Date of Hearing: April 19, 2022

ASSEMBLY COMMITTEE ON HIGHER EDUCATION
Jose Medina, Chair
AB 2232 (McCarty) – As Introduced February 15, 2022

SUBJECT: School facilities: heating, ventilation, and air conditioning systems.

SUMMARY: Requires a school district, county office of education (COE), charter school, private school, the California Community Colleges (CCC), the California State University (CSU), and requests the University of California (UC), once every five years, to inspect heating, ventilation, and air conditioning (HVAC) systems based on specified requirements, and ensure that all classrooms are equipped with a carbon dioxide (CO2) monitor. Specifically, **this bill**:

1) Makes several legislative findings and declarations, including, but not limited to, the following:

   a) It is the policy of this state that school facilities be designed and operated using available measures to provide a healthy indoor environment for students, teachers, and other occupants including, but not limited to, healthy indoor air quality and adequate ventilation with outdoor air;

   b) The 2019 report by UC Davis Western Cooling Efficiency Center and the Indoor Environment Group of the Lawrence Berkeley National Laboratory found that over one-half of new HVAC systems in schools had significant problems within three years of installation and that the vast majority of classrooms in California, including 95 percent of the classrooms studied in the Central Valley, continue to fail to meet minimum ventilation rates; and,

   c) The persistence of underperforming HVAC systems and inadequate ventilation rates in the classroom highlight the need for more prescriptive testing, monitoring, and maintenance requirements.

2) Establishes the following definitions:

   a) "Certified TAB Technician" means a technician certified to perform testing, adjusting, and balancing of HVAC systems by the Associated Air Balance Council, the National Environmental Balancing Bureau, or the Testing, Adjusting and Balancing Bureau;

   b) "Covered school" means a school district, a COE, a charter school, a private school, the CCC, or the CSU;

   c) "HVAC" means heating, ventilation, and air conditioning;

   d) "HVAC Acceptance Test Technician" means a technician certified to complete the forms set forth in subparagraph (B) of paragraph (1) of subdivision (b) of Section 10-103.2 of Part 1 of Title 24 of the California Code of Regulations by an Acceptance Test Technician Certification Provider approved by the State Energy Resources Conservation and Development Commission (CA Energy Commission) to provide that certification;

e) "Ppm" means parts per million; and,

f) "TAB" means testing, adjusting, and balancing.

3) Requires a covered school, and requests the UC, to ensure that facilities, including, but not limited to, classrooms for students, have HVAC systems that meet the minimum ventilation rate requirements set forth as specified in Table 120.1-A of Part 6 (commencing with Section 100.0) of Title 24 of the California Code of Regulations, to prevent students from being exposed to poor indoor air quality conditions.

4) Requires, at least once every five years, the annual inspection required for HVAC systems pursuant to Section 5142 of Title 8 of the California Code of Regulations of a covered school to include, and for the UC is requested to include, all of the following:

a) Verification that HVAC system filters are installed correctly and replaced where needed;

b) Calculation of the required minimum outside air ventilation rates for each classroom based on the anticipated classroom size and the minimum required ventilation rate per occupant set forth in Table 120.1-A of Part 6 (commencing with Section 100.0) of Title 24 of the California Code of Regulations, and, where needed, adjustment of the classroom ventilation rates to meet said standards;

c) Requires testing to be performed by a Certified TAB Technician or a HVAC Acceptance Test Technician and adjustments to be performed by a Certified TAB Technician;

d) Where applicable to the HVAC system inspected, performance of the testing requirements of the Mechanical Acceptance Tests adopted by the State Energy Resources Conservation and Development Commission for (i) Outdoor Air Acceptance; (ii) Constant Volume, Single-Zone, Unitary Air Conditioner and Heat Pump Systems Acceptance; (iii) Air Economizer Controls Acceptance; and (iv) Demand Control Ventilation Systems Acceptance. Requires the Mechanical Acceptance Tests to be performed by a HVAC Acceptance Test Technician;

e) Review of control sequences to verify systems will maintain intended ventilation, temperature, and humidity conditions during school operation;

f) Testing and recalibration of CO2 sensors, except for CO2 sensors installed or recalibrated within the previous three years; and,

g) Recommendations for repairs, replacements, or other remediation necessary to correct issues identified by the inspection and documentation of any repairs, adjustments, replacements, or other remedial actions taken to correct these issues.

5) Requires the documentation of compliance with the annual inspection required by this measure, including documentation of any repairs, adjustments, replacements, or other remedial actions taken or recommended to correct issues identified by the inspection, to be maintained by a covered school, and is requested to be maintained by the UC, for at least two compliance cycles, or 10 years, and made available to the public upon request.

6) Requires a covered school to, and the UC is requested to, ensure that all classrooms are equipped with a CO2 monitor that meets all of the following requirements:

   a) CO2 monitors installed in existing classrooms are hardwired or plugged in and mounted on the wall between three and six feet above the floor and at least five feet away from the door and operable windows;

   b) CO2 monitors for all new classroom construction are hardwired and, where applicable, integrated with building automation systems to ensure proper control of the outdoor air damper and demand control ventilation features;

   c) The CO2 monitor displays the CO2 readings through a display on the device or other means, such as a web-based application or cellular phone application;

   d) The CO2 monitor provides a notification through a visual indicator on the monitor, such as an indicator light, or other alert system, such as an electronic mail, text, or other cellular phone application, when the CO2 levels in the classroom have exceeded 1,100 ppm;

   e) The CO2 monitor maintains a record of previous data that includes at least the maximum CO2 concentration measured;

   f) The CO2 monitor has a range of 400 to 2,000 ppm or greater; and,

   g) The CO2 monitor is certified by the manufacturer to be accurate within 75 ppm at 1,000-ppm CO2 concentration and to require calibration no more frequently than once every five years.

7) Provides that the requirements, as enumerated in all of (6) above, may be amended by the Division of the State Architect (DSA) by regulation as necessary to reflect available technology and to achieve the intent of this bill.

8) Requires the classroom ventilation rates, or for the UC is requested to, be adjusted by a Certified TAB Technician to ensure that peak CO2 concentrations in the classroom remain below the maximum allowable CO2 ppm setpoint if a classroom CO2 monitor of a covered school or the UC indicates CO2 concentrations greater than 1,100 ppm more than once a week, as recorded by the monitor or as observed by a teacher or other staff.

9) Requires a covered school to, and the UC is requested to, keep a complete and accurate record for each incident where the CO2 setpoint was exceeded in a classroom and a record of any remediation or adjustments made as a result of the exceedance, maintain these records for at least five years, and make these records available to the public upon request.

10) Specifies that this bill shall apply to the UC only to the extent that the UC Regents, by resolution, make it applicable.

EXISTING LAW:

1) Establishes the UC as a public trust to be administered by the Regents of the UC; and, grants the Regents full powers of organization and government, subject only to such legislative

control as may be necessary to insure security of its funds, compliance with the terms of its endowments, statutory requirements around competitive bidding and contracts, sales of property and the purchase of materials, goods and services (Article IX, Section (9)(a) of the California Constitution).

2) Establishes the CCC, a postsecondary education system in this state, consisting of community college districts and the Board of Governors of the CCC (Education Code (EC) Section 70900).

3) Establishes the CSU administered by the Board of Trustees, and provides that the Trustees shall have the full power over the construction and development of any CSU campus and any buildings or other facilities or improvements (EC Section 89030, et seq.).

4) Defines "good repair" as a facility that is maintained in a manner that assures that it is clean, safe, and functional. Requires the school facility inspection and evaluation instrument and local evaluation instruments to include specified criteria, including the criterion that mechanical systems, including HVAC systems, are functional and unobstructed and appear to supply adequate amount of air to all classrooms, work spaces, and facilities (EC Section 17002).

5) Establishes the Clean Energy Job Creation Program to and allocates Proposition 39 revenues to fund energy efficient retrofits and clean energy installations as well as related improvements and repairs that contribute to reduced operating costs and provide certain non-energy benefits, including improved health and safety conditions in public schools. The program also allocated funds to the State Energy Conservation Assistance Account Education Subaccount to provide local education agencies with no-interest revolving loans to fund energy efficiency and renewable energy projects (Public Resources Code Section 26200, et seq.).

6) Establishes, until January 1, 2027, the School Energy Efficiency Stimulus Program at the California Energy Commission to fund appliance, plumbing and HVAC upgrades to schools using electric ratepayer-funded energy efficiency incentives (Public Utilities Code Section 1610, et seq.).

FISCAL EFFECT: Unknown

COMMENTS: *Double referral*. This bill passed out of the Assembly Committee on Education, with a vote of 5 - 1 on April 6, 2022. The Committee heard the measure as it pertained to matters that were germane to its jurisdiction.

Need for measure. According to the author, “Poor air quality in classrooms are a pervasive problem that negatively impact student health and learning.”

The author contends that, “Despite laws requiring schools to maintain functional HVAC systems to supply adequate ventilation and safe indoor air quality, poor indoor air quality remains an extensive problem.” Further, the author states that, “Poor installment of HVAC systems substantially increase energy costs and fail to maintain good indoor air quality.”

According to the author, "AB 2232 will require comprehensive HVAC inspections and air monitors in classrooms to ensure the wellbeing and learning of California students are protected from the harmful effects of poor air quality."

Existing HVAC requirements. As cited in the Assembly Committee on Education analysis of this bill, various sections of the law, in different Codes and Code sections, require school facilities to be in good working order and well maintained, including specified inspections. In 2004, the state settled the *Williams v. California* lawsuit and agreed to a number of initiatives intended to provide equal access to instructional materials, safe and decent school facilities, and qualified teachers. The settlement resulted in an agreement to provide funds to low performing schools (deciles 1-3 on the Academic Performance Index), including $800 million for emergency repair of school facilities.

COEs were charged with the inspection of the low-performing schools based on criteria of schools in good repair. "Good repair" is defined as a facility that is clean, safe and functional. The settlement also includes a lengthy list of facilities components required to be inspected, including gas pipes, doors and windows, fences, fire sprinklers, fire extinguishers, alarm systems, electrical systems, lighting, drinking fountains, roofs, gutters, and mechanical systems, which includes HVAC systems.

Committee Staff notes that while "good repair" is clearly defined in the Education Code for school facilities, it is not defined for any of the campuses of the public or private postsecondary institutions of higher learning (segments); that is to say, campuses of the UC, CSU, CCC, or California's independent colleges and universities (ICCU). Further, while this measure requires private K-12 schools to adhere to the requirements contained therein, the measure does not include the ICCUs in the State.

Moving forward, the author may wish to work with all affected stakeholders in creating a definition of "good repair" for the segments. Additionally, seeing that this measure requires private K-12 schools to participate, the author may wish to include, to the extent possible, ICCUs.

Additionally, under the Labor Code, the Occupational Safety and Health Standards Board (Board) is authorized to develop health and safety requirements for the protection of workers. Regulations adopted by the Board (Title 8, Section 5142) require HVAC systems to be maintained and operated in accordance with the State Building Standards Code and continuously functioning during working hours with some exceptions (e.g., during scheduled maintenance). The regulations also require the HVAC system to be inspected at least annually and problems found during the inspections to be corrected within a reasonable time. The employer is required to document in writing the name of the individual inspecting or maintaining the system, the date of the inspection and/or maintenance, and the specific findings and actions taken. The records are required to be retained for at least five years and made available for examination and copying, within 48 hours of a request, to the Division of Industrial Relations, any employee of the employer, and to any designated representative of employees.

More requirements? This measure, in part, requires the CCC, the CSU, and requests the UC, to conduct comprehensive HVAC inspections once every five years, consistent with standards developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and using a TAB-certified technician or an HVAC Acceptance Test Technician. The

inspector shall recommend repairs, replacements, and remediation to correct issues identified in the inspection.

Committee Staff understands that while the facilities of the 115 brick and mortar campuses and 78 centers of the CCC; the 23 campuses and eight satellite campuses and/or centers of the CSU; and, the 10 campuses of the UC adhere to the current health and safety laws surrounding HVAC inspections, it is presently unclear, if any of the current inspections align to the requirements prescribed in this measure.

Carbon dioxide monitors. According to information provided by the author, studies have found a link between low ventilation rates (supply of outdoor air) in classrooms and attendance, health and student performance. Adequate ventilation helps students be more alert and focused and is associated with fewer respiratory symptoms and absences due to illness. Ventilation standards are specified in Title 24 regulations. In a 2020 article, researchers at the Lawrence Berkeley National Laboratory and the Western Cooling Efficiency Center at UC Davis reported findings of a study of 11 K-12 schools, monitoring 104 classrooms, with ventilation rates of a majority of the classrooms exceeding the Title 24 level. The CO2 monitors can be used as a proxy for the level of ventilation in a classroom. When classrooms are empty, CO2 levels will be lower. When classrooms are occupied, CO2 levels will be higher as CO2 is exhaled by the people in the room.

This measure, in part, requires the installation of CO2 monitors in all classrooms. It specifies that the DSA can adjust the specific technical requirements of the CO2 monitors. However, if there is a CO2 reading above 1,100 ppm more than once per week, a TAB-certified technician shall adjust the CO2 level. Which means, it is not enough to simply install a CO2 monitor, but a person must also monitor the CO2 levels.

Committee Staff understands that while the maintenance crews of the various segments hold a variety of certifications, they are not required to hold a TAB certification, which is a very specialized certification. Further, it is presently unclear if any public entities, such as the CCC offer the TAB certification. Knowing that most classified employees of the segments, who comprise the maintenance crew, do not hold the specialized certification, it would appear that for the segments to adhere to the prescribed requirements of this measure, they would have to contract out key maintenance and operations work.

At a time when many of the segments are experiencing declining enrollment and their classrooms and lecture halls are not at capacity, due, in part, to the COVID-19 pandemic, and more classes remain virtual and/or campuses are utilizing a hybrid model of learning, what does the future entail for classroom learning?

For example, much of the CSU's 23 campuses were constructed with classrooms of fewer than 50 seats. Of the 2,794 CSU classrooms in a 2019-20 system inventory, only 133 can accommodate more than 100 students, and only 3 seat more than 300. Additionally, across UC's nine undergraduate campuses, most report that 15% or less of their lecture rooms can seat more than 100 students and approximately 2% can accommodate more than 300 students, according to a 2018 survey. However, as aforementioned, most classrooms and lecture halls are currently not to seating capacity.

With this in mind, the question becomes, is there a demand for the upgrades as required in this measure, which could potentially lead to increased energy bills at a time when many campuses continue to struggle financially?

The Committee may wish to examine if it is prudent to pass a measure that potentially takes away the local control of each campus and adds costs pressures by their potentially having to contract out for TAB-certified technicians to adjust CO2 levels.

Additionally, for campuses that are in rural or remote regions of the state, whereby it is already challenging to hire qualified technicians, what do the campuses do if they encounter an issue with the CO2 levels and there is not a TAB-certified technician in close proximity?

Moving forward, the author may wish to work with the segments in order to determine if an exemption should be included for campuses in rural or remote regions of the state to be exempt from the requirements contained in this measure.

Further, Committee Staff understands that as of January 1, 2023, CO2 monitors are required in all new CCC facilities; and that during the next phase of Title 24 regulations (which CCC must adhere to), CO2 monitors may be required for CCC facilities doing repairs or alterations.

The Committee may wish to consider if it is prudent to create a mandate regarding CO2 monitors knowing this idea is going through the regulatory process.

Other methods? According to the Community College Facility Coalition (CCFC) the CCC works hard to ensure healthy indoor air quality. During the COVID-19 pandemic, this has become even more critical. Many CCCs have sophisticated building management systems to monitor and manage mechanical and electrical equipment controlling ventilation, lighting, power systems, security, and other key components that directly affect health, safety, and educational outcomes.

For example, San José-Evergreen Community College District (SJECCD) started a Building Management System upgrade during the pandemic in Fall 2020, to replace the system at Evergreen Valley College and create a single platform for use across the entire SJECCD. During the project, SJECCD evaluated if the district would include CO2 monitors in all classrooms as part of the project, but ultimately found it to be cost prohibitive.

Committee Staff understands that for SJECCD to install CO2 monitors in all classrooms would have created a 25% increase on a $500,000 upgrade project to purchase the CO2 monitor devices and connect, install, program, and commission them to integrate with SJECCD's Building Management System. Committee Staff further understands that SJECCD has CO2 sensors in many of SJECCD's buildings at the building level, typically at the rooftop air handling unit, but not at the classroom level.

Using local control, SJECCD made a decision that was best for its region. As this measure is drafted, it appears to have the potential to take local control away from the CCC, CSU, and the UC (should they choose to adhere to the requirements of this measure).

The Committee may wish to consider if this measure is too prescriptive in nature; thus taking local control away from the CCC, CSU, and potentially the UC.

Committee comments. This measure, in part, requires the classroom ventilation rates, or for the UC is requested to, be adjusted by a Certified TAB Technician to ensure that peak CO2 concentrations in the classroom remain below the maximum allowable CO2 ppm setpoint if a classroom CO2 monitor of a covered school or the UC indicates CO2 concentrations greater than 1,100 ppm more than once a week, as recorded by the monitor or as observed by a teacher or other staff.

Committee Staff notes that the bill is silent as to how the observation would take place and how said observers would be trained to observe. That is to say, the measure does not require districts to identify teachers or staff to monitor readings. Further, in higher education students are instructed by faculty or instructors, not teachers, like in K-12 education.

Moving forward the author may wish to provide clarity as to the requirements for teachers or staff monitoring the CO2 outputs. Further, the author may wish to specify that for the participating higher education segments, a faculty member or instructor is observing the CO2 readings.

Arguments in support. According to the Western States Council Sheet Metal Workers, sponsors of the measure, "AB 2232 requires that all schools during their annual inspection, at least once every five years, have HVAC inspections once every five years by a certified professional. Carbon dioxide monitors must also be installed and programs with live updates on air quality so teachers will be alerted when levels are reaching a dangerous level."

The sponsors go on to state that, "It is essential for certified professionals to do this work so that HVAC systems are properly installed for our schools to have safe air quality." Further, the sponsors state, "Correctly installed HVAC systems are also essential for schools to reduce their energy use since these systems are more efficient. Studies have found that the incorrectly installed HVAC systems lead to underperformance causing a 30% increase in costs for schools."

The sponsors contend that, "We must do everything we can to protect students and create a productive learning environment while also reducing energy use."

Arguments of concern. The CCFC, in their letter of concern stated, AB 2232 requires installation of CO2 monitors in all classrooms, without providing a funding source to complete the work and without recognition of the scope of work required."

The CCFC further states that, "Installation of CO2 monitors is currently governed by California Building Code and triggered by a construction or modernization project. This bill would require installation of CO2 monitors in all classrooms, without a triggering event such as a construction project."

The CCFC contends that, "AB 2232 places too much specificity in statue. The requirements in AB 2232 for installation of CO2 monitors are highly prescriptive…we are also unsure how existing systems that include CO2 monitors that don't meet these specifications would be treated."

Related legislation. AB 2162 (Mullin) of 2022, which is pending action in the Assembly Committee on Education, in part, adds that, with respect to mechanical systems, "good repair" also means that the ventilation rate of every mechanical ventilation system used to prevent

harmful exposure is tested after initial installation, alterations, or maintenance, and at least annually, by means of a pitot traverse of the exhaust duct or equivalent measurements, and that records of these tests are maintained for at least 5 years.

Prior legislation. AB 841 (Ting), Chapter 372, Statutes of 2020, establishes a program at the CA Energy Commission to fund appliance, plumbing and HVAC upgrades to schools using electric ratepayer-funded energy efficiency incentives.

AB 2162 (O'Donnell), of 2020, which was held in the Assembly Committee on Education, would have required a school district to ensure that school facilities meet the minimum requirements of regulations enacted by the Occupational Safety and Health Standards Board that govern the quality of air provided to employees in places of employment, and would have required school districts to use contractors who have been certified by a nationally recognized organization for the inspection, maintenance, and repair of HVAC systems.

AB 2453 (Eduardo Garcia), Chapter 714, Statutes of 2018, authorizes a modernization apportionment from state school facilities bond funds to be used for air filtration systems. Authorizes a school or school district located in a community with a high cumulative exposure burden, as specified, to be eligible for grants as part of a community emissions reduction program to implement air quality mitigation efforts.

AB 1126 (Rendon), of 2015, which was held on the Suspense File in the Senate Committee on Appropriations, would have required a COE, a school district and a public school, as specified, to post on its website: 1) the most recent date of a HVAC system inspection report; and, 2) information on how to obtain the report.

REGISTERED SUPPORT / OPPOSITION:

Support

California Federation of Teachers, AFL-CIO
California Teachers Association
U.S. Green Building Council
Western States Council Sheet Metal Workers (Sponsor)

Opposition

None on file.

Analysis Prepared by: Jeanice Warden / HIGHER ED. / (916) 319-3960