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**SB835 - Public Schools - Heating, Ventilation, and Air-Conditioning Systems and Carbon Dioxide Monitors - Monitoring and Reporting Requirements**

Chairman Guzzone and members of Budget and Taxation Committee, thank you for the opportunity to provide written testimony regarding SB835.

The National Energy Management Institute (NEMI) works with public, private, and government organizations as well as companies nationwide to make indoor environments safer for people in schools, hospitals, and commercial buildings nationwide.

NEMI also creates training and certification opportunities, so consumers know the technicians — who assure fire safe safety systems are inspected, verify the Indoor Air Quality (IAQ) in schools, and ensure the Heating, Ventilation, and Air Conditioning (HVAC) systems in buildings are energy efficient — are the leading experts in their field. NEMI works with state and federal officials, as subject matter experts (SME), to make sure legislation and safety align, allowing members of the International Association of Sheet Metal, Air, Rail and Transportation (SMART) workers and the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) to use their training and experience to ensure the safety of building occupants and first responders.

## Intent

The overarching goal of SB835 is to ensure that the HVAC systems serving Maryland school buildings are not *just* operational but verified to be achieving design intent, providing the code required ventilation rate, and proper filtration while meeting the energy efficiency goals. All work is performed by a skilled, trained, and certified workforce which not only ensures the work is completed correctly; but promotes the growth of a skilled workforce needed to obtain the long-term energy efficiency goals of Maryland.

## Problem

Those of us who have spent time in school buildings and classrooms have recognized the signs of inadequate ventilation, thermal health, and overall IAQ. In March of 2021 the Government Accountability Office released the results of a study and estimated that 41% of school districts need

to update or replace the HVAC systems in at least half of their schools.[1] Poor IAQ can trigger or exacerbate asthma symptoms, which is the most common childhood chronic disease in the United states[2] and is the leading cause of absenteeism resulting in 13.8 million missed school days annually.[3] Improper filtration and ventilation contribute to the increased transmission of pathogens; a CDC study of 3000 individuals showed 57% sicknesses can be attributed to poor ventilation.[4] Additionally, HVAC systems are responsible for an estimated 50% of all energy use at K-12 schools in the South Atlantic regions[5], compared to lighting which only comprises 11% of energy use in a building.[6] Improperly or inefficiently operating HVAC systems can cause significantly higher energy use resulting in unnecessary energy costs to further squeeze limited budgets. Even new, high efficiency, HVAC units can waste energy and provide inadequate IAQ. A study by UC Davis and Lawrence Berkely National Lab showed only 15% of new units were providing adequate ventilation only 3 years after installation.[7] Other studies have show that 50% of new HVAC systems and 85% of replacement HVAC systems were not performing correctly due to poor quality installation.[8] [9]

## Benefits

Maintaining the proper levels of ventilation and filtration can produce significant benefits beyond code compliance and reduction in student absences. 8 studies reported that increased ventilation rates or lower $CO_2$ concentrations can increase student performance up to 15%.[10] Another study in the southwestern United States showed schools with proper indoor temperatures and higher ventilation rates resulted in 13-14% increase in students achieving satisfactory scores in math and

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[1] K-12 Education School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement (Rep. No. GAO-20-494). (June 4th, 2020). United States Government Accountability Office. https://www.gao.gov/assets/710/707374.pdf

[2] "The Links Between Air Pollution and Childhood Asthma," US Environmental Protection Agency, 2018, https://www.epa.gov/sciencematters/links-between-air-pollution-and-childhood-asthma.

[3] "Standard 55- Thermal Environmental Conditions for Human Occupancy," ASHRAE, 2020, https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmentalconditlons-for-human-occupancy; "Moisture Control, Part of Indoor Air Quality Design Tools for Schools," US Environmental Protection Agency, 2022, https://www.epa.gov/iaq-schools/moisturecontrol-part-indoor-air-quality-design-tools-schools; "Standards 62.1 & 62.2," ASHRAE, 2022, https://www.ashrae.org/technical-resources/bookstore/standards-&2-1-62-2; and Jose Guillermo Cedeno Laurent, et al., "Reduced Cognitive Function During a Heat Wave Among Residents of Non-Air-Conditioned Buildings: An Observational Study of Young Adults in the Summer of 2016,"PLOS Medidne 15, no. 7 (2018): e1002605, https://doi.org/10.1371/joumal.pmed.1002605.

[4] Allen, Joseph and Macomber, John. "What Makes an Office Building "Healthy"". Harvard Business Review. April 2020. https://hbr.org/2020/04/what-makes-an-office-building-healthy

[5] Emma Hines and Sara Ross, HVAC Choices for Student Health and Learning: What Policymakers, School Leaders, and Advocates Need to Know, RM I and Undaunted K12, 2023, https://rmi.org/insight/ hvac-choices-for-student-health-and-learning/.

[6] Department of Energy September 2015, An Assessment of Energy Technologies and Research Opportunities, Ch.5: Increasing Efficiency of Building Systems and Technologies, https://www.energy.gov/sites/prod/files/2017/03/f34/qtr-2015-chapter5.pdf

[7] Chan, et al, Ventilation rates in California classrooms: Why many recent HVAC retrofits are not delivering sufficient ventilation, Building and Environment Journal 167 (2020) (https://www.sciencedirect.com/science/article/pii/S0360132319306365).

[8] California Energy Commission, Strategic Plan to Reduce the Energy Impact of Air Conditioners (June 2008), CEC-400-2008-010, at p. (v) (https://docplayer.net/6285926-Staff-report-strategic-plan-to-reduce-the-energy-impact-of-air-conditioners-california-energy-commission-june-2008-cec-400-2008-010.html );

[9] Zabin, et. al, Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities, Don Vial Center for Employment in the Green Economy (2014), at pp. 32-34 and Appendix 2B (http://laborcenter.berkeley.edu/workforce-issues-and-energy-efficiency-programs-a-plan-for-californias-utilities/).

[10] Fisk, W. J., The ventilation problem in schools: literature review, Indoor air. https://onlinelibrary.wiley.com/doi/epdf/10.1111/ina.12403

reading tests.[11] This emphasizes the importance of using skilled, trained, and certified individuals for testing, repairs, and upgrades.

## Solution

While school district budgets do not have the available funding to wholesale repair, replace, or install new HVAC systems in every school in their jurisdiction; SB835 provides for a Ventilation Verification assessment of the existing HVAC infrastructure. A mechanical engineer then uses the resulting assessment report to reduce assumptions and work with the school district to make repairs, adjustments, or replace HVAC units based on regional requirements and available funding. To assist in this effort, the federal government is in the process of releasing once in a generation level of funding that can be used to improve IAQ and improve HVAC energy efficiency.

## Legislation

The proposed solution that is outlined in this bill is not unique, in fact many other states have adopted similar legislation; California passed AB841 & AB2232, Connecticut passed HB5506, Nevada passed AB257, New Jersey passed SB3995, and Delaware passed SB270. This year similar bills are being introduced in Pennsylvania, Oregon, Wisconsin, Illinois, New York, and New Mexico.

Thank you for your time and your attention to this matter of immense importance to school children, teachers, and administrators performance and health. Further information and publicly available resources can be found at https://www.nemionline.org/ but I would be happy to provide further information to the committee if desired, my contact information is below.

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[11] U. Haverinen-Shaughnessy, R.J. Shaughnessy, E.C. Cole, O. Toyinbo, D. J. Moschandreas, An assessment of indoor environmental quality in schools and its association with health and performance, Build. Environ. 93 (2015) 35–40. https://www.semanticscholar.org/paper/An-assessment-of-indoor-environmental-quality-in-Haverinen-Shaughnessy-Shaughnessy/d8ce5901edcd7401e118bf43d4bce436a77cb82e