

Preparing Schools for Climate Resiliency



What is a climate resilient school?

Climate resilient schools are prepared for the effects of climate change. They can sustain operations during climate events, are equipped with reliable and durable infrastructure, and keep students safe during one-time events and through long-term climate change effects.

Why should schools prepare for climate resiliency?

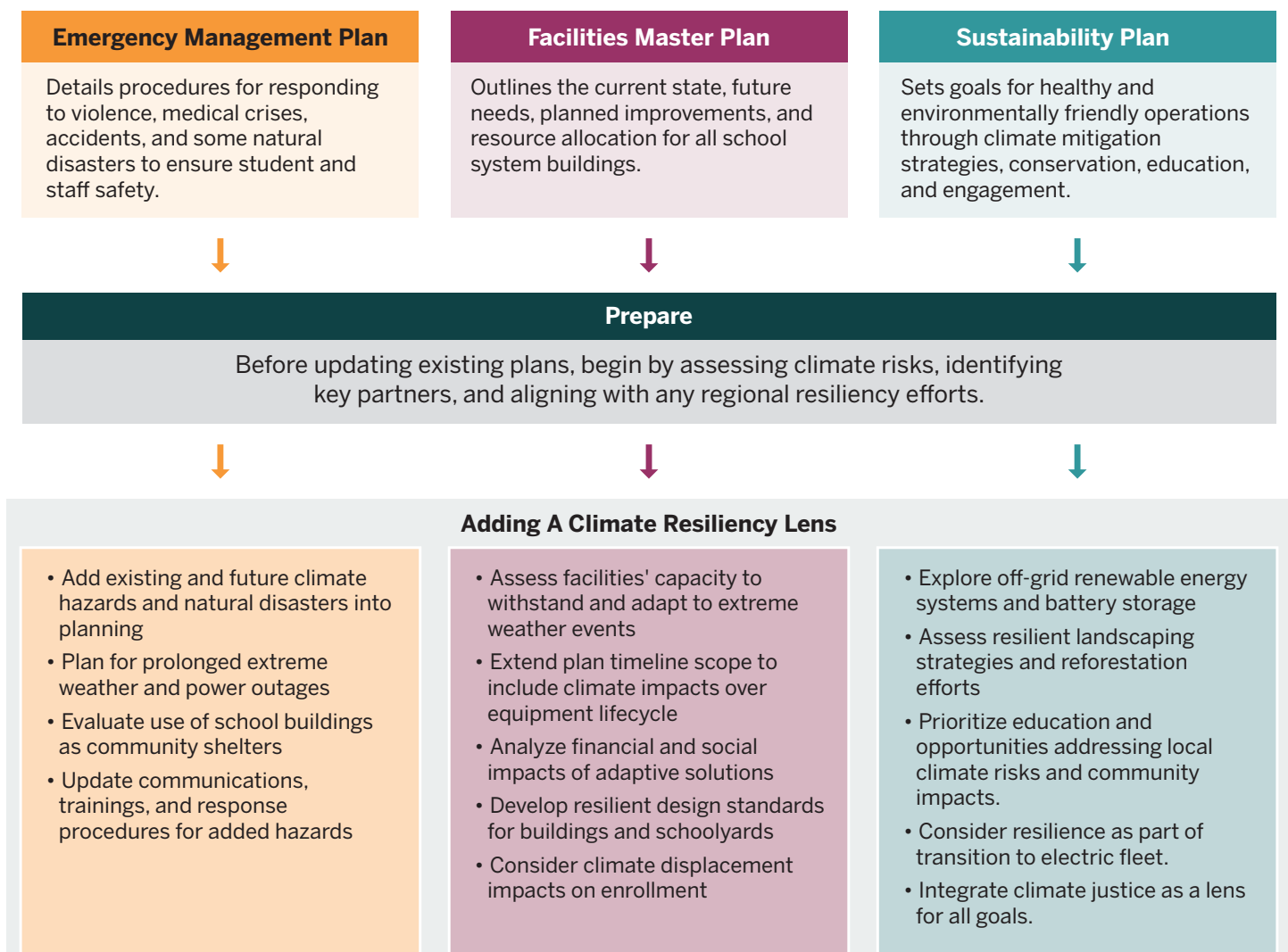
- **Streamlined emergency response:** Good climate resilience planning comes with better preparation and training, allowing leaders and staff to respond to emergencies efficiently and protecting human lives and infrastructure.
- **Reduced school closures:** Increasingly, schools are experiencing [student absences](#) connected to climate-related events. Making infrastructure climate adaptive so schools can “keep the lights on” is a top priority for school leaders.
- **Healthier schools:** [Preparing school buildings](#) to withstand extreme weather can also create healthier learning spaces. For example, upgrading ventilation systems to withstand wildfire smoke or envelope sealing to prevent leaks during storms improves long-term indoor environmental health.
- **Access to funding:** There’s [more funding](#) available than ever before to support community climate resiliency. Having climate risks already identified and infrastructure needs prioritized, especially in disadvantaged communities, will make it easier to pursue and secure funding that becomes available.

- **Cost avoidance and savings:** Resilient infrastructure maximizes energy efficiency and minimizes potential damage to equipment, schoolyards, and structures. [Studies](#) show that every \$1 spent on retrofits for resiliency can save \$4 in recovery and response costs.
- **Community support:** Schools often serve as emergency or [resilience hubs](#) for the local community. Resilience planning prepares schools and community support networks to streamline emergency response and ensure safe spaces for students and families.

Where does climate resilience fit into existing school planning?

Preparing for response to climate risks relies on and builds upon many planning processes school systems already have in place, including emergency management plans and master plans for long-range facilities. Looking at these existing plans with a climate resiliency lens brings additional focus on maintaining safe operations and protecting assets during extreme weather.

Integrating climate resiliency into school system planning



Key Considerations in Climate Resiliency Planning

The framework in this section uses the [U.S. Climate Resilience Toolkit](#) and enhances it with the unique needs of schools and school districts in mind.

1. Identify partners and stakeholders

- **Identify partners:** Work with local government, emergency response teams, universities, and service providers to coordinate proactive communication, risk assessment, infrastructure solutions, and potential funding partnerships.
- **Engage stakeholders:** Include a variety of school staff in your planning efforts. Facilities and operations staff will be critical in assessing preparedness, while teachers and principals can provide insight into the impacts of operational changes.

2. Assess risk and vulnerability

- **Determine your risk:** Using tools like [FEMA's National Risk Index](#), identify climate hazards and social vulnerability risk factors in your region. Engage partners to understand social vulnerabilities and unique neighborhood needs.
- **Consider impact:** Evaluate damage potential to school buildings and related risks to communications networks, community space use, transportation, outdoor and extracurricular activities, and mental health.

3. Evaluate solutions

- **Build your case:** Assess the cost of potential damage or loss from adverse events and long-term impacts of climate change so that the school system has a clear understanding of both the cost of action and the cost of inaction. Tools like ClimateFirst can help with this assessment.
- **Brainstorm solutions:** Based on the most critical climate hazards and vulnerabilities, develop a list of infrastructure, process, and policy needs to maintain safe operations and minimize asset damage.
- **Prioritize investments:** Evaluate upcoming capital projects for resilience opportunities and weigh short versus long-term investments based on cumulative benefits and cost. Center equity and the most vulnerable populations within planned investments.



Havre de Grace Middle and High Schools | Havre de Grace, MD | LEED Silver | Photo credit: © Sam Kittner/Kittner.com

Preparing for Specific Climate Risks

Through our work with school systems around the country, the Center for Green Schools has encountered smart solutions for many climate-related risks from experts and school staff at the leading edge. Though not exhaustive, below is a summary of solutions for some of the most common risks.

Wildfires

In wildfire events, the top priorities are to minimize the exposure of occupants to harmful contaminants in the air and to minimize the damage to property. Actions include:

- Upgrade to [MERV 13](#) filters in ventilation systems and use portable HEPA air cleaners.
- Weatherize buildings and repair windows and doors to minimize smoke infiltration.
- Explore wildfire-resistant, noncombustible [building materials](#)
- Create a [fire-resistant zone](#) around the perimeter of schools.
- Install indoor air quality sensors to [monitor fine particulate matter](#) (PM2.5) in a representative sample of spaces.
- Determine school closure and [outdoor activity parameters](#) during wildfire smoke events.

Case Study: Bellingham School District, WA

Located between Seattle and the Canadian border, Bellingham School District serves over 11,000 students across 28 facilities, including 22 schools. Since 2015, the community has been contending with increasing and more frequent wildfire events. The district applied for the EPA's Wildfire Smoke Preparedness in Community Buildings Grant Program, which they received in 2023. Their project focuses on wildfire smoke readiness assessment and planning, as well as indoor and outdoor air quality monitoring. An external consultant will assess the HVAC systems across all facilities and develop written preparedness plans for individual facilities that align with the national, state, and local departments of health. The district will also install indoor and outdoor sensors at all facilities to monitor wildfire smoke in real time. District staff, including the director of health services, will educate nurses, coaches, and administrator on how to interpret the data collected and how to implement the new protocols and procedures for wildfire events, such as smoke setpoints for canceling recess and afterschool activities and for sending students home.



Photo credit: Aleksandr Lesik, Adobe Stock.



Extreme temperatures

To manage extreme heat and cold, ensure that the building and grounds are protecting occupants as effectively as possible and that district operations respond to changing conditions. Actions include:

- Weatherize buildings and repair windows and doors to minimize outdoor air infiltration.
- [Reduce heat gain](#) across the building envelope with “cool” reflective roofing, increased roof insulation, and exterior window shade structures.
- Choose “cool” [pavements](#) with higher solar reflectivity values.
- Install [ceiling fans](#) and provide portable fans where existing ventilation is insufficient.
- Implement [retro-commissioning](#) on ventilation systems to identify under-performing or at-risk equipment.
- Increase shade in outdoor spaces by installing [shade structures](#) and [planting trees](#).
- Utilize drought-resistant, native landscaping and minimize irrigation.

Case study: Austin Independent School District, TX

In 2022, Austin voters approved a \$2.4 billion bond to fund infrastructure improvements for 25 schools in Austin Independent School District (AISD), including HVAC system upgrades districtwide and several full modernizations, each aiming to achieve [LEED certification](#) and Austin Energy Green Building (AEGB) certification. Adaptive design strategies are being employed to enhance energy efficiency and reduce heat gain through passive cooling, architectural shading, and increased shade coverage. AISD also manages an [urban forest](#) of 15,000 trees over 2200 acres of land across the city supporting cooling and continually works to identify tree-deficient areas for future planting.



Hurricanes, flooding, and storms

Preparing for water and wind damage involves assessing flood levels and mitigating potential damage to critical systems. Actions include:

- [Evaluate site modifications](#) to reduce exposure to flood waters, including fills, levees, and floodwalls. Improve [stormwater management systems](#) using bioswales, permeable pavement, and rainwater collection systems.
- Update [design flood elevation](#) levels at or above the historical high-water mark for new construction and major renovations.
- In spaces below flood levels, [replace water-sensitive materials](#) such as drywall with water-resistant materials like concrete and tile. Where possible, move critical HVAC and electrical equipment above flood levels.
- Ensure roofing materials are rated for wind and impact resistance and secure rooftop mechanical equipment with additional fasteners.
- [Identify evacuation routes](#) and pickup/drop-off locations away from flooding areas.
- Document building conditions pre-flood/storm for insurance purposes.

Case study: Milwaukee Public Schools, WI

Situated along lake Michigan, Milwaukee Public Schools (MPS) is no stranger to the impacts of climate change. A [Flood Health Vulnerability Assessment \(FHVA\)](#) showed that nearly 40% of Milwaukee's population lives in a neighborhood with high flood exposure, vulnerability, or both. Through a partnership with the non-profit Reflo, the district has received local grant funding from MMSD, City of Milwaukee Department of Public Works, Fund for Lake Michigan and others to design and build 31 [green schoolyards](#) to manage and filter stormwater onsite, provide engaging play spaces, and educate the community about stormwater resilience. The schoolyards replace hard, impervious surfaces with [green infrastructure](#) like rain barrels, rain gardens, additional trees, parking lots designed to temporarily hold storm water, spillways to protect buildings from water damage, and porous pavers to reduce flooding and pollution into the nearby lake and rivers.



Banneker Academic High School | Washington, D.C. | LEED Platinum | Photo credit: Juan Guarin

Power outages

The most critical goals in the event of a power outage are those associated with life safety, and continuity of school operations runs a close second. To ensure the school district is prepared, actions include:

- Install back-up on-site power generation, particularly solar PV arrays and battery storage that can operate off-grid. Ensure that all critical life safety equipment, like smoke and carbon-monoxide detectors, have back-up power and/or charged back-up batteries.
- Prepare for the impact to school food programs in the event of lost power, including transporting, storing, and serving meals while minimizing food waste.
- Verify backup communications methods with emergency responders, staff, and parents.

Case study: Santa Barbara Unified School District, CA

Santa Barbara Unified School District (SBUSD), located between the Pacific Coast and California's Santa Ynez Mountains, serves roughly 13,000 students across 18 schools. After being cut off from supply routes because of the Thomas Fire in 2017 and then a series of mudflows the following winter and spring, SBUSD started planning to sustain power during hazardous events. Initially, SBUSD used existing bond funds to study the feasibility of a district microgrid. After the initial study, a power purchase agreement (PPA) was structured to provide all of the funding for construction and installation. Construction took place over three years, resulting in eight schools powered by solar PV and six schools on microgrids (solar PV and connected battery storage equipment). These solar installations and microgrids can provide 70% of the district's overall electricity use and offset 93% of GHG emissions. The electricity stored in batteries is used daily to reduce costs, especially during peak electrical demand times, and it can also provide power to the schools' priority equipment and kitchens in an extended power outage. [Learn more here.](#)



Photo credit: Santa Barbara Unified School District

LEED v5 and Climate Resiliency

LEED, the green building rating system developed by USGBC, is widely recognized for its focus on building practices that protect the environment and human health, and resilience is integrated into the goals of the system. The latest LEED v5 rating system acknowledges the vital role buildings play in fostering resilience in the face of climate-related challenges and adverse events. LEED v5 includes credits directly focused on addressing climate resilience through conducting risk assessments, operational response planning, and occupant needs assessments. Learn more about resilience credits in [LEED v5](#).



Resources

Guides, plans, and toolkits:

[U.S. Climate Resiliency Toolkit](#): Framework for climate resiliency planning and federal resource database.

[Mitigation Ideas](#) (FEMA): Resource to identify and evaluate potential mitigation actions for reducing risk to natural hazards and disasters.

[Resilient Retrofits: Climate Upgrades for Existing Buildings](#) (Urban Land Institute): Retrofit design strategies by climate risk.

[Decision-Making Guide for School Closure](#) (San Mateo County Office of Education): Document to help determine school closures during emergencies and weather events.

[Sample School Emergency Operations Plan](#) (FEMA): Template plan for school systems.

[Climate Resilient California Schools](#) (Stanford University): Report with case-making facts and infrastructure solutions for school climate resilience planning.

Resources to find funding opportunities:

[U.S. Climate Resiliency Toolkit: Funding opportunities](#): Federal funding resources by climate risk.

[Federal Funding Programs for Resilience](#) (DOE): Database of financial assistance programs for state, local, and tribal governments' resilience activities.

[Extreme heat federal funding](#) (Heat.gov): Open funding opportunities for local governments to address extreme heat.

[Green Schoolyard Funding](#) (Children & Nature Network): Resources and case studies for securing funding for schoolyard upgrades.

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