K12 CLIMATE ACTION

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STATE POLICY LANDSCAPE 2020

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K12 Climate Action within the Aspen Institute Energy and Environment Program seeks to unlock the power of the education sector to be a force toward climate action, solutions, and environmental justice. The K12 Climate Action commission is developing an action plan and building a coalition to support the education sector in moving toward climate action, solutions, and environmental justice. **www.k12climateaction.org**

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

EXECUTIVE SUMMARY

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Education is one of the largest public sectors in America, serving over 50 million elementary and secondary students each year—nearly one in every six Americans.[1] In supporting students, families, and communities, schools have a large environmental impact. Additionally, as an integral part of communities, schools have already faced the damaging effects of climate change.

Schools also provide a unique opportunity. As they transition to more sustainable practices and adapt to increase resilience to climate change, educators can help equip the next generation to tackle the environmental challenges of the future. Today's students will help lead the fight against climate change, advance climate solutions, and create a more sustainable, resilient, and equitable future.

Why Education and Climate Change?

The nation's 98,000 K-12 public schools are among the largest energy consumers across public sector buildings, and energy costs account for the second-highest expense for school districts.[2] Schools serve over 7 billion meals annually, producing an estimated 530,000 tons of food waste each year.[3,4] School buses are the largest mass transit fleet in the country, with nearly 480,000 buses driving a total of nearly 3.45 billion miles annually.[5,6]

Extreme weather events—including flooding, hurricanes, wildfires, and heatwaves—have forced school closures, meaning students have lost learning time, supports, and services. Extreme weather events and the related trauma can cause lasting mental and physical health concerns for students.[7] Children are also particularly susceptible to the effects of air pollution, which continues to worsen. These negative effects of climate change fall disproportionally on communities of color and under-resourced urban and rural communities.[8]

As public entities, schools need the support of policy to mitigate their environmental impact and adapt to the negative impacts of climate change. Yet, few school systems have acted systemically to address climate change, and few large-scale climate proposals consider the role education can play.

Schools that take steps to lower energy consumption, use electric school buses, incorporate sustainable food use, and prepare for climate impacts can offer hands-on opportunities for students. These learning experiences can help students better prepare for the green economy, better understand human impact on the environment, and become equipped to advance sustainability.

POLICY LANDSCAPE

This report summarizes current state policies and programs that support sustainable practices to address climate change. We compiled state policies on six topics across the following three focus areas: mitigation, adaptation, and education. We focus specifically on policies related to schools and acknowledge alternative policies and solutions not covered in this report can also help schools address climate change.

FOCUS AREA	KEY QUESTION	TOPICS
Mitigation	How can schools reduce their carbon footprints?	Energy, Transportation, Food
Adaptation	How can schools become more resilient to climate change threats?	Virtual Learning Days
Education	How can schools prepare students for a more sustainable future?	Career and Technical Education, Science and Social Studies Standards

Findings

To date, there have been few systemic efforts in the education sector to reduce its climate impact and actively equip students to advance a more sustainable future. As a result, policies and programs addressing sustainability and climate change vary widely across states. Some policies are common across states, such as supporting local food procurement in schools and permitting Volkswagen Mitigation Settlement funds to be used for electric school buses. Other topics are only addressed by a few states, such as net-zero energy goals for schools and including climate change in social studies standards.

Though these efforts are making progress, schools still have a long way to go. For instance, only 16% of districts have some schools that use solar energy, and the VW Mitigation Settlement has only purchased a limited number of electric buses.[9] Policymakers, school leaders, and educators can learn from the policy initiatives currently occurring across the country. The variability across states, the need to support schools in transitioning to environmental sustainability, and leadership from youth create an opportunity to further advance policy to support schools in addressing climate change.

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

TOPIC	POLICY HIGHLIGHTS
Energy	• **6 states** have policies that target net-zero energy consumption in schools
Transportation	• **45 states**' Volkswagen Mitigation Settlement plans allow funding to be used for electric school buses • **24 states and DC** have policies to reduce school bus idling
Food	• **34 states and DC** have policies or programs to support local food in school meals • **17 states and DC** have policies or programs to support school gardens • **14 states** have policies or programs to encourage schools to divert surplus food waste
Virtual Learning Days	• **13 states** have policies that allow virtual learning days in place of inclement weather days
Career and Technical Education	• **29 states** have career and technical education programs that prepare students for green careers
Science and Social Studies Standards	• **29 states and DC** require teaching climate change as human-caused in science classes • **5 states** require teaching climate change in social studies classes • **16 states** require teaching about sustainability in social studies classes

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INTRODUCTION

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America's public elementary and secondary schools educate over 50 million students annually—nearly one in every six Americans.[1] To educate these students, schools have tremendous needs related to energy, transportation, and food. In fact, schools are among the largest energy consumers among public sector buildings, serve over 7 billion meals annually with related food waste, and use about 480,000 school buses for student transportation—the largest mass transit fleet in the country.[2,3,4]

Climate change will increase the frequency and intensity of wildfires, floods, hurricanes, and heatwaves. These extreme weather events will increase exposure to trauma among children. Climate change will also decrease air quality and food access. Poorer air quality, food insecurity, and heat can impact children's health and student learning.[5] Communities of color, Indigenous peoples, and under-resourced rural and urban communities will be disproportionately impacted by these negative consequences.

Schools across the country have already been forced to close for extreme weather events, and as a result, students have missed critical learning time and support services. Additionally, school closures related to COVID-19 have exposed weaknesses in the resilience of school systems, which will likely be exacerbated by climate impacts.

In the fight against climate change, schools are uniquely positioned to educate and prepare a new generation of students better equipped to tackle the environmental challenges in their future. Educators can engage students in learning on sustainability, the environment, green jobs, and climate change, while schools transition toward sustainable operations and build resilience. Doing so can help ensure over 50 million students are equipped with the knowledge and skills to advance a more sustainable, resilient, and equitable society in the future.

As public entities, our 98,000 public schools need the support of policy to effectively address climate change through mitigation, adaptation and education. Yet, current large-scale climate proposals have not sufficiently considered the needs and opportunities to support our public kindergarten through 12th grade (K–12) education sector.

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

In this report, we examine the current landscape of state policy to support the public K–12 education sector in:

- **Mitigation.** We examine current policies that support schools in mitigating their environmental impact through energy, transportation, and food.
- **Adaptation.** We examine current policies that support schools in adapting and building resilience to climate change.
- **Education.** We examine current policies that support schools advancing sustainability and addressing climate change through teaching and learning.

In each section, we describe a topic, identify the connection to climate change, outline existing state policies, and highlight promising initiatives and policies.

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

Research Methods

In this analysis, we examined state policy in all 50 states and the District of Columbia. To evaluate the extent to which each state addresses the issues associated with climate change and sustainability, we tracked the following components within the three areas of mitigation, adaptation, and education:

- **Mitigation:** To what extent do states have policies that support schools in reducing their carbon footprint related to
  - Energy Use;
  - Transportation Use; and
  - Food Use.
- **Adaptation:** To what extent do states have policies that support schools in
  - Preparing for extreme weather events; and
  - Supporting students in the aftermath of extreme weather events;
- **Education:** To what extent do states have policies that support schools in
  - Teaching sustainability;
  - Teaching climate science; and
  - Preparing students for the green economy.

For this study, we utilized many types of both primary and secondary sources, including, but not limited to: legislation, regulations, mitigation settlements, state standards, academic papers, reports, and news articles. We conducted the review between November 2019 and June 2020. As such, policies occurring after this time may not be reflected in the analysis. Additionally, we did not conduct a thorough review of district policy. However, in the analysis, we identified some district policy bright spots and have highlighted those across the report.

Limitations

In considering the results of this report, it is important to acknowledge some limitations. In particular, we relied on documentation to determine the presence or absence of policy. We did not speak with stakeholders across the country to evaluate their implementation in action. Therefore, while we may be able to report that a state may have referenced teaching sustainability in their state standards, for example, we cannot claim that students are in fact learning about sustainability in their classrooms. There may also be additional states, districts, and schools that are making great strides in advancing sustainability, but if those have not yet resulted in state policy, they would not be included in this analysis. We also acknowledge additional policies, not examined in this report, can help schools move toward climate action.

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

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ENERGY

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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			✘
Arkansas			✘
California	✘^	✘	✘
Colorado			✘
Connecticut			
Delaware			
District of Columbia			
Florida			
Georgia			
Hawaii			✘
Idaho			
Illinois			
Indiana			
Iowa			
Kansas			
Kentucky	✘^	✘	✘
Louisiana			
Maine			✘
Maryland	✘^		✘
Massachusetts	✘*		✘
Michigan		✘	
Minnesota			
Mississippi			
Missouri			
Montana			
Nebraska			
Nevada			
New Hampshire			✘
New Jersey		✘	
New Mexico			
New York	✘*	✘	✘
North Carolina		✘	✘
North Dakota			
Ohio			
Oklahoma			
Oregon		✘	✘
Pennsylvania			

Remaining states on following page

States R – W

Rhode Island			✘
South Carolina			✘
South Dakota			
Tennessee			
Texas			✘
Utah		✘	
Vermont		✘	
Virginia	✘	✘	
Washington		✘	✘
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.

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SCHOOL TRANSPORTATION

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What is School Transportation?

Students and their families need safe, reliable, and affordable ways of getting to and from schools. Families rely on a variety of means for transportation, including walking, bike-riding, public transportation, personal transportation, and our public-school bus system. In this report, we focus on the school bus system.

During the 2017–18 school year, nearly 23.3 million public school students took school buses daily, accounting for 55% of public school students.[1] The nation's school bus fleet is both large and costly. With nearly 480,000 buses, the fleet is more than twice the size of all other types of mass transit fleets combined.[2] In the 2015–16 school year, schools spent $24.3 billion on transportation expenses, for an average of $943 per student.[3] In total, all school buses across the US drove nearly 3.45 billion miles during the 2017–18 school year.[4]

CONNECTION TO CLIMATE CHANGE

School buses emit greenhouse gases that contribute to climate change. Currently, 94% of school buses run on diesel engines, which operate from burning fossil fuels.[5] The exhaust from diesel buses creates air pollution, harming both the environment and students' health.

Air pollution contributes to environmental and health disparities.[6] Communities of color and low-income communities face greater exposure to air pollution and have higher rates of related chronic health issues such as asthma and hypertension. These conditions—as well as exposure to air pollution itself—have been linked to higher instances and severity of COVID-19.[7] Children are also more susceptible to the negative health impacts of air pollution than adults because they have a faster breathing rate and their lungs are still developing.

Air pollution inside school buses can also harm students' health, with research suggesting greater risks for both urban and rural students. In particular, researchers previously have found students who take longer bus rides face more exposure to high levels of air pollution that can develop inside school buses due to diesel emissions.[8] In recent years, retrofit programs and advances in pollution control technologies have significantly reduced pollution from diesel exhaust. However, retrofit systems do not eliminate emissions completely.[9, 10]

There are a variety of options schools can use to reduce the environmental impact of school buses. Using cleaner technology in buses is one way to reduce air pollution.[11] Lower-emission school buses can include electric vehicles or engines that run on alternative fuels, such as propane.[12] While propane school buses can be a more environmentally and financially friendly option than diesel, they still emit significant levels of greenhouse gases. Transitioning directly to electric buses eliminates the environmental and health dangers of tailpipe emissions. Studies have shown that buses that are retrofitted or replaced entirely with green technology improve student academic performance and respiratory health and decrease student absenteeism.[13,14]

Electric School Buses

Electric buses have become a growing focus in recent years. They are better for the environment by eliminating tailpipe pollution – the US Public Interest Research Group (PIRG) predicts that replacing all school buses with electric buses could prevent over 5.3 million tons of greenhouse gas emissions annually.[15]

With front-end incentives, electric buses are also more economically efficient than diesel buses in the long-run.[16] While the upfront cost is higher—roughly three times more than a diesel or propane school bus—the savings of an electric bus can pay off over time, costing an estimated $170,000 less in lifetime fuel and maintenance costs. Annually, each electric school bus can save districts almost $2,000 in fuel and $4,400 in maintenance costs.[17]

Dominion Energy

Partnerships with regional energy providers can help schools access electric buses. In Virginia, for example, utility company Dominion Energy is partnering with school districts throughout its Virginia territory to provide electric buses.[18] The first phase of the pilot program will provide 50 buses across 16 districts by the end of 2020. These school districts will purchase electric buses for the same price as they would pay for diesel buses, with Dominion paying the additional cost for the electric bus and charging infrastructure.

The utility has proposed additional phases with a goal of having 100% of replacement school buses in its Virginia service areas be electric buses by 2030. To cover the cost of these phases, though, they were discussing increasing utility base rates. The batteries on the buses will supply and store clean energy for Dominion Energy's power grid. Advocates and school districts are working to ensure the phase-in centers equity, students, schools, and consumers in the planning.[19]

VW Mitigation Trust

Across all states, the Volkswagen (VW) Environmental Mitigation Trust can provide an opportunity for schools to purchase electric or other green buses with lower financial barriers.[20] The trust allocates $2.9 billion in total to all states to reduce air pollution from large vehicles as part of the company's settlements for misleading emissions tests. The use of the funds is determined by each state's plan. While the VW settlement funds can help support a modest transition to electric school buses, these funds alone are not enough to cover the cost of transitioning an entire fleet to electric buses.

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

State Policies

Electric Buses

State vehicle emissions regulations and funds for electric school buses can help states transition their school bus fleet.[21] Most states' VW settlement plans allow funds to be used to replace old diesel school buses from before 2009 with cleaner technology. Forty-five states' plans allow funds to be used to purchase electric buses and 39 states' plans allow purchases of alternative fuel buses. While plans allowing electric and alternative fuel vehicles are promising opportunities, most states also allow funds to be used for new diesel buses.

Idling

Twenty-six states and DC have policies or programs to reduce school bus idling as another way to curb air pollution. Twenty-four of these states have regulations on idling, most of which specifically apply to school buses or other vehicles near school buildings. Six states have idling reduction policies that may apply to school buses, though school buses are not explicitly mentioned. Three states (AL, IN, OH) have grant or loan programs to support idle reduction technology retrofits for school buses. Three states (AZ, ID, MD) have voluntary idling reduction initiatives for school buses through opt-in programs for schools or districts.

Reviewed by Tish Tablan, Program Director, Generation180 and Paola Massoli, Sr. Fellow, Generation180

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

BRIGHT SPOTS

- Twin Rivers Unified School District (CA) has 30 electric school buses, the largest such fleet in the country.[22] In 2017, Twin Rivers was the first of three districts in Sacramento County to start using the electric buses, which were paid for using funds from California's cap-and-trade program. The electric school bus routes primarily run through historically marginalized communities, decreasing their exposure to pollution. The electric buses have also reduced Twin Rivers' fuel costs by 80%.[23]
- Michigan has a pilot program to provide electric buses to school districts.[24] In fall 2019, seven districts began using a total of 17 electric buses. The program made $13 million available for districts to replace diesel school buses from 2009 or earlier and is partially funded by Michigan's VW settlement allocation.[25]

SCHOOL BUS EMISSION REDUCTION

DOES STATE HAVE POLICY TO REDUCE EMISSIONS OF SCHOOL BUSES?

States A–N	If state is using VW mitigation funds to replace school buses, what types are allowed in plan?		Does state have policy or program to reduce school bus idling?	
	Alt Fuel	Electric	Policy regarding school bus idling	Grant or loan program for idle reduction technology on school buses
Alabama	✘	✘		✘
Alaska	✘	✘		
Arizona	✘	✘	✘**	
Arkansas	✘	✘		
California		✘	✘	
Colorado		✘	✘*	
Connecticut	✘	✘	✘	
Delaware			✘	
DC			✘	
Florida	✘	✘		
Georgia				
Hawaii		✘		
Idaho	✘	✘	✘**	
Illinois	✘	✘		
Indiana	✘	✘	✘	✘
Iowa	✘	✘		
Kansas	✘	✘		
Kentucky	✘	✘		
Louisiana	✘	✘		
Maine	✘	✘	✘	
Maryland	✘	✘	✘**	
Massachusetts	✘	✘	✘	
Michigan	✘	✘		
Minnesota	✘	✘	✘	
Mississippi	✘	✘	✘	
Missouri	✘	✘		
Montana	✘	✘		
Nebraska				
Nevada	✘	✘	✘*	
New Hampshire	✘	✘	✘*	
New Jersey	✘	✘	✘*	

Remaining states on following page

States N–W

New Mexico	✘	✘		
New York		✘	✘	
North Carolina	✘	✘	✘	
North Dakota	✘	✘		
Ohio	✘	✘		✘^
Oklahoma	✘			
Oregon	✘	✘		
Pennsylvania	✘	✘	✘	
Rhode Island			✘*	
South Carolina	✘	✘		
South Dakota	✘	✘		
Tennessee	✘	✘		
Texas	✘	✘	✘*	
Utah	✘	✘	✘	
Vermont		✘	✘	
Virginia		✘	✘*	
Washington		✘		
West Virginia	✘	✘	✘	
Wisconsin	✘	✘		
Wyoming	✘	✘		
TOTALS	39	45	25	3
PERCENT	76%	88%	49%	6%

Note: Percentages are out of 51 (includes DC)

*Does not explicitly mention school buses **Optional policy for districts or schools ^ Funding previously available for school buses

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

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FOOD

K12 CLIMATE ACTION
THE ASPEN INSTITUTE

WHAT IS SCHOOL FOOD?

Schools are a key food provider in communities around the country. The federal government subsidizes the cost of school meals through the National School Lunch Program (NSLP) and the School Breakfast Program (SBP). Both programs allow students to receive free or reduced-price meals if their family income is below a certain threshold. During the 2018–19 school year, the programs served nearly 4.9 billion school lunches and over 2.4 billion school breakfasts.[1,2] In 2019, 74% of lunches served through NSLP and 85% of breakfasts served through SBP were free or reduced-price.[3,4]

The COVID-19 pandemic has further highlighted how much students and their families depend on schools to provide a critical source of nutrition. In making decisions about school closures at the start of the pandemic, school leaders and policymakers emphasized reliance on school meals as a major concern. Once closures began and the economic crisis increased food insecurity, many schools provided free food to students and their families.[5]

With so many families relying on school meals, it is important to have healthy, sustainable food in our schools. Access to nutritious food is particularly critical for the health of children and youth living in poverty, who face disproportionately worse health outcomes and healthcare access.[6] The pandemic underscores the need to support student health so students can continue to learn and grow.

CONNECTION TO CLIMATE CHANGE

Schools are major consumers of food products. Policies and programs that make the process of buying and serving school food more sustainable have the potential to make a big impact on sustainability goals. Intentionally sourcing and using food sustainably also presents applied, hands-on learning opportunities for students.

Additionally, reducing food waste from schools can benefit the environment. Schools alone produce an estimated 530,000 tons of food waste per year, and food that sits in landfills produces methane, a potent greenhouse gas.[7] Researchers have estimated the cost associated with wasted food in schools to be $1.24 billion.[8] Importantly, research suggests that healthier school food does not impact food waste in schools.[9]

State Policies

Local Food in Schools

Thirty-four states and DC have at least one policy or program in place to incentivize or otherwise encourage the use of locally-sourced food in schools, as identified by the National Farm to School Network. This includes general funding, state-run grant programs for schools or districts, state-wide farm-to-school programs, and local preference or incentives for school food purchasing.[10]

Local preference in purchasing decisions is the most common policy or program—found in 24 states and DC. One program in Michigan incentivized local food procurement for schools by reimbursing schools an additional 10 cents for locally sourced food. Eighteen states have state-run farm-to-school programs, many of which are cross-sector collaborations between departments of education and agriculture. To encourage local food procurement, some states have grant programs that include opportunities for schools to purchase kitchen equipment that will allow them to prepare and serve fresh produce.

School Gardens

Seventeen states and DC have state-sponsored or coordinated school garden programs, which allow students to learn about the science of sustainable growing practices. Many schools serve the produce from their gardens as part of school meals. While states often have restrictions on food served in schools, some states have explicit policies permitting school garden produce to be exempt from those restrictions.

Surplus Food

Fourteen states have policies, programs, or resources explicitly allowing or encouraging schools to divert surplus food through share tables, food donation, or recovery programs. Share tables are an option for students to contribute their unopened food items to a central location so other students can take them. Food donation or recovery policies or programs allow schools to donate excess food to non-profit organizations such as food banks. Each of these reduce food waste by ensuring excess food can be eaten instead of thrown away.

Composting

Five states and DC have composting policies or programs at the state level. At least two other states (CA, IN) allow or encourage composting as part of broader school garden or recycling programs. Even if schools implement food waste reduction practices such as share tables or food recovery, some food waste is still expected.[11] Composting is a sustainable way to make use of inedible food that schools would otherwise send to landfills.

Reviewed by Kumar Chandran, Policy Director, FoodCorps

BRIGHT SPOTS

- Minneapolis Public Schools (MN) recently developed a three-year Food Waste Plan of Action to prevent wasted food, redistribute food surpluses, and recycle food scraps.[12] The plan is based on the EPA's Food Recovery Hierarchy tool and was developed through a collaboration between the district and the National Resources Defense Council.[13]

- Oakland Unified School District (CA) has a goal of establishing a garden at every school in the district.[14] The school board has an extensive policy describing the role of building and grounds staff in supporting school gardens and outdoor classrooms.[15] The district also has a Memorandum of Understanding form for schools whose garden education is provided by outside organizations. OUSD is also a leader in school waste reduction.[16] The district requires share tables in every school and has a sustainability specialist who focuses on food waste reduction. In the initial stages of their effort, OUSD was able to prevent more than 50% of their waste from reaching a landfill.[17]

- Austin Independent School District (TX) has worked with the Good Food Purchasing program to purchase local, sustainable food to serve in schools.[18,19] The program is run by the Center for Good Food Purchasing to help schools and other institutions align their food procurement with the Center's standards on local economies, nutrition, a valued workforce, environmental sustainability and animal welfare. Austin ISD has taken several steps to improve their performance in all five categories.[20] The district has released bids for food products like organic milk and grass-fed beef to improve sustainability and animal welfare, and each school provides daily salad bars, plant-based meal options, and locally and sustainably grown ingredients.

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

SUSTAINABLE FOOD PRACTICES

DOES STATE HAVE POLICY OR PROGRAM RELATED TO SUSTAINABLE FOOD USE IN SCHOOLS?

States A – M	Explicitly allows, encourages, or requires schools to divert surplus food	Composting	School gardens	Policies or programs supporting local food in schools^		
				Appropriations, grant program, or other revenue streams	State-wide farm to school program within state agency	Local preference for school food purchasing
Alabama	✘				✘	✘
Alaska			✘		✘*	✘*
Arizona			✘			
Arkansas						✘
California	✘*		✘	✘		✘
Colorado				✘		✘
Connecticut				✘	✘	✘
DC		✘	✘	✘	✘	✘
Delaware						
Florida					✘	✘
Georgia						✘
Hawaii		✘*	✘	✘	✘	✘
Idaho						
Illinois			✘	✘	✘	✘
Indiana	✘					
Iowa				✘		
Kansas						
Kentucky				✘		✘
Louisiana			✘		✘	
Maine	✘					✘
Maryland	✘				✘	✘
Massachusetts				✘*		✘
Michigan				✘		✘
Minnesota	✘**			✘		
Mississippi			✘			
Missouri			✘	✘	✘	✘
Montana				✘		✘

Remaining states on following page

States N – W

Nebraska			✘			
Nevada	✘		✘			
New Hampshire	✘					
New Jersey	✘		✘	✘	✘	
New Mexico	✘			✘		✘
New York				✘	✘	✘
North Carolina						✘
North Dakota						
Ohio						
Oklahoma			✘		✘	
Oregon			✘	✘	✘	
Pennsylvania				✘	✘	
Rhode Island		✘				
South Carolina						
South Dakota						
Tennessee						✘
Texas	✘			✘		✘
Utah						
Vermont	✘	✘	✘	✘	✘	
Virginia						
Washington	✘	✘	✘	✘	✘	✘
West Virginia	✘		✘	✘	✘	
Wisconsin		✘	✘	✘		
Wyoming				✘		
TOTALS	14	6	18	24	18	24
PERCENT	27%	12%	35%	47%	35%	47%

Note: Percentages are out of 51 (includes DC) * Funding may not be ongoing ** State agency has guidance but predominantly from federal information
^Local food policy and program data from National Farm to School Network Policy Handbook
http://www.farmtoschool.org/Resources/State%20Farm%20to%20School%20Policy%20Handbook.pdf

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

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

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ADAPTATION & RESILIENCE

K12 CLIMATE ACTION
THE ASPEN INSTITUTE

Communities across the country are facing extreme weather events, including wildfires, hurricanes, and flooding which are intensified by climate change.[1] The devastation caused by these events surface prominently in our nation's schools. Amplified by the impact of COVID-19, the nation has become aware of the educational, social, and psychological support functions that public schools provide. In many cases, especially in low-income communities, schools have been the hub to provide essential services to meet the basic needs of children and families.

Extreme weather events affect all aspects of the school community, including school infrastructure, and most importantly, the people who learn and work in schools. Families and communities experience trauma and uncertainty in the wake of natural disasters, which in turn, impacts the way schools support their communities. Two case studies, the Camp Fire and Hurricane Maria, illustrate the harm caused by extreme weather events and the need for resilient school systems in the face of increasing climate change threats.

CASE: The Camp Fire and Paradise Unified School District

During the 2018 Camp Fire in California, 5,000 students and 540 teachers in Butte County lost their homes to the wildfire.[2] Families whose homes were destroyed had to make difficult decisions about where to go. The fire also destroyed six schools and severely damaged eight schools in Paradise Unified School District.[3] Schools in the district were closed for weeks, affecting over 4,000 students and their families.[4]

Many students transferred into new school districts while others decided to stay in Butte County, where administrators struggled to come up with the resources and logistics to continue student learning.[5] Some classes shifted online while others temporarily relocated to shopping centers, warehouses, and vacant facilities in other school districts.

The shifts in schedule and location presented a difficult academic transition for students who were already facing trauma from the effects of the wildfire on their families and communities. Education leaders emphasized the need for trauma-informed care for students, bringing in child trauma experts for staff training and receiving additional help from mental health professionals around the state.[6] Months after the fire, many students and families continued to live in tents and trailers, with limited access to critical materials like textbooks and Wi-Fi.[7]

Paradise Unified School District is still in the process of rebuilding over a year after the fire. At the start of 2020, the district had an estimated 1,700 active students—nearly half of its pre-fire enrollment.[8] The district is considering strategies to increase the resilience of its school system throughout its recovery process.

Extreme Weather Impact on Schools

- During the 2018–19 school year, California wildfires caused a record number of 1,900 schools to close, effecting approximately 1.1 million students statewide.[18]
- In 2017, Puerto Rican students missed an average of 78 school days after Hurricanes Irma and Maria, and 1.4 million Texas students along the Gulf Coast missed at least the first week of school.[19, 20]
- Flooding, the most common natural disaster, impacts schools across the country. Over 6,000 schools serving 3.5 million students are located in a flood zone.[21]

CASE: Hurricane Maria

In September 2017, Hurricane Maria devastated Puerto Rico. Thousands of Puerto Ricans lost their lives. Many lost their homes and their livelihoods. Students, parents, and educators all experienced trauma related to the storm and its effects on their families and communities.

The hurricane also impacted student learning and supports for Puerto Rico's nearly 350,000 students. Schools were forced to close in the aftermath of the storm, with the average student missing 78 school days.[9] Like much of Puerto Rico's infrastructure, many school buildings were severely damaged by the storm and lacked power for long stretches of time. Others were converted to shelters where families displaced from their homes came to live and cook. To date, the school system is still trying to recover.[10]

Over 200,000 Puerto Ricans relocated in the wake of the storm to states including Florida, without work or knowledge of the local education system.[11] School districts throughout the state needed to respond rapidly to enroll children in schools. To enroll an influx of approximately 10,000 new students across the state, Florida school districts sought to hire additional educators as well as provide services to support students and families through the transition.[12]

In Orange County Public Schools, district personnel welcomed families at the airport and helped them through the process of enrolling their children. The district worked to hire educators from Puerto Rico and supported the teachers upon arrival in applying for employment at the schools.[13] Miami-Dade Public Schools collaborated with Puerto Rico's Department of Education to align curriculum standards and graduation requirements to facilitate a smooth academic transition for all students.[14]

School administrators in Florida found it difficult to identify and respond to academic, social, and cultural needs of the new student population.[15] While Florida government officials welcomed displaced families, state funding and programming efforts were inadequate in covering the basic needs of students and families who had been displaced.

Typically, funding for districts is based on annual fall enrollment. The Florida Department of Education issued guidance allowing schools and districts to request a second enrollment survey to capture the influx of new students.[16] Those that met a certain minimum threshold for enrollment increases could receive additional funding. A year after the hurricane, the federal government provided Florida with $95.8 million in reimbursements for the additional costs associated with the increased enrollment of Puerto Rican students.[17]

CONNECTION TO CLIMATE CHANGE

Climate change is leading to more extreme weather events all across the country, increasingly resulting in school closures. Hurricanes, tornados, snowstorms, flooding, and wildfires have devastated communities in the last few years. Communities hit hard by severe weather can face long-term disruptions in student learning and widespread negative effects on children's mental and physical health.

Extreme weather caused by climate change has dangerous implications for students' health and wellbeing.[24] Children whose families experience homelessness, food insecurity, and other traumas as a result of extreme weather events are at risk for mental health conditions such as Post-Traumatic Stress Disorder (PTSD), anxiety, and depression.[25] Air pollution, high heat, and other effects of climate change are particularly harmful to children due to their ongoing physical and behavioral development.[26] Climate change also impacts the food supply chain, leading to food insecurity, which threatens child nutrition.[27]

In addition to extreme weather events, the US is projected to experience more and more hot days on average during the year. Higher temperatures are detrimental to learning and health, with students performing worse academically on hot days.[22] Extreme heat has led to school closures and adapted schedules. In June 2018, some schools in the northeast and Midwest cut school days short due to high heat and insufficient air conditioning in buildings.[23] These negative health and learning impacts have a disproportionate effect on schools serving low-income communities with insufficient or outdated air conditioning.

As climate change continues, schools will need to confront increasing challenges to students' health, safety, and learning. Considering ways to continue providing learning opportunities, student services, and supports for families and educators can help build a more resilient education system in preparation for learning disruptions and negative impacts related to climate change. Currently, many of the policy changes to respond to extreme weather have occurred in the aftermath of disasters. One way some states have built in flexibility to continue student learning is through state virtual learning policies—a practice considerably more widespread with the COVID-19 pandemic.

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

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

Virtual Learning Policies

To prepare for learning disruptions related to extreme weather, some states have developed policies related to virtual learning days. Schools that are able to implement virtual learning days rather than completely forgoing instruction due to extreme weather events can minimize both short- and long-term disruptions to student learning.

WHAT IS VIRTUAL LEARNING?

Virtual learning provides opportunities for schools to continue educating students while school buildings are not physically open. Prior to COVID-19, virtual learning was relatively rare in public school systems.

While virtual learning is now widespread due to the pandemic, there are large disparities in access by income, urbanicity, and race. In late March 2020, only a third of districts with over 75% low-income students reported being able to provide online learning to all students, compared to nearly three-quarters of districts with less than 25% low-income students.[28] In April, 31% of parents in rural communities and 30% of parents in urban communities reported that their children were somewhat or very likely to need public Wi-Fi for schoolwork because they do not have a reliable internet connection at home, compared to 14% of parents in suburban communities.[29] In late May, nearly twice as many Black students were rarely or never able to access a device for learning compared to white students.[30]

Prior to the pandemic, some states and school districts started to utilize virtual learning days in order to minimize lost instructional time due to school closures related to weather such as heat, storms, and flooding. States require a minimum number of instructional learning days or hours and utilizing virtual learning when schools are closed allows schools to not fall below that minimum threshold.

STATE POLICIES

Thirteen states have policies on virtual learning days or nontraditional instructional days. Some policies may allow "blizzard bags" or other options for schools to provide instruction through non-digital methods such as packets. Two states (IL, SC) have piloted virtual learning days beginning with a small number of districts.

Some states with virtual learning policies have certain limits on how the days may be used. Six states (IL, MO, OH, PA, RI, WY) require district virtual learning plans to go through a state or district approval process prior to implementation. Five states (MN, MO, OH, PA, WV) limit how many instructional days or hours may be completed through virtual learning. Ohio allows virtual learning for inclement weather only if schools will fall below the required minimum instructional days or hours due to weather events.

Some states allow waivers for school districts that cannot meet the minimum required instructional days or hours due to emergencies, including extreme weather events. These provisions, however, do not encourage continuity of education for students.

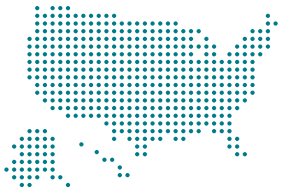
In response to the COVID-19 pandemic, at least one state (PA) has made policy changes to allow school districts to implement Flexible Instructional Days and increased the number of days that may be used. We have yet to see how the pandemic and immediate shifts to virtual, remote, and hybrid learning plans will impact permanent policy changes at the state-level to utilize virtual learning in schools.

Reviewed by Chi Kim, CEO, Pure Edge, Inc.

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

BRIGHT SPOTS

- Marshall Public Schools (MN) developed e-learning days to prevent learning interruptions due to snow or other inclement weather.[31] The state education agency approved the district to use up to five virtual learning days in place of snow days. Educators prepare for virtual learning days beginning in the fall and have specific hours they will be available to communicate with students.
- Miami-Dade County Public Schools' susceptibility to hurricanes and related school closures led the district to invest in education technology through a $1.2 billion school bond referendum passed in 2012.[32] The district's one-to-one technology program, professional development on technology, and prior family engagement initiatives enabled the district to be more prepared for the shift to virtual learning due to the pandemic.



DOES STATE HAVE POLICY REGARDING VIRTUAL LEARNING?

	YES	NO
Alabama		✘
Alaska		✘
Arizona		✘
Arkansas		✘
California		✘
Colorado	✔	
Connecticut		✘
Delaware		✘
District of Columbia		✘
Florida		✘
Georgia		✘
Hawaii		✘
Idaho		✘
Illinois	✔	
Indiana	✔	
Iowa		✘
Kansas		✘
Kentucky	✔	
Louisiana		✘
Maine		✘
Maryland		✘
Massachusetts		✘
Michigan		✘
Minnesota	✔	
Mississippi		✘
Missouri	✔	
Montana		✘
Nebraska		✘
Nevada		✘
New Hampshire		✘
New Jersey		✘
New Mexico		✘
New York		✘
North Carolina		✘
North Dakota		✘
Ohio	✔	
Oklahoma		✘
Oregon		✘
Pennsylvania	✔	
Rhode Island	✔	
South Carolina	✔	
South Dakota		✘
Tennessee		✘
Texas		✘
Utah		✘
Vermont		✘
Virginia		✘
Washington		✘
West Virginia	✔	
Wisconsin	✔	
Wyoming	✔	
TOTALS	**13**	**38**
PERCENT	**25%**	**75%**

Note: Percentages are out of 51 (includes DC)

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STATE STANDARDS

K-12 CLIMATE ACTION
THE ASPEN INSTITUTE

What are State Standards?

Every state has a set of standards which outline the knowledge and skills that the state expects students to learn for each grade, kindergarten through 12th grade, within particular subject areas. State standards compile learning targets and key competencies for each subject, including reading, math, science, and social studies.

Standards outline a state's expectations for teaching and learning but are not the same as curriculum. Curriculum determines how content is taught and often includes textbooks, materials, lesson plans or other resources for teachers. Curriculum decisions and class offerings can differ by district and school. Having a state standard on a given topic does not mean that standard is necessarily taught to all students or that all students will have the same depth of knowledge about that topic. States have internal processes for establishing their own standards. States, school districts, and teachers all help determine the curriculum taught in schools.

This report looks exclusively at state science and social studies standards for grades kindergarten through 12. For the purpose of this report, science standards include all elementary and middle school science classes, as well as high school science courses or topics such as biology and environmental science. Social studies standards include topics or courses such as history, geography, civics, and economics. These may be threaded throughout one grade-level social studies class or taught in separate courses by topic, particularly in high school.

CONNECTION TO CLIMATE CHANGE

Addressing climate change and protecting the environment involves both scientific and societal changes at all levels, from local to global. State standards provide an opportunity to create a framework to equip students with the knowledge and skills to understand and act on climate change. In 2019, 68% of parents and 74% of teachers thought that climate change and its effects on the environment and society should be taught in schools.[1] Another study found an estimate of 78% of adults believe schools should teach about the causes, consequences, and potential solutions to climate change.[2]

Understanding the science behind climate change is crucial for taking action to mitigate its effects on the environment. There is overwhelming scientific consensus that human actions impact climate change, with 97% of climate scientists in agreement.[3] Climate science involves many scientific disciplines—such as biology, chemistry, and earth system science.

Weaving climate change into these topics in kindergarten through 12th grade science classes in a developmentally appropriate way can give students a deep understanding of the causes, consequences, and solutions to climate change.

Understanding human impacts on the environment is critical in addressing climate change and advancing sustainability. Social studies classes are an opportunity for students to learn about how individuals and societies interact with the environment and the ways individuals, businesses, and governments make social and economic decisions.[4] Climate change and sustainability are particularly relevant in classes or units on geography, civics, and economics. Environmental conservation and sustainability are increasingly visible topics at various levels of government and continue to spur civic action in the US and around the world.

TERMINOLOGY

- **Standards:** Statements that define what students should know and be able to do by the end of a certain subject in a specific grade. Standards for public schools are generally set at the state level.
- **Curriculum:** Lesson plans and other resources for teachers that detail how course content should be taught. Curricula are generally created or selected to align with relevant standards in a subject and grade level. Curriculum decisions are often made at the district or school level.

INDIGENOUS KNOWLEDGE SYSTEMS

Indigenous peoples have a deep relationship with the land, water, and other natural elements which are integral to their cultures, knowledges, and livelihoods. These relationships have been developed and taught in Indigenous communities since time immemorial, long before the American public-school system was established. Indigenous Knowledge Systems (IKS) shapes Indigenous youth identity and perceptions of the world.

While science and social studies education in the US often includes human-environment interactions, there is an emphasis on empirical data and western science. Rarely do these classes include Indigenous Knowledge Systems, which is a holistic, observational, and systematic way of understanding the environment and its connection to culture and society. IKS has contributed to Indigenous communities leading on mitigating and responding to climate change as well as management of lands in which the majority of the world's remaining biodiversity is found.[5] To address climate change in schools, we need to be inclusive of Indigenous Knowledge Systems.

ENVIRONMENTAL LITERACY

Environmental literacy has provided a framework to help students build understanding about the environment and their role in it.[6] Environmental literacy involves developing students' understanding of how individual and collective actions impact the environment and preparing students to make environmentally conscious decisions based on their knowledge, skills, and context. While not necessarily named in state standards, environmental literacy relates to environmental education across disciplines including science and social studies. One state, Wisconsin, currently has interdisciplinary standards on environmental literacy and sustainability.

Some states have policies explicitly promoting environmental literacy. In California, a law on environmental education requires "environmental principles and concepts" to be included in state standards.[7] These principles include climate change and sustainability and have increased access to environmental education across the state.

CLIMATE LITERACY

Climate literacy is defined as "an understanding of your influence on climate and climate's influence on you and society."[8] In the late 2000s, many scientists and educators collaborated to define climate literacy, identify the principles and concepts that should be taught, and justify the teaching of climate science. In The Essential Principles of Climate Sciences guide, they acknowledge the need for climate literacy, stating: "Such understanding improves our ability to make decisions about activities that increase vulnerability to the impacts of climate change and to take precautionary steps in our lives and livelihoods that would reduce those vulnerabilities."[9]

This guide influenced the inclusion of climate literacy and concepts in the National Research Council's 2012 framework report which served as a basis for the Next Generation Science Standards (NGSS). Science teachers have stated that standards, like the NGSS, are one of the main reasons for teaching climate change.[10]

State Policies

Science Standards

Twenty-nine states and DC have state science standards that include teaching human-caused climate change. Of these, 20 states and DC use the Next Generation Science Standards (NGSS).[11] NGSS are a set of standards developed by states based on the National Research Council's (NRC) 2012 research-based Framework for K–12 Science Education.[12]

> ***Louisiana Grade 7 Science MS.ESS3D.a***: Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature. Addressing climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.

Fifteen states include science standards that mention climate change but do not specify that it is predominantly caused by humans. Many of these states' standards are also informed by the NRC's framework, but often their standards addressing climate change have been modified to remove or deemphasize the role of human actions on climate change. Several states mention climate change in their standards but only mention evidence that climate change occurs or what its effects are, without discussing the cause.

> ***Indiana Grade 8 Science 8.ESS.1***: Research global temperatures over the past century. Compare and contrast data in relation to the theory of climate change.

Five states only include climate change in the standards for optional or elective high school-level science courses. As a result, only some students may engage in teaching and learning that addresses climate change. Of these five states, only one (MA) specifically mentions human causes of climate change.

One state (PA), currently lacks any mention of climate change in their state science standards. However, Pennsylvania's current standards are from 2002, and the state began the process of reviewing and updating the standards in fall 2019.[13]

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

State Policies

Social Studies Standards

Forty states and DC have social studies standards that address **environmental issues** broadly, such as interactions between humans and their environments.

Eighteen states have social studies standards that explicitly mention **environmental sustainability**. Several states (including CO, GA, NJ, SC, WA) connect environmental sustainability to economics, trade, resource distribution, and the political consequences (e.g. global conflict) of decisions related to these topics. Some states (including OK, NJ, SC) have standards that direct students to describe or plan actions they can take to protect the environment. A few states (including MS, OK) specifically mention renewable resources, such as solar energy, in their social studies standards.

> ***Oregon Grade 4 Geography 4.10***: Describe how technological developments, societal decisions, and personal practices affect Oregon's sustainability (dams, wind turbines, climate change and variability, transportation systems, etc.).

Seventeen states' social studies standards explicitly include **climate change**. Of these, one references the human impact on climate change and four require teaching climate change but do not mention human causes. Twelve states allow but do not require teaching about climate change. For example, a standard addressing climate change may appear only in an elective or optional social studies class, or climate change may be listed as an optional example that teachers may or may not use.

> ***New Jersey U.S. History: America in the World by the End of Grade 12 6.1.12.GeoHE.14.a:*** Evaluate the impact of individual, business, and government decisions and actions on the environment and climate change and assess the efficacy of government policies and agencies in New Jersey and the United States in addressing these decisions.

Ten states do not mention any of the previous three topics—environmental issues, climate change, and environmental sustainability—in their social studies standards.

Reviewed by Frank Niepold, Climate Education Coordinator, Climate Program Office, NOAA

BRIGHT SPOTS

- New Jersey recently updated its standards to include climate change across most content areas for kindergarten through 12th grade.[14] The standards are designed to give students an understanding of the science behind climate change, prepare them for green jobs, and prompt them to consider climate solutions.[15] The standards will be implemented beginning with the 2021–22 school year.
- Portland Public Schools (OR) are utilizing social studies and science curricula about climate change and climate justice.[16] This work was spurred by the district board of education's 2016 resolution on climate literacy and is being led by the district's Climate Justice Program Manager.[17] Portland Public School students have been engaged in climate activism and are being involved in the curriculum development process.[18,19]

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

SCIENCE STANDARDS

DO STATE SCIENCE STANDARDS ADDRESS CLIMATE CHANGE?

States A–N	Requires teaching human-caused climate change	Requires teaching climate change but not as predominantly human-caused	Climate change only included in optional high school classes
Alabama			✘
Alaska	✘		
Arizona	✘		
Arkansas	✔		
California	✔		
Colorado	✘		
Connecticut	✔		
Delaware	✔		
DC	✔		
Florida		✘	
Georgia			✘
Hawaii	✔		
Idaho		✘	
Illinois	✔		
Indiana		✘	
Iowa	✔		
Kansas	✔		
Kentucky	✔		
Louisiana	✘		
Maine	✔		
Maryland	✔		
Massachusetts			✘^
Michigan	✔		
Minnesota		✘	
Mississippi		✘	
Missouri		✘	
Montana		✘	
Nebraska		✘	
Nevada	✔		
New Hampshire	✔		
New Jersey	✔		
New Mexico	✔		
New York	✘		
North Carolina		✘	
North Dakota	✘		

Remaining states on following page

States O-W

Ohio		✘	
Oklahoma		✘	
Oregon	✔		
Pennsylvania			
Rhode Island	✔		
South Carolina			✘
South Dakota		✘	
Tennessee	✘		
Texas			✘
Utah		✘	
Vermont	✔		
Virginia		✘	
Washington	✔		
West Virginia		✘	
Wisconsin	✘		
Wyoming	✘		
TOTALS	30	15	5
PERCENT	59%	29%	10%

Note: Percentages are out of 51 (includes DC) ✓ State uses Next Generation Science Standards (NGSS) ^ Standard about human-caused climate change

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

SOCIAL STUDIES STANDARDS

Do social studies standards address environmental issues?

States A–N	Environmental issues (e.g. human-environment interaction)	Climate Change		Sustainability	
		Requires teaching climate change, not necessarily human-caused	Allows but does not require teaching climate change (optional content or optional class)	Requires teaching sustainability	Allows but does not require sustainability (optional content or optional class)
Alabama	✘			✘	
Alaska					
Arizona	✘			✘	
Arkansas	✘			✘	
California	✘		✘*		✘*
Colorado	✘			✘	
Connecticut					
Delaware	✘				
DC	✘				
Florida	✘				
Georgia	✘			✘	
Hawaii	✘	✘		✘	
Idaho	✘				
Illinois	✘				
Indiana	✘		✘	✘	
Iowa	✘				
Kansas	✘				
Kentucky					
Louisiana					
Maine					
Maryland	✘		✘		
Massachusetts	✘	✘			
Michigan	✘		✘		
Minnesota	✘	✘			
Mississippi	✘			✘	
Missouri	✘				
Montana	✘				
Nebraska	✘		✘		
Nevada	✘				
New Hampshire	✘		✘		
New Jersey	✘	✘^		✘	
New Mexico	✘				
New York	✘				
North Carolina	✘		✘		
North Dakota	✘				

Remaining states on following page

States O-W

Ohio	✘			✘	
Oklahoma	✘	✘		✘	
Oregon	✘		✘	✘	
Pennsylvania					
Rhode Island	✘		✘		
South Carolina	✘			✘	
South Dakota					
Tennessee					
Texas	✘				
Utah	✘		✘	✘	
Vermont	✘		✘		
Virginia					
Washington	✘			✘	
West Virginia	✘		✘		✘
Wisconsin	✘			✘	
Wyoming					
TOTALS	41	5	12	16	2
PERCENT	80%	10%	24%	31%	4%

Note: Percentages are out of 51 (includes DC) ^Standard about human-caused climate change

*Topic required to be incorporated as standards and curriculum frameworks are revised

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CAREER & TECHNICAL EDUCATION (CTE)

K12 CLIMATE ACTION
THE ASPEN INSTITUTE

WHAT IS CTE?

Career and Technical Education (CTE) prepares students to enter the workforce or pursue post-secondary education or training after high school. Components of CTE can include work-based learning such as internships or apprenticeships, project-based or hands-on learning, and general workplace skills. Some CTE programs enable students to graduate from high school with industry-recognized certifications. During the 2017-18 school year, over 8.8 million high school students took at least one CTE course.[1]

Over the last decade, there have been efforts to make CTE programs more rigorous and responsive to education and labor market trends. As more industries require post-secondary training of some kind, new CTE programs have started to adapt by preparing students to complete post-secondary training or education in emerging fields.

CONNECTION TO CLIMATE CHANGE

CTE is an opportunity to prepare students for industries and careers that will become increasingly important to society. The demand for renewable energy and green technology has been growing in recent years and will continue to expand. By the end of 2019, there were over 3.3 million Americans working in clean energy, accounting for over 40% of the energy workforce and 2.25% of overall employment.[2] Jobs in solar energy and wind turbines have been predicted to be the fastest growing occupations over the next decade and may be able to play an important role in the country's economic recovery.[3]

A variety of industries including architecture, agriculture, and energy are making efforts to become more sustainable and lessen their environmental impact. Giving students the knowledge and skills to think about and solve problems with sustainability in mind is valuable to employers. A recent report from Pew Research Center found both mechanical and analytical skills are in high demand in emerging occupations related to the green economy.[4]

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

Green CTE Across States

Most states have adopted the Career Clusters framework from Advance CTE.[5] The framework features 16 broad career clusters and 79 more specific career pathways. There are some variations by state, which can allow states to be responsive to their own labor and industry needs. While state policies and programs can heavily influence CTE options, they do not solely determine which, if any, CTE programs are offered in a given school or district.

TERMINOLOGY

- **Career cluster:** Category of related career paths (e.g. agricultural and natural resources, STEM)
- **Pathway:** Program designed to prepare students for a certain industry (e.g. environmental service systems, energy)
- **Program of study:** Progression of classes a student takes to complete CTE program

Generally, state education agencies have approved options for programs and courses that districts and schools can adopt at the local level depending on their interest and capacity. As a result, the state education agency may support or approve programs that are not currently implemented at the local level within the state. There may also be schools or districts that provide CTE opportunities related to green careers or renewable energy that are not reflected in state frameworks or options. This analysis does not capture states that have schools or districts with their own local programs or partnerships in place.

Twenty-nine states have at least one of the following in their CTE program offerings:

- An explicit focus on sustainability or clean energy in pathway options
- A certification program in renewable or alternative energy industries
- At least one course specifically about renewable or alternative energy or that includes renewable or alternative energy in course standards

Most states with programs or classes that focus on clean energy do so through an engineering lens or in the context of an environmental services or agricultural pathway. Many states also have pathways that focus on natural resources without an explicit emphasis on sustainability or green technology. Often programs that have a class on renewable energy also have classes on nonrenewable energy—while the inclusion of classes on green energy is promising, it does not mean that is the sole focus of a program. Agricultural programs often mention sustainable practices but do not include this as a clear focus of a program or course.

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

Promising Initiatives

At least two states (MD, ND) offer green pathways or courses through Project Lead the Way (PLTW). As a non-profit, PLTW provides curricula and teacher training for hands-on STEM learning from PreK-12. Their high school programs for computer science, engineering, and biomedical science are designed to prepare students for both college and career. PLTW has an environmental sustainability course within their high school engineering program.[6]

At least four states (AL, NM, NC, SC) have a clean energy CTE program through the Southern Regional Education Board (SREB), a non-profit with 16 member states. The organization's Advanced Career programs prepare high school students for STEM careers, with Clean Energy Technology as one of nine pathways.[7,8]

Reviewed by Shaun Dougherty, Associate Professor, Peabody College, Vanderbilt University

DISTRICT BRIGHT SPOT

The NYC Solar Schools Education Program is a cross-sector collaboration created to engage students in the process of installing solar panels on public schools in the city.[9] Through the non-profit Solar One, the Solar CTE program provides a short-term opportunity for students at technical high schools to learn about solar energy, installation, and careers.[10] The program is integrated into existing CTE programs and includes supplies, professional development for teachers, two weeks of co-teaching, and access to a solar careers expo.

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

DO STATE CTE PATHWAYS OR PROGRAMS OF STUDY INCLUDE GREEN CAREERS?

	YES	NO
Alabama	✔	
Alaska		✘
Arizona		✘
Arkansas		✘
California	✔	
Colorado	✔	
Connecticut	✔	
Delaware		✘
DC		✘
Florida	✔	
Georgia	✔	
Hawaii	✔*	
Idaho		✘
Illinois		✘
Indiana	✔	
Iowa		✘
Kansas	✔	
Kentucky		✘
Louisiana		✘
Maine		✘
Maryland	✔	
Massachusetts	✔*	
Michigan		✘
Minnesota	✔	
Mississippi		✘
Missouri		✘
Montana		✘
Nebraska	✔	
Nevada	✔	
New Hampshire	✔	
New Jersey	✔	
New Mexico	✔	
New York		✘
North Carolina	✔	
North Dakota	✔	
Ohio	✔	
Oklahoma		✘**
Oregon	✔	
Pennsylvania		✘
Puerto Rico		✘
Rhode Island	✔	
South Carolina	✔	
South Dakota	✔	
Tennessee	✔	
Texas	✔	
Utah		✘
Vermont		✘
Virginia	✔	
Washington	✔*	
West Virginia	✔	
Wisconsin		✘
Wyoming		
TOTAL	**29**	**22**
PERCENT	**57%**	**43%**

* Some indication of pathway or program but limited information available

** OK has wind turbine technician program but limited information on whether program is in schools or separate "training centers"

Note: Percentages are out of 51 (includes DC)

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

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Federal Programs

Below we identify federal programs that can help schools reduce the environmental impact of their operations, support students in the aftermath of natural disasters, and provide environmental education opportunities.

DEPARTMENT OF AGRICULTURE

Farm to School Grant Program	Provides grants to support local food procurement for school meals as well as agricultural, garden, and food education. Awards planning, implementation, and support grants to school districts, state and local agencies, Indian Tribal organizations, agricultural producers, and non-profits.
National School Lunch Program	Allows students to receive free or reduced-price meals if their family income is below a certain threshold by subsidizing the cost of school meals. Includes guidance allowing schools to donate unused food to food banks, homeless shelters, or other non-profit organizations.

DEPARTMENT OF EDUCATION

Readiness and Emergency Management for Schools Technical Assistance Center (REMS TA Center)	Part of the Office of Safe and Supportive Schools. Helps schools, districts, and other educational agencies build capacity around emergency preparedness by providing guidance, training, communities of practice, and interactive tools. Serves as a resource for schools before, during, and after emergencies, including hurricanes and other natural disasters.
McKinney-Vento Homeless Assistance Act	Eliminates school enrollment barriers, provides public preschool services, and requires school districts to employ local liaisons to engage with families experiencing homelessness. Established the Education for Homeless Children and Youth Program to support students experiencing homelessness, including those who have been displaced by natural disasters, by providing technical assistance and information to schools and other agencies.
Green Ribbon Schools	Award program recognizing resourceful and environmentally sustainable practices in schools and districts. Recognizes three pillars of sustainability: reducing environmental impact and costs; improving the health and wellness of schools, students and staff; and providing effective environmental education. Winning schools and districts are invited to collaborate and share best practices but do not receive federal funding as part of the award.

DEPARTMENT OF ENERGY

Better Buildings Challenge	Aims to reduce energy use across nine sectors including K-12 schools. Partners with school districts to monitor and reduce energy consumption through a variety of methods. Seeks to reduce energy costs by sharing successful energy models, outlining performance goals, and helping schools find viable solutions that address their individual needs.

ENVIRONMENTAL PROTECTION AGENCY - EPA

Diesel Emissions Reduction Act (DERA) School Bus Rebate Program	Offers rebates to replace old diesel buses with those that meet current EPA clean emissions standards. Public entities and private fleets that provide transportation for public school students are eligible for the program.
Clean School Bus National Idle Reduction Campaign	Encourages schools to take steps toward emissions reduction to improve air quality, human health, fuel costs and engine quality. Provides schools, districts, and transportation providers with sample school bus idling policy, information about idling reduction technologies, and clear explanations of the negative impacts of school bus idling.
Environmental Education (EE) Grants Program	Provides funding to states, districts, and other educational organizations to develop environmental education programs and practices. Has primarily been directed toward environmental literacy, clean water, and biodiversity efforts.

DEPARTMENT OF COMMERCE - NOAA

Environmental Literacy Program	Offers funding and support for earth science and environmental education programs through national, regional, and local institutions. Supports partnerships and collaboration efforts across the education sector to foster conversations on ocean, coastal, and climate issues.
Bay Watershed Education and Training (B-WET) Program	Provides competitive funding to support watershed education for K-12 students. Promotes Meaningful Watershed Education Experiences (MWEEs) – indoor and outdoor activities that teach students to think critically about environmental issues affecting local watersheds and surrounding ecosystems. Regional program funding opportunities located in seven regions.

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

Glossary

TERM	DEFINITION
Adaptation	Reducing risks from today's changed climate conditions and preparing for impacts from additional changes projected for the future.
Alternative fuel	Fuel derived from a source other than gasoline. Examples include electricity, biodiesel, and ethanol.
Career and Technical Education (CTE)	Prepares students to enter the workforce or pursue postsecondary education or training after high school. Components can include work-based, project-based or hands-on learning.
Career cluster	Category of related career paths (e.g. agricultural and natural resources, STEM)
CTE pathway	Program designed to prepare students for a certain industry (e.g. environmental service systems, energy)
CTE program of study	Progression of classes a student takes to complete a CTE program.
Climate change	Long-term changes in average weather and climate, regionally and globally.
Composting	The practice of returning natural food remains back into the earth for the purpose of enriching soil.
Curriculum	Lesson plans and other resources for teachers that detail how course content should be taught. Curricula are generally created or selected to align with relevant standards in a subject and grade level. Curriculum decisions are often made at the district or school level.
Energy retrofitting	An energy conservation measure in an existing building that aims to improve building performance.
Geothermal energy	Energy derived from the earth's heat that is converted into thermal or electrical energy.
Greenhouse gases	Gases that contribute to global warming by absorbing infrared radiation, such as carbon dioxide and methane.
HVAC systems	Heating, ventilation, and air conditioning commonly used to cool and heat residential and commercial buildings.
Idling	When a vehicle's engine is running while the vehicle is not in motion.
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.
Local food procurement	Sourcing food from local growers or producers to decrease emissions associated with transporting food. Also includes choosing sustainably produced food products.

Mitigation	Reducing the amount and speed of climate change by reducing the carbon footprint of schools.
National School Lunch Program (NSLP)	A federally-assisted meal program operating in public and nonprofit private schools that provides nutritionally balanced, free or reduced-price lunches to students based on family income.
Net-zero energy building	Produces enough renewable energy to meet its own annual energy consumption requirements, thereby reducing the use of non-renewable energy in the building sector.
Next Generation Science Standards (NGSS)	A set of standards developed by states based on the National Research Council's (NRC) 2012 research-based Framework for K-12 Science Education.
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.
Resilience	The capability to anticipate, prepare for, respond to, and recover from extreme weather events and disasters with minimum damage to schools, students, and communities.
School Breakfast Program (SBP)	Federal program that subsidizes the cost of breakfasts served in schools. Allows students to receive free or reduced-price meals based on family income.
School gardens	Gardens on school grounds that provide an interactive opportunity for students to learn the science of sustainable food growing practices outside the classroom.
Share tables	Carts or tables in school cafeterias that are used to exchange unwanted, pre-packaged food to reduce food waste.
Solar energy	Energy derived from sunlight that is converted into thermal or electrical energy.
State standards	Statements that define what students should know and be able to do by the end of a certain course in a specific grade. Standards for public schools are generally set at the state level.
Sustainability	Meeting present needs without risking the health and environmental wellbeing of future generations.
Sustainability director	A school or district staff member who manages a variety of sustainability efforts.
Vehicle-to-grid	An energy system that transfers electricity between plug-in vehicles, such as electric powered buses, and a larger power grid.
Volkswagen (VW) Environmental Mitigation Trust	The VW trust allocates $2.9 billion to all states to reduce air pollution from large vehicles as part of the company's settlements for misleading emissions tests.