technology program is valuable and should be increased and set to grow at 4 percent per year adjusted for inflation, reversing nearly a decade of decline.
- Support the Fueling America's Security and Transportation (FAST) with Electricity Act to provide a 30% federal tax credit for electric transportation options beyond passenger cars; provide a 30% federal tax credit for recharging and refueling stations and provide loan guarantees to support capital investments in associated domestic manufacturing capacity.

#### **3. Transit and Passenger Rail**

Investing in US transportation infrastructure can greatly improve the efficacy and use of public transit and passenger rail. This investment can encourage ridership, promote ease of access and make regional mass transit more sustainable for communities and the environment. Increasing public funding for bus, commuter and passenger rail systems will release private investments to expand capacity, reduce highway congestion, link rural and suburban communities safely and mitigate the impacts to our environment.

- **Policy Recommendations:**
  - Provide predictable, dedicated and sustainable funding for capital investment in bus, commuter and passenger rail systems.
  - Include a Phase II of the Alternative Fuel Corridors (AFC) program which supports infrastructure for alternatives to gasoline like natural gas and hydrogen powered vehicles.
    - Include Diesel Exhaust Fluid as a component of AFCs at rail yards to increase adoption of EPA Tier 4 clean locomotives.
    - Provide matching funds to states for installation of clean re-fueling infrastructure along 10 major AFC's annually through 2030.
  - Reauthorize the Diesel Emissions Reduction Act (DERA).