EFFICIENT AND HEALTHY SCHOOLS

EFFICIENT AND HEALTHY SCHOOLS CAMPAIGN

Round 1 Recognition –

March 23, 2022

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Table of Contents

Efficient and Healthy Schools Campaign

Recommendations for Best-In-Class and Notable Achievement Recognition

Overview

The Efficient and Healthy Schools campaign (EHSc) aims to recognize K-12 schools and school districts that have implemented exemplary solutions involving heating, ventilating, and air- conditioning (HVAC) upgrades and other approaches to reduce energy costs and improve energy efficiency and indoor air quality (IAQ). This document provides a summary of school districts that applied for recognition during the first round of recognition (October to December, 2021).

The categories for recognition from EHSc are:

(1) HVAC Inspection and Maintenance for IAQ;
(2) Efficient HVAC for Indoor Environmental Quality (IEQ);
(3) Ongoing Monitoring and Analytics for HVAC Performance; and
(4) Team Approach to Support Strategic Investments in Efficient and Healthy Schools.

A total of 27 applications were received from nine school districts, including: seven applications each for categories (1), (2), and (4), and six applications for category (3).

As of January 24, 2022, there are 23 total districts and 726 schools (covering 438,977 students) that are participants in the EHSc. The nine school districts (486 schools supporting 334,228 students) that applied for recognition during the first round represent 40% of schools participating in EHSc. Two (22%) of the applicant districts have a high percentage of students receiving reduced price/free lunch, and one of these is a rural remote district (National Center for Education Statistics (NCES) Locale Code 43); five (55%) have a medium percentage of students receiving reduced price/free lunch; and two (22%) have a low percentage of students receiving reduced price/free lunch.

Best-in-Class Recognition

The LBNL team[1] prepared a summary table that includes all raw responses provided by applicants for each question in their application. From this tabulated summary, the LBNL Team identified responses from applicants that set them apart from their cohort.

[1] Rengie Chan, Alexandra Johnson, and Carolyn Szum, Energy Technologies Area, Lawrence Berkeley National Laboratory.

(1) HVAC Inspection and Maintenance for IAQ

Description: This category seeks to recognize schools and school districts that implement an inspection and maintenance policy to ensure adequate ventilation and effective filtration for good IAQ.

Best-in-class: In addition to performing periodic inspections of HVAC systems; utilizing approaches to aid systematic inspection of equipment; performing testing, adjusting, and balancing (TAB) to verify HVAC performance; and recently improving filtration efficiency, the best-in-class applicants also provide ongoing workforce training, and have taken additional steps to ensure effective filtration, such as by monitoring pressure drop, reducing filter bypass, and testing airflow to optimize filtration performance.

(2) Efficient HVAC for Indoor Environmental Quality

Description: Schools and school districts that use technical specifications for HVAC retrofits, upgrades, and/or replacements, resulting in reduction in energy costs and improvements in energy efficiency and indoor environmental quality (IEQ).

Best-in-class: In addition to setting design and technical specifications to ensure that HVAC retrofits, upgrades, and/or replacement meet outside air and other requirements for good IAQ, the best-in-class applicants provided very detailed descriptions of their requirements, including high-performance filtration specifications and their practice to conduct carbon dioxide (CO2) trend analysis to verify ventilation.

(3) Ongoing Monitoring/Analytics for HVAC performance

Description: Schools and school districts that use energy management and information systems (EMIS) to improve HVAC performance and operation through fault detection and diagnostics, benchmarking, and commissioning.

Best-in-class: In addition to utilizing EMIS for performance tracking, monitoring and verification, the best-in-class applicants also provided training to staff on EMIS, and communicate results with the school community to encourage their involvement in energy efficiency.

(4) Team Approach to Support Strategic Investments

Description: Schools with a formal collaboration between facilities personnel, school administration, and the community for strategic planning and investment in efficient and healthy buildings.

Best-in-class: In addition to setting quantitative energy goals, the best-in-class applicants also described in their submissions the role of energy management team, how information is communicated with the school community, and the incorporation of IAQ best practices.

Notable Achievement

In addition, the LBNL team identified three notable achievements for each recognition categories. Staff from U.S. Department of Energy[2] and U.S. Environmental Protection Agency[3] reviewed the nominations for notable achievements and each gave two votes for each category. Applicants that were not already recognized by best in class but received three or more votes for the category received the notable achievement mention.

Recommendations for Recognition

(1) HVAC Inspection and Maintenance for IAQ

This category seeks to recognize schools and school districts that implement an inspection and maintenance policy to ensure adequate ventilation and effective filtration for good IAQ.

Best-in-Class

Newark Board of Education, NJ

- The district performs ongoing, regular maintenance of all the mechanical HVAC systems, including replacing filters, cleaning coils, and ensuring dampers are operating properly. Facility engineers or technicians documented inspection and maintenance activities using the SchoolDude work order system. Because a lot of the HVAC equipment is older, the district emphasizes operations and maintenance (O&M).
- A qualified testing, adjusting, and balancing (TAB) professional is utilized by the school district when installing or retrofitting HVAC equipment. Bathroom and kitchen exhaust fans are inspected annually to validate performance. At the end of the year, each piece of mechanical equipment is checked for debris, cleaned, and filters are changed.
- Ongoing workforce training related to HVAC inspection and maintenance is provided to facility managers through the Safe School software application.
- Work has been completed since 2018 to improve filtration in HVAC systems, including increasing the minimum efficiency reporting value (MERV) of air filters and ongoing monitoring of pressure drop. Based on HVAC design values, the district switched from MERV 8 air filters to the MERV 13 filters.

[2] Sam Petty and Carl Shapiro, Commercial Building Integration, Building Technologies Office.
[3] Tracy Enger, EPA IAQ Tools for Schools, and Katy Hatcher, EPA EnergyStar Portfolio Manager.

- In addition to work conducted by in-house facility managers, the district also partners with outside firms to keep equipment running in top condition. As part of the ongoing effort, the district developed an Energy Savings Plan (ESP) under a state-wide Energy Savings Improvement Program (ESIP). ESIP provide funds to improve a building's energy performance, and the savings from those improvements pay for the equipment upgrades over time (up to a maximum of 20 years). As part ESIP, building assessments were conducted to collect data on the schools' air flow systems, documenting deficiencies and determining what to do to meet American Society for Heating and Air-Conditioning Engineers (ASHRAE) and Center for Disease Control (CDC) clean air guidelines.

Charleston County School District, SC

- A combination of facility engineers, facility managers, energy managers, and consultants conduct daily inspections of district HVAC systems utilizing the district's Building Automation System (BAS). Any detected problems by the BAS sweep are communicated to the "HVAC Shop" through a work order process (email or a phone call, depending on the severity of the issue). Additionally, the district's Preventative Maintenance (PM) Shop conducts scheduled routine maintenance on HVAC equipment (applicant provided a detailed PM process for belts, tension, and laser sheave alignment as an example). The PM staff utilize a checklist to document the inspections of HVAC systems, which is attached to work orders.
- A TAB professional is utilized by the school district when installing new HVAC equipment, performing HVAC retrofit, or conducting HVAC commissioning. Bathroom exhaust fans are inspected to validate performance via a mechanic in the HVAC Shop that is dedicated to exhaust and ventilation. Many of the exhaust fans are tied into the BAS so that during the daily sweeps, the facilities managers are able to see if they have a failed piece of equipment. Kitchen exhaust fans in hoods are inspected daily by kitchen managers, with more detailed inspections conducted annually.

- Ongoing workforce training related to HVAC inspection and maintenance is identified by the PM Coordinator and HVAC Shop Foreman and provided to mechanics.
- The district ensures HVAC filters are properly fit and changed on schedules, and coils are cleaned annually (at a minimum). They also ensure proper belt tensioning and bearings are greased to prevent premature motor failure. Mechanics check to see that all central plants (cooling towers, chillers, water pumps/motors) are fully and efficiently operational. They also monitor temperature (70° Fahrenheit (F) heating season, 73° F cooling season), relative humidity (55%) and carbon dioxide (CO2) (800 parts per million (ppm)) setpoints.

- Work has been completed since 2018 to improve filtration in HVAC systems, including increasing the MERV of air filters and ongoing monitoring of pressure drop. The school district tested HVAC airflow and system capacity, consulted with filter suppliers, and relied on facility managers' working knowledge of HVAC systems to determine the highest MERV filtration without adversely HVAC equipment. The district switched from MERV 9-11 air filters to the mostly MERV 12-13, and some 14+ filters.

Greenville County Schools, SC

- Facility engineers or technicians, energy manager, or preventative maintenance technicians conduct quarterly inspections of district HVAC systems, and the inspection and maintenance activities are facilitated by manufactures' recommended task lists and documented within the in-house work order system. Timely filter changes, coil cleaning, air handling unit (AHU) cabinet and duct cleaning, condensate drain system cleaning and inspections, and outside air intake/louver operation verification; and data trending on the building automation system (BAS). Bathroom and kitchen exhaust fans are inspected annually to validate performance.
- A TAB professional is utilized by the school district when installing new HVAC equipment, performing HVAC retrofit, conducting HVAC commissioning or general inspection and maintenance. The district tested HVAC airflow and system capacity, reviewed documentation on HVAC system design values, relied on facilities working knowledge of the HVAC system, consulted with HVAC contractors, and consulted with filter suppliers to determine the highest MERV filtration possible without adversely HVAC equipment. The HVAC system TAB and commissioning/recommissioning, typically costing roughly 3% of initial mechanical system costs. Key lessons learned: HVAC digital controls are often programmed initially based on vendors' previous projects. New systems need testing and verification through trending beyond the warranty period.
- Ongoing workforce training related to HVAC inspection and maintenance is through in-house mentorship programs.
- Work has been completed since 2018 to improve filtration in HVAC systems, including reducing filter bypass and using self-gasketing panel filters, tackifiers, and anti-microbial coatings.

Notable Achievement

Mariposa County Unified School District, CA

Accomplishment: Work has been completed since 2018 to improve filtration in HVAC systems, including increasing the MERV of air filters and replacement of HVAC units that were well past their expected lifespan. Based on a review of documentation on HVAC system design values and the facility manager's working knowledge of the HVAC system, where possible, the district switched from MERV 7-8 air filters to the MERV 9-11 filters.

Why Noteworthy: Of the seven districts applying for recognition in this category, this was the only district to apply for recognition that was *both* National Center for Education Statistics (NCES) Locale Code 43 (i.e., rural remote) and where >66% of students received free/reduced lunch (data from 2021 State of Our Schools report). Despite the evident lack of financial resources compared to other districts, work has been completed by the district since 2018 to improve filtration in HVAC systems, including increasing the MERV of air filters and replacement of HVAC units that were well past their expected lifespan. Given the minimal resources, this is a noteworthy accomplishment.

(2) Efficient HVAC for IEQ

This category seeks to recognize schools and school districts that use technical specifications for HVAC retrofits, upgrades, and/or replacement, resulting in reduction in energy costs and improvements in energy efficiency and indoor environmental quality (IEQ).

Best-in-Class

Charleston County School District, SC

- The district uses technical specifications to procure installation, retrofit and/or replacement of HVAC systems or components, as described in its "Design Requirements for New Construction and Major Renovations of Facilities." The school district sets a requirement for minimum OA ventilation (requires the use of dedicated OA units on all new construction; maximum of 800 ppm of CO2 in a classroom space) and filtration efficiency in HVAC technical specifications (applicant provided design requirement document). The district also sets the minimum filter depth (MERV 13 at 2 inches), limits the equipment noise (noise level not to exceed 25 noise criteria, and sets the criteria for fan performance in HVAC technical specifications.

- The following are utilized in technical specifications for HVAC: (1) HVAC system provides a slope in condensate pans so that water does not stand, (2) HVAC system provides access for cleaning coils and other components, (3) air stream surfaces are not porous, (4) insulation is not placed on internal air stream surfaces, except for sound attenuation insulation, (5) duct liners must meet American Society for Testing and Materials (ASTM) standards for erosion resistance and water vapors sorption, (6) locates air intakes away from sources of potential air pollution, such as diesel fumes where school buses or other vehicles may be idling, or exhaust air from cooling towers, kitchen, or HVAC systems.
- The school district always requires testing and balancing to verify the minimum OA ventilation following HVAC system retrofits, updates, and/or replacements. The school district uses results from testing and balancing and/or commissioning following HVAC system retrofits, updates, and/or replacements as: (1) internal records, to hold contractors accountable to deliver adequate ventilation per design; and (2) as documentation for project certification. The school district always monitors for CO2 following HVAC system retrofits, upgrades, and/or replacements. The district uses handheld CO2 monitors, CO2-enabled thermostat, IAQ monitor measuring CO2 and other pollutant(s), such as PM. This is done through spot checks of CO2 during occupied hours.
- The district completed an exemplary renovation of a Title I school in rural area that resulted in energy savings and improved indoor environmental quality. In 2018, and the district replaced HVAC equipment that was near the end of useful life and was struggling to keep the outside air (OA) units operational. A total HVAC replacement in conjunction with a full roof replacement was completed. In addition, the project called for replacing the existing water heaters and upgrading the lighting in the administration area, gymnasium, and multiple classrooms. The equipment replacement was modeled to achieve a 57% improvement over the baseline with an annual cost savings of over $140,000. Post-renovation, all of the units in the building, including the dedicated OA units, are working properly, maintaining consistent IEQ levels for temperature and humidity providing a comfortable, properly ventilated learning environment.

Greenville County Schools, SC

- The district uses technical specifications to procure installation, retrofit and/or replacement of HVAC systems or components. The school district sets a requirement for minimum OA ventilation and filtration efficiency in HVAC technical specifications. The district also sets the minimum filter depth, limits the equipment noise, and sets the criteria for fan performance in HVAC technical specifications (according to the district's Facilities Design Guide).
- The following are utilized in technical specifications for HVAC: (1) HVAC system provides a slope in condensate pans so that water does not stand, (2) HVAC system

provides access for cleaning coils and other components, (3) air stream surfaces are not porous, (4) insulation is not placed on internal air stream surfaces, except for sound attenuation insulation, (5) duct liners must meet ASTM standards for erosion resistance and water vapors sorption, (6) locates air intakes away from sources of potential air pollution, such as diesel fumes where school buses or other vehicles may be idling, or exhaust air from cooling towers, kitchen, or HVAC systems. The district also does not allow use of duct liners.

- The school district always requires testing and balancing to verify the minimum OA ventilation following HVAC system retrofits, updates, and/or replacements. The school district uses results from testing and balancing and/or commissioning following HVAC system retrofits, updates, and/or replacements in the following ways: (1) submits to state, local, or other agency in charge of project oversight, (2) keeps as internal records, (3) holds contractors accountable to deliver adequate ventilation per design, and (4) uses as documentation for project certification.
- The school district often monitors for CO2 following HVAC system retrofits, upgrades, and/or replacements. The district uses handheld CO2 monitors, CO2-enabled thermostat, in-duct CO2 monitors, standalone in-room CO2 monitors, and IAQ monitor measuring CO2 and other pollutant(s), such as particulate matter (PM). Spot checks of CO2 were performed during occupied hours. The district also performed analysis of time trends of CO2 values.

Columbia Public Schools, MO

- The district uses technical specifications to procure installation, retrofit and/or replacement of HVAC systems or components (i.e., equipment is designed in collaboration with a mechanical engineering firm). The school district sets a requirement for minimum OA ventilation and filtration efficiency in HVAC technical specifications. The district also limits the equipment noise in HVAC technical specifications (dictated by space usage and code requirements, and meeting and exceeding new International Building Code (IBC) American National Standard Institute (ANSI) guidelines for new installs.
- The following are utilized in technical specifications for HVAC: (1) HVAC system provides a slope in condensate pans so that water does not stand, (2) HVAC system provides access for cleaning coils and other components, (3) air stream surfaces are not porous, (4) insulation is not placed on internal air stream surfaces, except for sound attenuation insulation, (5) duct liners must meet ASTM standards for erosion resistance and water vapors sorption, and (6) locates air intakes away from sources of potential air pollution, such as diesel fumes where school buses or other vehicles may be idling, or exhaust air from cooling towers, kitchen, or HVAC systems.
- The school district always requires testing and balancing to verify the minimum OA ventilation following HVAC system retrofits, updates, and/or replacements. The school district uses results from testing and balancing and/or commissioning

following HVAC system retrofits, updates, and/or replacements in the following ways: (1) keeps as internal records, and (2) to hold contractors accountable to deliver adequate ventilation per design.

- The school district always monitors for CO2 when installing new HVAC equipment and oftentimes following HVAC system retrofits, updates, and/or replacements. The district uses handheld CO2 monitors, CO2-enabled thermostat, and in-duct CO2 monitors. The district performs spot checks of CO2 during occupied hours, and analyzes time trends of CO2 values.

Davis School District, UT

- The district uses technical specifications to procure installation, retrofit and/or replacement of HVAC systems or components. The school district sets a requirement for minimum OA ventilation and filtration efficiency in HVAC technical specifications. The school district sets a requirement for minimum OA ventilation and filtration efficiency in HVAC technical specifications. The district also sets the minimum filter depth and sets the criteria for fan performance in HVAC technical specifications. The district does not limit the equipment noise in HVAC technical specifications.
- The following are utilized in technical specifications for HVAC: (1) HVAC system provides a slope in condensate pans so that water does not stand; (2) HVAC system provides access for cleaning coils and other components; (3) duct liners must meet ASTM standards for erosion resistance and water vapors sorption; and (4) locates air intakes away from sources of potential air pollution, such as diesel fumes where school buses or other vehicles may be idling, or exhaust air from cooling towers, kitchen, or HVAC systems.
- The school district always requires testing and balancing to verify the minimum OA ventilation following HVAC system retrofits, updates, and/or replacements. The school district uses results from testing and balancing and/or commissioning following HVAC system retrofits, updates, and/or replacements in the following ways: (1) keeps as internal records, and (2) to hold contractors accountable to deliver adequate ventilation per design.
- The school district always monitors for CO2 following HVAC system retrofits, updates, and/or replacements. The district uses CO2-enabled thermostat, in-duct CO2 monitor, standalone in-room CO2 monitor, IAQ monitor measuring CO2 and other pollutant(s), such as particulate matter (PM). The district performs spot checks of CO2 during occupied hours and keeps records of peak CO_2 values.

Notable Achievement

Boulder Valley School District, CO

Accomplishment. The district conducted a middle school deep energy retrofit project in 2016, including active chilled beams with dedicated outdoor air system (DOAS) with a high efficiency energy recovery ventilator (ERV). The solution achieved a 37% energy reduction despite adding air conditioning to the building. Prior to the retrofit, the building was chronically thermally uncomfortable—especially during shoulder seasons. The building went from having the most comfort complaints in the district to no complaints.

Why Noteworthy: The renovation project is noteworthy because the school achieved a 37% energy reduction, despite adding air conditioning. Moreover, the school went from having the most thermal comfort complaints in the district to having no complaints – a remarkable achievement!

(3) Ongoing Monitoring and Analytics for HVAC Performance

This category seeks to recognize schools and school districts that use energy management and information systems (EMIS) to improve HVAC performance and operation through fault detection and diagnostics, benchmarking, and commissioning.

Best-in-Class Recognition

Newark Board of Education, NJ

- The school district uses EMIS to organize system and/or equipment data, monitor energy use, and/or inform repairs and improvements. Currently, they are migrating from a variety of systems like Metasys, Honeywell, Siemens, etc. and standardizing the system to a web-based Niagra platform. The district also utilizes School Dude to help manage maintenance work orders and PM tasks and to collect equipment information and data.
- The EMIS is used in the school district for periodic performance tracking and energy performance contracting. Most sites in the school district have EMIS capable of providing whole-building interval data. The district is working on making the EMIS capable of providing monitoring and verification (M&V) of energy savings. Most sites in the school district have EMIS integrated with submetering and some sites have EMIS capable of fault detection and diagnostics (FDD) of building HVAC systems and/or equipment.

- The school district is working on developing this capability district-wide and an enterprise management system will be installed alongside the upgraded BAS to provide a platform that can collect and monitor FDD information. The platform will also be used to provide information for making decisions regarding maintenance and upkeep of the mechanical systems. Some sites in the school district have EMIS capable of supporting automated system optimization (ASO) of building HVAC systems and/or equipment.
- Pay for Performance (P4P) incentives are applied to offset costs for the EMIS implementation. The school district supports workforce training related to ongoing use of EMIS and engages students.
- The district routinely shares EMIS data and/or findings with the school community, including the following groups: superintendent, school board, school administrators, students, parents, and teachers.

Charleston County School District, SC

- The school district uses EMIS to organize system and/or equipment data, monitor energy use, and/or inform repairs and improvements (Siemens operating system Desigo). The EMIS is used in the school district for ongoing commissioning or monitoring-based commissioning (MBCx) and for monitoring space CO2 so that the district can provide proper ventilation. The system also monitors space temperature and humidity with common setpoints to condition buildings that provide a comfortable learning environment.
- All sites in the school district have EMIS capable of providing whole-building interval data. All sites in the school district also have EMIS capable of providing M&V of energy savings (i.e., create baseline model and monitor deviations from predicted energy use). Some sites (25%) have EMIS integrated with submetering and all sites have EMIS capable of FDD of building HVAC systems and/or equipment.
- All sites in the school district have EMIS capable of supporting ASO of building HVAC systems and/or equipment.
- The school district supports workforce training offered by Siemens.
- The district routinely shares EMIS data and/or findings with the school community, including the following groups: superintendent, school board, school administrators, and the HVAC Shop (noting energy spikes when weather does not warrant a noticeable flux in consumption).

Davis School District, UT

- The school district does use EMIS to organize system and/or equipment data, monitor energy use, and/or inform repairs and improvements. They have installed Schneider Electric's EcoStruxure in over 100 facilities (11,188,534 ft2). The EMIS is

used in the school district for periodic performance tracking (i.e., monitoring energy use and trouble-shooting HVAC-related issues) and ongoing commissioning or MBCx.

- The district also utilizes Energy Manager by Dude Solutions to track and monitor all of their facilities' energy and water costs and usage. This includes tracking and auditing all the thousands of bills they receive yearly. From this data, they make decisions on buildings that aren't operating correctly or could use some type of energy improvement. Those improvements might include low-emitting diode (LED) lighting upgrade, controls ongoing commissioning or MBCx, periodic performance tracking, etc.
- Most sites in the school district have EMIS capable of providing whole-building interval data; M&V of energy savings (i.e., create baseline model and monitor deviations from predicted energy use); and FDD of building HVAC systems and/or equipment. Few sites have EMIS integrated with submetering (i.e., BACnet power meters have been installed in all of the schools to provide live feedback and alarming for power usage; ZEB schools have submetering). Most of the sites in the district have EMIS capable of supporting ASO of building HVAC systems and/or equipment.
- Incentives were applied to offset costs for the EMIS implementation. The district applies for and reinvests all of the utilities' rebates. Since 2016, they have received $1,467,766 from rebate programs for EMIS. The school district supports workforce training related to EMIS. Their energy committee helps guide training for employees. They also have one certified energy manager on staff.
- The district does routinely share EMIS data and/or findings with the school community, including superintendent, school board, and school administrators.

Notable Achievement

Adams 12 Five Star Schools, CO

Accomplishment: The school district uses EMIS to organize system and/or equipment data, monitor energy use, and/or inform repairs and improvements. They have installed real-time electricity tracking in 37 facilities across the district (62% of facilities), and real-time natural gas tracking meters in three facilities. In the three facilities with both electric and natural gas tracking, this data is brought into a third-party EMIS platform, SkySpark. The EMIS is used in the school district for periodic performance tracking (i.e., monitoring energy use and trouble-shooting HVAC-related issues. Through their electricity provider (Xcel Energy), the district was able to receive third-party support (building modelling and rebate support); up-front rebates for the EMIS equipment installed; and behavioral rebates

after one and two years in the program for implementing EMIS-related energy saving measures.

Why Noteworthy: This district utilized a full range of incentives to support the implementation of EMIS through their utility (Xcel Energy): up-front rebates, behavioral rebates, etc. They also work closely with the utility to track the electricity cost savings associated with implementation of EMIS in their schools. The district represents best practice to utilize EMIS with incentives from utility.

(4) Team Approach to Support Strategic Investments in Efficient and Healthy Schools

Schools and school districts with a formal collaboration between facilities personnel, school administration, and the community for strategic planning and investment in efficient and healthy buildings.

Best-in-Class

Newark Board of Education, NJ

- The school district sets energy goals or targets for reducing carbon emissions as part of an approved Energy Savings Plan for the district. Facilities personnel, superintendent, school board, school administrators, and students are all involved in setting energy goals or targets for reducing carbon emissions.
- The school district has an energy management team or a group of individuals who are responsible to lead efforts on improving energy efficiency. They have Department of Energy and Sustainability dedicated to that which includes: energy manager, facility manager, facility engineers or technicians, and consultant/service contractor.
- The energy management team measures the following non-energy benefits from energy efficiency improvement projects: (1) fewer IAQ complaints; (2) fewer comfort complaints; (3) improved satisfaction from occupant survey; (4) fewer student visits to health room for asthma-related issues; (5) improved equipment reliability; (6) improved resilience, such as by enabling building to remain operational during extreme events. Other benefits, such as those included in the ESP, typically come from domestic water retrofit projects and benefits derived from strategies like a Solar Power Purchase Agreement (PPA). The domestic water retrofits result in reduced water flow rates on flush valves and sinks.
- The school district has a designated IAQ coordinator who is responsible to lead IAQ management activities and a leadership team (involving facilities personnel, school

administrators, students, teachers, and union representatives) to assist the IAQ coordinator and engage school administrators to support IAQ management. The school district regularly communicates the IAQ program's intent, activities, and results with the community. The district makes it a mandate to ensure the community has access to data and any issues. A public report is available of the issues, readings, and abatement as well. Utilizing the EPA IAQ Tools for Schools resources, the district promotes involvement from all stakeholders. They periodically use SurveyMonkey to find out if there are any IAQ issues and have designated the Head Custodian to take the lead in IAQ with support from students, teachers, administrators, and union representatives.

Charleston County School District, SC

- The school district sets energy goals or targets for reducing carbon emissions, which is to reduce EUI by at least 1.5% each year. The facilities personnel, superintendent, and the Associate of Facilities Management are all involved in setting energy goals or targets for reducing carbon emissions.
- The school district has an energy management team or a group of individuals who are responsible to lead efforts on improving energy efficiency. This team includes: energy manager, facility manager, facility engineers or technicians, consultant/service contractor. Moreover, principals and administrators shall act or appoint an energy coordinator for their facility, per the district's Facility Management Standard Business Procedure (SBP).
- The energy management team measures the following non-energy benefits from energy efficiency improvement projects: (1) fewer comfort complaints; and (2) improved resilience, such as by enabling building to remain operational during extreme events.
- The approach to measure non-energy benefits is as follows: the facilities management (FM) team does biannual visits with every school principal and receives input on what the results are for the FM projects at their schools. A decrease in work orders related to HVAC issues after the FM team does a replacement project is a big measure of success. Every year, the FM team gives out $300,000 to schools that hit their energy targets for them to spend as they see fit through the Energy Savings Incentive Program. With the exterior building envelope program where they seal cracks and openings, they see a decrease in pest issues as a measurable benefit. New windows decrease damage to interior walls from leaks and condensation, hence less repairs and repainting.
- The school district has a designated IAQ coordinator who is responsible to lead IAQ management activities and a leadership team (involving facilities personnel and school administrators) to assist the IAQ coordinator and engage school administrators to support IAQ management. The school district regularly

communicates the IAQ program's intent, activities, and results with the community (i.e., notice to principals and parents especially concerning outside air practices).

- The school district also regularly involves students, teachers, school staff, and the community in helping to maintain good IAQ. Through Principal visits and a media package called "The Principal Packet", the district shares the FM Energy Management Regulations. This document includes directions on leaving windows and exterior doors closed, as well as a directive not to tamper with room thermostats and sensory equipment, all of which can impact IAQ.

Boulder Valley School District, CO

- The school district sets energy goals or targets for reducing carbon emissions (i.e., reduce 2020 baseline energy use from 64 EUI to 56 EUI by 2025 and be zero energy by 2050). The facilities personnel are involved in setting energy goals or targets for reducing carbon emissions.
- The school district has an energy management team or a group of individuals who are responsible to lead efforts on improving energy efficiency. This team includes: energy manager, facility manager, facility engineers or technicians, and the Sustainability Coordinator.
- The energy management team measures the following non-energy benefits from energy efficiency improvement projects: (1) improve equipment reliability. The district utilizes the BAS and experience of technicians to help determine reliability improvements and to measure non-energy benefits from energy efficiency projects.
- The school district has a designated IAQ coordinator who is responsible to lead IAQ management activities and a leadership team to assist the IAQ coordinator and engage school administrators to support IAQ management. The leadership team is comprised of facilities personnel and community members. The school district regularly communicates the IAQ program's intent, activities, and results with the community and regularly involves students, teachers, school staff, and the community in helping to maintain good IAQ.
- The school district does routinely incorporate IAQ best practices as part of energy efficiency upgrades and building modernization projects. For instance, IEQ is incorporated into their Technical Guide for Design Consultants; and they reference preferred U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) credits with an emphasis on IAQ and state construction must limit toxins and indoor air pollutants. The school district uses the following approaches to incorporate IAQ best practices as part of energy efficiency upgrades and building modernization projects: (1) form a design and construction team that includes IAQ expertise; and (2) include school maintenance staff on the project team.

Notable Achievement

Davis School District, UT

Accomplishment: The district has an 18-member energy committee that meets monthly to discuss direction, problems, and goals. This committee has been meeting since 2009. This team includes: energy manager; facility engineers or technicians; Director of Utility Services (Certified Energy Manager CEM and Chairman); energy programmers; New Construction Administrator and Director; Coordinator and Director of Custodial; Electrical Coordinator and Forman; Maintenance Director; HVAC Coordinator and Forman; and the Energy Auditor. The facilities personnel, superintendent, school board, and school administrators are all also involved in setting energy goals or targets for reducing carbon emissions for the district.

Why Noteworthy: This district has a large (18-member) and most comprehensive energy management team, including experts in energy management, new construction, auditing, custodial services, etc. The facilities personnel, superintendent, school board, and school administrators are all also involved in setting energy goals or targets for reducing carbon emissions for the district. This district represents a best practice for putting together a comprehensive team to support strategic investments in efficient and healthy schools.