U.S. DEPARTMENT OF ENERGY

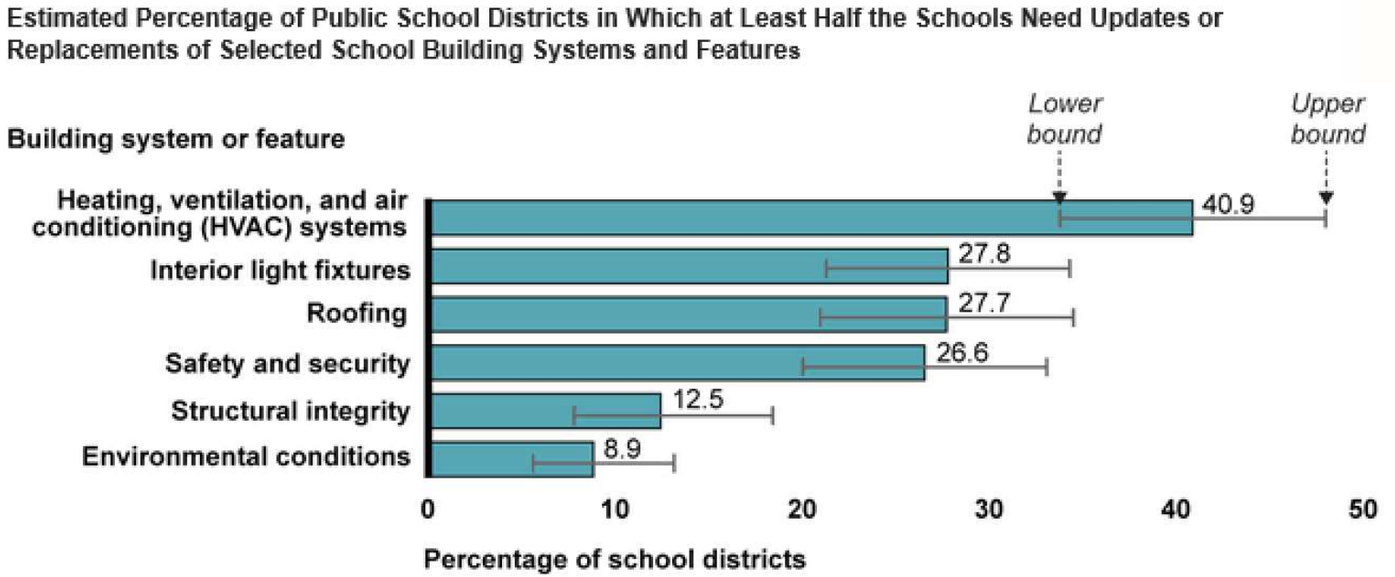
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Back to *Better* Schools

DOE Building Technologies Office and Weatherization and Intergovernmental Programs Office

Reviewing the Situation: 2020 GAO Report

- 54% of public school districts need to update or replace multiple building systems or features in their schools.
- 36,000 schools need HVAC updates.
- Public school facilities also serve a civic role as voting places and emergency shelters.
- Most states **do not** conduct statewide assessments to determine school facilities' needs and instead leave this task to school districts.



Source: GAO, *K-12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement*, GAO-20-494 (Washington, D.C.: June 2020).

Reviewing the Situation: 2016 State of Schools Report

"The nation is underspending on school facilities by $46 billion — an annual shortfall of 32 percent…investment levels in all states but three will not meet the standards…"

The Nation Underinvests in Public School Facilities

		Historic Spending	Modern Standards	Projected Annual Gap
K–12 FACILITIES	Maintenance & Operations	$50 billion	$58 billion	$8 billion
	Capital Construction	$49 billion	$77 billion	$28 billion
	New Facilities		$10 billion	$10 billion
	TOTAL	**$99 billion**	**$145 billion**	**$46 billion**

Source: Filardo, Mary (2016). *State of Our Schools: America's K–12 Facilities 2016.* Washington, D.C.: 21st Century School Fund.

What others are saying about energy, IAQ & school facilities…

"To maintain America's competitive edge, we must harness this opportunity to rebuild the nation's schools and position them to both protect and improve the health and well-being of the students, teachers, and school staff."
-Rachel Hodgdon,
International WELL Building Institute

"Good indoor air quality has been proven to reduce disease transmission in schools and increase students' academic performance, but many outdated HVAC systems fail to provide clean air and waste energy, too. With this support from the Department of Energy, school systems around the country have a great opportunity to use federal funds to improve the air in their buildings while saving on energy costs."
-Nora Wang Esram,
American Council for an Energy-Efficient Economy

"Protecting the health, safety and welfare of students, faculty and administrators from the spread of pathogens including SARS-CoV-2, is essential to protecting the entire population. Further, by improving school ventilation systems and indoor air quality, students can avoid other health problems and learn more productively."
- Charles E. Gulledge II,
American Society of Heating, Refrigerating and Air-Conditioning Engineers

Approximately 100,000 U.S. public K-12 schools and 13,000 school district house 50 million kids and 3 million teachers.

U.S. public K-12 schools consume 65 TWh of electricity and 140 TBtu of natural gas annually, contributing 33 million metric tons of carbon dioxide equivalent emissions (0.6% of U.S. greenhouse gas emissions). Conversion factors are from EIA for natural gas and EPA for electricity.

…a big problem with an energy efficiency connection.

U.S. school facilities are our resilience centers.

U.S. school facilities need significant investments.

These investments can reduce school energy bills, improve comfort and air quality in schools, increase teacher retention, create resilient places and connect kids with good paying clean energy career paths.

"Schools face tough decisions when it comes to putting federal relief funding to good use. As a one-time infusion, we believe this funding is uniquely well-suited for facilities investments, which can increase health and well-being, lower carbon emissions, and reduce operating costs in the long run."

-Thank you Anisa Heming!

Center for Green Schools at the U.S. Green Building Council

"States and district facilities managers need independent sources of information and technical assistance to guide their decisions on facilities standards, policy, practice, and procurement. The Department of Energy will be a valuable partner to states and districts as they work to deliver healthy and efficient modern facilities across all communities."

-Thank you Mary Filardo!

21st Century Schools Fund

"Our K-12 public schools represent an opportunity for 1 in 6 Americans to walk in the door of a clean energy success story every day. We applaud the DOE's leadership in convening public and private partners to support our K-12 sector in making the transition to clean energy and ensuring our young people are prepared to shape and lead the clean energy transition."

Jonathan Klein,

UndauntedK12

Efficient *and* Healthy Schools

The American Rescue Plan and 2021 Coronavirus Response and Relief Supplemental Appropriations Act provide tens of billions to American schools.

DOE, acting through EERE, is directed by the Energy Act of 2020 to be the "lead Federal agency for coordinating and disseminating information on existing Federal programs and assistance that may be used to help initiate, develop, and finance energy efficiency, renewable energy, and energy retrofitting projects for schools." [§1001 (b)]

The country has a heightened awareness of ventilation and health in buildings due to COVID-19.

Building ventilation investments improve air quality and can either increase or reduce energy consumption.

American Rescue Plan (ARP) Elementary and Secondary School Emergency Relief (ESSER)
State Plans on HVAC, Ventilation, and/or Indoor Air Quality Improvements

Based on approved and submitted (under review) state plans as-of August 16, 2021

https://oese.ed.gov/offices/american-rescue-plan/american-rescue-plan-elementary-and-secondary-school-emergency-relief/stateplans/

Improving Ventilation in Schools, Colleges, and Universities to Prevent COVID-19

Did you know? You can use American Rescue Plan (ARP) education funds further described below to improve indoor air quality for in-person instruction, including through:

- Inspection, testing, and maintenance of current ventilation systems and approaches
- Purchasing portable air filtration units, such as HEPA air filters
- Purchasing MERV-13 (or higher) filters for your HVAC system and ACs
- Purchasing fans
- Repairing windows and/or doors so that they can open to let fresh air in
- Servicing or upgrading HVAC systems consistent with industry standards
- Purchasing equipment to run outdoor classes
- Purchasing carbon dioxide (CO2) monitors, air flow capture hoods, and anemometers for custodians and building personnel to assess ventilation
- Paying for increased heating/cooling costs due to increased use of heating/cooling systems
- Other spending that supports inspection, testing, maintenance, repair, replacement, and upgrade projects to improve the indoor air quality in school facilities, including mechanical and non-mechanical heating, ventilation, and air conditioning systems, filtering, purification and other air cleaning, fans, control systems, and window and door repair.

Several states described spending of prior/current ESSER funds towards HVAC, ventilation, and/or indoor air quality improvements in their State Plan.

Examples: Delaware, Kentucky, Michigan

State	Status of ARP ESSER State Plan	Descriptions of prior/current ESSER spending in the State Plan
Delaware	Approved	$26,209,039 on indoor air quality / HVAC $6,417,665 on facility repairs
Kentucky	Approved	$38,422,506 on improve indoor air quality
Michigan*	Under review	$143,105,465 on indoor air quality, including HVAC system upgrades

* The Michigan Department of Environment, Great Lakes, and Energy (EGLE) offered the Michigan K-12 Public School HVAC Assistance Program, to provide air quality assessment tools, webinars, and best practices, as well as to receive recommendations for remediation of identified issues.

Most states* describe plans to improve HVAC, ventilation, and/or indoor air quality in their State Plan.

Examples: South Carolina, Hawaii, California

* 30 out of 44 State Plans. NOTE: there are 7 states (CO, FL, MN, MS, VA, VT, WI) that have not yet submitted their State Plan to U.S. Department of Education.

South Carolina State Plan (approved):

replacements, air conditioning, roofing, and water system upgrades. To date, facility improvement needs of rural, poor, and small LEAs have gone unmet, especially in counties or areas with limited revenue generating capacity or a poor tax base. Recognizing the need for additional resources, for fiscal year 2021–22, state lawmakers are proposing to allocate up to $100 million of state funding, $85 million to support facility improvements in disadvantaged LEAs, and $15 million to incentivize consolidation amongst smaller LEAs and schools. If approved, these funds will become available effective July 1, 2021. Leveraging these funds, the SCDE will set aside a portion of its ESSER ARP funds to further address capital needs of rural, poor school districts.

Hawaii State Plan (approved):

To improve ventilation and air quality in our facilities, HIDOE promotes outdoor air ventilation, ventilation systems that are operating properly, and the use of air purifiers. HIDOE is currently planning to monitor and track the air quality of classrooms by measuring the amount of air circulation and ventilation and will take the necessary steps to improve air circulation if needed.

California State Plan (under review):

Environmental Health Laboratory Branch of CDPH. LEAs also have the option to submit a technical assistance request, through the Safe Schools for All School Hub website's technical assistance portal, where specific questions regarding ventilation can be submitted and responded to by SMEs within two to three days. Recently, as state funding (AB 86) was allocated to LEAs to utilize for COVID-response purposes, CDE collaborated with CDPH and the California Division of the State Architect in order to provide instructions to school administrators on the process to request prioritization in submitting heating, ventilation, and air conditioning (HVAC); ventilation; and other school facility upgrades and improvements. As the process involved with a

Back to *Better* Schools: DOE, Education and EPA

Who? DOE, Ed, EPA, LBNL, and *you*!

What? Supporting school facility investments.

When? Starting now! Schools can sign up online or by e-mailing EHSC@lbl.gov.

Why? These investments can:

- Reduce school energy expenditures,
- Improve comfort and safety,
- Ensure continuity of operations and resilience,
- Provide for public health,
- Enable accessibility and transparency into facility status,
- Ease operation,
- Create pathways for better teacher retention and productivity.

How can State Energy Offices help?

- Work with state, district and local-level school representatives to share resources, information, values and benefits.
- Sign up your school partners to get help and take action!

EFFICIENT HEALTHY SCHOOLS CAMPAIGN

Back to *Better* Schools: DOE, Education and EPA

Seeking schools to demonstrate best practices :

HVAC Inspection and Maintenance for IAQ
Schools and their school districts that implement an inspection and maintenance policy to ensure adequate ventilation and effective filtration for good indoor air quality (IAQ).

Efficient HVAC for IEQ
Schools and their 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).

Ongoing Monitoring and Analytics for HVAC performance
Schools and their school districts that use energy management and information system (EMIS) to improve HVAC performance and operation through fault detection and diagnostics, benchmarking, and commissioning.

Teamwork to Support Strategic Investments in Efficient Healthy Schools
School and their school districts with a formal collaboration between facilities personnel, school administration, and the community for strategic planning and investment in efficient healthy buildings.

EFFICIENT HEALTHY SCHOOLS CAMPAIGN

What else?

- Continue **existing relationships** through the Better Buildings Challenge for K-12 school districts.
- Consolidate information on existing programs and financing mechanisms.
- Piloting **virtual school audits** with Asset Score.
- Convene regular **engagement** with school stakeholders:
  - to align messaging,
  - work collectively to solve identified needs and barriers, including across school type and region,
  - provide solutions to help de-carbonize schools. and
  - especially provide support in disadvantaged communities.
- **Build capacity** through innovative energy and climate focused school and district-level energy, energy efficiency and decarbonization programming.

LAUSD Leverages Asset Score

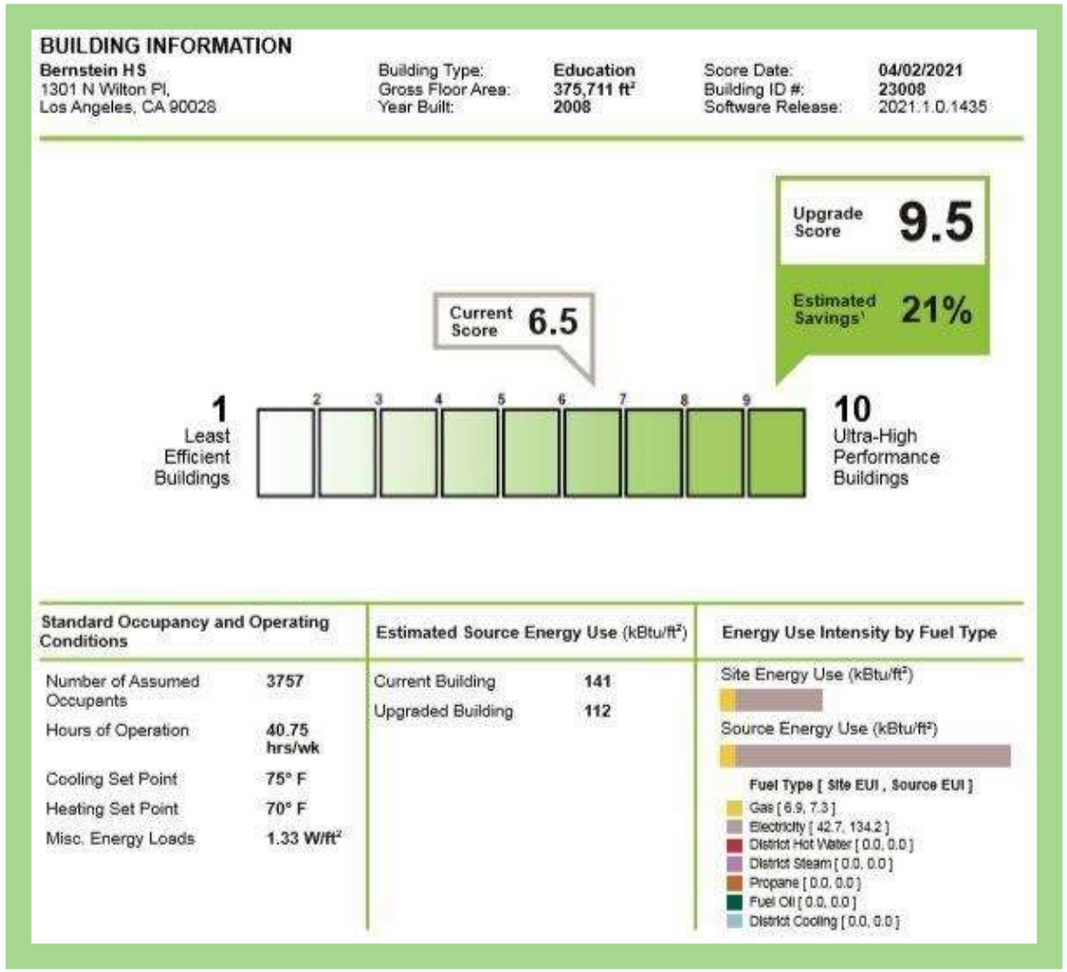
Results

The Asset Score report (see a snapshot below) showed estimated savings of **21% achievable** through select upgrades to the building envelope, lighting and HVAC systems.

If implemented, these measures would improve the school's Asset Score rating from 6.5 to 9.5 (10 being an ultra-high performance building).

"As an architect, I like that we can start thinking more deeply about our buildings and the systems in them. This is a great tool to have."

– Christos Chrysiliou



BUILDING INFORMATION

Bernstein HS
1301 N Wilton Pl,
Los Angeles, CA 90028

Building Type: **Education**
Gross Floor Area: **375,711 ft²**
Year Built: **2008**

Score Date: **04/02/2021**
Building ID #: **23008**
Software Release: 2021.1.0.1435

Upgrade Score **9.5**

Estimated Savings[1] **21%**

Current Score **6.5**

1 Least Efficient Buildings — 2 3 4 5 6 7 8 9 — 10 Ultra-High Performance Buildings

Standard Occupancy and Operating Conditions	
Number of Assumed Occupants	3757
Hours of Operation	40.75 hrs/wk
Cooling Set Point	75° F
Heating Set Point	70° F
Misc. Energy Loads	1.33 W/ft²

Estimated Source Energy Use (kBtu/ft²)	
Current Building	141
Upgraded Building	112

Energy Use Intensity by Fuel Type

Site Energy Use (kBtu/ft²)

Source Energy Use (kBtu/ft²)

Fuel Type [Site EUI , Source EUI]
Gas [6.9, 7.3]
Electricity [42.7, 134.2]
District Hot Water [0.0, 0.0]
District Steam [0.0, 0.0]
Propane [0.0, 0.0]
Fuel Oil [0.0, 0.0]
District Cooling [0.0, 0.0]

Thank you!

Amy Jiron, amy.jiron@ee.doe.gov
Mariana Egea-Casalduc, mariana.egea-casalduc@ee.doe.gov
Rengie Chan, wrchan@lbl.gov

Join the Efficient Healthy Schools Campaign!