

**U.S. House Science, Technology, and Space Committee
Subcommittee on Investigations and Oversight**

Written Testimony of Nate A. Baguio, Senior Vice President of Commercial Development

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Thank you, Chairman Foster, Ranking Member Obernolte and esteemed members of the committee for inviting me to testify today. As we meet here in the *Land of Lincoln*, it reminds of something he once said,

“You cannot escape the responsibility of tomorrow by evading it today.”

Today’s discussion about this historic change in the way our great nation’s transportation system moves children, passengers, packages, materials, hauls waste and imports and exports goods through some of world’s busiest ports, is as critical an issue as we face today. With change comes opportunity. An opportunity to take a direct role in combating climate change, creating healthy breathing environments in our communities and workplaces, reducing our dependence on overseas energy supplies, improving national security and reducing the tax burden on our citizens.

My name is Nate Baguio and I serve as the Senior Vice President of Commercial Development for the Lion Electric Company. Lion is a leading and dedicated manufacturer of all-electric medium- and heavy-duty vehicles, including all-electric school buses, urban delivery trucks, and shuttle buses. Currently, Lion has delivered nearly 600 vehicles in North America, and we are opening the largest all-electric medium- and heavy-duty vehicle manufacturing site in the United States here in Illinois. At full-production, this facility will produce 20,000 all-electric medium- and heavy-duty vehicles per year made by American workers. This factory is on-schedule to be operational before the end of the year (2022).

Medium and Heavy-Duty Vehicle Demand and Performance

The transition to electric vehicles is already well underway as EV car sales have more than doubled each of the past three years, even during the most significant health and supply chain crisis of our lifetime. Orders at The Lion Electric Co. have grown by over 500% from this time last year with more expected upon the opening of the Federal Clean School Bus Program in the coming days. This program will help communities most in need with \$500M in funding for electric school buses. Funding provided by the recently signed into law Investment in Infrastructure and Jobs Act that will add \$1B per year over the next five years towards new, all-electric, healthy school buses for children.

Modern electric school buses have been taking children to school since 2016 and have been outperforming their fossil fuel counterparts. On average, the cost to maintain an electric school bus is 80% less than a diesel school bus and is 60% less costly to fuel. The number of parts to replace or maintain (or fail) in a diesel school bus vs. an electric are approximately 10-to-1.

The lithium-ion batteries in these buses have performed as well. At Lion, we are measuring less than 0.5% degradation of available battery energy year-over-year through robust use in wide-ranging climates.

It is important to note that these buses, although a very different technology, meet or exceed all of the safety requirements required under Federal law and each of the states in which they operate.

The direct operating benefits of medium and heavy duty all-electric vehicles only tell a portion of the story of reducing emissions in our communities.

According to the Environmental Defense Fund, removing tailpipe pollution from medium and heavy-duty vehicles by 2040 would:

- Prevent as many as 2,600 premature deaths and 140,000 lost workdays each year by 2040 and prevent as many as 57,000 premature deaths in total through 2050.
- Avoid 224 million metric tons of greenhouse gas (GHG) emissions every year by 2040 and eliminate more than 4.7 billion tons cumulatively by 2050.
- Significantly reduce ozone forming nitrogen oxides (NOx) pollution by more than 450,000 tons and harmful particulate pollution by nearly 9,000 tons every year by 2040.
- Provide our nation with up to \$485 billion in health and environmental benefits alone because of pollution reductions.

Domestic and Partner Sources of Raw Materials

“China is the world’s largest processor of copper, nickel, cobalt, lithium, and rare earth elements. It controls 75-percent of lithium-ion battery production, including 60 percent of the world’s cathode production and 80 percent of the world’s anode production – despite not having a geological advantage in the majority of these materials.”, Abigail Wulf, Director for Center for Critical Minerals Strategy.

In order for original equipment manufacturers such as Lion Electric to continue to provide and grow the availability of EV’s in the US market, a stable supply chain needs to be present. The manufacturing capacity of vehicles is robust as is the demand for these vehicles, but content continues to be based on volatile sources even if vehicles are built in America.

It is critical to partner with favorable allies such as Canada. The current Canadian federal budget includes over \$2B in research and implementation funding for critical mineral mining and processing specifically for transportation. The transition to independence should consider opportunities not only in the US, but in Central and South America.

Recycle, Reuse and Use Responsibly

Over 90% of the lithium-ion battery pack can be recycled or disposed of sustainably. The ReCell project at the Argonne National Laboratory is working to improve the recycling process to separate and process more of the battery’s content to be a useable source for future batteries. The goal is to reintroduce minerals and metals back into the supply chain, do it sustainably and cost effectively. This continued research and recycling will be a key part to keeping up with demand.

In some of our largest vehicles we have 508Kwh battery configurations that are designed to operate Class 8 trucks. In all of our vehicles these batteries can serve an additional life as stationary storage for solar or wind generated energy. This reuse of existing assets can reduce the demand for new batteries for less demanding uses. Depending on intended duty, this can potentially double the life of a battery

pack beyond its use in transportation. More research is warranted on second life viability as a mechanism to reduce strain on supply chain.

As the demand on critical minerals and metals intensifies in the EV era, a program of encouraging responsible use of these valuable resources can effectively ease the burden on supply. The Federal Highway Administration released new results last month showing that “on average” most Americans drive less than 40 miles per day. In very few instances do most commuters need maximum range on their vehicle. The anxiety associated with range and the resulting strain on battery supply chain can be offset with robust investment in charging infrastructure networks and public education.

Although lithium-ion chemistries are the most effective zero emission solutions for transportation today and for the years to come, new technologies will need to be developed for long range travel, aviation and transcontinental shipping. The United States will need to invest in less cobalt dependent chemistries and advance solid-state technology to achieve energy independence and meet climate goals to ensure future generations will have a liveable planet.

Thank you for the opportunity to submit these brief comments to the committee and I invite any questions you may have regarding the state of medium and heavy-duty electric transportation.