BUILD BACK BETTER — REBOOTING THE U.S. ECONOMY AFTER COVID-19

Manufacturing Electric School and Transit Buses: Creating Jobs and Economic Growth

AUTHOR: DAN LASHOF, DIRECTOR, WRI UNITED STATES
CONTACT: CHRISTINA DECONCINI, CDECONCINI@WRI.ORG

Summary

As Congress contemplates how to provide economic relief and create desperately needed employment opportunities for millions of Americans suffering as a result of the economic havoc spurred by the COVID-19 pandemic, lawmakers have the chance to ensure that we build back better, in ways that create millions of well-paying jobs, spur billions in economic growth, and advance a low-carbon economy. Research shows that smart climate action is not only good for but essential to economic growth.[1] These objectives must go hand in hand.

One way Congress could immediately create good jobs while simultaneously advancing a cleaner economy is to expand Electric Vehicle (EV) manufacturing capacity and accelerate the replacement of diesel buses with electric buses. Federal grants to school districts and transit agencies for electric bus purchases and related charging infrastructure, as well as providing grants and loans to accelerate the electric vehicle manufacturing industry, would infuse funding to school districts and cities and simultaneously improve public health and create new manufacturing jobs.

Proposal:

Scale up the Clean Cities, Clean School Buses and Low and No Emissions Vehicle programs to provide $20 billion in grants to school districts and transit systems—enough to replace 60,000 school and transit buses, or about 10 percent of the national fleet.

Introduction

The economic fallout of COVID-19 will deal a major blow to the United States automobile industry, which directly employs over 4 million people. Passenger vehicle sales posted a 38% decline in March[2] and an even greater crash is expected in April according to TrueCar.com.[3] Assembly lines for both conventional and electric vehicles have been shut down and supply chains disrupted. Federal grants to school districts and transit agencies for electric bus purchases and related charging infrastructure is one way to reboot this key sector of the economy while also supporting financially strapped transit agencies and school districts, and spurring investment in electric vehicle and battery manufacturing capacity.

Zero-Emission Buses Need a Boost. Virginia and Los Angeles Provide Models

The fleet of zero-emission, predominantly battery-electric, buses is growing rapidly but still constitutes a small share of the total. Less than 1% of school buses are currently electric. While many school districts are experimenting with electric buses, most of these are running pilot projects with orders for just a handful of electric buses. One major exception is in Virginia, where Dominion Electric has committed to the largest electric school bus program in the country in cooperation with school districts.[4] Dominion plans to have 50 electric school buses in service in 2020, replace most of Virginia's 1,500 school buses with electric buses by 2025, and electrify 100% of the bus fleet by 2030. The utility will pay the incremental cost of electric buses and install charging infrastructure in exchange for having access to the electricity storage capacity of buses as a grid asset when they are not in use transporting children.

The electric public transit bus fleet is also growing, with a total of almost 2,300 zero-emission electric or fuel cell buses in the United States as of September 2019.[5] Of those buses, over 1,000 are in California, with Los Angeles placing the single largest order of 155 electric buses and committing to convert its entire fleet to zero emission by the time it hosts the Olympics in 2028.

The Dominion electric school bus program in Virginia and the Los Angeles electric transit bus program in California show that electric bus technology is ready to scale. Many electric bus efforts, however, have stalled in their pilot stages due to a lack of federal assistance. Without Congressional support to accelerate progress it will take far too long to achieve the economic, health, and climate benefits that electric buses can provide.

Benefits

Scaling up electric bus manufacturing and use in the United States will create jobs, lower operating costs, increase resilience, improve public health, and lower carbon emissions.

- **Jobs**: Electric buses and their drivetrains are manufactured at facilities in Alabama, California, Georgia, Indiana, Minnesota, New York, North Carolina, and South Carolina using components from many other locations throughout the United States. Scaling up production would not only add thousands of jobs at these locations but could attract additional electric vehicle component suppliers to invest in the United States and better position the entire automobile industry to compete for the rapidly expanding zero-emission vehicle market.

- **Cost Savings:** Electric buses have much lower operating and maintenance costs than diesel buses. According to Proterra, their electric transit bus can achieve the equivalent of 25 mpg, compared to 5 mpg for a diesel hybrid bus, resulting in a two-thirds reduction in fuel costs.[6] Actual savings will depend on the details of the route and applicable electric rates, but an analysis by the California Air Resources Board found that an electric transit bus could save over $300,000 in fuel and maintenance costs over its lifetime compared to a diesel hybrid or compressed natural gas bus.[7] School buses travel fewer miles per year than transit buses so savings per bus will be somewhat lower. Nonetheless, the Twin Rivers school district in California has found that it is saving about $15,000 per year in operations and maintenance costs for its electric school buses compared with the remaining diesel school buses in its fleet.[8]

- **Resilience**: Electric buses are well suited to incorporate vehicle-to-grid (V2G) technology, which allows them to serve as mobile electricity storage devices.[9] If 60,000 electric buses carry batteries that store an average of 150 kWh each, the total capacity would be 9 GWh, or about nine times as much as the stationary battery energy storage capacity installed in the United States in 2019.[10] While the obvious fact that buses are mobile makes it more challenging to use them for grid services compared to stationary batteries during normal grid operations, this becomes an advantage during emergencies.

A fleet of electric buses with V2G capability, for example, could be deployed to critical locations during red flag warnings before transmission lines are powered down, and electric buses could quickly restore power to critical infrastructure in communities that are blacked out as a result of fire or storm damage to transmission lines. School buses, in particular, are also mostly available to serve as grid storage during the middle of the day and during summer months, so they pair well with solar electricity generation.

- **Health:** Replacing diesel buses with electric avoids emissions of harmful local pollution, which directly improves public health. Diesel exhaust is classified as a carcinogen by the International Agency for Research on Cancer,[11] and inhaling diesel pollution can impair lung function and aggravate asthma symptoms. The lung conditions caused by diesel pollutants also put Americans at increased risk and vulnerability for respiratory illnesses, such as COVID-19. Diesel buses emit pollution directly into densely populated neighborhoods, and diesel school buses directly harm children, whose lungs are particularly vulnerable, negatively affecting their ability to learn.[12] King County, Washington, estimates that each of its electric transit buses reduces health and environmental damages by more than $100,000 over its lifetime compared with diesel buses.[13]

- **Climate:** Replacing America's fleet of school and transit buses with electric buses would reduce carbon dioxide emissions by about 7 million tons per year,[14] and this climate benefit would grow over time as our electricity system becomes cleaner. With our current national average mix of electricity sources, electric buses reduce net carbon emissions by about 50% compared with diesel buses.[15] While this emission benefit varies from region to region, electric buses still have a significant advantage even in the most emissions-intensive areas.

Background

There are currently about 475,000 school buses in the United States, with the largest fleets in Texas, New York, Illinois, California, Pennsylvania, and Florida.[16] These familiar yellow buses transport 23 million children every school day and rack up 3.4 billion miles per year. The diesel buses that dominate the fleet also produce particulate air pollution, which is often found in higher concentrations inside the bus than outside, where it directly affects children's vulnerable lungs. States provide over $9 billion per year in aid to school districts for student transportation.

There are 66,000 public transit buses in the United States, driven over 2 billion miles per year and emitting about 6 million tons of CO2.[17] The majority of these buses are powered by diesel engines, either directly (42%) or in hybrid diesel-electric configurations (18%), with compressed natural gas buses accounting for almost 30%.

U.S. Electric Bus Manufacturing Creates Jobs, Including in Georgia, Indiana, North Carolina, Alabama, South Carolina, Minnesota, New York, and California

All three major school bus suppliers in the United States now offer electric versions of their familiar yellow buses:

- Blue Bird,[18] based in Fort Valley, Georgia, has over 1,500 employees and partners with Indiana-based Cummins for its electric bus powertrains. It makes electric versions of its iconic Vision, All American, and Micro Bird school buses.

- Lion Electric[19] makes three styles of electric school buses at its facilities in Quebec.

- Thomas Built,[20] with 1,600 employees based in High Point, North Carolina, is a division of Daimler Trucks. Its electric school buses use a powertrain supplied by Proterra (see below). Thomas Built makes the Safe-T-Liner® C2 Jouley™ electric school bus.

There are three primary electric transit bus suppliers in the United States:

- BYD[21] is one of the world's largest electric bus manufacturers. It has 750 U.S. employees, with its North American headquarters in Los Angeles and a manufacturing facility in Lancaster, California.
- New Flyer[22] is the largest transit bus maker in North America, with 6,900 employees and manufacturing facilities in Alabama, Minnesota, and New York, as well as in Canada. They make the Excelsior Charge electric bus in multiple configurations from 35- to 60-foot lengths.
- Proterra[23] with over 400 employees is a dedicated electric bus and powertrain producer headquartered in Burlingame, California, with manufacturing in Los Angeles and Greenville, South Carolina.

If Congress scales up federal programs to provide $20 billion to replace 60,000 school and transit buses—about 10% of the fleet—we would see a dramatic increase in the number of these jobs.

Federal Funding Programs

The Department of Energy, the Environmental Protection Agency, and the Department of Transportation have programs that could be scaled up to fund large-scale electric school and transit bus procurement and related charging infrastructure.

- The Department of Energy's **Clean Cities Program**[24] supports nearly 100 local coalitions of public and private stakeholders to reduce consumption of conventional transportation fuels. Funding and technical assistance through Clean Cities could support development of charging infrastructure for electric buses and provide funding for cities to procure electric buses for their school and transit fleets.
- The Environmental Protection Agency offers rebates for the purchase of electric school buses under the Diesel Emissions Reduction Act through its **Clean School Buses Program**.[25]
- The Department of Transportation's **Low and No Emission Vehicle Program**[26] funds local agencies to purchase zero-emission transit buses.

Recommended Investment

A federal investment of $20 billion through the Clean Cities, Clean School Buses, and Low and No Emission Vehicle programs would provide full funding to replace about 10% of the school and transit bus fleet with electric vehicles and provide for the necessary charging infrastructure, based on the following assumptions:

- 50,000 electric school buses at $250,000 per bus = $12.5 billion
- 10,000 electric transit buses at $750,000 per bus = $7.5 billion

These are conservative assumptions; the cost per bus should decline substantially as production scales up, allowing the replacement of a larger share of the bus fleet. The investment in production capacity for buses can also be leveraged for other medium- and heavy-duty vehicles, such as delivery trucks, passenger vans, and shuttle buses.

Conclusion

A federal investment of $20 billion in electric buses will create jobs in states throughout the country suffering from the economic shutdown and help scale up the capacity of the U.S. electric vehicle industry at a time of flagging new car sales. It will also accelerate the replacement of dirty diesel buses, a significant source of lung-damaging air pollution, which they are currently pumping directly into our neighborhoods and schoolyards.

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Endnotes

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