Committee: Ways and Means
Testimony on: HB1451 "School Bus Purchasing – Zero-Emission Vehicle – Requirement"
Position: Support
Hearing Date: March 4, 2020

The Chesapeake Chapter of Physicians for Social Responsibility submits this testimony in support of HB1451, which requires that new school buses bought after October 1, 2023, by a county board of education, and new school buses bought after October 1, 2026, by contractors who provide student transportation under contract to counties, be zero-emission vehicles.

This legislation will provide important health and other benefits to Maryland's children, for the following reasons:

Diesel emissions are the unhealthiest kind of transportation emissions – While important progress has been made in reducing the health-harming nature of diesel fuel and improving the efficiency and reducing pollution from heavy diesel vehicles, diesel exhaust fumes still have higher levels of health-harming substances, including particulate matter and nitrogen oxides, than other transportation fuels.[1] Most of the particulate matter in diesel soot is of "ultrafine" size - the most harmful type of particles because their microscopic size allows them to enter deep into the lungs and actually penetrate cell walls to enter the circulation. Particulate matter is strongly associated with pulmonary and cardiovascular risk and with long-term mortality. Nitrogen oxides from fossil fuel combustion, including diesel exhaust, are still the major precursors of ground level ozone, which is an important trigger of asthma attacks.

Diesel exhaust contains over 40 toxic air contaminants, including benzene, formaldehyde, and heavy metals. These and other substances make diesel exhaust exposure a recognized cause of cancer risk; the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment found that "long-term exposure to diesel exhaust particles poses the highest cancer risk of any toxic air contaminant evaluated."[2] As a result of studies of the health effects of diesel exhaust, in 2012 the International Agency for Research on Cancer (a division of the World Health Organization) listed diesel engine exhaust as "carcinogenic to humans."

Volunteer studies have also shown that exposure to diesel exhaust increases individuals' susceptibility to allergens that trigger asthma or other respiratory symptoms, and may actually facilitate the development of new allergies.[3]

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[1] Union of Concerned Scientists, *Diesel Engines and Public Health*; https://www.ucsusa.org/clean-vehicles/vehicles-air-pollution-and-human-health/diesel-engines, 2019
[2] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment and American Lung Association of California, *Health Effects of Diesel Exhaust*; 2001 (updated 2019)
[3] California Air Resources Board, *Overview: Diesel Exhaust and Health*; https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health, 2013

Children are more susceptible to these health effects – The developing lungs of children make them especially sensitive to the harmful effects of diesel exhaust exposure.[3,4] The high prevalence of asthma in young children increases this susceptibility, and asthma attacks are important causes of school absence and of medical care-seeking for school-age children. There is also strong evidence that exposure to transportation exhaust pollution causes long-term damage to lung development in children: a long term study of over 2,000 children in Los Angeles showed a direct connection between such exposure and reduced lung function development.[5] Because diesel exhaust makes up roughly 2/3rds of the particulate matter and half of the nitrogen oxide content of transportation pollution,[1] it is fair to say that part of this lung function impairment is attributable to diesel exhaust emissions.

Diesel school buses can directly expose children to diesel exhaust emissions – Almost everyone in the U.S. – especially in urban and suburban areas and near major transportation routes – is exposed to some degree of diesel exhaust pollution. While there is limited research on this issue, existing evidence indicates that diesel school buses can actually produce direct exposure of children to exhaust emissions that would be otherwise avoidable. Ironically, the greatest exposure documented occurred when children were actually riding in the bus. One study by Yale University researchers found that fine particulate matter pollution concentrations measured on buses were as much as 5-10 times higher than average pollution levels measured fixed-site pollution monitoring stations.[6] Another study controlled for other exhaust exposure by comparing pollution levels in school buses with those in surrounding traffic; that study determined that a child riding inside a diesel school bus may be exposed to as much as 4 times the level of diesel exhaust as someone riding in a car ahead of it.[7] Exposure levels were higher in the back of the bus and when windows were closed.

The time of second greatest exposure would be when children are lining up to board buses after school, especially if the buses are idling. This exposure would affect not just the children who travel on the buses, but potentially all children leaving school.

If an average school bus ride lasts 30 minutes each way, a child will spend about 180 hours each year exposed to this health risk. Across our state, in grades K-12, Maryland children will spend an estimated total of 80 million hours each year on school buses. This is a consequential health issue for our children.

Zero-Emission Vehicles – especially electric school buses – are a feasible and cost-effective alternative to diesel school buses – Zero-emission vehicles would include such technologies as fuel cells (which are not in mass production), but specifically include electric powered school buses. As of 2019, every major manufacturer of school buses is offering electric powered versions, and electric school buses are now available in every capacity category. The initial cost of an electric school bus is substantially greater than a diesel bus; however, the long-term savings in fuel, operation, and maintenance costs actually make the electric bus a more cost-effective investment over its lifetime. The U.S. Public Interest Group (US PIRG) determined that while electric school buses cost around $120,000 more than diesel school buses, lifetime fuel and

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[4] Liu, NM and Grigg, J, *Diesel, Children, and Respiratory Disease*; British Medical Journal (BMJ Paediatrics Open), 24 May 2018

[5] Gauderman, WJ, et al, Association of Improved Air Quality with Lung Development in Children; New England Journal of Medicine, vol.372, no.10; 5 March 2015

[6] Wargo, J, *Children's Exposure to Diesel Exhaust on School Buses*; Environment and Health; February 2002

[7] National Resources Defense Council Coalition for Clean Air, *No breathing in the aisles — diesel exhaust inside school buses;* https://www.nrdc.org/sites/default/files/schoolbus.pdf, January 2001

maintenance savings of electric school buses are around $170,000.[8] Forbes has calculated that in general, the fuel, operation, and maintenance cost savings of electric buses provide a payback in about 7 years;[9] the average life of a school bus is over 15 years.

It is also possible to find financing options that reduce the up-front "sticker shock" of new electric buses, allowing the savings over time to cover a significant part of the purchase cost. The NRDC's study reviewed available financing and funding choices and found that American cities and school districts already had a multitude of options to make the transition to electric buses feasible.[7] Based on all these feasibility findings, the NRDC proposed incremental replacement of diesel school buses with electric buses, as fleets are expanded or as diesel buses are retired from service and replaced.[7]

Finally – Providing basic support for a transition of our school buses to zero emissions vehicles will demonstrate to our children that we are serious about reducing pollution and greenhouse gases and addressing climate change – Our children hear a lot these days about climate change, and hear many expressions of concern about doing something. Pediatric experience shows clearly that our children learn more by what we do than what we say. Providing technical support and grant funding that will assist local jurisdictions as they begin this transition will ultimately create a visible change in a core element of the world children experience every day - going to school. It will provide a material lesson for our children. Since they are the ones who will bear the brunt of climate change, it's a lesson that's important – and urgent. We owe it to them, and to their health.

On these bases, we strongly support favorable action on HB1451.

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[8] US PIRG, *Paying for Electric Buses Financing Tools for Cities and Agencies to Ditch Diesel*; 30 October 2018
[9] Forbes, The U.S. just spent $84 million on electric buses; https://www.forbes.com/sites/sebastianblanco/2018/08/31/84-million-electric-buses/#50edccc65e40, 31 August 2018