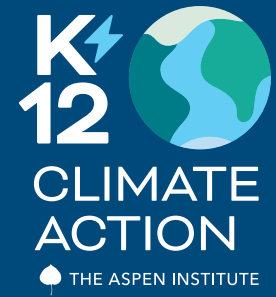


ENERGY



What is Energy Use in Schools?

With over 98,000 public schools, K–12 schools are among the largest consumers of energy in the public sector.¹ School buildings require substantial energy use to keep students healthy, safe, and ready to learn. Everything from HVAC to charging computers to cafeteria kitchen appliances needs energy to run. Across the country, schools spend an estimated total of \$8 billion annually on energy costs, making energy the second-highest expenditure in district budgets behind only salaries.²

Many schools also have aging infrastructure, which reduces energy efficiency. A recent Government Accountability Office (GAO) report estimates 54% of districts need to update or replace at least two building systems in many of their district's schools.³ The report also found key differences in how high- and low-poverty districts fund facilities costs, which contribute to inequity in the quality of school buildings.⁴

With schools in worse condition, under-resourced communities need to pay more annually for upkeep and maintenance, further exacerbating funding inequities across communities and preventing opportunities to invest in infrastructure improvements and energy efficiency.⁵ Additionally, old infrastructure can lead to lost energy and higher energy costs. For example, old windows may allow air to leak, and older lighting systems may take more energy to run.



CONNECTION TO CLIMATE CHANGE

Buildings are a major contributor to greenhouse gas emissions. In 2019, building operations accounted for 28% of the US' energy use.⁶ Schools can take many approaches to reducing energy consumption, which in turn protects the environment. Schools might use strategies including solar panels, daylight-responsive lighting systems, geothermal heating and cooling systems, and lowering HVAC use when students and staff are not in school buildings.⁷

Upgrading infrastructure, ventilation, and lighting and utilizing clean energy helps minimize the environmental impact of schools, reduce schools' costs, and improve student health and learning.⁸ Importantly, these efforts also provide opportunities for students to learn about sustainability, energy, and efficiency in action. In many states, solar power purchasing agreements can assist schools in procuring their power from renewable energy sources with little to no upfront costs.⁹

As energy efficiency efforts have become more widespread in schools, a greater number of schools are targeting or achieving LEED certification.¹⁰ LEED is a widely-used rating system for sustainable design, construction, and building operations. As of August 2020, there were 2,252 LEED-certified schools in the US.

The push for net-zero energy in buildings has increasingly included schools as well. Often, net-zero energy schools are entirely new buildings, which allows maximum flexibility to make sustainable design decisions. However, tearing down and reconstructing entire buildings causes its own detrimental effects on the environment. It is important to consider whether schools can be retrofitted or renovated to allow existing buildings to get close to net-zero energy.¹¹ Importantly, any strategy a school or district considers should be grounded in the local context and consider local community and energy needs.¹²

TERMINOLOGY

- **Net-zero energy building:** Produces enough renewable energy to meet its own annual energy consumption requirements.¹³
- **Clean or renewable energy:** Energy produced from resources that are easily replenished and do not have detrimental effects on the health of humans or the environment. Examples include solar, wind, and geothermal energy.
- **LEED certification:** Internationally recognized system for rating sustainable building design, construction, and operations. Each of the four certification tiers requires a minimum number of sustainability strategies.

State Policies

There are a variety of approaches states can take to improve energy efficiency in schools. One option is to direct state funds toward this goal. As of 2017, the Center for Green Schools at the U.S. Green Building Council found that seven states had programs to directly fund energy efficiency improvements in existing school buildings.¹⁴ Tennessee, for example, has a revolving loan program that has benefited 93% of districts across the state. Supporting investments in school infrastructure and facilities, particularly in low-income communities, can also help improve school energy efficiency and create healthier learning environments.

Six states have policies or programs that target net-zero energy consumption specifically in schools. Three of these states (CA, KY, MD) recently had grant programs to help schools transition to net-zero energy, though these programs are not currently funded.

In the last few years, several states have had legislation or executive orders that set goals of net-zero energy use in state buildings, but do not specifically include schools. Two states (MA, NY) have pending or recently passed legislation that may implicate schools. Many states have policies that require buildings shift to higher energy efficiency, meet LEED standards, or reduce emissions based on certain thresholds.

States without net-zero policies or grants specifically for schools have still made progress toward net-zero schools. As of 2019, 11 states had at least one K-12 school that was net-zero energy certified or verified by the New Buildings Institute, and 17 states had at least one K-12 school which was considered net-zero energy emerging.¹⁵

Reviewed by Anisa Heming, Director, Center for Green Schools at the U.S. Green Building Council



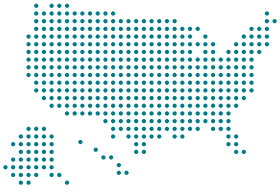


BRIGHT SPOTS

- Los Angeles Unified School District has committed to using 100% clean, renewable energy by 2040.¹⁶ This builds on the district's prior commitment to reducing energy consumption by 20% by 2024 and participation in several local, state, and federal programs to improve sustainability.
- Salt Lake City School District has committed to using 100% clean, renewable energy for electricity by 2030.¹⁷ The district has also committed to using carbon-neutral energy to power 50% of district operations by 2035 and 100% by 2050. The measure was the result of student-led efforts, in collaboration with parents and environmental organizations.¹⁸
- Arlington Public Schools' Discovery Elementary (VA) is a net-zero energy school that saves \$117,000 annually in utility costs compared to a typical elementary school of the same size in the district. This is enough to cover the salaries of two starting teachers.¹⁹
- Warren County Public Schools' Richardsville Elementary (KY) was the first net-zero energy school in the country in 2010.²⁰ In addition to solar panels, Richardsville Elementary uses a variety of approaches to minimize energy consumption, including daylight harvesting, geothermal heating and cooling, and a high-performance thermal envelope.²¹ The building itself is also used as a teaching tool for students to learn about sustainability. In 2015, the school operated at 18.2 kBtus per square foot—well below the state average of 60 kBtus and national average of 73 kBtus.²² Richardsville also regularly produces more energy than it consumes. The local utility company buys back the school-produced solar energy, sending the school a check for \$35,000–\$37,000 annually. The school also saves an average of \$60,00 in annual electricity costs.



Photo by Allison Shelley for American Education: Images of Teachers and Students in Action.



DOES STATE SUPPORT OR HAVE NET-ZERO ENERGY SCHOOLS?

States A - P	Policy targeting net-zero energy consumption in schools	Net-zero energy certified or verified school ²³	Net-zero energy emerging school ²³
Alabama			
Alaska			
Arizona			X
Arkansas			X
California	X [^]	X	X
Colorado			X
Connecticut			
Delaware			
District of Columbia			
Florida			
Georgia			
Hawaii			X
Idaho			
Illinois			
Indiana			
Iowa			
Kansas			
Kentucky	X [^]	X	X
Louisiana			
Maine			X
Maryland	X [^]		X
Massachusetts	X [*]		X
Michigan		X	
Minnesota			
Mississippi			
Missouri			
Montana			
Nebraska			
Nevada			
New Hampshire			X
New Jersey		X	
New Mexico			
New York	X [*]	X	X
North Carolina		X	X
North Dakota			
Ohio			
Oklahoma			
Oregon		X	X
Pennsylvania			

Remaining states on following page

States R – W

Rhode Island			X
South Carolina			X
South Dakota			
Tennessee			
Texas			X
Utah		X	
Vermont		X	
Virginia	X	X	
Washington		X	X
West Virginia			
Wisconsin			
Wyoming			
TOTALS	6	11	17
PERCENT	12%	22%	33%

Note: Percentages are out of 51 (includes DC)

* Schools not specifically mentioned in policy but may be implicated ^ Limited state funded program, not currently funded

Zero energy verified, certified, and emerging schools data from New Building Institute's 2019 Zero Energy Schools Watchlist

https://newbuildings.org/wp-content/uploads/2019/02/2019_SchoolsWatchlist.pdf



Bottom two photos by Allison Shelley for American Education: Images of Teachers and Students in Action.

References

1. U.S. Energy Information Administration, "Table PBA3. Sum of major fuel consumption totals and gross energy intensities by building activity subcategories, 2012," Commercial Buildings Energy Consumption Survey, accessed August 31, 2020, <https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/pba3.php>
2. U.S. Department of Energy, "Energy Savings Performance Contracting: A primer for K-12 Schools," April 2016, accessed August 31, 2020, https://www.energy.gov/sites/prod/files/2016/05/f31/K-12-ESPC-Primer_April2016.pdf
3. U.S. Government Accountability Office, "School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement," GAO-20-494, June 4, 2020, accessed August 31, 2020, <https://www.gao.gov/products/GAO-20-494>
4. Mary Filardo, Jeffrey M. Vincent, and Kevin J. Sullivan, "How crumbling school facilities perpetuate inequality," *Phi Delta Kappan*, 100, no. 8 (April 2019): 27-31, <https://kappanonline.org/how-crumbling-school-facilities-perpetuate-inequality-filardo-vincent-sullivan/>
5. Mary Filardo, "State of Our Schools: America's K-12 Facilities 2016," 21st Century School Fund, 2016, accessed August 31, 2020, <https://www.centerforgreenschools.org/state-our-schools>
6. "How much energy is consumed in U.S. buildings?," U.S. Energy Information Administration, June 15, 2020, accessed August 31, 2020, <https://www.eia.gov/tools/faqs/faq.php?id=86&t=1>
7. Nichole L Hanus, Gabrielle Wong-Parodi, Parth T Vaishnav, Naïm R Darghouth, and Inês L Azevedo, "Solar PV as a mitigation strategy for the US education sector," *Environmental Research Letters*, 14, no. 044004 (2019), <https://doi.org/10.1088/1748-9326/aafbcf>
8. Energy Star, "Schools: An Overview of Energy Use and Energy Efficiency Opportunities," accessed August 31, 2020, <https://www.energystar.gov/sites/default/files/buildings/tools/SPP%20Sales%20Flyer%20for%20Schools.pdf>
9. Solar Energy Industries Association, "Solar Power Purchase Agreements," accessed August 31, 2020, <https://www.seia.org/research-resources/solar-power-purchase-agreements>
10. "Better Buildings Equal Better Lives." U.S. Green Building Council, accessed August 31, 2020, <https://www.usgbc.org/leed>
11. Kristen Keim, "Guide to achieving zero energy schools now available," U.S. Green Building Council, March 5, 2018, <https://www.usgbc.org/articles/guide-achieving-zero-energy-schools-now-available>
12. Kate Crosby and Anisa Baldwin Metzger, "Powering Down: A Toolkit for Behavior-Based Energy Conservation in K-12 Schools," U.S. Green Building Council, 2013, <https://centerforgreenschools.org/sites/default/files/resource-files/Behavior-based-Efficiency.pdf>
13. "A Common Definition for Zero Energy Buildings," U.S. Department of Energy, accessed September 11, 2020, <https://www.energy.gov/eere/buildings/downloads/common-definition-zero-energy-buildings>
14. Yngrid Chayacani and Blair Mariko Toy, "State-Level Legislation to Support Energy Efficiency: Dedicated Funding for Existing K-12 Schools," Center for Green Schools at the U.S. Green Building Council, September 15, 2020, accessed August 31, 2020, <https://kapost-files-prod.s3.amazonaws.com/uploads/asset/file/59b95b7f65e77e00270005d3/Energy%20Eff%20Leg%20for%20Existing%20Schools.pdf>
15. New Buildings Institute, "2019 Zero Energy Schools Watchlist," 2019, accessed August 31, 2020, https://newbuildings.org/wp-content/uploads/2019/02/2019_SchoolsWatchlist.pdf
16. Los Angeles Unified School District, "Los Angeles Unified School Board Commits to Transitioning to 100% Clean, Renewable Energy," Press release, December 3, 2019, <https://achieve.lausd.net/site/default.aspx?PageType=3&DomainID=4&ModuleInstanceID=4466&ViewID=6446EE88-D30C-497E-9316-3F8874B3E108&RenderLoc=0&FlexDataID=84166&PageID=1&Comments=true>
17. Salt Lake City School District Board of Education, "Resolution to Establish Goals for Sustainability, Clean Energy, and Carbon Neutrality," June 2, 2020, accessed August 31, 2020, <https://www.slcschools.org/board-of-education/board-meetings/2019-20/20200602-1700-1/exhibit-2g3/english/>
18. Renewable Energy World Content, "Student-initiated resolution to power Salt Lake City School District with 100% clean energy adopted," June 8, 2020, August 31, 2020, <https://www.renewableenergyworld.com/2020/06/08/student-initiated-resolution-to-power-salt-lake-city-school-district-with-100-clean-energy-adopted/#gref>
19. VMDO Architects, "Discovery Elementary School Becomes First School to Receive LEED Zero Energy Certification," Press release, July 19, 2019, <https://www.arlnow.com/press-releases/discovery-elementary-school-becomes-first-school-to-receive-leed-zero-energy-certification/>
20. Warren County Public Schools, "Richardsville Elementary slated to be first Net Zero School in the Nation," accessed August 31, 2020, <https://www.warrencountyschools.org/userfiles/1374/Net%20Zero%20news%20release.pdf>
21. Hannah Chenoweth, "The Nation's First Net-Zero Energy School," K12 Facilities Forum, May 1, 2018, accessed August 31, 2020 <https://info.k12facilitiesforum.com/blog/the-nations-first-net-zero-energy-school>
22. Jennifer Wohlleb, "Five years of operation and 'zero' to show for it," *Kentucky School Advocate*, July/August 2015, accessed August 31, 2020, <https://www.ksba.org/WarrenCountyNetZeroSchools.aspx>
23. New Buildings Institute, "2019 Zero Energy Schools Watchlist," 2019, accessed August 31, 2020, https://newbuildings.org/wp-content/uploads/2019/02/2019_SchoolsWatchlist.pdf