K12 CLIMATE ACTION PLAN

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aspen institute

K12 Climate Action Commission

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EXECUTIVE SUMMARY

From wildfires to flooding to extreme heat, the impacts of climate change are threatening our communities, our health, our wellbeing, our economy, and our future. The existential threat of climate change will increasingly impact all aspects of our society from agriculture to business, from healthcare to education. Heat, air pollution, and extreme weather are already impacting students' health and learning and will only be exacerbated in the future. We must all determine our responsibility to take action and advance climate solutions. To date, the education sector has yet to establish its role in addressing climate change, and large-scale climate solutions too often overlook the role education can play.

Through this action plan, we identify the opportunity for the education sector to take action, advance climate solutions, and prepare today's students to lead a sustainable future. For this plan to succeed, policymakers at the local, state, and federal levels must work in collaboration with school leaders, educators, students, families, and communities. We outline recommendations for policymakers at every level to catalyze and scale localized action across the country.

We envision a future where America's over 100,000 schools are models for climate action, climate solutions, and sustainability, and the 50 million children and youth in these schools are prepared to succeed in the clean economy and lead a more sustainable, resilient, and equitable society. Today's youth are rightly demanding we all take action to address climate change. By supporting our schools in becoming models for climate action, solutions, and environmental justice, we can build lasting change to advance a sustainable future.

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K12 CLIMATE ACTION COMMISSION

In the fall of 2020, the K12 Climate Action Commission — 22 education, environment, youth, civil rights leaders, and more — came together to recognize the urgency of climate change and the opportunity for the education sector to be a leader in creating a more sustainable society. We believe in the potential to unlock the power of the education sector as a force for climate action, climate solutions, and environmental justice.

Over the last year, we held a listening tour to learn about the needs and opportunities to support the education sector in addressing climate change. We heard from youth, educators, school leaders, parents and caregivers, researchers, and policymakers from across the country. We are inspired by their leadership and success in taking climate action in their communities and have grounded this action plan in what we learned.

To unlock the power of the education sector, we must build on existing successes and use policy to catalyze and scale continued action to address climate change in schools. We have identified the need to:

MITIGATE. The education sector has a substantial environmental footprint. Our nearly 100,000 public K-12 schools sit on 2 million acres of land and are one of the largest public energy consumers. With 480,000 school buses, our schools operate the largest mass transit fleet in the country. Schools also serve over 7 billion meals each year and generate 530,000 tons of food waste. *To mitigate climate change, the education sector can reduce its carbon footprint and transition to clean energy and sustainable operations.*

ADAPT. The COVID-19 pandemic has highlighted how disruptions to our schools affect all communities. The increasingly widespread impacts of climate change are also disrupting schools, impacting health and learning, and exposing students and communities to trauma and uncertainty. Yet, schools can be key to helping our communities adapt. Schools can work to ensure continued support for learning and services, and school facilities can be used as hubs of community resilience. *To adapt to climate change, the education sector can proactively plan and build resilience in preparation for climate impacts.*

EDUCATE. Educators are uniquely positioned to develop, engage, and prepare the rising generation of students to be better equipped to address climate change and to succeed in the clean economy. Educators across subject areas in school and in out-of-school programs can support teaching and learning on sustainability, the environment, green jobs, and climate change and empower students with agency to advance solutions. *The education sector can support teaching and learning on climate change, climate solutions, and sustainability to prepare students to lead a sustainable future and succeed in the clean economy.*

ADVANCE EQUITY. Climate change disproportionately impacts Black, Latino, Indigenous, Asian American and Pacific Islander, and other communities of color and low-income rural and urban communities. Climate action in the education sector must center the voices and experiences of students and families in these communities and prioritize their needs and strengths. *To advance equity, the education sector can prioritize communities most impacted by climate change and involve students, families, and community members in decisions about climate action.*

For the education sector to effectively mitigate, adapt, educate, and advance equity to address climate change, we need collaboration across all levels of government and across sectors, including advocacy, business, media, and philanthropy.

SPECIFICALLY, WE RECOMMEND LOCAL, STATE, AND FEDERAL POLICYMAKERS:

LOCAL

Recommendation 1: Acknowledge and prioritize the opportunity for the education sector to advance climate solutions.

Recommendation 2: Develop and implement comprehensive local K-12 climate action plans to consider the needs and opportunities to mitigate, adapt, educate, and advance equity to address climate change. These plans should:

2.1: *Support mitigation strategies to transition to clean energy, clean transportation, sustainable food use, and building electrification and to promote healthy learning environments with improved air quality and safe drinking water that are free of environmental toxins.*

2.2: *Support adaptation and resilience strategies by assessing local climate risks and determining school needs to prepare, adapt, and build resilience to climate change.*

2.3: *Support teaching and learning on climate change, climate solutions, and sustainability to further integrate teaching and learning about climate change across the curriculum and prepare students for the clean economy.*

2.4: *Advance equity while developing local K-12 climate action plans by engaging and prioritizing students, families, and communities who are disproportionately impacted by climate change.*

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STATE

Recommendation 1: Take a whole-of-state approach to address climate change and include education. This whole-of-state approach should:

1.1: Integrate education in plans to address climate change.

1.2: Establish targets and support implementation for transitioning schools to clean energy, building electrification, and electric buses.

1.3: Prioritize communities most impacted by climate change and education inequities.

1.4: Center student voice in developing plans to support the education sector in taking climate action.

Recommendation 2: Support the development and implementation of comprehensive local K-12 climate action plans. States can play a critical role in supporting local K-12 climate action plans by providing guidance, technical assistance, funding, and resources to school districts to assess local needs and assets and support implementation of local K-12 climate action plans.

Recommendation 3: Advance state-level programs and policies to support mitigation, adaptation, and resilience.

3.1: Ensure funding for school infrastructure and school building codes support clean, efficient, sustainable, resilient, and healthy learning environments for children.

3.2: Support the transition to electric school bus fleets.

3.3: Expand access to locally-grown, healthy, sustainable food and increase opportunities for food donation, food rescue, and composting.

3.4: Develop financial incentives or opportunities to support schools in transitioning to clean energy, transportation, and sustainable food.

3.5: Ensure plans for virtual learning can be effective and provide access to all students in preparation for climate-related learning disruptions.

3.6: Support school districts in assessing their vulnerability to climate change and equipping schools as hubs for community resilience.

3.7: Support districts in creating green sustainable schoolyards.

Recommendation 4: Advance state-level programs and policies to support education.

4.1: Integrate climate change, climate solutions, and sustainability in standards across grades and subjects and develop curriculum frameworks, provide professional development, and leverage certification to support educators in teaching the standards.

4.2: Develop career and technical education opportunities to prepare students for jobs in the clean economy and integrate environmental sustainability across all career pathways.

FEDERAL

Recommendation 1: Elevate and amplify the role education can play in climate solutions. The White House, Department of Education, and other agencies can use their platforms, convening power, and resources to help communicate the need and opportunity for the education sector to contribute to climate solutions. We recommend that the federal government take the following actions to demonstrate leadership to support climate action in schools:

1.1: Build cross-agency collaboration to support the education sector in taking climate action.

1.2: Establish climate change as a U.S. Department of Education priority.

1.3: Center student voice in developing plans to support the education sector in taking climate action.

1.4: Research, recognize, and effectively disseminate best practices gathered across federal agencies to provide states, districts, and schools with easy access to information, research, and strategies to support the sector in moving to climate action.

Recommendation 2: Support the development and implementation of comprehensive local K-12 climate action plans. Grants from the federal government can be used to help school districts develop and implement comprehensive climate action plans to mitigate, adapt, educate, and advance equity to address climate change.

Recommendation 3: Advance federal policies and programs to support mitigation, adaptation, and resilience.

3.1: Invest in school infrastructure to promote clean energy, clean air, clean water, sustainable schoolyards, sustainable food, and climate adaptation and resilience.

3.2: Support the transition to electric school bus fleets.

3.3: Expand access to locally-grown, healthy, sustainable food and increase opportunities for food donation, food rescue, and composting.

3.4: Increase broadband access for schools and families.

3.5: Establish financing opportunities through tax incentives, bond authority, and revolving loan funds.

Recommendation 4: Advance federal policies and programs to support education.

4.1: Prepare youth for jobs in the clean economy and integrate environmental sustainability across all career pathways through career and technical education.

4.2: Enable professional development and teacher preparation programs to support teaching and learning on climate change, climate solutions, and environmental justice.

4.3: Emphasize the importance of Indigenous knowledge systems through existing programs to support Indian Education, Native Hawaiian Education, and Native Alaskan Education and disseminate best practices to build broader awareness of Indigenous knowledge.

To the young people listening who are passionate about protecting the climate and their communities but don't know where to start — look to your schools, there is work to be done.

And to the adults listening who believe in the role our education system must play in addressing climate change and preparing citizens to participate robustly in our democracy, find ways to partner with young people in your community. You have as much to learn from them, as they do from you."

— Andrew Brennen,
Co-Founder Kentucky Student Voice Team

INTRODUCTION

From stories of wildfires on the news to flooding in our backyards, the impacts of climate change are happening now. With the recent release of the Intergovernmental Panel on Climate Change report, the UN Secretary-General identified the accelerating impacts of human-caused climate change as a "code red for humanity."* Climate change will increasingly impact every part of our society from transportation to business, from agriculture to education. To address climate change, we can no longer consider it an issue for those from the energy and environment sectors to tackle on their own but rather every sector—and everyone—must step up and determine its role in being part of the solution.

We are youth, parents and caregivers, educators, school leaders, advocates, researchers, policymakers, and more. We have come together to create this action plan to outline the opportunity for America's K through 12 grade education sector to join the fight against climate change.

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

*United Nations, "Secretary-General Calls Latest IPCC Climate Report 'Code Red for Humanity', Stressing 'Irrefutable' Evidence of Human Influence," press release, August 9, 2021, https://www.un.org/press/en/2021/sgsm20847.doc.htm

MISSION: Our mission is to unlock the power of the public K-12 education sector to be a force for climate action, solutions, and environmental justice to help prepare children and youth to advance a more sustainable, resilient, and equitable society.

BELIEFS: We believe today's children and youth will be essential in the fight against climate change, and we must empower children and youth with the knowledge and skills to build a more sustainable, resilient, and equitable world.

VISION: We envision a future where America's over 100,000 schools are models for climate action, climate solutions, and sustainability, and the 50 million children and youth in these schools are prepared to succeed in the clean economy and lead a more healthy, sustainable, adaptable, resilient, and equitable society.

■ **For this vision to happen, we believe in ten years:**

- **Our nearly 100,000 public schools** will run on clean renewable energy, have healthy air quality and clean drinking water, be equipped to adapt to local climate impacts, and be equipped as centers of community resilience;

- **Our 480,000 school buses** will be electric and run on clean electricity;

- **Our over 7 billion meals** served in public schools will utilize locally-grown, sustainable, healthy food, and any food waste will be diverted or composted;

- The **over 2 million acres of land** our schools control will have green sustainable schoolyards, provide healthy and safe spaces for students to learn and play, reduce community heat and flooding, and increase access to green space for communities;

- The over **50 million children and youth** in schools will have the opportunity to learn about climate change, climate solutions, and sustainability across the curriculum, be empowered with the agency to advance climate solutions, be prepared for good jobs in the clean economy, and have the needed social, emotional, and learning supports to build resilience in the face of climate change.

■ **For this vision to happen, policymakers and stakeholders will need to act systemically now to advance climate action. We believe in the next five years:**

- The **federal government** and **state governments** should provide local school districts with the funding, resources, and support to ensure healthy, sustainable, and resilient learning environments, build the capacity of educators to support teaching and learning, and support the development and implementation of local K-12 climate action plans in particular in under-resourced communities most impacted by climate change and pollution;

- All **school districts** will have developed, in collaboration with students, educators, and the community, K-12 climate action plans based on local needs and assets to support their schools in mitigating, adapting, educating, and advancing equity to address climate change;

- **Business** and **philanthropy** will recognize the opportunity to support and invest in schools taking climate action; and

- **Advocacy** and **the media** will help build the narrative for supporting our schools in moving toward climate action, solutions, and environmental justice.

In this action plan, we focus on public schools, which are the responsibility of the federal, state, and local governments. Serving nearly one in six Americans, K through 12 public schools can play a critical role in moving our country towards environmental sustainability. If all the schools in the U.S. shift to clean energy, sustainable food use, clean transportation, and green sustainable schoolyards over the next decade, we will have successfully reduced reliance on fossil fuels for one of the largest public sectors impacting the environment. If we help schools better prepare for the impacts of climate change, we will have built a more resilient school system for our children, youth, and communities. And what makes schools especially impactful is the potential for them to transition to sustainability and build resilience *while educating their students*, helping prepare youth to succeed in a clean economy and confront deepening climate challenges.

As public entities, public schools need the support of policy, but few policy proposals consider the role of the education sector in advancing sustainability and few school systems have acted systemically to address climate change.

Over the past year, we held a listening tour to learn more about the needs for the education sector to address climate change. We heard from young leaders in Utah, Kentucky, and Maine to superintendents in Miami, Philadelphia, and rural Colorado. We heard from educators from Oklahoma, the U.S. Virgin Islands, the Spokane Tribe, New York, and more. What we learned from their stories is not just the urgency of climate change but also the amazing work currently underway across the country and the opportunity for policymakers to work alongside local communities, Tribes, advocacy organizations, business, philanthropy, and media to scale this work to help prepare children and youth to advance a more sustainable, resilient, and equitable future.

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In this action plan, we outline how schools can help contribute to climate solutions through strategies to:

MITIGATE. To help mitigate the impacts of climate change, schools can reduce their carbon emissions and reliance on fossil fuels. With 98,000 schools across the country, they are among the largest energy consumers in the public sector, serve over 7 billion meals annually with related food waste and use about 480,000 diesel school buses for transportation–the largest mass transit fleet in the country. In this action plan, we highlight the needs, opportunities and implications for schools to transition to more sustainable operations.

ADAPT. Extreme weather has already impacted schools across the country. Climate change, exposure to pollutants, and food insecurity are harming children's health. School closures related to COVID-19 have exposed weaknesses in the resilience of school systems, which will be exacerbated by climate impacts. Yet, opportunities to proactively plan, provide students with mental health support, and transition schoolyards to absorb stormwater, reduce heat, and create healthy spaces to learn and play can help build resilience. In this action plan, we highlight the needs and opportunities for schools to adapt and build resilience in preparation for disruptions and negative impacts related to climate change.

EDUCATE. Educators are uniquely positioned to develop, engage, and prepare a new generation of students to be better equipped address with climate change. Educators across subject areas can support teaching and learning on sustainability, the environment, green jobs, and climate change to help ensure today's students are equipped with the knowledge and skills to advance a more sustainable and resilient society in their future. In this action plan, we highlight how teaching and learning in formal and informal settings can empower children and youth with the knowledge and skills to build a more sustainable world.

ADVANCE EQUITY. Black, Latino, Indigenous, Asian American and Pacific Islander, and other communities of color and low-income communities are disproportionately impacted by the negative consequences of climate change, and yet all too often are underrepresented in conversations about climate solutions. In this action plan, we highlight the intersections between equity, race, income, and climate change and the opportunity to center under-resourced urban and rural communities and historically underrepresented students and families in advancing climate action in schools.

The work of supporting our education sector in addressing climate change cannot be done without collaboration across the federal, state, and local levels and can be tackled best with intergenerational partnerships with business, philanthropy, media, and student, family, and educator advocacy. In this action plan, we outline the opportunity and steps each of these groups can take to support climate action in our schools. Finally, we include a menu of solutions schools can consider based on their local needs and context to help address climate change.

As a country, we are working to address climate change and take climate action with immediate steps to invest in technology, research, and decarbonization. These technical solutions are critical to address the urgency. The consequences, however, will be with us for decades to come, and we must take action beyond the immediate. By investing in our children, youth, and schools, we can take the immediate action of decarbonizing a large public sector and build lasting change to a more sustainable, resilient, and equitable future.

MITIGATION

The nation's 98,000 K-12 public schools have a significant environmental impact.[1] In order to serve over 50 million students in every community across the country, schools have a variety of resource needs that impact the environment, including energy, buildings, land, food, water, and transportation.[2] In fact, schools are one of the largest public sector energy consumers, operate the largest mass transit fleet in the country, occupy 2 million acres of land, and serve over 7 billion meals annually with related food waste.[3] Energy, transportation, food, and other school operations all contribute to the sector's carbon emissions, and as public entities, our schools require the support of the public to decarbonize.

In addition to benefiting the environment, improving sustainability in schools can protect the health and safety of students and educators, improve learning outcomes, and build resilience for communities.[4] Poor indoor air quality, contaminated drinking water, environmental hazards, and diesel pollution have significant impacts on student health and learning.[5] Efforts such as transitioning to electric school buses and electrifying buildings can help reduce air pollution. Ensuring schools have clean water, green schoolyards, and modern HVAC systems are three examples of how sustainable infrastructure supports students' health by reducing the risks of asthma in children and improving attendance.[6] Supporting schools in serving healthy food, including locally-grown sustainable food, can promote better child nutrition and healthy eating habits.[7]

Helping our schools mitigate their environmental impact enables schools to create healthy sustainable learning environments for children and communities. Providing these learning environments which improve health and learning outcomes can reduce longer-term healthcare costs and improve participation in the economy.[8] Sustainability efforts also reduce costs for schools and districts on maintenance and operations, allowing schools to repurpose funding previously spent on operational costs to teaching and learning.

As schools transition to more sustainable practices in their buildings, grounds, and transportation, they create hands-on learning opportunities for students.[9] Actively engaging in sustainable practices and climate mitigation at school can help students understand how they can take climate action, which creates a sense of agency. Educators can use school infrastructure and sustainability improvements to teach students about clean energy, composting, electric vehicles, and more, enabling them to be better prepared to support our larger societal efforts for decarbonization.

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School Buildings and Energy

Buildings account for almost 40% of carbon dioxide emissions in the U.S., and with over 98,000 school buildings across the country, schools have the collective potential to help lower greenhouse gas emissions.[10] Energy costs are the second-largest costs for school districts, second only to salaries.[11] Reducing schools' environmental impacts through energy efficiency, clean energy, energy education, and sustainable infrastructure has environmental, financial, and health benefits.

WHAT WE'VE HEARD

During our listening session on mitigation, energy education specialist Gilbert Rosas of Stockton Unified School District in California spoke about helping students promote energy efficiency within their schools through the student energy patrol program.[12] Gilbert shared that the school district is on track to save $22 million in ten years through energy conservation, solar panels, and solar battery storage at schools.

Using solar energy is one way schools can lower their environmental footprints and contribute to reducing greenhouse gas emissions. Solar-powered schools are becoming more popular each year. As of 2019, there were 6,839 solar public K-12 schools in the U.S., with a 144% growth rate in the last five years.[13] Yet, there is still a significant gap — only 7% of public schools currently use solar energy. This creates huge potential to support the expansion of solar panels on school campuses. Schools can make use of solar energy, other renewable energy sources, and energy-efficiency improvements through either new construction or retrofitting existing buildings. Renewable energy for schools with battery storage can also have the added benefit of building community resilience by creating microgrid energy systems for the community. Direct ownership of solar can maximize annual cost-saving benefits for schools, or, currently, about half of all states allow power purchase agreements which enable third-party ownership and minimize upfront costs.[15]

Other infrastructure improvements such as geothermal heating and cooling, LED lighting, and green roofs can help schools decrease their reliance on fossil fuels and support decarbonization. Berkeley County Schools in West Virginia installed geothermal heating and cooling systems in seven schools and made additional energy efficiency upgrades, resulting in a 75% decrease in energy use in those schools.[15] In Virginia, the Manassas Park Elementary School building design uses a variety of innovative strategies for lighting, ventilation, and insulation. Together, the sustainability measures are expected to reduce carbon emissions by 37% and use nearly half as much energy as the average K-12 school building.[17] As schools begin to incorporate more sustainable facilities improvements, they can consider pursuing sustainability-related certificates from existing programs, such as Leadership in Energy and Environmental Design (LEED) and the Collaborative for High Performance Schools.

BRIGHT SPOTS

In Arkansas, Batesville School District worked with teachers to reduce energy consumption and installed solar panels on two schools.[16] The combined 1,483 solar panels generate half of the district's energy needs and save the district $100,000 per year in energy costs. The district is on track to save $4 million over 20 years from a combination of solar power generation, energy conservation, and improved water efficiency, with a portion of the savings already being used to raise teacher salaries. Teachers also received training on how to incorporate solar technology into STEM classes.

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

Net-zero energy schools, which produce as much clean energy as they consume, have especially high benefits for both the environment and school budgets.[18] As of 2019, 11 states had at least one public K–12 school that was net-zero energy certified or verified by the New Buildings Institute, and 17 states had at least one public K–12 school which was considered net-zero energy emerging.[19] To achieve net-zero emissions, schools often use solar panels as well as building designs and other elements that support energy efficiency. While many net-zero energy schools are built new, schools can also retrofit existing buildings to achieve net-zero or close to net-zero energy status. Importantly, designing new buildings to target net-zero energy can often be done in the same budget as other new buildings.

Many schools around the country, however, have aging infrastructure, which has negative implications for energy efficiency, health, and learning. A recent GAO report found that 54% of districts need to replace at least two building systems in many of their schools.[20] In total, the country underinvests in school facilities by $46 billion annually.[21] Communities of color and low-income communities are more likely to have aging infrastructure and higher maintenance costs due to inequitable school funding structures and historic underinvestment.[22] These additional costs often prevent these communities from being able to afford the upfront costs needed to improve school infrastructure. Sustainability focused school infrastructure investments will be critical to help the education sector transition schools to clean energy.

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School Transportation

Students use a variety of transportation methods to get to school, including biking, walking, public transportation, school buses, and private cars. These options represent a range of environmental impacts, and each transportation option comes with different safety concerns and feasibility across communities. School buses are one of the most common ways students get to and from school — during the 2018-19 school year, 57% of public school students took school buses to get to school.[23] Students from low-income families are more likely to ride school buses to get to school than students from higher-income families who may have more transportation options.[24]

The nation's 480,000 school buses are the largest mass transit fleet in the country.[25] During the 2017-2018 school year, school buses drove nearly 23.3 million students about 3.45 billion miles. Currently, 94% of school buses are diesel powered.[26] Diesel engines create air pollution, which contributes to climate change, harms students' health, and impacts academic performance and absenteeism.[27] Students of color are disproportionately exposed to air pollution, contributing to higher rates of asthma and other health issues.[28]

Transitioning to electric school buses has substantial environmental, economic, and health benefits. Electric school buses eliminate tailpipe emissions, meaning that schools utilizing these buses will have students breathing cleaner air. Electric school buses save an estimated $2,000 in fuel costs and $4,400 in maintenance costs annually.[29] Over the lifetime of the bus, an electric school bus is projected to save a district $170,000 in maintenance and fuel costs.

Though the upfront costs are currently higher than diesel buses, grants, public-private partnerships, and other financing mechanisms are substantially reducing costs for districts. Importantly, transitioning to electric buses also requires building the needed charging infrastructure and supporting workforce training to help maintain and operate electric buses. Policymakers can also help ensure that diesel buses are decommissioned to prevent them from further contributing to pollution and emissions in another community.

In addition to electric school buses, communities can also take other steps to reduce transportation emissions associated with students' commutes to school. City-led efforts to increase safe routes to school for walking and biking can support alternative, emission-free methods of transportation. Many students also take public transportation to school, and city efforts to electrify public transit can reduce emissions from students' commutes to school.

BRIGHT SPOTS

In Maryland, Montgomery County Public Schools (MCPS) recently announced a plan to transition its entire bus fleet* to electric through a partnership with Highland Electric Transportation.[30] Highland Electric will lease the buses to MCPS and take care of maintenance and operations for the same price the district would typically pay to purchase and maintain a diesel bus, reducing the challenge of higher upfront costs.

BRIGHT SPOTS

Stockton Unified School District (SUSD) has also partnered with private companies to transition to electric school buses through grants from the California Air Resources Board, the California Energy Commission, and rebates from the local utility company.[31] Less than a year after submitting the first grant proposal, the district has built charging stations and acquired its first set of electric buses. Supporting more districts in making plans, accessing funding, and building needed charging infrastructure can help schools transition their school bus fleet to electric.

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

*The transition will occur in phases, beginning with 25 buses in fall 2021, with a goal of completing the transition of all 1,422 buses by 2035.

School Food

Schools are critical food providers, serving over 7 billion meals annually.[32] The process of purchasing, using, and disposing of food contributes to schools' environmental footprints. Sourcing food that is grown locally and sustainably is better for the environment and local economies. Working with local food vendors can also help schools incorporate more fresh produce, which is important for child nutrition. Schools and districts with kitchen equipment that supports cooking from scratch — rather than solely refrigerating and heating pre-packaged food — can more easily serve meals that use fresh local produce.

Currently, 34 states and DC have at least one policy — for instance incentives for local procurement or farm-to-school programs — to encourage the use of local-sourced food in schools.[33] School gardens, supported by 18 states, coupled with food education have helped students understand the benefits of healthy eating, and research has found that students in schools with school gardens and garden education eat more fruits and vegetables.[34] With 88% of school breakfasts and 77% of school lunches served to low-income students, serving more sustainable and nutritious food in schools can also help improve health for these students.[35]

Schools also contribute to the country's challenges with food waste. Schools produce an estimated 530,000 tons of food waste annually.[36] As food sits in landfills, it emits methane, a potent greenhouse gas that contributes to climate change. Food waste in schools has a financial cost as well – an estimated $1.24 billion each year.[37] Importantly, research suggests that healthier school food does not impact food waste.[38] Efforts to reduce food waste can consider how to divert or repurpose the waste.

Schools can reduce food waste by diverting surplus food through share tables or food donation programs. Currently, 14 states have policies or programs that allow or encourage these efforts.[39] Food that is not suitable to be donated can be composted instead of thrown away. Currently, five states and DC have composting policies, and two states allow or encourage composting as part of school garden or recycling programs. Schools have also been working to add kitchen dishwashing capability to reduce an over-reliance on single use plastic with school meals.[40]

Ensuring schools and policymakers consider the full process of food in schools (procurement, menu, and waste) can help schools mitigate their impact. Schools have also been working to add dishwashing capability to reduce an over-reliance on single use plastic with school meals.[41]

BRIGHT SPOTS

In California, Oakland Unified School District has a sustainability manager who focuses on reducing food waste, creating a Food Share program at every school and increasing compost programs.[42] San Diego Unified School District's Love Food Not Waste program takes food that has been prepared but not taken by students and makes it available for local hunger relief organizations.[43] Between 2016-2019, the program rescued 530,900 pounds of food from schools and eliminated 275,200 pounds of greenhouse gas emissions.[44]

Water Use, Other Consumption, and Waste

Water, paper, and other resources are essential to meet the needs of students and staff, but can also contribute to high levels of unnecessary waste. Using water efficiently is better for the environment and can save schools money.[44] Conserving water is particularly important as climate change increases the length and severity of droughts in many parts of the country.[46] Reducing water use also saves energy which reduces greenhouse gas emissions. Efforts to conserve water in schools can include using water-efficient appliances and irrigation systems, repairing leaks, and managing water runoff.[47]

Materials that are thrown away end up in landfills, which are the third-largest source of human-related methane emissions in the country.[48] Schools can work to lower the amount of waste they produce by minimizing the use of single-use plastics and other materials, implementing effective recycling programs*, and using supplies made from recycled products, among other efforts.[49] As discussed above, schools can also work to limit food-related waste by using and composting sustainable food packaging.

Whether reducing water use or increasing recycling programs, creating a culture of conservation among students, teachers, and other school staff is crucial to success. Educators can also incorporate resource conservation into their lessons through hands-on activities and school-wide sustainability practices such as rainwater harvesting and upcycling.

*Some materials, such as paper and aluminum, are easier to recycle than others. According to EPA data, less than 9% of plastics were recycled in 2018.

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

District Efforts to Move Schools Toward Sustainability & Clean Energy

Over the last few years, school districts across the country have been developing sustainability plans and committing to use clean energy. Students are often key leaders in these efforts, working with communities and school board members to push for climate action in schools.

The School District of Philadelphia launched its GreenFutures five-year sustainability plan in 2016 with a goal of improving sustainability education and operations in every school.[50] GreenFutures spans five areas of sustainability, from consumption and waste to school greenscapes, with targets and specific actions for each area. The plan also emphasizes community engagement, equity, and educational opportunities.

In response to collaborative campaigns from students, parents, and climate-focused organizers, a growing number of school boards have passed clean energy resolutions, including:

- In July 2015, **San Diego Unified School District** passed a resolution calling for an action plan to help the district transition to 100% clean energy by 2035 and pursue other sustainability goals.

- In December 2019, **Los Angeles Unified School District** passed a resolution committing to transition to 100% clean, renewable electricity by 2030 and to electrify buildings and buses by 2040.

- In June 2020, **Salt Lake City School District** passed a resolution committing to 100% clean energy for electricity by 2030 and 100% carbon neutral energy for all operations by 2040.

- In February 2021, **Seattle Public Schools** passed a resolution committing to 100% clean and renewable energy by 2040 or earlier.

- In April 2021, **Miami-Dade County Public Schools** passed a resolution to transition the district to 100% clean energy by 2030.

WHAT WE'VE HEARD

As we heard from Salt Lake City students Mahider Tadesse and Andie Madsen, intergenerational collaboration was critical to passing the resolution and students are actively involved in implementation plans. Since the resolution passed unanimously in June 2020, Andie shared that she has already seen similar student-led efforts begin in other districts in Utah:

"One of our selling points for the campaign was that this is a nationwide movement that's happening, but already the effects of our climate leadership in Salt Lake City are being realized in parts of Utah, which is a fossil-fuel heavy state."

Many districts around the country have already worked to prioritize sustainability and take climate action. Building on these existing efforts, supporting their implementation, and sharing their success can help create momentum to reduce the environmental footprint of the education sector. Policymakers, educators, parents, caregivers, and students can mitigate climate change in schools by collaborating across generations and emphasizing how taking climate action now can create a healthier and more stable future for today's students.

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

ADAPTATION & RESILIENCE

The COVD-19 pandemic has highlighted the need for the public education system to become significantly more resilient in the face of disruption. The pandemic has also exacerbated underlying inequities for students of color and low-income students. Likewise, the impacts of climate change — from floods to heat waves to wildfires — are already disrupting schools across the country and similarly exacerbating inequities. Schools must proactively adapt to these worsening climate impacts, anticipate likely climate risks related to health and learning, and support students as the impacts of climate change worsen.

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

Climate change is leading to an increase in the frequency and severity of extreme weather.[1] Hurricanes, wildfires, flooding, and high heat have impacted schools and communities around the country — a trend that is predicted to continue. In their wake, these extreme weather events bring trauma, uncertainty, and destruction to communities, families, and schools.

The worsening effects of climate change will take a toll on students' mental and physical health, as well as their opportunity to learn. The community-wide trauma experienced in the wake of extreme weather events impacts children and youth as they experience and witness loss, damage, and dislocation.[2] Air pollution and poor air quality contributes to the development of asthma.[3] Heat impairs student learning, with a disproportionate effect on Black and Latino students, and heat waves have increasingly pushed schools without sufficient infrastructure to close for "heat days." [4]

Yet, considering the opportunity for schools to adapt and be better prepared for the worst impacts of climate change can also help them build resilience and serve as community hubs of climate resilience. By leveraging schools as foundational pillars in every community and equipping them with sustainable infrastructure, clean energy, and essential services, schools can retain critical functions in the event of severe weather and provide shelter and support to community members.

Impact of Climate Change on Health and Learning

One of the most widespread impacts of climate change is rising heat and an increasing number of hot days each year. By the middle of the 21st century, most areas in the United States are predicted to experience 20 to 30 more days per year with temperatures 90°F and higher.[5] Significant portions of the country will also experience many more days above 100°F each year, with much of the south predicted to have more than 50 per year by the end of the century.[6]

Increasing heat waves and poorer air quality can be especially dangerous for children's health due to their ongoing physical and behavioral development.[7] Specifically, climate change can result in increased prevalence of asthma and allergies. Asthma already affects over 5 million children and youth under age 18, with Black children being twice as likely as white children to have asthma.[8] Students with asthma experience higher rates of absenteeism, which impacts their learning.[9] Children are also particularly susceptible to heat-related illnesses, especially if they have chronic health conditions such as asthma or diabetes.[10] Heat, droughts, snowmelt, and sea rise will impact the availability of safe and healthy food and water which in turn can impact brain development.[11] Indigenous children and communities often face particularly high health risks related to the impacts of climate change on water quality, air quality, and food access, in both urban and rural settings.

Rising temperatures due to climate change are also increasing the number of students who attend school in heat islands.* In 2019, the Trust for Public Land found that 36% of the country's 50 million public school students attended school on a heat island.[13] Between 2013 and 2019, there was a 32% increase in the number of students attending schools that were 10°F hotter than surrounding areas, and low-income students are more likely to attend schools in heat islands than non-low-income students.

Research shows that heat has detrimental effects on student learning, which schools need to consider as they adapt to climate change.[14] In the last several years, schools across the country have already had to close or adjust their schedules in response to extreme heat and buildings without air conditioning.[15] This leads to lost learning time and reduced access to school-based supports and activities. School closures due to heat disproportionately affect students in low-income communities who are more likely to attend schools with outdated facilities.[16] As high heat becomes more common in parts of the country that are normally cooler, some schools will need to add air conditioning for student health and wellbeing. As schools install air conditioning systems they should consider strategies including energy-efficient heat pumps, clean electricity, and geothermal heating and cooling to ensure the installation of air conditioning does not increase emissions.

There are a variety of strategies schools can consider to reduce the worsening impacts of climate change on students' opportunity to learn. For instance, addressing indoor air quality in school buildings, building green roofs and sustainable schoolyards, and ensuring access to healthy food and clean water can help support children's health and wellbeing.[17]

WHAT WE'VE HEARD

Eco-Anxiety. Even without directly experiencing the worst climate impacts, as students witness and learn about climate impacts, they may develop eco-anxiety — persistent worries about their own futures and the prospects for future generations.[18] In our first listening session, Dr. Aaron Bernstein of Harvard Chan C-CHANGE shared that strong relationships with supportive adults in school can be a protective factor for eco-anxiety. Schools can also take an active role in reducing eco-anxiety by helping students learn how they can take climate action and develop agency to contribute to climate solutions.

*Heat islands have an average temperature 1.25°F higher than the surrounding city or town.

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

Extreme Weather

Extreme weather events are already impacting students, communities, and schools across the country and will only increase with climate change. In California, the Camp Fire caused thousands of students to lose their homes and damaged or destroyed more than a dozen schools, which were then closed and relocated to shopping centers, warehouses, and other vacant facilities.[19] In Puerto Rico, damage from Hurricane Maria caused students to miss an average of 78 school days and over 200,000 Puerto Ricans relocated in the wake of the storm, with states like Florida receiving an influx of newly arrived students.[20] As these events continue to occur, schools will need to develop plans to ensure supports for students and families.

EXTREME WEATHER AND STUDENT MENTAL HEALTH

Many students experience trauma in the wake of severe weather events. Hurricanes, floods, wildfires, and other extreme weather often cause fatalities, homelessness, and food insecurity, among other challenges. These experiences can cause trauma responses and mental health issues for children and youth.[21] In the past year, the pandemic, resulting economic recession, and ongoing systemic racism have also taken a toll on students' mental health, particularly for students of color and low-income students whose communities are also disproportionately impacted by climate change.[22] Addressing students' mental health needs can help schools adapt to climate change and foster students' resilience.

Schools can support students' mental health before, during, and after extreme weather events by increasing their capacity to provide these services and social emotional support.[23] Most schools already have a shortage of mental health staff and educators receive little if any training on supporting students' mental health needs.[24] Schools that plan ahead by creating partnerships with nearby districts, providing tiered supports, and training educators and school staff on trauma-informed practices and eco-anxiety, can be better prepared when extreme weather strikes.[25] Building capacity to support students' mental health now can also help students recover from the pandemic and develop resilience and coping skills.
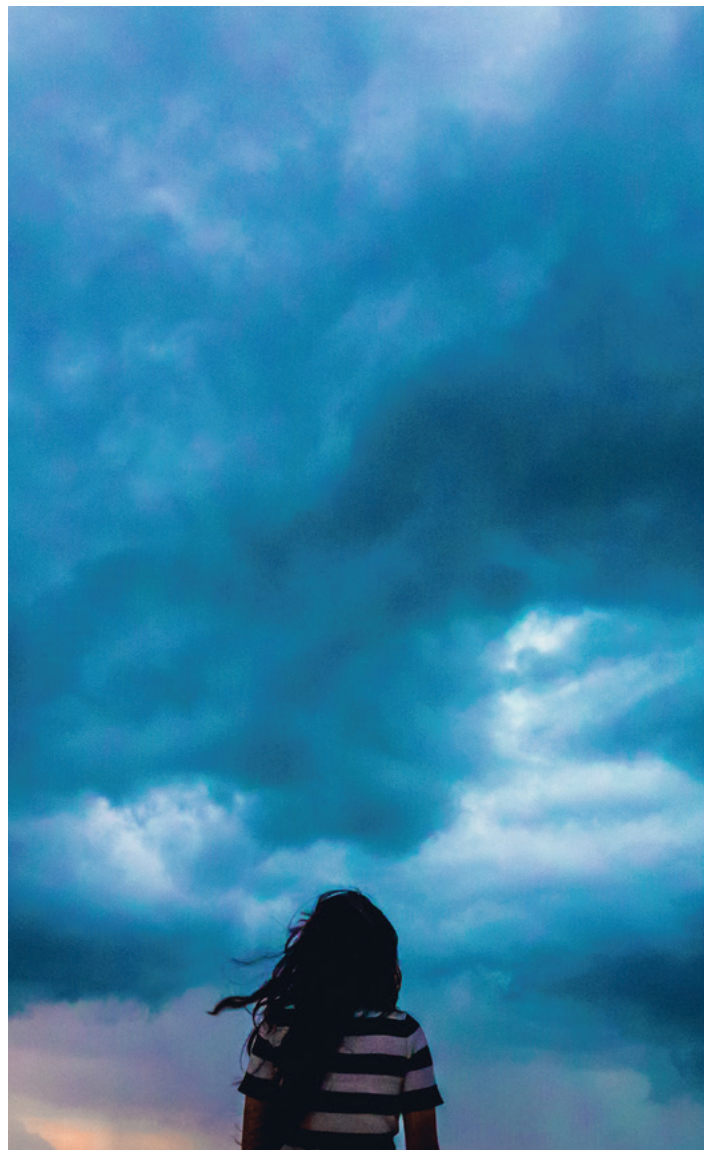
WHAT WE'VE HEARD

At our listening session on adaptation, we heard from Dr. Victor Carrion who has worked extensively with children, youth, and school counselors after hurricanes in Puerto Rico and wildfires in California. He spoke about the importance of giving students "the opportunity to build resilience." He noted, we can support students by "strengthening their support system, the strengthening of their families, [and] the resources that we provide educators… We also need to increase the coping tools that kids may have themselves."

EXTREME WEATHER AND CONTINUED ACADEMIC SUPPORT

Extreme weather often causes schools to close due to power outages, flooding, or other infrastructure challenges. This can lead to lost learning days and access to school-based student supports.

Allowing schools to use virtual learning when students are unable to be in the building can minimize disruptions to student learning. States require a minimum number of instructional learning days or hours each year and utilizing virtual learning when schools are closed can help schools avoid falling below that minimum threshold. While virtual learning has been widespread during the pandemic, few states have policies that specifically allow virtual learning in the event of inclement weather. As of October 2020, 13 states had policies that address virtual learning or nontraditional instruction days.[26]

The COVID-19 pandemic and widespread virtual learning have highlighted the disparities in access to the internet and digital devices, both of which are necessary to reduce learning disruptions. In fact, prior to the pandemic an estimated 15 million students lacked adequate internet access and an estimated 10 million lacked access to a digital device for virtual learning.[27] While pandemic-related efforts have substantially reduced these numbers, the majority of those efforts are not long-term solutions and will expire within one to three years.

In order to be effective, policies that support virtual learning must go hand-in-hand with improving access to the internet and digital devices. Gaps in access to devices and the Internet are a challenge in both rural and urban areas.[28] Expanding internet and digital device access is critical to advancing equity and ensuring that all students can continue their academic learning and support services even when schools are closed. Providing training and support for educators and families on how to use digital devices and online platforms can ensure all students are able to benefit from increased digital access.[29]

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

EXTREME WEATHER AND ENROLLMENT CHANGES

Climate migration can impact school enrollment.[30] When extreme weather events such as hurricanes cause widespread devastation, large numbers of families may move to different areas where they have family support or other opportunities to regain stability in the face of loss. As families migrate within the U.S. and arrive from abroad, schools and districts may see upticks in enrollment in the middle of the year.[31] At the same time, areas affected by sea level rise or other climate impacts may see drops in enrollment.[32]

Many students whose families relocate due to climate impacts may have experienced trauma and loss, making both academic, social emotional, and mental health support especially important for incoming students. Districts that plan ahead for how to deal with climate-related enrollment changes may be better able to serve students and families. Assessing districts' likely climate risks, and building relationships with nearby districts can help better prepare communities for potential climate impacts.

WHAT WE'VE HEARD

Miami-Dade County Public Schools Superintendent Alberto Carvalho shared with us how extreme weather events such as Hurricane Maria led to mid-year influx of new students. Superintendent Carvalho spoke about the district's plans to serve incoming students in three different scenarios, depending on the rate of new student arrivals — accepting students at all schools, setting up one to three registration centers, or establishing new full-service schools to serve newly-arrived students. Each plan is designed to meet students' academic, physical health, mental health, and social emotional needs. In the aftermath of Hurricane Maria, the district also expedited the process for hiring newly-arrived teachers from Puerto Rico.

"To us, both sides of the coin are important. Academic preparation, but side by side with social emotional support and mental health support, considering the trauma that these children arrived with after living through a hurricane disruption or an earthquake in Haiti."

Photos 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.

The Role of Schools in Community Resilience

Schools have an opportunity to be centers of community resilience and support in the face of climate impacts. Schools are already community hubs, with many schools providing access to food, healthcare, and social services to students, families, and other community members, which has become even more crucial during the pandemic. In the case of widespread power outages, infrastructure damage, and other community challenges, schools have the ability to provide critical resources such as food, shelter, electricity, and healthcare. In particular, schools that use renewable energy such as solar panels coupled with battery storage — also known as solar microgrids — can maintain these functions even if other buildings in the area have lost power. Many schools serve as emergency shelters, and creating solar microgrids on these schools can improve resilience, as seen in several schools in Florida.[33]

BRIGHT SPOTS

In Santa Barbara Unified School District, the district is intentionally preparing schools to serve as community hubs in the event of power outages and extreme weather. In 2018, Santa Barbara experienced a mudslide after a wildfire, shutting down the city for two and a half weeks and preventing students from getting to school. That experience motivated the community and district leaders to transform school buildings into solar microgrids that can use solar energy to maintain core functions in the event of power outages.[34]

WHAT WE'VE HEARD

Laura Capps, a school board member in Santa Barbara Unified School District, highlighted the importance of schools as hubs of community resilience in emergencies:

"When everything else is shut down from these extreme climate events, we need our schools to have the lights on. We need those kitchens to keep working, so that we can continue to feed kids and families… In fact, our office of emergency of our county did their briefings every day from one of our high school auditoriums."

The Role of Schools in Community Adaptation

School grounds make up an estimated 2 million acres of land across the country, making land use another opportunity for improving sustainability and helping communities adapt.[35] Leveraging school grounds in adaptation planning can help reduce community heat and flooding and increase access to green space.

Currently, many outdoor spaces at schools include large swaths of heat-trapping asphalt, which can contribute to flooding and higher temperatures within neighborhoods. Often the localized effects at schools themselves can be even more extreme, making it dangerous for children to play outside in hot weather. On a 63°F day, students at one school in Oakland, CA measured surface temperatures as high as 115°F on the unshaded playground.[36]

Access to green space — outdoor environments with trees or other native plants — is beneficial for reducing heat, reducing air pollution, and improving physical and mental health for communities, but access to these spaces is currently inequitable.[37] On average, parks that serve people of color are half as large and five times as crowded as those that serve majority-white populations. Parks that serve low-income households are four times smaller than those that serve predominantly high-income households.[38]

Redesigning school grounds to replace asphalt with green sustainable schoolyards can support student wellbeing and make green spaces more accessible to communities.[39] These schoolyards can also help reduce stormwater runoff and community flooding.[40]

WHAT WE'VE HEARD

In Chicago, a partnership between schools, local water authorities, a community-based organization, and the mayor's office is creating green schoolyards that support student health and resilience to climate change. As we heard from Healthy School Campaign's Kenneth Varner, "As our climate is changing, it's important to think of schools as multipurpose use buildings. Our schoolyards are designed to hold 150,000 gallons of water per rainstorm," which is increasingly important as flooding becomes more common.

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

While the impacts of climate change present many challenges to students, families, and communities, schools have the opportunity to be part of climate solutions, build resilience, and help communities adapt. Schools that consider the potential impacts on their community, plan ahead for those impacts, and leverage partnerships can be better prepared for potential disruptions and help advance a more resilient society.

EDUCATION

Education has a critical role to play in addressing climate change. An understanding of climate change and sustainability will be essential for future citizens, workers, and leaders, making the education sector key to building a more sustainable and resilient society. In fact, education has been identified as an underutilized social tipping point needed for decarbonization — the process of phasing out reliance on carbon across all parts of the economy.[1]

Climate change will affect every part of our society, from healthcare to agriculture to business, and ensuring students are prepared to live and succeed in a changing climate is becoming increasingly important. Schools, communities, Tribes, and out-of-school programs are already helping students develop the knowledge and skills they will need to live fulfilling lives and be active citizens. Integrating teaching and learning about climate change, climate solutions, and sustainability across disciplines and educational settings will help students understand the impact of climate change and what they can do to reduce their impact on the environment, build resilience, and enhance their own prospects in a clean energy future.

Public Support for Climate Change Education

Students, parents, caregivers, and teachers have already expressed high levels of support for climate education. 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.[2] Additionally, 78% of all adults believe that schools should teach about the causes, consequences, and potential solutions to global warming.[3] Despite strong support for teaching climate change, only 42% of teachers reported teaching climate change in their classes.[4]

While 57% of teens report that climate change makes them feel afraid, 54% said it makes them feel motivated to take action.[5] Learning about climate solutions and how to take climate action can help students combat eco-anxiety — persistent worries about their own futures and the prospects for future generations.[6] Yet, 54% of teens say they have learned little or nothing about how to reduce the effects of climate change in school.[7]

Youth are already leading movements for climate action and climate justice.[8] In 2019, nearly 1 in 4 teenagers in the U.S. reported voicing their opinions on climate change in the prior three years through school walk-outs, protests, or writing to government officials.[9] In 2021, 32% of adults in Generation Z reported personally taking action to address climate change in the past year.[10] Like Maya Green, students around the country are asking schools to address climate change so they can better understand and solve the problems they see in their communities.* [11]

WHAT WE'VE HEARD

At our first listening session, student activist Maya Green spoke about witnessing climate change while growing up in Charleston, South Carolina. She shared, "With increasing frequency over my lifetime, I've noticed the hurricane evacuations that come year after year… I've lived the worsening climate crisis. That definitely influenced my passion for taking climate action, but the school system has not really provided much of a space for that."

*See Alliance for Climate Education, Climate Generation, and Schools for Climate Action for more examples of students seeking climate education in schools.

Connections to Local Communities

Climate change and sustainability education can happen in classrooms, through school-wide efforts, in afterschool and extended learning programs, in community-based programs, museums, science centers, media and more. Whether school- or community-based, each educational setting has unique opportunities to engage students by helping them make connections between their own experiences and academic content.

The impacts of climate change differ based on geography, meaning that communities across the country experience climate change in different ways — from droughts in California to sea level rise in Florida to flooding in Minnesota. Climate change education creates opportunities for teaching and learning about the relationship between human activity, local communities, and their environments. Grounding climate education in students' lived experiences can also increase student engagement and recognize the connection to culture and values.[12]

For instance, Indigenous communities have been teaching youth about the environment while seamlessly making connections between disciplines, culture, and language for generations. By reframing humans' relationships with nature to emphasize that humans are part of the natural world, Indigenous communities prepare youth to be responsible stewards of the land and make decisions that protect nature and their communities. All students deserve to learn about our relationship to our environment, the impact our decisions and actions have on our environment, and how we can be better environmental stewards.

Grounding education about climate change and sustainability in a local context can include connections and exposure to local job opportunities. Whether it's increasing exposure and training to careers in off-shore wind in Massachusetts or building awareness of careers in sustainable agriculture in Colorado, partnering with local employers and community colleges can help students be better prepared for the jobs within their community that will be needed to address climate change and better prepare them for the opportunities in the future.

WHAT WE'VE HEARD

At our listening session on adaptation, we heard from science educator Michealrose Ravalier who teaches about climate change and climate resilience at Ivanna Eudora Kean High School in the U.S. Virgin Islands. Michaelrose shared: "Student engagement is critical and is at the base of addressing not just climate action and climate justice issues, but also allows students to take ownership of their responsibility in being good environmental stewards. And in doing so, it helps them to become emotionally stable, emotionally balanced, and emotionally resilient."

K-12 Education

Schools provide critical opportunities for students to learn about climate change and sustainability across subjects and through a variety of engaging and relevant pedagogies. Climate change and sustainability can be incorporated into state standards, curriculum, and educator support.

INTERDISCIPLINARY LEARNING

In school and across the curriculum, students can learn about the causes and effects of climate change and how to take climate action. Climate change education is frequently associated with science, but understanding the impacts of climate change and learning about climate solutions extends across disciplines. Subjects ranging from biology to civics to English can help students understand climate change, examine what can be done to advance solutions, and process their experiences of climate impacts.

Incorporating climate change into teaching and learning can happen through a number of mechanisms. State standards, curriculum decisions and materials, and educator support can all help teachers and students access education on climate change, sustainability, and the environment across subject areas.

WHAT WE'VE HEARD

We heard from Melissa Lau, a middle school science teacher in Oklahoma, about how including climate change in classes other than science can help teachers as well as students. Melissa shared that because climate change is "such a big, broad topic and there [are] so many components to it," only teaching about climate change in science classes puts additional pressure on science teachers. With more social studies teachers including climate change and climate solutions in their classes, Melissa said "having those cross-curricular connections is an amazing support."

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

STANDARDS

One opportunity to increase access to climate change education is to include climate change and human impacts on the environment in state standards across subjects. State standards set expectations for what students should know and be able to do in each subject at each grade level. States have internal processes for establishing and revising their own standards. Having state standards on a given topic does not mean that information is necessarily taught to all students or that all students will have the same depth of knowledge about that topic, but it establishes a goal to be applied across the state.

Currently, New Jersey is the only state with climate change in K-12 standards across most subjects.[13] This means that whether in science, social studies, health, or art students will have the opportunity to learn about the ways climate change impacts us and our environment and explore climate solutions.

As of fall 2020, twenty-nine states and DC have state science standards that include human-caused climate change in at least one required science class.[14] Of these, 20 states and DC have adopted the Next Generation Science Standards (NGSS) as part of their state science standards. 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 and which include language about human-caused climate change.[15] Fifteen states' science standards include climate change but do not specify that it is predominantly caused by humans.[16] 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. States that do include climate change in their science standards do not necessarily reference climate change in other subject standards.

Social studies provides a critical opportunity for students to learn about climate change and how they can contribute to solutions, including through civic engagement. Social studies classes help students learn how individuals and societies interact with the environment and the ways individuals, businesses, and governments make decisions. Students are already making connections between climate change and civics outside of school by taking part in demonstrations and contacting government officials. Yet, only 17 states' social studies standards explicitly mention climate change*, and only 18 mention environmental sustainability.^[17]

WHAT WE'VE HEARD

At our first listening session, we heard from New Jersey First Lady Tammy Murphy about the process of working with educators to create standards that include climate change in every grade level and every subject area. The First Lady highlighted the urgency and relevance of climate change education, stating:

"We are handing [students] a real problem that has perhaps already affected their health and will certainly continue to affect every aspect of their lives. If we don't educate them and give them the tools they need to understand the dangers of climate change and how to combat it, no matter what career they pursue, then I believe we are borderline negligent."

* Five states require and 12 states allow teaching climate change in social studies classes.
^ Sixteen states require and two states allow teaching about sustainability in social studies classes.

CURRICULUM

There are many opportunities to include climate change and sustainability in curricula and make connections to existing school and community resources. While standards outline a state's expectations for *what* should be taught, curriculum determines *how* content is taught and often includes textbooks, materials, lesson plans or other resources for teachers that are aligned to the state standards. Curriculum decisions are generally made at the local level, meaning curricula and class offerings can differ by district and school. States can also support the development of curricula.

Climate change and sustainability education provide opportunities for deeper learning, where students develop skills such as critical thinking, collaboration, and communication that help them succeed in school and after graduation.[19] Curricula that take student-centered or inquiry-based approaches to teaching and learning also improve student achievement and engagement by helping students learn about relevant real-world problems and brainstorm solutions.[20]

Approaches such as place-based education and project-based learning allow students to investigate the environmental issues that matter to them and affect their communities.[21] Focusing on local issues and allowing student inquiry to drive learning can help students make connections to their cultures and lived experiences.[22] Outdoor learning in school grounds, local parks, and community gardens in urban, rural, and suburban areas also provides opportunities for students to safely learn about the climate and environment in their own communities.

Implementing other school-wide sustainability practices — from composting to energy conservation — creates opportunities for hands-on learning.[24] Schools that use solar energy or other elements of sustainable building design and operation can themselves be used as pedagogical tools. For instance, students in Stockton Unified School District learn about clean energy and energy conservation by using the district's solar dashboards and participating in the student energy patrol program.[25] School gardens, like those in Oakland Unified School District, help students learn about the benefits of local, sustainable food and understand how the local environment impacts food access.[26] Schools can also incorporate rain gardens which can help students learn about stormwater management and climate adaptation.

BRIGHT SPOTS

In Seattle, the Learning in Places project is working with students, educators, and families to co-design culturally relevant science curriculum for grades K-3.[23] The program uses school gardens and community green spaces to help students learn about ecological reasoning and decision-making.

BRIGHT SPOTS

California recently provided funding to San Mateo County to develop open access climate change and environmental justice curricula for all grades that align with the state's environmental principles and concepts.[18] The curriculum materials will be made freely available to all districts in California and around the country.

EDUCATOR SUPPORT

Building on standards and curricula, educators are essential in ensuring students have the opportunity to engage and learn about climate change. Most educators believe climate change should be taught in schools, but many do not feel they have enough preparation or resources to do so. According to an NPR poll, 74% of teachers believe that climate change and its impacts on society should be taught in schools, yet 55% did not teach about climate change or discuss it with students.[27]

Providing pre-service training for teachers can help incoming educators feel prepared to talk and teach about climate change and sustainability in their classrooms. For teachers who are already in the profession, high-quality in-service professional development can help both new and veteran teachers incorporate climate change, climate solutions, and sustainability into their classrooms. Learning from other educators and sharing best practices can help educators better engage students in cross-curricular deeper learning.

BRIGHT SPOTS

The ClimeTime network in Washington is one successful example of a state-funded professional development (PD) program where educators have the opportunity to develop the knowledge, skills, awareness, and tools to teach climate science in the classroom.[28] The network provides funding to all districts in the state as well as several community-based organizations and Tribes to create PD programs that align with state standards and address topics including environmental justice, culturally relevant teaching, and place-based education.

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

Career and Technical Education

Career and Technical Education (CTE) presents an opportunity to prepare students for high-skill, high-wage jobs in the clean economy. CTE within schools prepares students to enter the workforce or pursue post-secondary education or training after high school. CTE programs also provide career exposure, hands-on training, and opportunities for work-based learning.[29] Some CTE programs enable students to graduate from high school with industry-recognized certifications or college-level credits. During the 2018-19 school year, over 8.9 million high school students took at least one CTE course.[30]

CTE programs span 16 different career clusters, ranging from Agriculture, Food, and Natural Resources to Hospitality and Tourism, and there are opportunities to incorporate sustainability across all clusters.[31] Jobs in clean energy industries, such as wind turbine technicians and solar panel installers, are some of the fastest growing in the country and can play an important role in the country's economic recovery from the pandemic.[32] In fact, a report from Pew Research Center found both mechanical and analytical skills are in high demand in emerging occupations related to the clean economy.[33] Currently, twenty-nine states have CTE programs or classes with an explicit focus on sustainability or clean energy.[34]

Climate change will impact every facet of our society, and as a result all industries will need a better understanding of their role in mitigating climate change and advancing a more sustainable society.[35] Students who are prepared to think about sustainability and climate solutions in whatever career path they choose will be better positioned for high-skill, high-wage jobs in the future and can help industries better address climate change.

Photos by Allison Shelley for American Education: Images of Teachers and Students in Action.
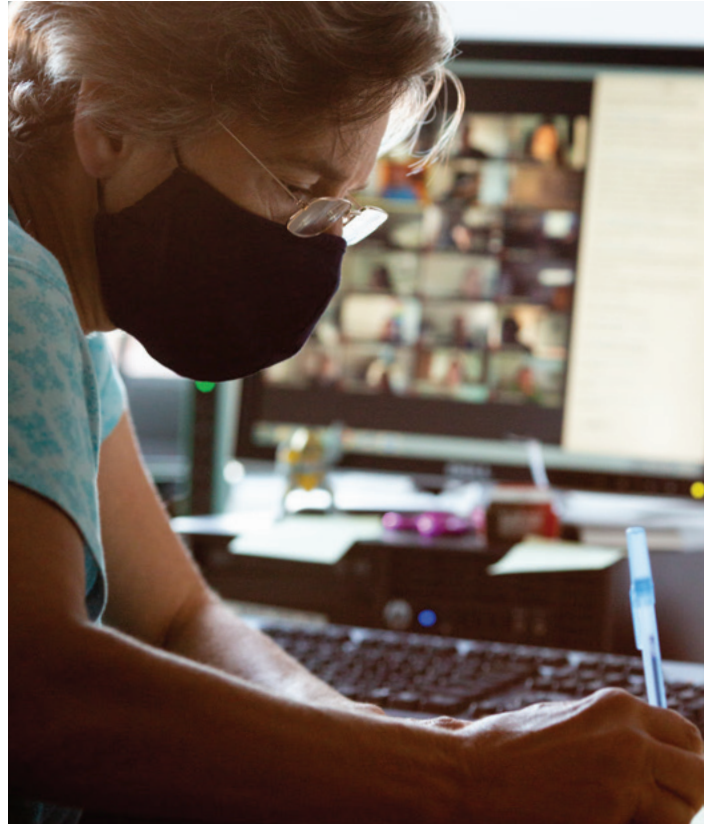
National Career Clusters Framework:[36]

- Agriculture, Food & Natural Resources
- Architecture & Construction
- Arts, A/V Technology & Communications
- Business Management & Administration
- Education & Training
- Finance
- Government & Public Administration
- Health Science
- Hospitality & Tourism
- Human Services
- Information Technology
- Law, Public Safety, Corrections & Security
- Manufacturing
- Marketing
- Science, Technology, Engineering & Mathematics
- Transportation, Distribution & Logistics

Note: *Career clusters can differ by state and district. This national framework was developed by Advance CTE.*

PARTNERSHIPS WITH BUSINESS LEADERS AND COMMUNITY COLLEGES

CTE often includes work-based learning and increasingly provides pathways to higher education. Developing partnerships with leaders in industries such as solar panel installation or electric vehicle engineering can help ensure students are qualified to get high-skill, high-wage jobs in high-demand industries after graduation. Additionally, partnerships with community colleges are essential to help students transition into higher education and training programs or graduate high school with recognized post-secondary credentials. On our listening tour we had the opportunity to learn about examples of these successful partnerships from New York to rural Colorado.

CTE AND A JUST TRANSITION

Transitioning to a clean economy will create many new jobs — an estimated 18 million jobs globally.[37] Communities that rely on industries such as coal will need support to prepare for new, clean energy jobs. Ensuring that schools in these areas have green CTE programs can help today's youth benefit from the transitioning economy and find successful employment in growing industries.

A just transition must also include support for communities of color and Indigenous communities who are disproportionately harmed by the impacts of climate change.[38] Advancing equity and environmental justice means ensuring that those most impacted by climate change are able to benefit from climate solutions and high-paying jobs in the growing green economy. Expanding green CTE programs in these communities can help students of color and Indigenous students benefit from climate solutions.

Opportunity youth — those between the ages of 16 through 24 who are not enrolled in school or participating in the labor market — should also be part of a just transition to a clean economy. Sustainability-focused CTE and workforce development programs can help some of the country's 4.6 million opportunity youth gain the skills needed to obtain good jobs in clean energy industries.[39] Policymakers have also proposed establishing a Civilian Climate Corps to create a national service program to provide climate change mitigation and adaptation employment opportunities for youth with a focus on communities most affected by climate impacts.[40]

BRIGHT SPOTS

- **P-TECH schools** provide an example of collaborative work with business leaders, community colleges, and community-based organizations to provide workforce development and career opportunities for low-income students of color.[41] The P-TECH model lets students both explore careers related to sustainability and climate change and learn the technical skills needed to qualify for jobs in sectors such as automotive engineering and construction. Students at P-TECH schools graduate with both a high school diploma and an associate's degree in six years and are first in line for jobs with industry partners. In New York, P-TECH recently announced a partnership with the New York Power Authority.[42] The agency will provide internships, mentoring, and pathways to jobs for P-TECH students expanding pathways for an inclusive workforce in clean energy.

- The **Environmental Sciences and Climate Institute** (ESCI), a new collaborative between several school districts and community colleges in rural southwest Colorado, is intentionally designed in close collaboration with community college faculty and staff to ensure students in climate change related fields can smoothly transition into taking college-level courses.[43] The initiative includes project-based learning and outdoor learning for students as well as professional development for educators.

- **Bright Solar Futures** in Philadelphia works with the local Philadelphia Energy Authority to provide paid internships for students, giving them career exposure and compensating them for their work.[44] The three-year CTE program also prepares students to graduate certified in solar panel installation.

Out-of-School Education and Informal Learning

Informal learning and out-of-school programs provide opportunities to engage children and youth in learning about climate change and the environment. Out-of-school settings — including afterschool programs, summer programs, and museum education — often have engaging opportunities for outdoor and experiential learning and enable students to pursue their interests. Museums, aquariums, and other sites of informal learning in the community can be key partners for schools in providing educational content and hands-on learning opportunities.[45] Out-of-school programs are also key spaces to develop youth leadership and social emotional skills through positive youth development.[46]

While out-of-school programs can increase key learning opportunities, students must have access to these programs in order to benefit from them. Currently, there are barriers to accessing afterschool programs. Recent data from Afterschool Alliance found that parents report cost, availability, and safe routes to and from programs as key challenges.[48] Any investments in out-of-school programs should center equity and work to ensure that programs are available to students in under-resourced communities and address the needs and strengths of youth and their families.

WHAT WE'VE HEARD

During a listening session, youth activist Amara Ifeji spoke about gaining access to outdoor learning through out-of-school programs. Amara attended and subsequently led a stormwater management program in Maine that sparked her and other students' interest in taking environmental science and STEM classes in school. She shared: "This learning wasn't only transformative because it allowed me to explore and assert my passion, it also led me to commit to providing opportunities for other youth." After students attended a stormwater management program Amara facilitated, they all reported wanting to continue learning about environmental science both in and out of school. Amara then established her own program in Maine to increase opportunities for young women of color to have access to environmental education.

BRIGHT SPOTS

The Pacific American Foundation uses place-based and culturally relevant out-of-school education to connect Hawaiian youth to their local environment.[47] For example, over the last 25 years, the Pacific American Foundation has restored a fish pond which has become a site for hands-on learning, or *ma ka hana ka ʻike* (through doing one learns). Executive Director Herb Lee shared that this learning connects students to the land, their culture, and provides opportunities to learn about conservation. The organization has also provided professional development for educators around their "place-based, culture-based, and project-based" curriculum. "Content and context are inextricably intertwined in Hawaii. Place has a lot to do with how we educate our youth."

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

Connections to Early Learning and Post-Secondary Education

Though this action plan is primarily focused on K through 12 education, we acknowledge that there are critical opportunities to include climate change and sustainability education in early childhood settings as well as post-secondary education. Age-appropriate environmental education — particularly through outdoor learning and play-based learning — in early childhood can help children develop social emotional skills and environmental literacy.[49] Once students complete their K-12 education, they can continue pursuing education and careers that address climate change and sustainability. Collaborative work and planning across early childhood, K–12, and post-secondary education is needed to most effectively support the education sector in addressing climate change and preparing children and youth in advancing a sustainable future.

Policymakers, educators, parents, caregivers, and students all have the opportunity to support climate change and sustainability education in their communities. Whether updating state standards, adopting place-based education, expanding CTE programs, or working with out-of-school program providers, each community has a variety of options to take climate actions that are in line with their local needs and priorities.

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ADVANCING EQUITY

Black, Latino, Indigenous, Asian American and Pacific Islander, and other communities of color, low-income communities, people with disabilities, and under-resourced urban and rural communities bear the greatest burdens from negative climate impacts, from greater exposure to pollution to greater vulnerability to extreme weather.[1] Any climate actions or solutions must prioritize, elevate, and engage these communities to advance equity and environmental justice. Given their experiences with the impacts of climate change and environmental injustice, these communities have crucial insight into climate solutions and must be at the helm of climate actions, both in and out of schools.

Students, parents, caregivers, families, and communities are the central stakeholders in the education sector, and research shows their involvement in schools improves students' educational experiences and outcomes.[2] Building relationships with these stakeholder groups and including their perspectives in decision-making processes is necessary for meaningful community engagement.

Our country is just beginning the decarbonization of our economy and society required to address climate change. We are at a critical moment where we can advance policies that help support an equitable and just transition. Centering the experiences and perspectives of Black, Latino, Indigenous, Asian American and Pacific Islander, and other communities of color, low-income communities, and under-resourced urban and rural communities in this transition can help advance a more equitable future.

Advancing equity can be a focus by which policymakers and education leaders guide climate action in schools to help schools mitigate, adapt, and educate to address climate change. To succeed in advancing equity, we must acknowledge the existing inequities in our schools and communities currently affecting students' ability to learn. Without equity-focused efforts centering students and communities, these existing inequities will only worsen as climate change worsens.

WHAT WE'VE HEARD

During a listening session, youth activist Jerome Foster II emphasized the critical role that youth can play in advancing climate action. He shared that, increasingly, "young people are included in curriculum development, included in how we allocate funds to frontline communities, and a plethora of other initiatives." Jerome also spoke about how understanding civics can help youth take the lead on climate advocacy at the federal, state, and local level.

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

Health Impacts, Climate Change, and Equity

High heat — one of the most widespread climate impacts — has disparate effects on communities of color. Due to a history of redlining,* communities of color are more likely to live near heat islands, which are areas that have an average temperature that is higher than the surrounding city or town.[3] Additionally, schools serving more low-income students have heat island differentials twice as large as those serving non-low-income students.[4]

Communities of color and Indigenous communities face disproportionately higher rates of air pollution and other environmental hazards, as well as associated health problems.[5] In fact, recent research identified that despite being less responsible for pollution, Black and Latino Americans bear a larger share of the "pollution burden."[6] Children of color and Indigenous children are disproportionately exposed to air pollution and have higher rates of childhood asthma.[7] Asthma rates are particularly high among Black children, a rate of 13.5% compared to 6.4% for white children.[8] Children and youth with asthma, diabetes, and other chronic conditions are at greater risk of heat-related illnesses.[9] Increased exposure to heat and pollution and increased prevalence of asthma impact students' ability to attend, learn, and succeed in school.[10]

Climate impacts including flooding and other extreme weather are also threatening water quality, which in turn creates greater health risks.[11] Communities of color and communities with high levels of non-English speakers are more likely to have unsafe drinking water.[12] Lead in particular is one of the most significant environmental hazards for children. Yet, research has shown far too many schools have elevated levels of lead in their school water.[13] Exposure to any level of lead can increase the likelihood for health problems, brain damage, and disability in children.

Reducing schools' environmental footprints and reducing greenhouse gas emissions in these communities are critical ways to promote equity. Improving indoor air quality in schools, adding water filtration systems, and reducing exposure to diesel emissions from school buses can promote student health, wellbeing, and opportunity to learn.[14]

* Redlining refers to the federal government's practice in the 1930s of creating maps that labeled areas with large populations of Black residents in red to discourage banks from providing mortgages to people in those areas. Redlining encouraged segregation and economic inequality which still persists today.

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

Extreme Weather and Equity

Climate impacts such as hurricanes, wildfires, and severe floods are a source of collective trauma, often causing students and families to experience homelessness, food insecurity, and loss.[15] Communities of color and urban and rural low-income communities often face the most significant and longest-term damages from severe weather caused by climate change.[16] For instance in Houston, low-income housing is more likely to be located in low-lying flood prone areas, meaning these communities were hit hardest by Hurricane Harvey.[17] Rural communities that depend on the land for their livelihoods are experiencing more severe flooding and droughts.[18] This extreme weather damages crops and livestock, leaving communities with financial insecurity. Additionally, research shows that disaster aid after extreme weather events often widens existing racial wealth gaps.[19]

Though many supports are needed to advance equity and address these disparities, ensuring sufficient support in these communities for schools and providing school-based wrap-around services and student mental health support can help promote resilience.

School Infrastructure, Resilience Hubs, and Equity

Utilizing schools as hubs of community resilience can help communities adapt to a changing climate. Yet, with the history of education funding based on local property taxes, many low-income communities with high populations of students of color have outdated school facilities.[20] Schools funded by the federal Bureau of Indian Education (BIE) that serve predominantly Indigenous students also frequently have unsafe facilities.[21] These outdated facilities are less energy efficient, have worse indoor air quality, may lack air conditioning, and are more vulnerable to severe weather. As a result, schools that have to pay more for annual maintenance and operations face greater challenges securing funding for capital improvements.[22]

Prioritizing low-income communities in school infrastructure investments to build sustainable school buildings and grounds not only helps mitigate schools' environmental footprints but can also make schools and communities more resilient to climate impacts. Schools that adopt more resilient infrastructure — such as solar microgrids which allow schools to retain key functions when other buildings lose power — can be critical resources for providing food, shelter, and other services during an emergency.[23]

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

Education and Equity

To advance a more sustainable society and succeed in the clean economy, today's students will need a better understanding of climate change, climate solutions, and environmental sustainability. Yet, too often, students of color, low-income students, students with disabilities, and rural students do not have the same educational opportunities as their peers. Schools with predominantly Black and Latino student populations are less likely to offer advanced math and science courses than schools with predominantly white students, and students with disabilities are enrolled in higher-level math and science courses at disproportionately low rates.[24] Students attending rural schools have lower Advanced Placement (AP) course access rates, particularly for STEM AP courses, than students attending urban or suburban schools.[25]

Access to climate change and sustainability education must be equitable and inclusive across the curriculum and grade levels. This includes an emphasis on accessibility for students with disabilities, during both classroom and field-based learning. In addition to equitable access, sustainability and climate change education should be culturally relevant and respect communities' environmental knowledge and relationships with the land. Schools and districts can work with students, families, Tribes, and communities to develop curricula that are culturally relevant and engaging.[27] Climate education can also integrate local and national environmental justice issues to provide students a better understanding of inequities across communities.

To prepare for the clean economy, students need access to green CTE programs that prepare them for clean energy jobs or to integrate environmental sustainability into any career pathway. Providing access to green CTE programs in communities that have been hardest-hit by climate change will enable students to benefit in this transition. Additionally, these programs can help opportunity youth build the skills needed to obtain jobs in a clean economy.[28]

WHAT WE'VE HEARD

Student Voice activist Leigh Walden is from rural Colorado and has seen climate impacts in her hometown. Leigh attends a suburban school that teaches about climate change, but her friends who attend a rural school have not had that same opportunity.[26]

"In my suburban school, I have classes like AP Environmental Science and Earth science available to me. In these courses, we learn about climate change and discuss its implications. Meanwhile, the school of my peers does not require or promote these courses, discouraging students from learning about the resources needed for a safe and sustainable approach to agriculture."

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

Indigenous Children, Youth, and Communities

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. IKS has contributed to Indigenous communities leading on mitigating and responding to climate change as well as management of lands and waters in which the majority of the world's remaining biodiversity is found.[29]

While science and social studies education in the U.S. includes human-environment interactions, it is often narrowly focused and does not consider holistic understandings of these interactions. Rarely do these classes include Indigenous knowledge systems — a holistic, observational, and systematic way of understanding the environment and its connection to culture and society. To address climate change in schools, we need to be inclusive of Indigenous knowledge systems.

Federal involvement in educating Indigenous children and youth is grounded in a history of forced removal from Indigenous lands, forced cultural assimilation through abusive boarding schools, and a lack of recognition of Tribal sovereignty. The legacy of racism and violent erasure of Indigenous people has contributed to ongoing systemic disparities in public and Tribal education of Indigenous children and youth. Ownership and stewardship of Indigenous land has also been a source of contention between Tribal, federal, and state governments both historically and currently.

Tribal nations are sovereign entities, meaning they govern themselves and their interactions with state or federal governments are considered nation-to-nation relationships. There are 574 federally-recognized Tribal nations across 35 states.[31] Additionally, some states have state-recognized Tribal nations that are not federally recognized and do not necessarily receive the same federal funding.[32]

Indigenous children and youth around the country attend a variety of schools, including general K-12 public schools, tribally-controlled schools that receive federal funding, and schools operated by the Bureau of Indian Education (BIE). Roughly 90% of Indigenous students attend traditional public schools, while around 8% attend schools run by the BIE.[33] In our policy recommendations, we consider opportunities to support Indigenous youth across educational settings, including the unique needs related to BIE schools.

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

BRIGHT SPOTS

In Washington State, schools are required to teach about Tribal sovereignty, history, and culture through the *Since Time Immemorial* curriculum or other tribally-developed curricula.[30] *Since Time Immemorial* was designed in collaboration with Tribes and includes lesson materials that are aligned to state standards as well as training and implementation support for educators.

BUREAU OF INDIAN EDUCATION SCHOOLS

The Bureau of Indian Education (BIE), a division of the U.S. Department of the Interior, is tasked with providing education to Indigenous children and youth while respecting Tribal sovereignty and cultural diversity as well as addressing the needs of the whole student within the context of their family and community. BIE serves roughly 46,000 students in 183 elementary and secondary schools on 64 reservations across 23 states.[34]

A persistent challenge in providing quality education to Indigenous students is ensuring that BIE-funded schools have access to the same level of high-quality instruction, support services, and school facilities as general public schools. BIE funds repairs, improvements, and construction of school facilities, which are commonly in poor condition and do not meet health and safety standards. For instance, a 2016 federal report on the condition of BIE school facilities found that, of the 13 schools visited for the report, 12 had grounds or drainage issues, 10 had asbestos or mold, and 5 were in condemned buildings.[35]

Safe learning environments are critical for all students, including Indigenous students in BIE schools. As we detailed in the mitigation section of this report, updating school facilities to be safer and more sustainable can have health and learning benefits for students as well as financial benefits by reducing the maintenance and operating costs associated with crumbling buildings. Decisions regarding supporting BIE schools must also be responsive to the needs, strengths, and values of Indigenous students, families, and communities.

WHAT WE'VE HEARD

"It's time for all schools to include Indigenous voices and methodologies if they want to combat the climate crisis in the classroom. We are beyond learning about Indigenous people, it's time to learn with them."

—
Owen L. Oliver (Quinault/Isleta Pueblo)
From the people of the Lower Columbia River, Salish Sea, and Southwest Pueblos

We have worked through this commission to center issues of equity while learning about what the education sector can do to mitigate, adapt, and educate to address climate change. We have learned that, to center equity, local plans for climate action in schools must be developed with community input, based on community needs and assets, and center the voices of people who are impacted most. State and federal policymakers will play a critical role by prioritizing resources to the communities most impacted and support to address the historic educational inequities that may prevent communities from ensuring healthy sustainable learning environments for all children and youth.

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

RECOMMENDATIONS

For the education sector to effectively mitigate, adapt, educate, and advance equity to address climate change, federal, state, and local policymakers will need to work together to maximize opportunities for climate action. Business, philanthropy, advocacy organizations, and the media can also play an important role as a catalyst for action. We outline opportunities for each of these stakeholders to support America's nearly 100,000 public schools in becoming models for climate action and America's 50 million children and youth in these schools to succeed in the clean economy and lead a more healthy, sustainable, adaptable, resilient, and equitable society. Central to this work is the local development and implementation of K-12 climate action plans with support, resources, funding, policies, and leadership from the state and federal level.

Opportunities at the Local Level

Although they must work within the framework of state and federal policy, local school districts have significant authority and responsibility to determine how schools operate and support teaching and learning. Local policies frequently come from school boards or school district leadership and respond to community needs and challenges. Districts can be key leaders in supporting climate action in schools. We recommend local leaders:

Recommendation 1: Acknowledge and prioritize the opportunity for the education sector to advance climate solutions. Local school boards and superintendents can elevate the opportunity for the education sector to address climate change through local K-12 climate action plans. Mayors and other local policymakers can also partner with local school districts to include schools in local climate mitigation and resilience planning and strategies.

Recommendation 2: Develop and implement comprehensive local K-12 climate action plans to consider the needs and opportunities to mitigate, adapt, educate, and advance equity to address climate change. Considering these issues comprehensively can help communities leverage the greatest benefit by integrating mitigation and adaptation efforts with teaching and learning in schools.

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

School districts should focus on assessing community needs and assets to support comprehensive and localized community action. These climate action plans should be developed in collaboration with students, families, educators, school leaders, facility managers, school board members, Tribal leaders and Indigenous community members, community-based organizations, and out-of-school educators and with input from business, early learning, and post-secondary programs. School districts can follow models from other school districts, cities and towns and build on existing sustainability, emergency management, and environmental education efforts. Specifically, these plans should:

2.1. Support mitigation strategies to transition to clean energy, clean transportation, sustainable food use, and building electrification and to promote healthy learning environments with improved air quality and safe drinking water that are free of environmental toxins. 100% clean energy resolutions, sustainability directors, and existing sustainability plans can be pivotal in shaping mitigation strategies for school districts. Specifically, local districts should:

2.1.A: Assess school infrastructure needs and create plans to ensure all students have access to healthy sustainable learning environments. School districts should assess infrastructure needs for their school buildings and grounds to develop a plan that supports lasting change toward healthy sustainable learning environments for students. New buildings, retrofits, and renovations can be designed to optimize health and sustainability and utilize energy-efficient clean technology. School districts should consider opportunities to leverage state, federal, and other resources to support sustainable school infrastructure investments.

2.1.B: Utilize renewable energy. Many existing schools have the potential to adopt renewable energy which has economic, environmental, health, and learning benefits. School districts should support their schools in considering options to install solar, geothermal heating and cooling, and other renewable energy options. Leveraging options like power purchase agreements or state and federal funding may help schools utilize renewable energy with little or no additional upfront cost.

2.1.C: Transition school bus fleets to electric. Developing plans to electrify school bus fleets and school vehicles and build charging stations can help schools reduce their environmental footprint and ensure cleaner air for students. Public-private partnerships and state and federal funding can be leveraged to support districts in this transition.

2.1.D: Support healthy sustainable food use. School districts should include in their plans opportunities to increase access to locally-grown sustainable food, support students in making healthy food choices, and incorporate food donation, rescue, and composting to reduce waste.

2.1.E: Use replacements to support clean energy, transportation, and building electrification. As schools need to replace building systems (including HVACs), repair or install new roofs, and replace school buses and vehicles, districts should require replacements utilize energy-efficient clean technology and support electrification.

2.1.F: Provide workforce development and training for school support staff to maximize benefits and success for transition to sustainable operations. School districts should ensure workforce development and training opportunities are available for school support staff and facilities managers to learn about clean energy, clean transportation, and new school district policies and systems to support sustainable operations.

2.2: Support adaptation and resilience strategies by assessing local climate risks and determining school needs to prepare, adapt, and build resilience to climate change. Districts should develop plans based on local context to:

> **2.2.A: Provide professional development for educators and school leaders on trauma-informed practices and increase access to student mental health support.** Providing educators with tools to support students who have experienced trauma can help students cope with experiencing climate impacts and eco-anxiety. Increasing access to mental health care by identifying partnerships with departments of mental health, community-based organizations, and institutions of higher education can help schools provide integrated support to address students' social, emotional, and learning needs.

> **2.2.B: Develop plans for virtual learning for climate-related learning disruptions.** With potential learning disruptions related to increased heat, extreme weather, and flooding, school districts can support continued learning for students by maintaining virtual learning plans and continuing support for educators and families to utilize virtual learning when education in the building is not feasible.

> **2.2.C: Transition to green sustainable schoolyards.** Transitioning schoolyards from heat-trapping asphalt to green sustainable schoolyards helps to create healthy spaces for students to learn and play, increases community access to green space, and helps to build resilience by reducing community heat and flooding.

> **2.2.D: Utilize schools as hubs for community resilience.** Equipping schools with climate resilient infrastructure as well as reliable power with strategies like solar microgrids with battery storage can help the broader community prepare for extreme heat, weather, and power outages.

2.3: Support teaching and learning on climate change, climate solutions, and sustainability to further integrate teaching and learning about climate change across the curriculum and prepare students for the clean economy. School districts should assess existing curriculum to determine how climate change, climate solutions, and sustainability can be further integrated across grades and subject areas. Working with existing curriculum coordinators and environmental literacy plans can be pivotal in determining education strategies for districts. Specifically, school districts should identify opportunities to:

> **2.3.A: Provide high-quality professional development for educators and school leaders to support teaching and learning on climate change, climate solutions, and sustainability.** High-quality, embedded, and ongoing professional development for educators and school leaders will be essential to support teaching and learning. Importantly, this work should be grounded in existing teaching practices and enhance existing curricula to build support for educators without creating additional burdens or barriers.

> **2.3.B: Provide resources and professional development for place-based learning.** Tying climate education to local climate impacts and solutions, including actions at the school itself (solar, electric school buses, and schoolyards), can help provide opportunities for youth to understand climate change in an accessible and authentic way and increase student engagement and understanding.

> **2.3.C: Engage students and community members in developing educational strategies and curriculum planning.** Connecting curriculum to students' lived experiences will empower youth to be part of the solution and help students develop agency. Students, families, and community members can contribute to educational planning to ensure community buy-in, intergenerational learning, and continued education in the home and community.

2.3.D: Develop career and technical education opportunities to prepare students for jobs in the clean economy and integrate environmental sustainability across all pathways. Today's youth will need to be prepared with the knowledge and skills needed to succeed in jobs in the clean economy to advance a sustainable future. Partnering with community colleges, local business, and other community organizations can help districts identify opportunities (including apprenticeships) and build pathways to high-skill, high-wage, and in-demand jobs.

2.3.E: Collaborate with out-of-school education providers including afterschool programs, museums, and community-based organizations. Collaborating with organizations supporting informal learning can help increase student engagement and provide a well-rounded understanding of climate change, climate solutions, and sustainability. It can also help leverage limited resources to communicate the opportunity to address climate change locally.

2.3.F: Partner with local Indigenous communities, Tribal organizations and Indian centers to integrate Indigenous knowledge into teaching and learning. Developing partnerships with local Indigenous communities can help educators incorporate holistic approaches to caring for the land, air, and water and reinforce local community-based solutions to advance a sustainable future.

2.4: Advance equity while developing local K-12 climate action plans by engaging and prioritizing students, families, and communities most impacted by climate change. School districts should prioritize support for students of color, Indigenous students, students with disabilities, and low-income rural and urban students — whose communities are disproportionately impacted by climate change — when creating and implementing climate action plans. Districts must authentically engage these communities and incorporate their input in decision-making. Specifically, school districts should:

2.4.A: Ensure voices of communities most impacted by climate change are centered in decision-making, including students. To advance equity and environmental justice, districts must develop and implement their action plans in a way that prioritizes and lifts up students and communities who face the greatest challenges due to climate change.

2.4.B: Ensure community input in climate plans. As school districts develop climate action plans, they should actively involve students, families, and other community members in the planning process. District climate action plans should represent the needs and strengths of local communities.

Opportunities at the State Level

State governments increasingly share responsibilities for decisions in schools with local school districts. In addition to providing funding and resources to schools, states often make decisions about state standards, educator certification, and career and technical education pathways in addition to establishing policies on buildings, transportation, food, and emergency management.

At the state level, we recommend Governors, state-level policymakers, and state education leaders take the following actions to demonstrate leadership and support comprehensive climate action in schools:

Recommendation 1: Take a whole-of-state approach to address climate change and include education. With the impacts of climate change being felt across sectors and issues, states should set ambitious whole-of-state approaches to address climate change and support coordinated climate action. An interagency position, or coordinating agency, could help the Governor identify cross-agency opportunities and opportunities to leverage state, local, and federal funding to address cross-cutting priorities. This whole-of-state approach should:

1.1: Integrate education in plans to address climate change. By recognizing and including education in their plans to address climate change, Governors and state policymakers can elevate the opportunity for the education sector to advance climate solutions.

1.2: Establish targets for transitioning schools to clean energy, building electrification, and electric buses. Clear targets to decarbonize the public school system can help the state and local districts recognize the importance of transitioning schools to clean energy, electrification, and clean transportation. These goals can also enable states to develop implementation plans to achieve the objectives and create incentives for communities meeting decarbonization targets.

1.3: Prioritize communities most impacted by climate change and education inequities. States can play a key role in advancing equity by targeting resources and support to urban and rural communities with high populations of students from low-income families that will be most impacted by pollution, heat, extreme weather, and other negative impacts of climate change.

1.4: Center student voice in developing plans to support the education sector in taking climate action. Youth are key stakeholders in schools and in conversations about climate change. Policymakers should listen to, support, and integrate the perspectives of youth, in particular youth of color, youth from low-income rural and urban communities, Indigenous youth, and youth with disabilities, in decision-making about climate action in schools.

Recommendation 2: Support school districts in developing and implementing comprehensive local K-12 climate action plans. States can play a critical role in supporting local K-12 climate action plans by providing guidance, technical assistance, funding, and resources to school districts to assess local needs and assets and support implementation of local K-12 climate action plans. Advancing state-level policies on mitigation, adaptation, and education outlined below can help support implementation of local K-12 climate action plans.

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

Recommendation 3: Advance state-level programs and policies to support mitigation, adaptation, and resilience. We recommend states establish programs or policies to:

3.1: Ensure funding for school infrastructure and school building codes support clean, efficient, sustainable, resilient, and healthy learning environments for children. Currently, state funding, along with local funding, is used to build and retrofit school buildings and grounds. States can ensure funding and school building codes help schools make decisions to utilize clean and energy-efficient technology that also promote health, well-being, and climate resilience. Even though these systems and infrastructure improvements may have additional upfront costs, the longer-term economic, health, learning, and environmental benefits should be prioritized.

3.2: Support the transition to electric school bus fleets. States can support districts in transitioning to electric school buses by helping to fund the upfront costs of buses and charging infrastructure, including by building financing partnerships with state-regulated utilities. States can also prioritize workforce development programs that provide training on electric bus maintenance and operations to ensure districts can access support locally.

3.2.A: Enforce idling reduction policies during the transition to electric buses. State laws and regulations can create limits on school bus idling to reduce air pollution from diesel or other non-electric buses. Establishing and enforcing idle reduction policies before and during the process of transitioning to electric buses can help mitigate climate change and protect student and community health as an interim measure.

3.3: Expand access to locally-grown, healthy, sustainable food and increase opportunities for food donation, food rescue, and composting. States can help schools source food locally through farm to school programs and policies that incentivize districts to procure food from local farms and producers. School garden programs and policies that allow schools to serve the produce grown in school gardens can also increase access to healthy food. States can support schools in reducing food waste through policies that encourage schools to donate surplus food to families or non-profit organizations and compost food scraps.

3.4: Develop financial incentives or opportunities to support schools in transitioning to clean energy, transportation, and sustainable food. State level policies including power purchase agreements, revolving loan funds, tax incentives, local food reimbursement incentives, and other public-private partnership incentives can be utilized to help reduce or even eliminate upfront costs for school districts. Removing the barrier of upfront cost can help many school districts reap the health and learning benefits from the transition to clean energy, transportation, and food and reduce long-term operational costs.

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

3.5: Ensure plans for virtual learning can be effective and provide access to all students.
As a critical tool to support learning disruptions related to climate change, states can help ensure that all students have access to broadband and digital devices and that educators and families have support to understand and utilize virtual learning options. States can also establish policies that support virtual learning as an option for climate-related learning disruptions.

3.6: Support school districts in assessing their vulnerability to climate change and equipping schools as hubs for community resilience. States can utilize emergency management teams to help assist school districts in assessing their vulnerability to climate change, support planning related to extreme weather, and determine needs for health, learning and other continued support. State funding can be used to equip schools as hubs of resilience with strategies such as solar microgrids or electric buses with vehicle-to-grid technology. Additionally, states can provide guidance and potential flexibility to school districts in addressing enrollment changes related to extreme weather including creating partnerships across districts to support student and family needs.

3.7: Support districts in creating green sustainable schoolyards. States can leverage funding, including funding for parks, to establish green sustainable schoolyards that are open to the public outside of school hours. These schoolyards increase access to healthy outdoor spaces for communities and build community resilience to heat and flooding. States should prioritize funding for schools in communities that are currently subject to heat island effects and lack sufficient access to parks.

Recommendation 4: Advance state-level programs and policies to support education:
We recommend states establish programs or policies to:

4.1: Integrate climate change, climate solutions, and sustainability in standards across grades and subjects. Climate change will impact all facets of society from earth science and weather to economics and health. While several states have integrated the teaching of climate science in science standards, considering ways to integrate lessons on climate change across the curriculum can provide students with deeper opportunities to engage and seek solutions. Standards developed in a developmentally appropriate way can help students build an understanding of our relationship to our environment and climate and how that, in turn, impacts our society. Additionally, tying these standards to climate solutions and civics can empower students to develop agency, understand how they can make a difference, and help address climate change.

> ***4.1.A. Develop curriculum frameworks and guides tied to the standards.*** To ensure successful implementation of the state standards, states can provide curriculum frameworks and guides to support teaching and learning. These guides help draw connections between the standards and curriculum by identifying lessons that can support students' understanding of the different standards.

> ***4.1.B. Provide professional development tied to the standards for educators and school leaders.*** To build the capacity of educators and school leaders to effectively support teaching and learning, the state has the opportunity to support high-quality professional development related to climate change, climate solutions, and sustainability.

> ***4.1.C. Leverage teacher certification to ensure teachers are prepared to teach these cross-curricular standards.*** Teacher certification and licensure provides an opportunity for states to support new educators in being prepared to engage students in learning about climate change, climate solutions, and sustainability.

4.2: Develop career and technical education opportunities to prepare students for jobs in the clean economy and integrate environmental sustainability across all career pathways.
Building on existing state plans for career and technical education, states can seek opportunities to establish career pathways in industries such as clean energy, emergency management, and sustainable agriculture, and ensure credentials are aligned with high-skill, high-wage jobs in the clean economy. States can also provide guidance about ways to integrate environmental sustainability across career pathways. To build collaboration, states can support dual-enrollment programs between K-12 schools and post-secondary institutions and engage clean economy industry partners to ensure CTE standards and opportunities align with the needs of industry, business, higher education, and the community.

Opportunities at the Federal Level

The federal government can play a critical role in helping to support schools in moving toward climate action, solutions, and environmental justice. With much of the federal role in education focused on advancing equity by targeting resources to communities with high populations of low-income students, the federal government can leverage resources, in particular for communities most impacted by climate change. The federal government can also play a critical role in producing research, disseminating best practices, and elevating the role education can play in climate solutions.

Recommendation 1: Elevate and amplify the role education can play in climate solutions.
Policymakers at the federal level can utilize leadership and communications to advance climate action, climate solutions, and environmental justice in schools. The White House, Department of Education, and other agencies can use their platforms and convening power to help build awareness about the need and opportunity for the education sector to contribute to climate solutions. We recommend that the federal government take the following actions to demonstrate leadership to support climate action in schools:

1.1: Build cross-agency collaboration to support the education sector in taking climate action.
The federal government should develop cross-agency collaboration to support the education sector in taking climate action. Given the following agencies' responsibilities include:

- The U.S. Department of Education supporting many equity initiatives in schools,
- The Environmental Protection Agency supporting healthy learning environments, clean school buses, and environmental education,
- The U.S. Department of Agriculture supporting school meals,
- The Department of Interior supporting the Bureau of Indian Education,
- The U.S. Department of Energy supporting research and technical assistance on clean energy in schools,
- The National Oceanic and Atmospheric Administration supporting climate education,
- The White House Office of Domestic Climate Policy establishing government-wide leadership, and
- Other federal agencies with interest and jurisdiction,

cross-agency collaboration can advance a comprehensive approach to support education in moving toward climate action, solutions, and environmental justice. Establishing a position or lead office within the White House can help support the cross-agency priorities for education, including early and post-secondary education and workforce development to build the capacity for our society to address climate change and succeed in the clean economy.

1.2: Establish climate change as a U.S. Department of Education priority. Schools, school districts, and states look to the Department of Education for leadership. The U.S. Department of Education can include climate action, climate solutions, and sustainability as a priority across grant programs and establish a position within the Secretary's office to elevate solutions and address climate change. As the Department of Education establishes agency-wide priorities, the elevation of climate change as a priority will send a strong message to the field and provide an opportunity for grantees to support work on climate action in schools.

1.3: Center student voice in developing plans to support the education sector in taking climate action. Youth are key stakeholders in schools and in conversations about climate change. Policymakers should listen to, support, and integrate the perspectives of youth, in particular youth of color, youth from low-income rural and urban communities, Indigenous youth, and youth with disabilities in decision-making about climate action in schools.

1.4 Research, recognize, and effectively disseminate best practices gathered across federal agencies to provide states, districts, and schools with easy access to information, research, and strategies to support the sector in moving to climate action. Several programs currently highlight best practices in schools. For instance, the Department of Education's Green Ribbon Schools annually recognizes successful green schools across the country. The Department of Energy's Better Buildings Challenge has featured schools transitioning to net-zero energy. NOAA's Bay Watershed Education and Training helps schools provide indoor and outdoor watershed education. USDA's Farm to School grant program supports schools in accessing locally-grown healthy food. The federal government should work to coordinate and effectively disseminate research and best practices across federal agencies to provide states, districts, and schools with easy access to information, research, and strategies to support the sector in moving to climate action, solutions, and environmental justice.

Recommendation 2: Support the development and implementation of local K-12 climate action plans. Grants from the federal government can be used to help school districts develop and implement comprehensive climate action plans to mitigate, adapt, educate, and advance equity to address climate change. These grants can support planning based on local needs, assets, interests, and collaborative development with the community. They can prioritize community efforts to leverage existing federal, state, and local funding to support the plan's implementation and to coordinate with local climate action plans at the town, city, or county level.

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Recommendation 3: Advance federal policies and programs to support mitigation, adaptation, and resilience: We recommend the federal government establish policies and programs to:

3.1: Invest in school infrastructure to promote clean energy, clean air, clean water, sustainable schoolyards, sustainable food, and adaptation. School infrastructure investments from the federal government can further ensure the health, safety, and well-being of students and educators, improve learning outcomes and the environmental and fiscal sustainability of schools, and build resilience for communities. Given existing resource inequities, urban, rural, and Indigenous schools with high populations of low-income students often face barriers in making needed infrastructure improvements. The federal government has an opportunity to remove these barriers by providing grants to under-resourced school districts to repair, renovate, and modernize their school buildings and grounds, including schools that receive funding through the federal Bureau of Indian Education. All infrastructure investments should consider student and educator health and learning, include clean and sustainable building systems and technology, and provide opportunities for workforce training in clean energy systems. Specifically, these investments should support:

3.1.A: Repairs and renovations of school buildings to increase energy-efficiency and use of renewable energy. Strategies including solar, geothermal heating and cooling, building design, and adaptive lighting can help schools make progress toward net-zero energy and create learning opportunities for students. Utilizing federal investments to support schools across the country in making progress toward net-zero energy will not only increase the environmental sustainability of our schools but also ensure that, in the future, more local taxpayer dollars can be devoted to teaching and learning.

3.1.B: Improvements to indoor air quality. Poor indoor air quality impacts student health and learning, and climate change can decrease indoor air quality as heat, pollution, and the prevalence of allergens worsen. Federal investments in school infrastructure should help ensure healthy indoor air quality with strategies including improved ventilation, filtration, and pollutant removal.

3.1.C: Access to safe drinking water in schools. Lead testing as well as filtration, repairs, and replacing lead service lines and fittings can help ensure all children have access to safe and healthy drinking water and improve long-term health outcomes for students. Federal investments in school infrastructure should help ensure safe drinking water for students.

3.1.D: Sustainable schoolyards. Transitioning schoolyards from heat-trapping asphalt to green sustainable schoolyards can provide healthy and safe spaces for students to learn and play, reduce community heat and flooding, and increase access to green space for communities. Federal investments in school infrastructure should support green sustainable schoolyards.

3.1.E: Sustainable food. School kitchens with the ability to support cooking from scratch and cleaning reusable dishes can help promote access to healthy sustainable food and reduce waste from food packaging. Federal investments in school infrastructure should support schools in building kitchens with these capabilities.

3.1.F: Climate adaptation and resilience. Schools will need to adapt to worsening climate impacts and can serve as community hubs of resilience where community members can shelter during emergencies and access clean electricity with strategies like solar micro-grids with battery storage. Federal investments in school infrastructure should support schools in assessing local climate risks and building more resilient infrastructure to help schools and communities adapt to climate change.

3.2: Support the transition to electric school bus fleets. Investments from the federal government to help offset the upfront costs of electric school buses and charging infrastructure can help students breathe cleaner air and reduce the sector's environmental footprint. Investments to support schools in transitioning to electric school buses should be used for buses, charging infrastructure, and training. Based on local needs, this funding could also permit schools to transition their non-bus fleet to electric and build workplace charging infrastructure, ensuring better air quality around the school and reducing the overall environmental impact of the school system.

3.3: Expand access to locally-grown, healthy, sustainable food and increase opportunities for food donation, food rescue, and composting. The federal government should build on existing guidance through the National School Lunch and the School Breakfast Program to support states, districts, and schools with food donation and recovery as well as composting. Additionally, expanding the Farm to School grant program from USDA and supporting states in developing farm to school programs can help increase access to locally-grown food in schools.

3.4: Increase broadband access for schools and families. Investments from the federal government should support efforts to increase high-speed internet access, and in particular, home internet access. Expanding internet access can build resilience for our school systems when faced with potential learning disruptions.

3.5: Establish financing opportunities through tax incentives, bond authority, and revolving loan funds. In addition to providing direct grants, the federal government should consider options to use tax incentives, bond authority, and revolving loan funds to assist schools in transitioning to sustainable operations. For instance, providing a direct-pay option for renewable energy tax credits for schools would allow schools to maximize economic benefits from strategies like solar installation, without needing to rely on third party developers to benefit. Funding school infrastructure bonds or establishing revolving loan funds (where future savings can be reinvested into other infrastructure projects) can also help create funding mechanisms for school infrastructure and clean energy initiatives. As the federal government creates incentives for transitioning to a clean economy, policymakers should ensure schools are able to access and benefit from these incentives.

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Recommendation 4: Advance federal policies and programs to support education.
We recommend the federal government establish policies and programs to:

4.1: Prepare youth for jobs in the clean economy and integrate environmental sustainability across all career pathways through career and technical education. Increased funding from Carl D. Perkins Career and Technical Education Act or other job training programs should be used to support districts in determining opportunities to integrate environmental sustainability across career pathways and create or expand CTE courses and programs that prepare students for high-skill, high-wage jobs and careers in industries such as solar energy, wind energy, environmental engineering, sustainable agriculture, or emergency management. To ensure equity and a just transition, policymakers should prioritize districts with high percentages of students from low-income families and districts most impacted by climate change and the transition to a clean energy economy.

> *4.1.A: Invest in opportunity youth to ensure an equitable and just transition.* To ensure an equitable and just transition and build an economy that works for everyone, opportunity youth must be included. Increasing investments in Job Corps, Youth Build, and National Service, including a Civilian Climate Corps, can include opportunities for apprenticeships and pathways for opportunity youth to access good jobs and careers in industries such as solar energy, wind energy, environmental engineering, sustainable agriculture, or emergency management.

4.2: Enable professional development and teacher preparation programs to support teaching and learning on climate change, climate solutions, and environmental justice. Several programs within the Department of Education including Supporting Effective Instruction Grants and the Supporting Effective Educator Development Programs may provide opportunities to support educators in teaching climate change, climate solutions, environmental justice, and sustainability. Additionally, programs like Student Support and Academic Enrichment Grants can build educators' capacity to support social emotional learning and build student resilience. To advance this work, the Department of Education can learn from other governmental offices including EPA's Office of Environmental Education or NOAA's Office of Education. The Department of Education, working with other agencies, can provide technical assistance and elevate the opportunity for grantees to integrate educator support for teaching climate change, climate solutions, and environmental justice.

4.3: Emphasize the importance of Indigenous knowledge systems and disseminate best practices to build broader awareness of Indigenous knowledge. Existing programs to support Indian Education, Native Hawaiian Education, and Native Alaskan Education through the Every Student Succeeds Act can continue to emphasize the importance of and support learning about Indigenous knowledge systems and Indigenous culture, language, and food sovereignty to reaffirm the role of holistic approaches toward understanding the relationship between humans and the environment. Dissemination of best practices from these programs can help build broader awareness of Indigenous knowledge as a practice.

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Opportunities for Advocacy

Students, parents, caregivers, families, and educators can play a crucial role in advocating for climate action in their schools and communities. As the primary stakeholders in education, students, parents, and families are critical voices to drive action in their schools and can work with educators to advance school and district-wide policies that meet local needs.

Students can advocate for climate mitigation, adaptation, and education at the school level through clubs, student government, and community-based organizations that support youth leadership. Student representatives on school boards at the local and state level can be leaders in elevating opportunities for local and state school boards to take action. Students can also apply their knowledge of civics and their lived experiences in their schools and communities to share their ideas and stories with educators and school leaders.

Parents, caregivers, families, and educators can work with school PTAs or other parent and family organizations to advocate for climate action in their students' schools. For example, a growing number of school boards are passing 100% clean energy resolutions or planning to transition their school buses to electric as a result of student and family activism.

Recognizing the potential learning, environmental, health, and equity benefits, education, climate, and civil rights advocacy organizations can also play a critical role in supporting local, state, and federal advocacy efforts with students, parents and caregivers, and educators.

Students, parents and caregivers, educators, and advocacy organization should consider opportunities to:

- Recognize the opportunity for cross-sector intergenerational collaboration to advance climate action within their local schools; and

- Advocate that schools and districts comprehensively address climate change by reducing the school systems' environmental footprint, adapting to climate impacts, and engaging students in learning about climate change, climate solutions, and high-skill, high-wage jobs in the clean economy.

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Opportunities for Business

Business can play a critical role in supporting climate action in schools as an opportunity to help the sector prepare youth for jobs in the clean economy. Business advocacy organizations and trade associations can help identify the knowledge and skills needed for the clean economy and advocate for increased teaching and learning opportunities to ensure students are prepared for success. Additionally, ensuring clean economy industries participate in industry advisory councils, partner with career and technical education programs, and provide apprenticeships can help build a pathway for students to high-skill, high-wage clean economy jobs.

Businesses can also partner with schools and districts to finance climate mitigation and adaptation efforts as an investment. These public-private partnerships can help districts avoid upfront costs that may otherwise be prohibitive. For example, Highland Electric Transportation is partnering with Montgomery County Public Schools in Maryland to help the district transition to electric school buses. The company will purchase the buses and provide maintenance and operations support for the district. The district will lease the buses for the same amount they have been paying for diesel buses. This cost is higher than the cost of operating and maintaining electric buses, allowing Highland Electric to repay the upfront costs of the buses and earn a profit through the differential over time. Opening up financing opportunities for schools to transition to sustainable operations can also help businesses in meeting their environmental, social, and governance (ESG) goals.

Business should consider opportunities to:

- Advocate for teaching and learning to support students in developing the knowledge and skills needed for the clean economy; and

- Engage with public-private partnerships to support mitigation and adaptation investments in schools.

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Opportunities for Media

Media can play a critical role in supporting climate action in schools. Young people and families across the country are exposed to media through television, radio, YouTube, apps, social media, and streaming platforms. Given this extensive reach, media can help students and families understand the opportunity to support schools in reducing their environmental footprint, adapting to climate impacts, and teaching climate change, climate solutions, and sustainability. Working in close collaboration with public institutions such as NASA, NOAA, NSF, public broadcasting outlets, and other scientific agencies can help media outlets provide scientific information and resources about climate change and solutions to communities, families and children.

The media can combat potential worries about eco-anxiety by tying information about climate change to climate solutions. Sharing information through the lens of connections to school—for example, how diesel school buses or food waste in the cafeteria impact emissions—connects learning about climate change to students' lived experiences. Further, learning about ways students can take action within their schools can help them develop agency and learn how they can make a difference in their broader community.

Media should consider opportunities to:

- Support a coordinated campaign across media outlets and platforms to help young people and families better understand climate change and climate solutions;

- Share stories about how young people can take action to advance climate solutions, particularly in their schools and local communities; and

- Encourage young people to create their own content through user-generated platforms such as YouTube, TikTok, and Instagram to further amplify information about climate change and solutions.

Opportunities for Philanthropy

Philanthropic foundations already do extensive work to support the education sector and address climate change, though few are working at the intersection of the two. Addressing climate change through schools and out-of-school education programs can advance many foundations' existing strategic priorities such as health and equity. Every community will experience the impacts of climate change, so both global philanthropies and those engaged in place-based work could impact how communities prepare for climate change. Ultimately, a more sustainable, resilient, and equitable education system increases opportunities and strengthens communities.

Support from philanthropy can help communities that are most impacted by climate change — primarily low-income communities and communities of color — access the resources they need to implement climate solutions and continue to lead on climate action. Philanthropy can also be a catalyst to help communities leverage additional resources, support intergenerational organizing and collaboration, enable innovation, and develop best practices for taking climate action in schools. This is especially important in communities that may not otherwise have access to the resources and support needed to prioritize climate action on a broad scale.

With philanthropic organizations across the country ranging from large private foundations, to community foundations, to small family foundations, philanthropy can help support cross-sector work by considering:

- Impacts climate change will have on their existing communities and priorities;

- Opportunities to incorporate diverse voices and perspectives, including youth, into strategic priorities; and

- Silos across strategic priorities hindering cross-sector work needed to achieve success across intersectional issues.

Menu of Solutions

100% RENEWABLE ENERGY RESOLUTIONS

Passing a 100% renewable energy resolution in a school district commits the district to transitioning from existing energy sources that use fossil fuels to using clean energy sources for all operational needs. Generally, these resolutions include a target year by which the transition will be made along with potential intermediate goals.

Benefits
- Reduces greenhouse gas emissions for the district with implementation.
- Saves districts money on energy costs. Energy costs are currently the second highest costs for districts, and transitioning school districts to clean renewable energy can significantly reduce and potentially eliminate those annual costs.
- Creates learning and leadership opportunities for students. Many successful campaigns for clean energy resolutions have been led by students and continue to involve students in implementation.

Addressing Barriers
- Garnering support from school board members to pass a resolution is a potential barrier. Collaboration between students, parents, educators, and school board members and effective messaging and communication can build support.
- Securing funding for clean energy transitions and energy efficiency upgrades can be a barrier. Leveraging local, state, and federal funds and establishing public-private partnerships can lower upfront costs.
- Effective implementation is critical for successful follow through of clean energy resolutions. Planning for implementation early on and collaborating with students, parents, and educators on implementation plans can help districts set themselves up for success.

Success Stories
- Salt Lake City School District passed a 100% clean energy resolution in June 2020, committing to use 100% renewable energy for electricity by 2030 and 100% carbon neutral energy for all energy uses by 2040.
- In December 2019, Los Angeles Unified School District passed a resolution committing to transition to 100% clean, renewable energy by 2040.

CLIMATE CHANGE EDUCATION COORDINATOR

A climate change education coordinator in a school district can help integrate cross-curricular climate change education and support educators in teaching about climate change, climate solutions, and sustainability.

Benefits
- Can identify cross-curricular opportunities for climate education across all grade levels.
- Can provide professional development and embedded and ongoing support for educators on climate education.

Addressing Barriers
- Funding can be a barrier to hiring a climate change education coordinator. Searching funding opportunities such as grants can help cover costs.

Success Stories
- In Oregon, Portland Public Schools hired a Climate Justice Programs Manager to support teaching and learning about climate change and climate justice across grades and subjects and co-design curricula with students.

CLIMATE CHANGE IN STATE STANDARDS

State standards set expectations for what students should know and be able to do in each subject at each grade level. Including climate change in state standards helps schools ensure students have a foundational understanding of climate change so they can make decisions that protect their communities and prepare them for the future.

Benefits
- Sets an expectation that all students across the state will have the opportunity to learn about climate change.
- Opens opportunities for states to provide more support to educators and school leaders on teaching about climate change to implement state standards.

Addressing Barriers
- State laws may dictate when state standards can be revised, which can be a barrier. Learning about when and how your state revises standards can help determine the most effective opportunities to integrate climate change.
- Curriculum debates can be a challenge in including climate change education in schools. Focusing on local climate impacts, sustainability, and environmental conservation can build community support.

Success Stories
- In 2020, New Jersey became the first state in the country to revise its state standards to include climate change across grade levels and subjects.

COMPOSTING

Composting is a way to convert food waste into a natural fertilizer. As food sits in landfills, it emits methane, a potent greenhouse gas that contributes to climate change. Composting helps to divert food waste from landfills, which reduces greenhouse gas emissions.

Benefits
- Composting programs in school cafeterias provide opportunities for sustainability education and student leadership.
- Compost can be used as a natural fertilizer in school gardens or in the community.

Addressing Barriers
- Meeting all composting needs on-site can be a barrier. Partnering with community-based organizations can help schools create and implement structures that support some on-site and off-site composting.
- Buy-in from school leaders and staff can be a challenge for establishing school composting programs. Educating and training school staff on composting benefits and processes can help with implementation.

Success Stories
- San Diego Unified School District's food waste reduction program, called Love Food Not Waste, includes support for composting food waste from school cafeterias. The program, which includes food donation as well as composting, has rescued 530,900 pounds of food from schools and eliminated 275,200 pounds of greenhouse gas emissions.

CURRICULUM SUPPORTS ON CLIMATE CHANGE AND SUSTAINABILITY

Curriculum supports can include frameworks, lesson plans, and other materials that help educators teach about climate change, sustainability, and the environment. Curriculum and related supports can be developed collaboratively with educators, students, and community-based organizations and aligned to state standards.

Benefits

- Gives educators tools to teach about climate change, sustainability, and the environment.

- Can help more students access education on climate change, sustainability, and other environmental topics.

- Can support implementation of state standards that include climate change and sustainability.

Addressing Barriers

- Capacity can be a barrier to developing and implementing robust curriculum supports. Partnering with environmental education and community-based organizations can help increase capacity.

Success Stories

- In California, the state recently provided funding to San Mateo County to develop open access climate change and environmental justice curricula for all grades that align with the state's required environmental principles and concepts.

- The National Wildlife Fund's Resilient Schools Consortium (RiSC) helps students learn about how climate impacts will affect their communities and what they can do to make their communities more resilient. The curriculum uses hands-on, place-based learning to teach about coastal resilience and extreme heat in New York City schools.

- In Seattle, the Learning in Places project is working with students, educators, and families to co-design culturally relevant science curriculum for grades K-3. The program uses school gardens and community green spaces to help students learn about ecological reasoning and decision-making in their communities.

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EDUCATOR PROFESSIONAL DEVELOPMENT ON CLIMATE CHANGE AND SUSTAINABILITY

In-service professional development (PD) provides educators with knowledge and instructional tools they can use to improve teaching and learning in their classrooms. PD focused on climate change, climate solutions, and sustainability helps prepare and empower teachers to include these topics as they are teaching.

Benefits
- Supports educator's knowledge of climate change, climate solutions, and sustainability and how these topics can be incorporated across the curriculum.

Addressing Barriers
- Capacity can be a barrier to increasing PD opportunities. Educators already have PD requirements and many constraints on their time. Embedding PD on climate change into existing PD opportunities can help reduce capacity constraints.

- Ineffective implementation can be a barrier to successful PD. Research shows that PD is most effective when educators receive continued support and coaching on incorporating what they have learned into their practice.

Success Stories
- In Washington State, the ClimeTime network is a state-funded professional development program where educators have the opportunity to collaboratively develop knowledge, skills, awareness, and tools to teach climate science.

- Arizona State University's Sustainability Teachers' Academies provide workshops on teaching about sustainability. Each workshop involves 200 hours of hands-on, interactive professional development for K-12 educators across the country.

ELECTRIC SCHOOL BUSES

Electric school buses run on electricity rather than diesel fuel — a leading contributor to air pollution and greenhouse gas emissions.

Benefits
- Supports students' health. Electric school buses do not have tailpipe emissions that contribute to air pollution and have been linked to childhood asthma and absenteeism.

- Saves districts money in the long-run. Each bus saves an average of $170,000 in maintenance and operation costs over its lifetime.

Addressing Barriers
- The upfront costs for electric school buses are higher than diesel school buses and buses require charging infrastructure. Public-private partnerships, grants, and government support can make electric school buses more affordable.

Success Stories
- In California, Stockton Unified School District is supporting the transition to electric school buses through grants from the California Air Resources Board, the California Energy Commission, and rebates from the district's local utility company. Less than a year after submitting the first grant proposal, the district has built charging stations and acquired its first set of electric buses.

- In Maryland, Montgomery County Public Schools recently announced a plan to transition its entire bus fleet to electric through a partnership with Highland Electric Transportation. Highland Electric will lease the buses to the district and take care of maintenance and operations for the same price the district would typically pay to purchase and maintain a diesel bus, which avoids the challenge of higher upfront costs.

ENERGY EFFICIENCY EDUCATION

Education on energy efficiency helps students, educators, and other school staff understand the importance of conserving energy and what they can do to conserve.

Benefits	• Helps lower energy use, which makes it easier for schools to become net-zero energy or close to net-zero energy.
	• Creates opportunities for hands-on learning and student leadership on energy efficiency and climate mitigation.
Addressing Barriers	• Capacity can be a barrier to coordinated energy efficiency education. Partnering with local businesses or community-based organizations and hiring a district sustainability manager can help build capacity and support implementation.
Success Stories	• In California, Stockton Unified School District, students are involved in the energy patrol, which helps teach students and staff about reducing energy use and practicing energy conservation.

GEOTHERMAL HEATING AND COOLING

Geothermal heating and cooling uses the Earth's underground stable temperature to provide heating and cooling for buildings through a network of pipes and wells dug into the ground. Geothermal heating and cooling replace gas heating systems and inefficient HVAC systems, reducing schools' greenhouse gas emissions.

Benefits	• Geothermal heating and cooling is an efficient, reliable, and sustainable system for heating and cooling school buildings.
	• Geothermal heating and cooling saves schools money on operations costs as the systems generally need less maintenance than traditional heating and cooling systems.
Addressing Barriers	• Some school sites may not be compatible with geothermal heating and cooling due to soil composition or space constraints and upfront costs can be a barrier. Working with engineers can help determine best sites for geothermal and the potential payoff period when factoring in annual savings.
Success Stories	• In West Virginia, Berkeley County Schools installed geothermal heating and cooling systems in seven schools and made additional energy efficiency upgrades, resulting in a 75% decrease in energy use in those schools.

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GREEN CAREER AND TECHNICAL EDUCATION (CTE)

Green career and technical education (CTE) programs or pathways focus on sustainability and clean energy jobs to prepare students for success in the clean economy. Jobs in the clean energy sector are among the fastest growing in the country and as climate change continues to impact society, all industries will need to adapt and become more sustainable.

Benefits	• Prepares students to be successful in in-demand, high-wage, high-skill jobs that will increasingly become available with the clean economy.
	• Helps employers by ensuring young people are prepared for success in the clean economy workforce.
Addressing Barriers	• Insufficient educator knowledge and skills related to sustainability and clean energy can be a barrier to expanding green CTE programs. Establishing partnerships with businesses and institutions of higher education can help increase capacity and support educators.
Success Stories	• P-TECH schools have CTE programs that let students both explore careers related to sustainability and climate change and learn the technical skills needed to qualify for high-skill, high-wage jobs. Students at P-TECH schools graduate with a high school diploma and an associate's degree in six years and are first in line for jobs with industry partners.
	• The Environmental Sciences and Climate Institute (ESCI), a new collaborative between several school districts and community colleges in rural southwest Colorado is designed in collaboration with community colleges and includes project-based learning and exposure to climate related careers including emergency management.

GREEN SCHOOLYARDS

Green sustainable schoolyards replace heat-trapping asphalt with outdoor spaces that incorporate grass, trees, or other native plants creating healthy spaces for students to learn and play. Some green schoolyards have edible gardens, rain gardens, or other elements that support learning about sustainability and the environment.

Benefits	• Supports student and community health by reducing the impacts of high heat, which presents greater risks to children and low-income communities of color.
	• Provides outdoor learning opportunities for students and healthy space for students to learn and play.
Addressing Barriers	• Funding can be a potential barrier. Creating partnerships with non-profit organizations and municipal agencies can help schools secure funding for design, construction, and upkeep.
Success Stories	• The School District of Philadelphia has worked with non-profits and city agencies to create sustainable schoolyards with green stormwater management in over 30 schools. Many other schools in the district have been updated to include school gardens or other green elements.
	• In Chicago, the Space to Grow initiative is a partnership between Chicago Public Schools, two municipal water agencies, and two non-profit organizations. The initiative has worked with school communities to design, construct, and maintain 25 green schoolyards primarily in under-resourced neighborhoods.

LOCAL FOOD PROCUREMENT

Districts obtain school food in accordance with state and local policies on food safety, nutrition, and procurement processes. Policies such as local food procurement incentives and farm-to-school programs make it easier for districts to obtain school food from local farms and other food producers. These policies reduce the distance that food travels to arrive at schools, which decreases the amount of greenhouse gases emitted from transportation, and they can also promote more sustainable food choices when partnering with local farms.

Benefits
- Supports local farms and food producers financially by incentivizing districts to buy from local businesses.

- Incentivizing districts to procure food from local farms can help increase fresh produce offered in schools, which supports student health.

Addressing Barriers
- Lack of school kitchen equipment for cooking from scratch can be a barrier to incorporating locally-grown produce into school meals. Grants and other funding opportunities can help schools and districts update their kitchens with necessary equipment.

- Many districts work with food service management companies to provide school food, which can be a barrier to serving local food. Districts can work with distributors to prioritize sourcing ingredients locally.

Success Stories
- In Texas, Austin Independent School District partners with the Good Food Purchasing Program to incorporate locally-produced food in schools by partnering with local farms and local wholesale food producers. During the 2015-16 school year, 47% of the district's food came from local producers.

- The New Mexico Grown program is a state grant program that incentivizes districts who participate in the National School Lunch Program to serve local fruits and vegetables for meals and snacks. The program is managed by a Farm to School Specialist at the state's Department of Public Education.

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

NET-ZERO ENERGY SCHOOLS

Net-zero energy schools produce as much clean energy as they consume throughout the course of a year. Most schools accomplish this through a combination of energy efficiency improvements, building design, energy education, and renewable energy.

Benefits

- Reduces greenhouse gas emissions and school energy and operations costs. Funds saved on energy can be repurposed to support teaching and learning.

- Provides hands-on opportunities for students to learn about sustainable infrastructure and energy conservation.

Addressing Barriers

- Despite assumptions about higher cost, the design and construction of net-zero energy school buildings can often be built for the same cost as school buildings that are not net-zero energy.

- Limitations of certain school sites may be a barrier to net-zero energy schools, particularly when renovating existing buildings. For example, some school roofs may not be compatible with solar panel installations. Schools that are unable to be fully net-zero energy can still benefit from energy efficiency improvements.

- Schools may not know where to start to create healthy, sustainable buildings. Established programs such as Leadership in Energy and Environmental Design (LEED) and the Collaborative for High Performance Schools can provide guidance.

Success Stories

- Kentucky used money from the 2009 American Recovery and Reinvestment Act (ARRA) to create a program that helped improve energy efficiency efforts in schools. As a result, Kentucky was home to the first net-zero K-12 school in the country, and remains among the states with the greatest number of net-zero schools.

- Discovery Elementary School in Arlington, 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.

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

OUT-OF-SCHOOL ENVIRONMENTAL LEARNING

Out-of-school time (OST) programs provide students with opportunities to learn and pursue their interests through community-based programs during afterschool hours, over the summer, or through informal learning in spaces such as museums. Including outdoor education and learning about the environment in OST programs addresses climate change by expanding students' opportunities to learn about sustainability and their local environment.

Benefits	• Provides opportunities for students to develop and follow their own interests outside of school increasing their engagement and learning.
	• Supports youth in learning about their local environment and culture while increasing connections to the community.
Addressing Barriers	• Limited green spaces or other safe outdoor spaces can be a challenge for outdoor education. Partnerships between community-based organizations and local parks departments can improve access.
Success Stories	• The Fresh Tracks program supports youth of color, opportunity youth, and Indigenous youth in becoming leaders for equity and environmental justice in their communities by using nature and cultures to bridge divides.
	• The Girl Scout Tree Promise initiative challenges Girl Scout troops to plant five million trees across the country in five years in order to preserve forests and reduce climate change.
	• National 4-H provides opportunities for youth to learn about the environment, agriculture, and health through youth leadership opportunities in their communities, including through a middle school curriculum on sustainability and climate change.

PLANS FOR SUDDEN ENROLLMENT CHANGES

Climate impacts such as hurricanes, wildfires, and severe flooding can cause families to move to different areas to regain stability in the face of loss. As families migrate within the U.S. and arrive from abroad, schools and districts may see upticks in enrollment in the middle of the year. Creating plans for enrollment changes helps districts adapt to extreme weather and become more resilient to climate impacts.

Benefits	• Supports the mental health of arriving students who may have experienced trauma associated with extreme weather by having plans to evaluate students and provide needed services.
	• Supports the academic success of arriving students who may have had significant disruptions in schooling due to extreme weather by having plans to integrate students into the district and evaluate them for any needed services.
Addressing Barriers	• Capacity constraints can be a barrier to creating plans for enrollment changes. Districts can create partnerships with community-based organizations and other nearby districts to increase capacity when needed.
Success Stories	• Miami-Dade County Public Schools has plans to serve incoming students in three different scenarios, depending on the rate of new student arrivals — accepting students at all schools, setting up one to three registration centers, or establishing new full-service schools to serve newly-arrived students. Each plan is designed to meet students' academic, physical health, mental health, and social emotional needs.

POWER PURCHASE AGREEMENTS

Power purchase agreements (PPAs) allow third party developers to install and maintain solar panels at a school site with the school buying the solar power generated by the panels at a fixed cost for a number of years. PPAs enable schools to use solar energy for little or no additional cost.

Benefits
- Allows districts to benefit from solar panels without needing to purchase, install, or maintain them.

- Saves schools money on energy costs because the cost of solar energy is generally cheaper than traditional energy sources and can remain the same throughout the term of the agreement (e.g. 20 years).

Addressing Barriers
- Laws on PPAs differ by state, and in some instances may prevent schools from using PPAs. Advocating for changes to PPA laws, where applicable, can help more schools benefit from PPAs.

Success Stories
- In Arizona, Tucson Unified School District uses solar power at 80 schools and is expected to save $43 million in energy costs over 20 years. Through a power purchase agreement, the district paid no upfront costs and will purchase the energy generated by the solar panels at a fixed rate for 20 years.

REVOLVING LOAN FUNDS

Revolving loan funds can help support clean energy projects which save money over time. As one project repays the loan with the energy costs saved, a loan is then given to the next project. This structure enables a smaller upfront fund to be continually used to support additional clean energy projects.

Benefits
- Increases access to clean energy for schools or districts that may face challenges raising capital funds.

- Enables a single funding source to support multiple schools or districts in transitioning to clean energy.

Addressing Barriers
- Acquiring initial funding for a revolving loan fund can be a barrier. Partnering with businesses and government agencies can help raise initial funds.

Success Stories
- Maine established a School Revolving Renovation Fund in 1998 to help schools address health and safety concerns and improve energy and water conservation in school buildings.

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SCHOOL GARDENS

School gardens are used to grow produce at school which can be used by students and families. School gardens provide students with local food and can help students learn about sustainable food systems.

Benefits
- Provides hands-on opportunities for students to learn about the environment, sustainability, and growing food across all grades and across the curriculum.
- Can expose students and families to different types of produce and new ways of cooking.

Addressing Barriers
- Maintaining school gardens over time can be a potential barrier. Partnerships with community-based organizations can help provide funding, capacity, and expertise.

Success Stories
- In California, Oakland Unified School District has a goal of establishing a garden at every school. The district has a policy outlining the role of building and grounds staff in maintaining school gardens and a ready-to-use memorandum of understanding form for schools whose garden education is provided by outside organizations.

SOLAR POWER FOR SCHOOLS

Solar power converts sunlight into clean, renewable energy through solar panels that can be installed across school campuses — on roofs, over parking areas, or on the ground. By relying on clean, renewable energy, solar power reduces greenhouse gas emissions for schools.

Benefits
- Using solar power provides schools with clean energy and saves schools money on energy costs and operations.
- Installing solar panels creates opportunities for students across grade levels to learn about clean energy and solar power.

Addressing Barriers
- Upfront costs to install solar panels are a potential barrier. Power purchase agreements (PPAs) let districts purchase solar energy from a third party, which can reduce or eliminate costs for districts.
- Some school sites may not be compatible with solar panels due to roof integrity, size, or other constraints. Districts can still reduce fossil fuel use and energy costs by installing solar panels on schools that are compatible.

Success Stories
- In Arkansas, Batesville School District worked with teachers to reduce energy consumption and installed solar panels on two schools. The combined 1,483 solar panels generate half of the district's energy needs and save the district $100,000 per year in energy costs. Teachers also received training on how to incorporate solar technology into STEM classes.

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

STUDENT MENTAL HEALTH SUPPORT

Extreme weather events often damage schools, homes, and other buildings in a community and cause many students and their families to experience homelessness, food insecurity, and other losses. Supporting student mental health helps students recover from extreme weather events and build their resilience to climate impacts.

Benefits
- Helps students manage their responses to traumatic events like hurricanes, wildfires, and other extreme weather.

- Addressing students' mental health needs can help students and educators continue with teaching and learning in the aftermath of community-wide trauma.

- Develops students' ability to be resilient in the face of climate impacts and other sources of trauma.

Addressing Barriers
- Staff capacity can be a barrier. Establishing partnerships with community-based organizations and nearby school districts can increase capacity in the event of community-wide trauma.

- Lack of training for non-mental health staff in schools. Professional development on trauma-informed practices and mental health support can help educators and other school staff appropriately respond to students' needs.

Success Stories
- After Hurricane Maria, the Puerto Rico Department of Education worked with the non-profit Pure Edge to train educators and school mental health professionals on supporting students who have experienced trauma.

SUSTAINABILITY DIRECTOR

A sustainability director for a school district can help manage and coordinate the district's efforts to improve sustainability in facilities and operations and the district's climate mitigation efforts.

Benefits
- Providing leadership and support for schools and districts in reducing their environmental footprints.

- Supports energy efficiency education for students, educators, and staff.

Addressing Barriers
- Funding can be a barrier to hiring a sustainability director. Searching for funding opportunities and realizing the potential for savings from lower energy costs as a result of this position can help.

Success Stories
- In Texas, Austin Independent School District has a sustainability manager who implements and tracks programs designed to improve sustainability and reduce costs by addressing energy use, water conservation, food use, and sustainable transportation, among other issues.

- Denver Public Schools has a sustainability team that includes a sustainability director, project and energy efficiency specialist, and school garden program specialist, among other positions. The sustainability team works with students and educators to conserve energy and water and reduce waste.

- The Center for Green Schools at the US Green Building Council runs the School Sustainability Leaders Network which provides fellowships, support, and learning opportunities for school or district staff whose roles include a focus on sustainability efforts.

TEACHER PREPARATION ON CLIMATE CHANGE AND SUSTAINABILITY

Teacher preparation programs educate future teachers before they enter the workforce. These programs include a range of requirements which differ by state and are aligned to teacher certification and licensure. Teacher preparation programs that include climate change and sustainability can help ensure that new teachers have the knowledge and skills they need to teach about climate change.

Benefits
- Increases teacher knowledge of climate change and how it can be incorporated across the curriculum and across all grades.
- Improves educators' comfort with teaching about climate change and sustainability from the beginning of their careers.

Addressing Barriers
- Building the capacity of teacher preparation programs to integrate climate change and sustainability can be a barrier. Identifying opportunities to partner with sustainability schools or existing programs with climate change education expertise can increase capacity for teacher preparation programs.

Success Stories
- The Center for Sustainable Futures at Teachers College, Columbia University supports several courses related to teaching about sustainability and the environment for students in education-related graduate programs. The center also provides professional development programs for in-service teachers.

VIRTUAL LEARNING PLANS

Plans for virtual learning allow schools to more easily continue teaching and learning even during extreme weather conditions and help schools be more resilient when extreme weather forces school buildings to close.

Benefits
- Supports academic continuity when schools must close due to climate impacts or other emergencies.

Addressing Barriers
- Access to the internet and digital devices at home can be a barrier to virtual learning. Schools can work with local governments, businesses, and community-based organizations to promote existing programs that affordably expand access to the internet and devices.
- Educator and parent/caregiver comfort with online platforms and digital devices can be a barrier to supporting virtual learning. Providing resources and training to educators and parents/caregivers can help increase support.

Success Stories
- Many districts have developed robust virtual learning plans as a result of the pandemic, including options that allow a return to virtual or hybrid learning when needed. In Ohio, Cleveland Metropolitan School District partnered with a local non-profit to distribute 17,000 digital devices to students and install thousands of hotspots in the community at a reduced cost.

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

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