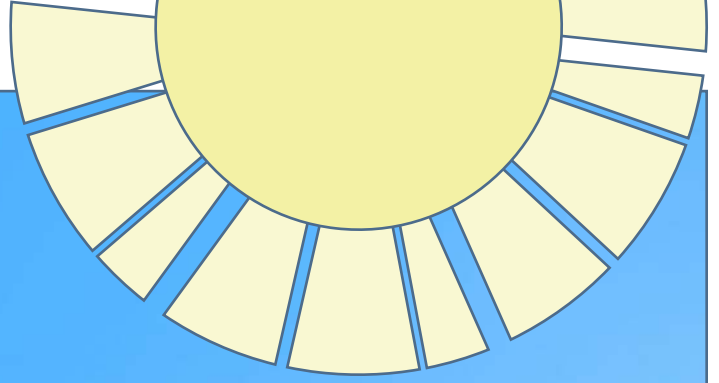


FOURTH EDITION
SEPTEMBER 2022

Brighter Future

A Study on Solar in U.S. K-12 Schools





Generation180 inspires and equips individuals to take action on clean energy. We envision a 180-degree shift in our energy sources – from fossil fuels to clean energy – driven by a 180-degree shift in people's perception of their role in making it happen – from apathy to agency, from despondency to determination, from hopeless to hopeful.



Generation180 is working toward a future in which all of our K-12 schools are completely powered by clean energy. We are leading a nationwide movement that will reduce energy costs, enhance student learning, and foster healthier communities for all. The campaign leverages the integral role that schools can play in encouraging clean energy action throughout their communities.

Our campaign works to advance the transition to clean energy in the following ways:

Mapping the Solar Schools Movement / Generation180 is tracking the fast-growing number of K-12 schools nationwide that tap into the power of the sun. Our national report, *Brighter Future: A Study on Solar in U.S. K-12 Schools*, analyzes trends and ranks states for solar adoption by schools. Our interactive online map helps you identify solar schools near you and learn more about their systems, including the installer, system size, and funding mechanism.

Building a Toolbox for Going Solar / Generation180 has developed a library of free resources to help schools flip the switch to solar energy. The *How-To Guide for Schools Going Solar* offers step-by-step advice for going solar and includes an introduction to solar finance. The *Solar Schools Campaign Toolkit* is an organizing guide for students, parents, teachers, and community members who want to catalyze change at their schools. The virtual *Help Desk* collects and organizes relevant resources, answers questions, and offers personalized support.

Empowering and Connecting Educational Leaders / To scale the clean energy movement nationwide, Generation180 is leveraging the knowledge and experience of schools that have led the way. Our Clean Energy School Leaders Network is a group of superintendents, school board members, operations and facilities directors, and others who want to advance clean energy adoption at schools and will share their knowledge and experience with peers.

Inspiring a Brighter Future / Generation180 shares success stories and best practices from school districts around the country that are using clean energy. Through reports, blogs, videos, presentations, and digital content, we help schools recognize the benefits of going solar, identify the opportunities, and share solutions and success stories.

Expanding Equitable Access to Solar / Generation180 focuses on identifying and expanding opportunities for all schools to benefit from clean energy, regardless of their size, geography, or resources. Through our state campaigns, we advocate for policies that remove financial barriers, and we target resources and assistance to the most disadvantaged, underserved, and diverse communities.

SolarforAllSchools.org

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COVER IMAGE: HOLABIRD ACADEMY, ONE OF THREE ZERO ENERGY SCHOOLS IN MD | BALTIMORE, MD
CREDIT: GRIMM+PARKER ARCHITECTS

Thanks to the entire Generation180 team, including staff, writers, and interns, for their support, dedication, and contribution to the census, report, and supporting materials. We recognize Kristen Keim and Tish Tablan for leading the project.

Leaders in the Movement

We would like to recognize the following individuals and organizations featured in the *Leaders in the Movement* section. Thank you for sharing your stories and perspectives with us and for helping us to retell them here.

Albuquerque Public Schools Tony Sparks

Denver Public Schools Monica Schultz

Grid Alternatives Jaiden Comesatnight, Meg McHugh, Adena Rice, Tim Willink

Miami-Dade County Public Schools Thomas Brulay, Michele Drucker

Minnesota Renewable Now Kristel Porter

Mount Desert Island Regional School System Matt Haney

Pittsburg Unified School District Matthew Belasco, Dr. Janet Schulze

Tucson Unified School District Barbara Hurley

University of Arizona Greg Barron-Gafford, Moses Thompson

Content Contributors

We would like to acknowledge the contributions of partner organizations that assisted with the content of this report.



Solar Energy Industries Association | SEIA.ORG

Shawn Rumery, Senior Director of Research at Solar Energy Industries Association, has been a contributor to the national census since the second edition of this report in 2017. We recognize his role in developing the census methodology and supporting Generation180's ongoing data collection and analysis.



New Buildings Institute | NEWBUILDINGS.ORG

Reilly Loveland, Senior Project Manager at New Buildings Institute, collaborated with us to write the *Beyond Solar to Carbon Neutral* section of this report and contributed content from New Building Institute's Getting to Zero program and *Decarbonization Guide for School Building Decision Makers*.



Sponsor

Generation180 recognizes FedEx for its generous support of the fourth edition of the *Brighter Future* report. Generation180 and FedEx have teamed up on a collaboration that will enable more U.S. schools to obtain solar power and benefit from cost savings, educational opportunities, and climate protection. We share a vision for inspiring others to act more sustainably and for increasing momentum toward a renewable and regenerative future for schools across the country.

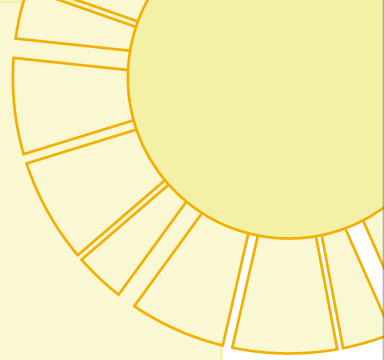


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On the Path to a Brighter Future

The development of this fourth edition of the *Brighter Future* report began in 2020, the dawn of a new era that we have been referring to as the “decisive decade.” The ten years leading up to 2030 will be the critical window during which we can still close the widening gap between our current global greenhouse gas emissions and where we need to be to keep the climate stable with a less than 1.5 degree Celsius rise in the average global temperature.

With nearly 55 million students attending approximately 130,000 K-12 schools, the education sector in the United States plays a significant role in addressing the climate crisis and in helping the country transition toward a key solution: a 100% clean energy future. Generation180 estimates that powering all U.S. K-12 schools with 100% solar would eliminate approximately 60 million metric tons of carbon dioxide emissions each year, the equivalent of closing down 16 coal-fired power plants.¹

Schools have a mission to prepare students for their bright futures. By switching to clean energy, schools can teach our youth and model for our communities how we will achieve a stable climate and a healthy planet together.

America’s schools are making meaningful progress in the switch to clean energy. Since the start of 2015, the cumulative installed capacity at K-12 schools has tripled, and the number of schools with solar has doubled. By the end of 2021, 9% of K-12 public schools and 19% of public school districts had installed solar energy systems. We still have a long way to go to reach the goal of 100% clean energy, and the speed and scale of the climate crisis calls for us to respond faster than ever.

Through our Solar for All Schools campaign, Generation180 is mapping a path forward for the education sector and providing the resources and support needed for K-12 schools to be part of the nationwide transition to clean energy. This report benchmarks the nation’s progress and lays out the opportunities to continue scaling solar at schools across the country. It analyzes the growth of solar adoption by schools and shares insights into how and why they are doing it. Most importantly, the report also identifies and shares the success stories of educational institutions that are leading the way in their communities and offering inspiration and ideas to help other schools find their path to clean energy.

TURN THE PAGE FOR A SUNNY OUTLOOK →

Key Findings

Nationwide Growth of Solar at Schools

Over 6 million students attend the 8,409 K-12 schools across the United States that are generating solar energy. Nearly one in ten (9%) K-12 public schools has adopted solar technology. Solar energy is being utilized by almost one in five (19%) public school districts.²

Since the start of 2015, the cumulative solar capacity at K-12 schools has **tripled** and the number of schools with solar has **doubled**

With more than 1,644 megawatts (MW) of cumulative installed capacity, our nation's schools now generate enough solar energy to power the electricity use of 300,000 homes each year.³ That is enough electricity to power all the households in cities the size of Washington, D.C., Boston, or Denver.⁴

Since the start of 2015, when the first edition of this report was published, the cumulative solar capacity at K-12 schools has tripled, and the number of schools with solar has doubled. The growth of solar adoption by U.S. K-12 schools has continued to grow over the past two years since the release of the third edition of this report. This fourth edition includes data on new solar projects completed by U.S. K-12 schools during the years 2020 and 2021, a period significantly impacted by school closures, district budget shortfalls, labor shortages, and supply chain disruptions. Despite these setbacks associated with the COVID-19 pandemic, the nation's K-12 public schools continued to make meaningful progress in the transition to solar. Overall, the rate of solar adoption by K-12 schools has kept pace with the growth of solar in the commercial sector.⁵ Between 2020 and 2021, the number of solar schools grew by 14% and the amount of solar installed at schools grew by 22%.

SEE FIG 1 AND FIG 2.

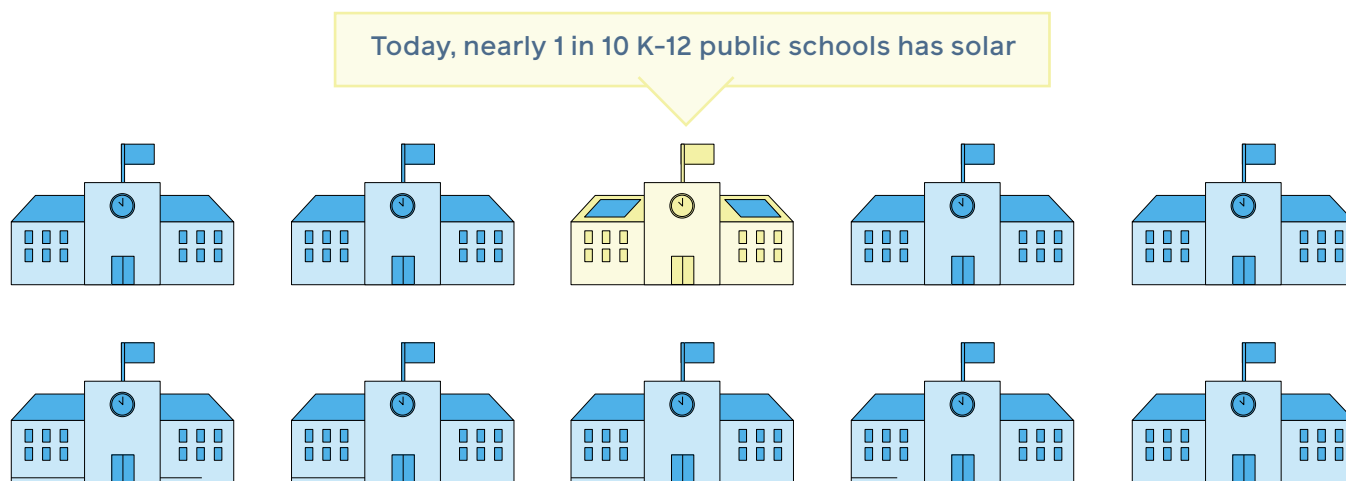


FIG 1
GROWTH IN CUMULATIVE SOLAR CAPACITY AT SCHOOLS

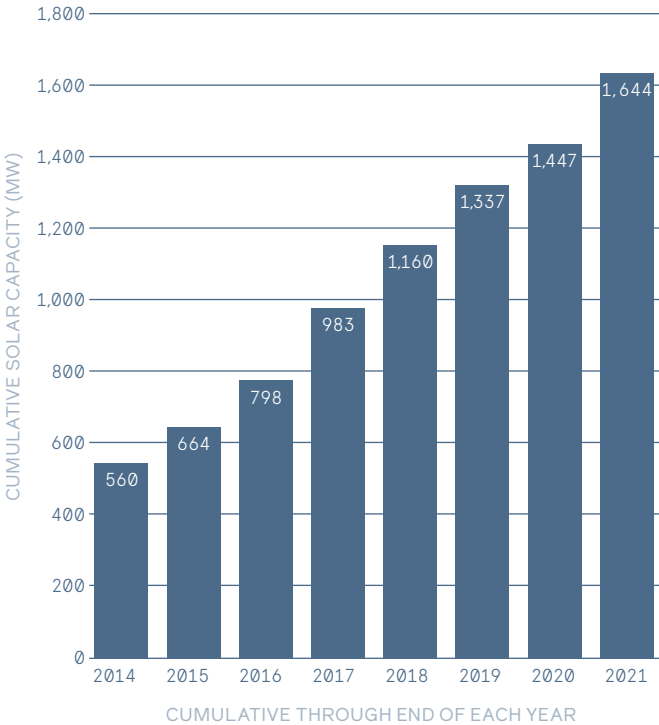
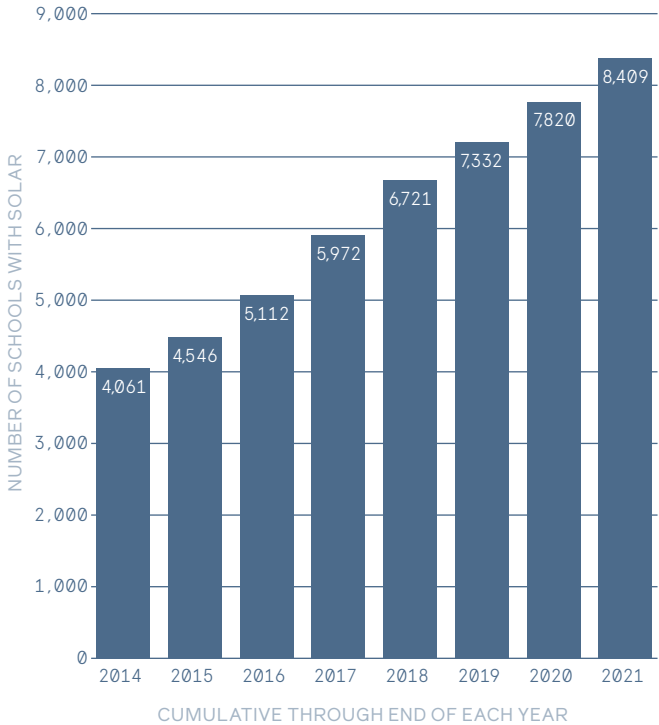


FIG 2
GROWTH IN NUMBER OF SOLAR SCHOOLS



The State of Solar Adoption by U.S. K-12 Schools

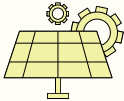
DATA ARE CUMULATIVE THROUGH END OF 2021

8,409

NUMBER OF SCHOOLS WITH SOLAR

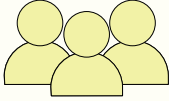
7%

PERCENTAGE OF ALL K-12 SCHOOLS WITH SOLAR



CUMULATIVE SOLAR CAPACITY
1,644 MEGAWATTS (MW)

AVERAGE SYSTEM SIZE PER SCHOOL
193 KILOWATTS (kW)



STUDENTS ATTENDING A SOLAR SCHOOL
6,118,335

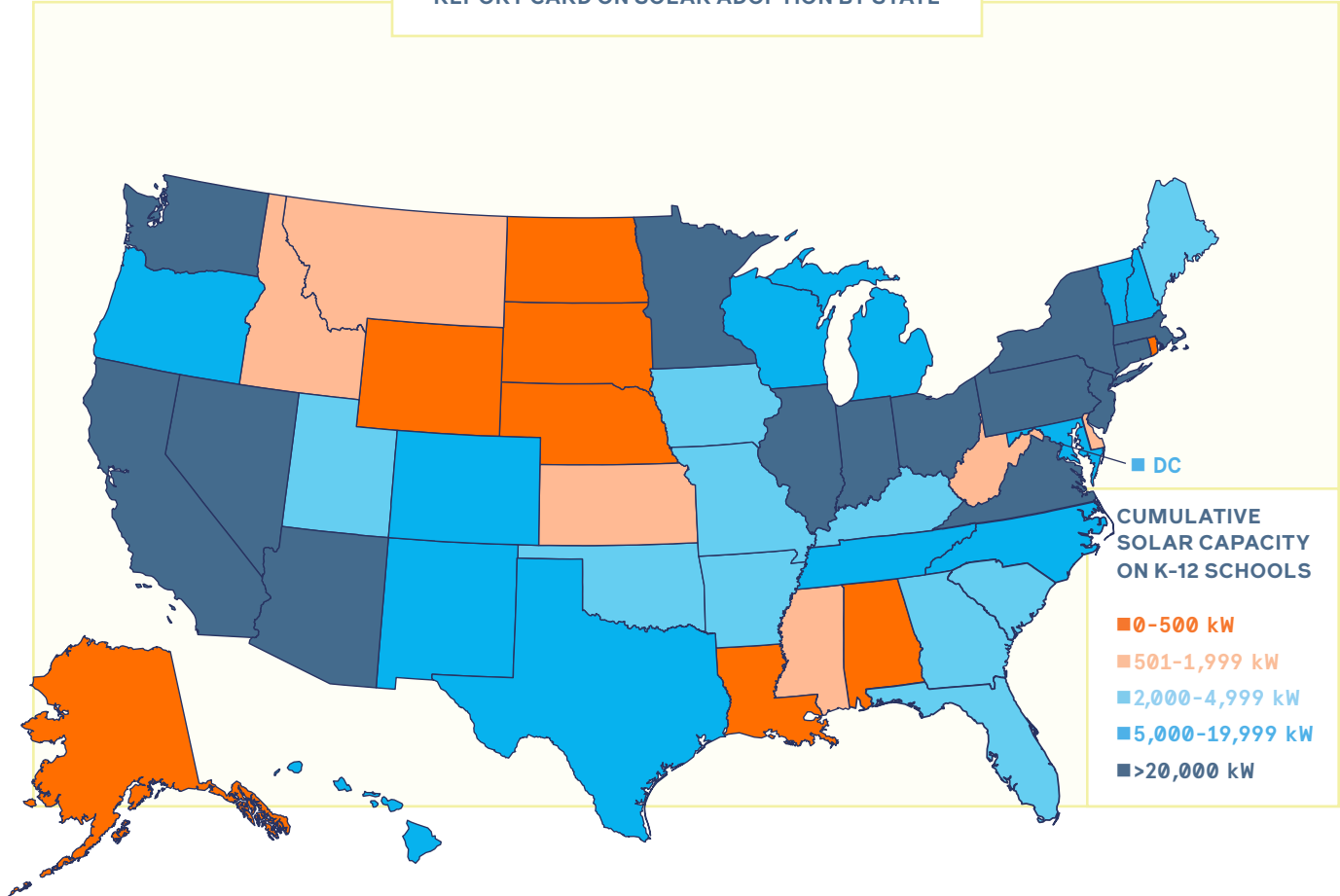
PERCENTAGE OF STUDENTS ATTENDING A SOLAR SCHOOL
12%



NUMBER OF SCHOOL DISTRICTS WITH SOLAR
2,538

PERCENTAGE OF SCHOOL DISTRICTS WITH SOLAR
19%

REPORT CARD ON SOLAR ADOPTION BY STATE



State Rankings for Cumulative Solar Capacity on K-12 Schools

TOP 10 STATES Head of the Class

STATE	TOTAL kW
CALIFORNIA	703,507
NEW JERSEY	194,388
ARIZONA	127,225
MASSACHUSETTS	77,629
ILLINOIS	56,237
INDIANA	50,809
CONNECTICUT	49,731
NEW YORK	44,975
VIRGINIA	43,845
WASHINGTON	29,415

TOP 5 STATES Most Improved

STATE	2-YEAR GROWTH (kW)
WASHINGTON	8.3X
WISCONSIN	3X
ILLINOIS	2.8X
ARKANSAS	2.7X
VIRGINIA	2X

Five states doubled their installed solar capacity during 2019-2021.

BOTTOM 10 STATES Needs Tutoring

STATE	TOTAL kW
SOUTH DAKOTA	0
NEBRASKA	19
ALABAMA	28
ALASKA	38
NORTH DAKOTA	80
WYOMING	230
RHODE ISLAND	366
LOUISIANA	390
IDAHO	601
MONTANA	747

SEE COMPLETE STATE RANKINGS IN APPENDIX B ON PAGE 37.

State Rankings for Distribution of Solar Schools

TOP 10 STATES

Number of Solar Schools

STATE	#
CALIFORNIA	2,819
NEW JERSEY	662
ILLINOIS	508
ARIZONA	411
MASSACHUSETTS	309
NEW YORK	281
FLORIDA	281
CONNECTICUT	279
WISCONSIN	225
MARYLAND	188

TOP 10 STATES

Percentage of Solar Schools

STATE	%
HAWAII	40%
DISTRICT OF COLUMBIA	30%
CONNECTICUT	28%
CALIFORNIA	27%
NEW JERSEY	26%
NEVADA	24%
VERMONT	20%
ARIZONA	18%
MASSACHUSETTS	17%
MARYLAND	13%

TOP 5 STATES

Most Improved

STATE	2-YEAR GROWTH (#)
CALIFORNIA	389
WISCONSIN	77
CONNECTICUT	74
VIRGINIA	65
ILLINOIS	53

Five states added over 50 new solar schools each during 2019-2021.

SEE COMPLETE STATE RANKINGS IN APPENDIX B ON PAGE 37.

State Adoption Trends

The states with the highest adoption of solar by schools have implemented a variety of policies that expand general access to solar. California and New Jersey have remained the top two states in both the number of solar schools and cumulative solar capacity on schools since 2014. New York, Massachusetts, and Arizona have consistently ranked among the top states for solar schools since 2014 as well. These top-performing states have instituted clean energy mandates, solar incentives, and access to third-party financing for solar installations. Four of the five leading states also have their own state-based solar renewable energy credits or renewable energy markets that create additional financial incentives for going solar.

Eight of the top ten states for cumulative solar capacity on schools and for the number of solar schools have state policies that support the statewide transition to clean energy, with goals for 100% carbon-free electricity and ambitious targets for economy-wide greenhouse gas reductions.⁶ Additionally, electricity prices in these states are high, which results in greater electric bill savings and a financial benefit for making the switch to solar.

States consistently at the bottom of the rankings in this report face utility barriers, poor net metering policies, and few options for solar financing. Nine of the bottom ten states for cumulative solar capacity either disallow or have unclear policies about third-party ownership of solar installations, which is the way most solar projects at schools are financed. These states also have some of the lowest electricity rates in the country, which minimizes the financial incentives for going solar. South Dakota remains the only state with zero solar schools.

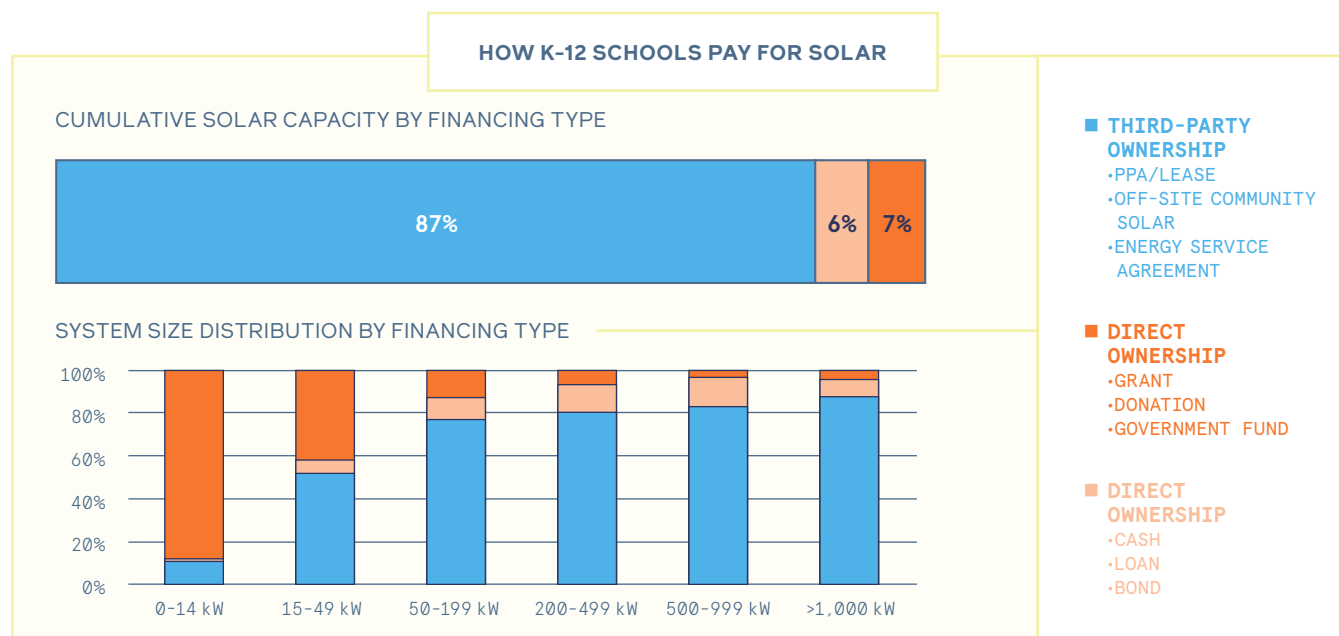
Funding the Switch to Solar

Third-Party Ownership Without Upfront Capital Costs

Access to funding is typically the biggest concern for school districts interested in making the switch to solar. According to available data on methods of financing, schools own and maintain only 13% of the solar capacity installed at K-12 schools (also known as direct ownership). Of those projects directly owned by schools, there was a nearly even split between the use of schools' own financial resources (such as cash, loans, or bonds) (6%) and the use of grants, donations, or government funds (7%) as the primary financing type.

Schools have predominantly relied on some form of third-party ownership, which typically requires little-to-no upfront costs and no maintenance of the array during the term of the agreement. For projects where financing data were available, **87% of cumulative solar capacity was financed primarily through third-party financing structures**, such as power purchase agreements (PPAs), leases, energy service agreements, and subscriptions to off-site community solar. This compares with a 79% share of third-party ownership at the end of 2019.

The reliance on third-party ownership is more evident when projects are broken out by solar capacity. For projects **over 50 kilowatts (kW) in capacity, 79% were funded primarily through third-party ownership**. In contrast, for projects under 50 kW in capacity, 80% were funded primarily with grants and donations. The use of grants and donations climbs to 89% for smaller systems and for demonstration projects under 15 kW in size. Grants and government funds do play an important role in larger projects as a secondary or tertiary funding source. For projects owned by third parties, these additional funds help bring down the costs for the solar developer and the customer.

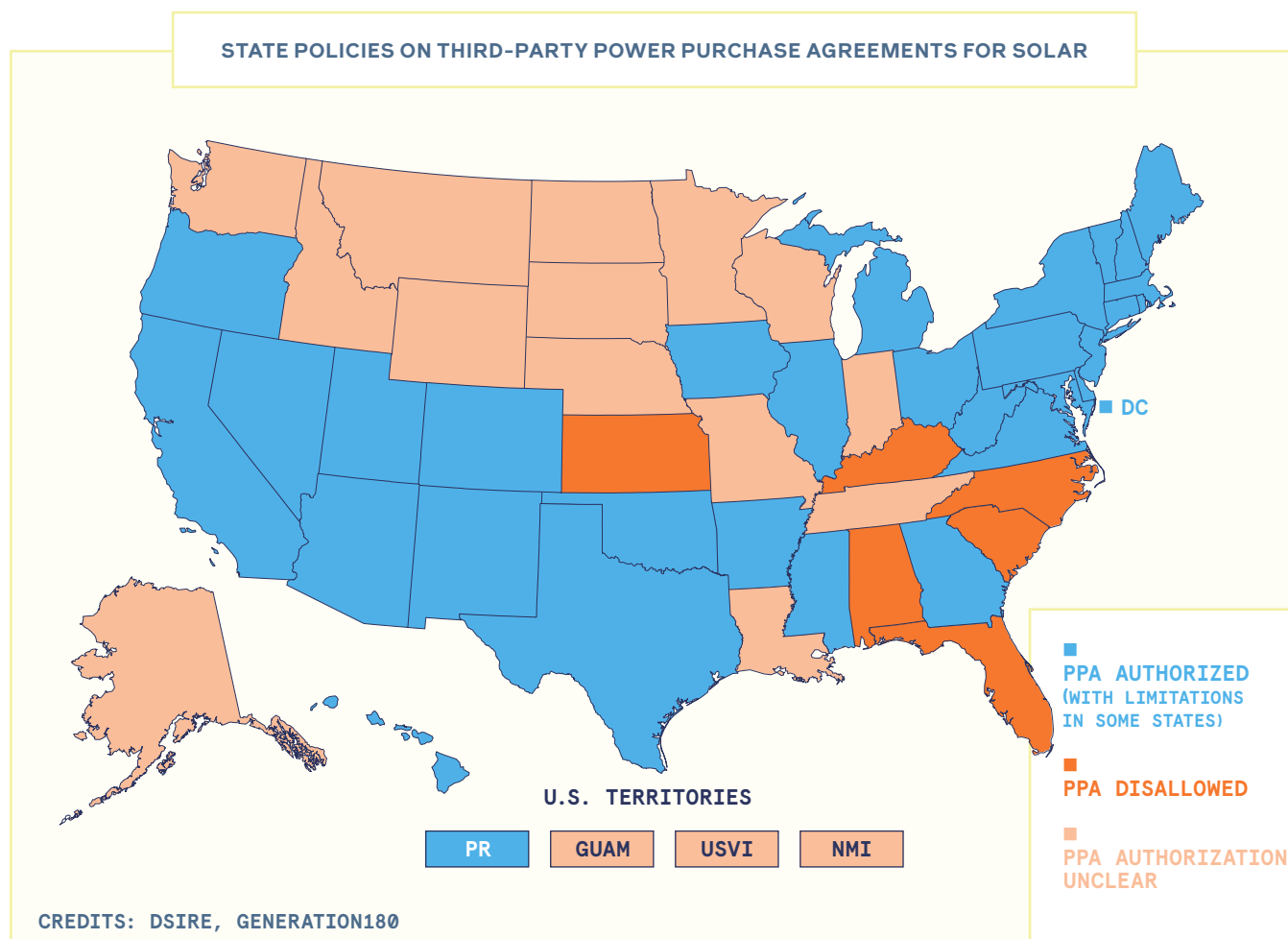


Impact of State Policy on Solar Adoption

The most common model that schools use to fund a solar energy system through third-party ownership is a power purchase agreement, or PPA. A PPA is a financing arrangement in which a solar developer funds, owns, and maintains the solar energy system for a set period, often ranging from 10 to 25 years. In a PPA, the school district pays for the energy produced by the solar system, usually at a lower rate than what the district previously paid to the utility for electricity.

With a PPA financing structure, schools typically see immediate energy savings that increase over time as the utility's electricity rates rise. The benefits of a PPA include receiving stable and low-cost solar-powered electricity with little-to-no upfront capital costs or ongoing maintenance.

Currently, 30 states plus Washington, D.C. and Puerto Rico have policies that allow third-party ownership of solar through PPAs. These states have an average of 16 times more cumulative solar capacity at K-12 schools than states that disallow PPAs or have unclear policies. **States that allow PPAs make up 98% of the cumulative solar capacity at all K-12 schools, while the remaining 20 states without PPAs contribute only 2%.**



New Federal Policies Supporting Solar Adoption

Significant federal funds for K-12 schools to invest in clean energy have not been available since the implementation of the American Recovery and Reinvestment Act of 2009. However, a new wave of federal funds is expected to be available for energy upgrades at public schools. In April 2022, the Biden-Harris Action Plan for Building Better School Infrastructure was announced, and the administration launched a \$500 million grant program for energy upgrades at public schools nationwide that was created by the Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law).⁷

The grant funding will be distributed through competitive grants offered by the U.S. Department of Energy over a five-year period until funds are expended. Eligible projects include energy efficiency improvements, renewable energy improvements, and the installation of infrastructure for alternative-fueled vehicles at public school facilities. Projects will be prioritized for funding if they are located at rural and high-poverty schools and if they leverage additional private, philanthropic, and public funding.

The Inflation Reduction Act, passed in August 2022, enabled a historic \$369 billion federal investment in energy security and climate change. The law allocated \$50 million in funding to help schools monitor and reduce their air pollution and greenhouse gas emissions; of this amount, \$37.5 million will be distributed to schools in low-income and disadvantaged communities. Schools in disadvantaged communities will also be eligible to apply for Environmental and Climate Justice Block Grants. The U.S. Environmental Protection Agency (EPA) will distribute \$3 billion for projects that include zero-emission resilient technologies and related infrastructure, climate resiliency, and workforce development tied to greenhouse gas reduction.

The Inflation Reduction Act also created a new financial incentive for schools to purchase and own solar energy and battery storage systems through direct ownership. Beginning in 2023, schools and other tax-exempt entities will be able to access the newly expanded Investment Tax Credit. For the next 10 years, schools can receive a direct payment of 30% of the cost of solar energy and battery storage projects. This incentive may be combined with the new grants created by these two laws to significantly reduce the upfront costs for schools that want to directly own their systems.



NEOCITY ACADEMY, FIRST ZERO-ENERGY K-12 SCHOOL IN FLORIDA | ORLANDO, FL | CREDIT: MARK HERBOTH

Equitable Access to Solar

Disadvantaged and under-resourced communities have often been left behind in the country's transition to clean energy. However, this report found that schools in low-income communities have been able to access solar technology and are contributing greatly to the growth of solar adoption by schools nationwide. Around half of the country's public schools with solar are eligible for the Title I Schoolwide Program, indicating that at least 40% of students are from low-income families.

Half of all public schools with solar serve low-income communities

The availability of funding options that lower the required upfront capital cost has been critical for these schools to be able to access clean energy. States that allow the use of third-party ownership have, on average, triple the number of Title I -eligible schools with solar than states with unclear policies or bans on third-party ownership. In states where access to third-party ownership is not an option, schools are more reliant on grants and donations to be able to fund clean energy projects.

Under-resourced communities stand to benefit the most from the energy cost savings and educational benefits that going solar can provide, and more can be done to increase access to clean energy for all schools. Over half of the country's public schools meet the low-income requirements of the Title I Schoolwide Program,⁹ yet only 9% of public schools have gone solar. There is still an accessibility gap to close with increased funding opportunities, assistance for schools with overburdened staff to navigate the process, and policies that give schools more financial incentives. The recently passed Bipartisan Infrastructure Law and the Inflation Reduction Act will move the country in the right direction by prioritizing low-income, rural, and environmental justice communities in its programs and funding for schools.

What is a Title I Eligible School?

Title I, Part A of the Elementary and Secondary Education Act provides financial assistance to schools and local education agencies that serve a population with a high percentage of students from low-income families.⁸ The National Center for Education Statistics categorizes all public schools based on their eligibility for two types of Title I programs:

Title I Targeted Assistance Program

Eligible schools must have at least 5% of the school-age population come from low-income families. The financial assistance is used to directly support the lowest-achieving students.

Title I Schoolwide Program

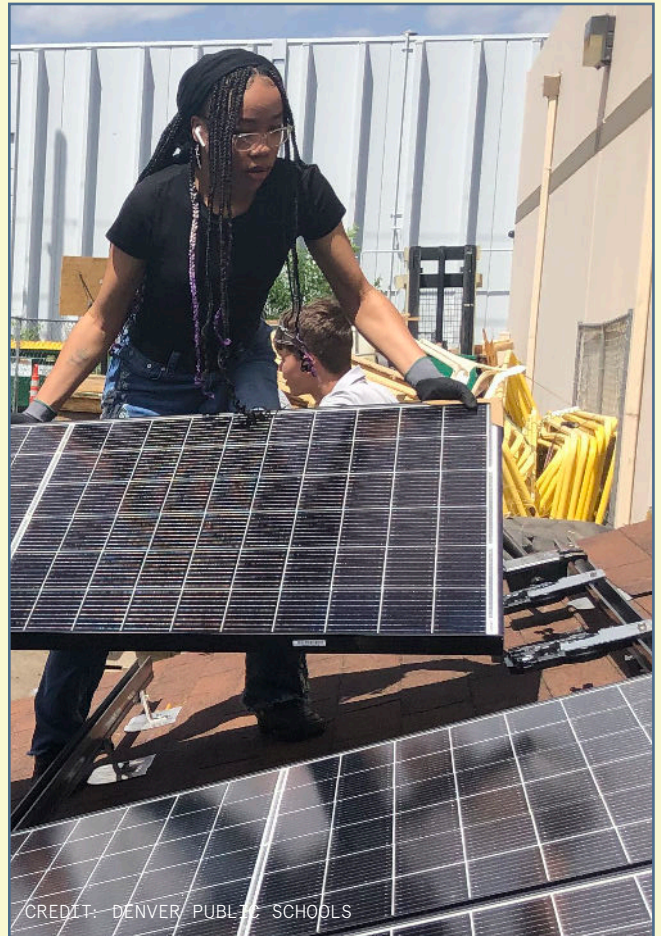
Eligible schools must have at least 40% of the school-age population come from low-income families. The financial assistance is used to support all students in meeting state academic standards.



TUCSON UNIFIED SCHOOL DISTRICT | CREDIT: UNIVERSITY OF ARIZONA



HEART BUTTE PUBLIC SCHOOLS
CREDIT: GRID ALTERNATIVES



CREDIT: DENVER PUBLIC SCHOOLS



Leaders in the Movement



Solar adoption by U.S. K-12 schools is growing rapidly and delivering a wealth of benefits to students, schools, and communities.

Listed here are trends that are driving schools to join the clean energy movement and success stories of schools that are leading the way. →

Success Stories

PAGE 16

Energy Resilience Solar with battery storage and microgrids provide backup power during grid disruptions and prevent interruptions to student learning. Schools with these technologies can serve as emergency community shelters during natural disasters and prolonged power outages. Learn how **Albuquerque Public Schools** became the state leader in the deployment of solar plus battery storage.

PAGE 18

Electrification School districts are transitioning away from fossil fuels by electrifying their buildings and vehicles and switching to clean energy power sources. Learn how **Pittsburg Unified School District** has taken a comprehensive approach to sustainability that includes building electrification, electric vehicles, solar, and battery storage.

PAGE 20

Community Solar Community solar expands access to the benefits of solar to renters and those who can't install their own solar array. Schools are increasingly participating in community solar projects as hosts and as subscribers. Learn how **Heart Butte Public Schools** and **Minneapolis Public Schools** are hosting community solar projects to help their neighbors lower their electricity bills.

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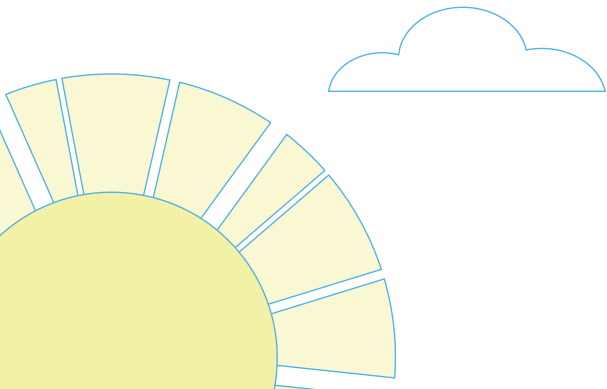
Workforce Development Solar photovoltaic installer is expected to be one of the country's fastest growing occupations over the next decade.¹⁰ High schools around the country are training their students with the skills and knowledge to start a career in this dynamic sector. Learn how **Denver Public Schools** developed a summer Renewable Energy Academy to give its students a head start on careers in clean energy.

PAGE 26

STEM Education Schools are using solar technology in creative ways to provide real-world, hands-on learning opportunities in science, technology, engineering, and math. Learn how **Tucson Unified School District** is cultivating future scientists with hands-on research in agrivoltaics.

PAGE 28

Community Activism Students, parents, and community members are speaking up and urging their schools to transition to clean energy and be part of the climate solution. Learn how students and community activists in **Miami-Dade County Public Schools** and **Mount Desert Island Region School System** led the charge for their schools to go solar.



Energy Resilience

ALBUQUERQUE PUBLIC SCHOOLS Leading the Charge Toward Resiliency

Albuquerque Public Schools (APS) serves nearly one-quarter of New Mexico’s public school students at 143 schools across a region spanning more than 1,200 square miles. The largest district in the state is costly to operate, and it initially turned to energy conservation and clean energy to reduce its burdensome utility bills. Now APS is at the forefront of clean energy deployment in the public school sector and boasts the most extensive battery storage system in New Mexico.

For the past decade, the APS Water and Energy Conservation Committee (WECC), which includes district leadership, municipal utility staff, and the state department of energy staff, has led the district to set and meet ambitious sustainability goals, such as reducing water and energy use by 20% over a 10-year period ending in the 2023–2024 school year. With WECC’s guidance, APS codified sustainability into school board policy and now requires that all new buildings are solar-ready, receive preliminary photovoltaic designs, and meet green building standards. The district’s pioneering efforts in sustainability now include a solar + battery storage project that will drastically reduce energy costs and provide resiliency during power disruptions.

This first-of-its-kind project is part of the Energy Storage for Social Equity Initiative sponsored by the U.S. Department of Energy and Sandia National Laboratories and is jointly supported by New Mexico Energy, Minerals, and Natural Resource Department, Clean Energy States Alliance, and Osceola Energy. The state’s largest high school, Atrisco Heritage Academy High School, was selected as the site for the solar plus battery storage project due to its hefty utility bills, which can exceed \$50,000 every month in the summer. More than half of Atrisco’s electricity bill comes from demand charges, which are based on the highest electricity use at any point during the month. The batteries can be used to discharge stored energy to the grid incrementally throughout the day to reduce those peaks (also known as peak shaving) to avoid demand charges and lower the electricity bill. The cost savings for this project are anticipated to be \$3.5 million over 25 years.



ALBUQUERQUE PUBLIC SCHOOLS
ALBUQUERQUE, NEW MEXICO

School District
84,000 students at 143 schools

Solar Installation
• 2.8 MW at 30 schools
• 850 kW rooftop array paired with battery storage at Atrisco Heritage Academy High School

Battery Storage Installation
• 720 kW Tesla Megapack 2 system
• Storage capacity of 2,884 kWh

Energy Offset
• ~16% of electricity consumption of the 30 solar schools
• ~4% of district’s electricity consumption

Cost Savings
\$3.5 million over 25 years

Financing
• \$750,000 in federal and state grants
• \$2,750,000 in district capital funds

Partners
U.S. Department of Energy, Sandia National Laboratories, New Mexico Energy, Minerals, and Natural Resources Department, Clean Energy States Alliance, Osceola Energy



CREDIT: ALBUQUERQUE PUBLIC SCHOOLS



ALBUQUERQUE PUBLIC SCHOOLS |
CREDIT: OSCEOLA ENERGY

APS broke ground on the solar plus battery storage project in October 2021. The fully installed system will include 2,200 rooftop solar panels and a Tesla Megapack 2 battery with an energy storage capacity of 2,884 kilowatt-hours (kWh). APS anticipates that the system will be operational by the end of 2022.

The next phase of the project is to evolve the battery system so it can be used for islanding – taking the building off the grid and using the battery to supply power for designated areas. The ability to keep school buildings operational when the grid goes down would ensure that students can stay in school for learning, meals, and other essential services. Atrisco serves a population where 14% of students live in households below the federal poverty line and nearly all students are eligible for free or reduced-price lunch. The campus has an on-site community health clinic and is often used as a community gathering space. A resilient school campus would provide numerous benefits to students and the community.

APS is currently working on an implementation plan and a cost analysis so when the time comes to enter this next phase, the district will be ready. The battery system would be designed to provide backup power to an area of campus that includes large spaces where people can congregate in an emergency or during a grid outage, such as the gym, library, and cafeteria. This project will be a pilot for rolling out similar projects at other district schools.

“At APS, we’re creating a culture within the district and the community that promotes and values sustainability,” said Anthony Sparks, APS Project Manager and WECC Coordinator. “As the largest district in the state, we want to set a good example and do groundbreaking work so smaller districts can implement similar projects and not be afraid to do so.”

“At APS, we’re creating a culture within the district and the community that promotes and values sustainability.”

ANTHONY SPARKS
APS PROJECT MANAGER
AND WECC COORDINATOR



Electrification

PITTSBURG UNIFIED SCHOOL DISTRICT District Leadership Paves the Way to Electrification



PITTSBURG UNIFIED SCHOOL DISTRICT
PITTSBURG, CALIFORNIA

School District
11,000 students at 14 schools

Solar Installation
3.49 MW capacity, 55 shade structures at 14 schools

Battery Storage Installations
1.6 MW (3.0 MWh) at 10 schools

Energy Offset

- 63% of district’s total energy consumption
- 90% of district’s electricity consumption

Cost Savings

- Solar: \$11 million over the life of the project
- Battery Storage: \$2.8 million over seven years

Financing

- Solar: Power purchase agreement and certificate of participation
- Battery Storage: \$715,000 from MCE Energy, \$1 million in infrastructure grants from utility PG&E

Pittsburg, California, located about 40 miles east of San Francisco, was historically known as Black Diamond, a nod to the nearby coal resources that supported the town’s economy. However, Pittsburg’s reliance on coal is shifting, and Pittsburg Unified School District (PUSD) is building a new reputation for the community as a leader in sustainability.

According to Superintendent Dr. Janet Shulze, PUSD’s success in transitioning to clean energy can be attributed to institutionalizing the district’s goals and commitments at the school board level. In 2018, green school operations and energy and environmental resource management were codified as board policies. These policies hold PUSD leadership and staff accountable for meeting clean energy and sustainability goals, ensure that sustainability remains a priority regardless of changes in leadership, and help maintain a culture that supports implementing innovative clean energy projects.

PUSD’s clean energy efforts took off in 2011 with solar installations at 12 district campuses and its support center. With 3.49 MW of solar online, PUSD generates 90% of its electricity consumption from the sun. The solar installations are helping PUSD avoid energy costs of over \$1 million per year, with lifetime cost savings of over \$11 million. The district is now designing a new building for Parkside Elementary School that will become its first zero-energy school.

Transitioning to an electric vehicle (EV) fleet is another component of PUSD’s clean energy commitment. When Matthew Belasco, Director of Maintenance, Operations, and Transportation, assumed leadership of PUSD’s transportation department in 2017, he developed a plan to electrify its fleet of vehicles and school buses. “When I watched the buses leave each day with big plumes of black smoke billowing out the back, it reminded me of seeing the same thing as a kid. I knew we could do better for our students. That really motivated me to electrify our fleet.”



PITTSBURG UNIFIED SCHOOL DISTRICT
CREDIT: SAGE ENERGY CONSULTING/NV5

Belasco secured funding for the first two electric school buses using a combination of grants and district money and leveraged PG&E’s pilot EV incentive program to cover costs for charging infrastructure. Currently, PUSD’s fleet includes four electric school buses and six EVs for student transportation and staff use. Belasco anticipates adding three more electric school buses in the fall of 2022. PUSD has also applied for grant funding to install 32 chargers at five schools to encourage staff to drive EVs. An additional 18 chargers at three more schools are expected to come online by the end of 2022.

Soon after Belasco began electrifying the fleet, he started to research battery storage. When he learned about how batteries can reduce energy costs by discharging power during peak load times and also provide backup power during grid outages, he was sold. “While we haven’t experienced any shutdowns due to grid failure, it can’t hurt to be over prepared. The ability to keep our schools open and running during a power failure ensures that there are no disruptions to teaching and learning.”

PUSD’s battery storage system is expected to be online in December 2022. The system will include 1.6 MW of a combination of two- and four-hour lithium batteries for a total of 3.0 megawatt-hours at 10 district campuses. As an early adopter, PUSD is able to take advantage of financial incentives offered through power delivery company MCE Energy and \$1 million in energy infrastructure grants from PG&E. Models show PUSD could save \$78,000 per year and an additional \$50,000-\$70,000 in incentives for the first five to seven years of operation.

PUSD’s districtwide commitment to sustainability is getting noticed. Several nearby school districts have visited to learn about its clean energy initiatives. In recent years, PUSD has been named a Green Ribbon School District with Gold Distinction by the California Department of Education and received leadership awards from Green California Schools and Community Colleges.

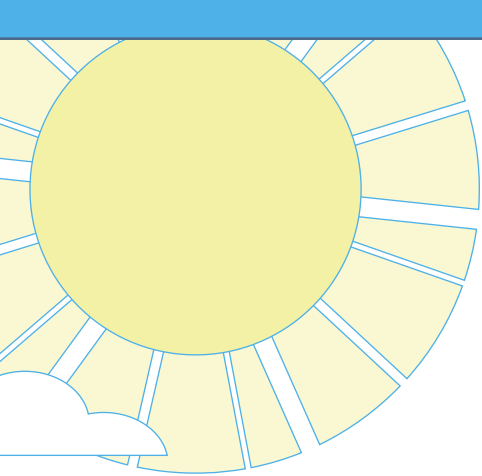
“My advice to other districts is to codify your sustainability practices and commitments as school board policy,” said Dr. Schulze. “Doing this gives staff the directive and encouragement to press forward and ensures these practices continue, regardless of changes in district leadership.”



PITTSBURG UNIFIED SCHOOL DISTRICT, CA
CREDIT: SAGE ENERGY CONSULTING/NV5

“The ability to keep our schools open and running during a power failure ensures that there are no disruptions to teaching and learning.”

MATTHEW BELASCO
PUSD DIRECTOR OF
MAINTENANCE, OPERATIONS,
AND TRANSPORTATION



Community Solar

HEART BUTTE PUBLIC SCHOOLS Solar for the Tribal Community

The local high school on the Blackfeet Indian Reservation, home to around 9,100 tribal members in Heart Butte, Montana, is the host of a community solar project that is serving the community by reducing energy costs. With almost 40% of the population living in poverty, more than twice the state average, families are struggling to pay their electricity bills. Heart Butte Public Schools teamed up with local utility Glacier Electric Cooperative and nonprofit GRID Alternatives to develop a solution that would help the school district and its neighbors save money. With grant funding provided by the Tribal Solar Accelerator Fund and Bonneville Environmental Foundation, the district installed a 160 kW community solar array at Heart Butte High School in July 2021.

Heart Butte High School is expected to save \$42,000 in electricity costs over 30 years. Households can subscribe, with no upfront costs, to the community solar program and anticipate savings of approximately \$200 per year. Glacier allows 20 community members to enroll per year and the program is fully subscribed. Moving forward, Glacier will rotate enrolled subscribers annually to spread the benefits to as many new households as possible. The program is expected to reduce electricity costs for the community by a total of \$120,000.

“We thought it was a good idea,” explained Mike Tatsey, Heart Butte Public Schools Superintendent. “But instead of just powering the school, we’re sending 75% of the electricity to the community. That’s because we’re all about the kids’ basic needs being met before they come in to learn. It’s putting [money back] into the pockets of kids and their families every month, and that’s a direct benefit to the people.”¹¹

This community solar project brought another important benefit to Heart Butte students and tribal members: workforce development. GRID employed community members to install the solar array and provided online and in-person training to develop those skills within the tribal community. GRID provided



HEART BUTTE PUBLIC SCHOOLS
HEART BUTTE, MONTANA

School District
177 students at 3 schools

Solar Installation
160 kW ground-mounted community solar garden

- Energy Distribution**
- 25% to Heart Butte Public Schools
 - 75% to community subscribers

- Cost Savings**
- Heart Butte Public Schools: \$42,000 over 30 years
 - Community subscribers: \$120,000 cumulative

- Financing**
- \$340,00 grant from Bonneville Environmental Foundation
 - \$120,000 grant from Tribal Solar Accelerator Fund
 - \$40,000 from Heart Butte Public Schools



HEART BUTTE PUBLIC SCHOOLS, MT | CREDIT: GRID ALTERNATIVES

hands-on training for Heart Butte High School students, exposing them to possible career paths in renewable energy and helping them acquire job skills. Trainees learned about solar systems, acquired the necessary skills to complete a solar installation, and got an opportunity to complete a roof or ground installation. The students received pay and benefits for their work as well as equipment they would need in the field.

One student, Jaiden Comesatnight, got involved with GRID's student training after learning about the Heart Butte Community Solar Project from his counselor and principal. He joined the project a few months after graduating high school and worked on the solar installation for about a month and a half. After his work on the project, GRID offered him a full-time job as a solar installer.

"My uncle has worked on wind turbines, but I'm the first in my family to work in the solar industry," said Jaiden. "One thing I enjoy most about my job is that I get to travel around the country, something many of my family members on the reservation haven't experienced before."



CREDIT: GRID ALTERNATIVES

"One thing I enjoy most about my job is that I get to travel around the country, something many of my family members on the reservation haven't experienced before."

JAIDEN COMESATNIGHT
SOLAR INSTALLER AT
GRID ALTERNATIVES

What is Community Solar?

Equitable access to solar power is growing through a practice called community solar, also known as shared solar or solar gardens. Community solar enables customers (or subscribers) to buy or rent part of an off-site solar system and receive credit on their energy bill for the electricity it produces. This arrangement allows people to enjoy the benefits of solar without having to install their own system, making solar accessible to those who rent or cannot afford to install solar.

MINNEAPOLIS PUBLIC SCHOOLS Bringing Energy Choice to the Whole Community

North Community High School in Minneapolis, Minnesota is the host site for an innovative community solar project that prioritizes climate justice, diversity, and equity. The high school serves a racially and economically diverse community, making it an ideal location to install a solar garden that provides community members an opportunity to access clean, cost-saving energy. Minneapolis Public Schools and the City of Minneapolis together benefit from 20% of the array’s electricity, and the remainder is allocated for the benefit of subscribers in the community.


The North Community High School Community Solar Garden is a collaborative project involving the school district, local government, and community partners. Two local Black-owned businesses, Renewable Energy Partners and Go Solar Construction, developed and installed the 365 kW solar garden, which went online in summer 2022. Nonprofit Minneapolis Climate Action partnered with Renewable Energy Partners to enroll families in the solar garden and administer subscriptions.

The solar garden is set up with low-income households in mind. Families who wouldn’t normally have access to solar are first in line for subscriptions. To increase accessibility, enrollment requires no credit checks or upfront costs. If subscribers want to save more on their electricity bill, they can choose to pay a one-time subscription fee. The solar garden has the capacity to power up to 70 homes, and to date 65 households have subscribed.

“Community solar gives people an opportunity to own their own solar array and participate in something collectively with their neighbors,” said Kristel Porter, executive director of Minnesota Renewable Now and a leader of community engagement efforts around the solar garden. “This is especially important for communities that often get left behind in so many ways. It’s empowering for them too – they finally have a say in something that directly impacts their lives.”



NORTH COMMUNITY HIGH SCHOOL | MINNEAPOLIS, MN | CREDIT: MINNESOTA RENEWABLE NOW



MINNEAPOLIS PUBLIC SCHOOLS
MINNEAPOLIS, MINNESOTA

School District
Over 31,598 students at 97 schools

Solar Installation
365 kW rooftop community solar garden at North Community High School

Energy Distribution

- 80% to community subscribers
- 10% to City of Minneapolis
- 10% to North Community High School

Cost Savings

- \$200 per year for community subscribers
- Up to \$720 per year for North Community High School

Financing
Third-party tax equity financing by US Bank, debt financing by Renewable Energy Partners

“Community solar gives people an opportunity to own their own solar array and participate in something collectively with their neighbors.”

KRISTEL PORTER
EXECUTIVE DIRECTOR
OF MINNESOTA RENEWABLE NOW



NORTH COMMUNITY HIGH SCHOOL | MINNEAPOLIS, MN
CREDIT: MINNESOTA RENEWABLE NOW



Spotlight on the Growth of Community Solar

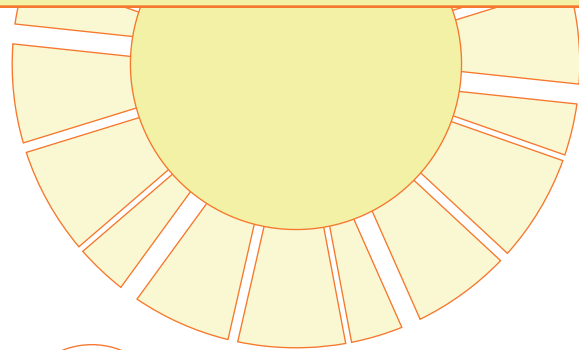
Deployment of community solar is growing nationwide, and 22 states plus Washington, D.C. have policies that support community solar.¹² Community solar now accounts for 5% of cumulative solar capacity at K-12 schools. Community solar arrangements lower the barrier to solar for schools that are unable to install on-site solar arrays due to cost, limited space, unsuitable roofs, or other reasons.



In Minnesota, over two dozen school districts are participating in community solar gardens, whether as subscribers purchasing shares of the arrays or as hosts leasing their land for the solar garden.



In Washington, subscriptions to off-site community shared solar farms account for **93%** of the cumulative solar capacity at K-12 schools. This shift toward community solar subscriptions contributed to a huge jump in statewide cumulative solar capacity over the past two years, moving Washington up in the state rankings from 27th place in 2020 to 10th place in 2022.



Workforce Development

DENVER PUBLIC SCHOOLS Lighting the Path to Solar Energy Careers



DENVER PUBLIC SCHOOLS DENVER, COLORADO

School District
90,000 students at 207 schools

Solar Installations
9 MW of ground-mounted and rooftop arrays at 50 schools

Financing
Power purchase agreement, energy performance contract, donation, sale of solar renewable energy credits

Greenhouse Gas Offset
Equivalent to taking 2,175 gas-powered vehicles off the road

“I knew about renewable energy, but I never really understood how it worked or why it was important. The Renewable Energy Academy opened my eyes and introduced me to careers I didn’t know existed,” explained Kimberly, a high school junior in Denver Public Schools (DPS).

Kimberly was one of 12 student participants in the inaugural Renewable Energy Academy, which teaches high school students about careers in renewable energy and gives them an opportunity to gain basic solar installation skills needed to get hired in the solar industry. The four-week summer academy, held in June 2022, was a joint effort between DPS and GRID Alternatives Colorado, a non-profit solar installer and industry trainer. Funding for the academy came from three-year grants that were awarded to DPS and GRID from Denver’s Climate Action, Sustainability, and Resiliency Department for the promotion of green career pathways.

During the program, students received eight hours of mentoring from engineering and construction professionals, who shared their different career paths and provided guidance on career exploration and setting long-term goals. They went on site tours at Jack’s Solar Garden to learn about using solar fields for agriculture and at the National Renewable Energy Laboratory to participate in renewable energy demonstrations, and attended a workshop focused on electrician apprenticeship opportunities. They also completed a capstone project to design a sustainable city, an activity that enabled students to apply what they learned in the academy and practice soft skills like teamwork and communication that will serve them in the workplace.

A key feature of the Renewable Energy Academy was the opportunity for students to participate in GRID’s solar installation basic training (IBT Lab Lite) during the middle two weeks of the program. This 40-hour high school course taught construction basics, electricity fundamentals, solar system design



RENEWABLE ENERGY ACADEMY | DENVER, CO | CREDIT: DENVER PUBLIC SCHOOLS

and components, and 3D modeling, mostly through hands-on applications. Students learned how to use common hand and power tools, completed a solar installation on a mock ground-based roof array, wired a small, off-grid solar system, and engaged in labs to measure solar panel output. They also met with solar industry professionals who discussed their careers and the different career pathways available in solar.

After completing the IBT Lab Lite course, students received a certificate from GRID that demonstrates they have acquired the skills necessary for solar installation. This entry-level, industry-vetted training will give these high school students a head start in the solar industry and prepare them for internships and the next level of training required to enter the workforce. Once students turn 18, they can build on their high school training and participate in GRID's adult solar training program. GRID also has an agreement with local solar industry partners who will recognize the certificate and consider those students for solar installation jobs at their companies.

All 12 students completed the IBT Lab Lite course, and 11 students completed the entire Renewable Energy Academy. After a successful first year, DPS and GRID look forward to offering the academy again next summer.

As for Kimberly, she plans to use her certificate to get a job in solar installation after high school. She wants to save money for college and is thinking about pursuing a career in solar design and installation or electrical engineering. "I'm grateful for the opportunity to attend the Renewable Energy Academy," she said. "I learned so much and had a lot of fun, too!"



CREDIT: GRID ALTERNATIVES

"The Renewable Energy Academy opened my eyes and introduced me to careers I didn't know existed."

KIMBERLY
STUDENT IN DENVER
PUBLIC SCHOOLS

STEM Education

TUCSON UNIFIED SCHOOL DISTRICT Cultivating Tomorrow’s Scientists Through Agrivoltaics

Several years ago, a group of students in Barbara Hurley’s environmental science class at Rincon High School in Tucson Unified School District (TUSD) began exploring real-world questions in their school’s agrivoltaics garden. One question they wanted to answer: could they successfully plant carrots, usually grown in cooler temperatures, in the heat of late summer when shaded under a solar panel canopy? The students’ curiosity and hard work paid off when they harvested a healthy crop of carrots in late fall and proved that the cooler, wetter microclimate created under the solar panels could change the seasonality of plant lifecycles.

Ms. Hurley’s students have a unique opportunity to conduct college-level research and make scientific discoveries about agrivoltaics, thanks to a collaboration between TUSD and the University of Arizona’s (UA) Community and School Garden Workshop. This partnership began in 2009 when UA was seeking internship opportunities to expand its agrivoltaics research. At the same time, TUSD was looking for ways to enrich student learning. The partnership proved to be an ideal pairing and a win-win for the university and the school district.

“Every year, I get students with a range of abilities, including those who think they can’t do science,” said Ms. Hurley. “By the end of the year, most students realize that they can and are way better at it than they thought they were.”

In Ms. Hurley’s class, students can often be found outdoors engaging in hands-on, real-world science and making important discoveries about the world they live in. Students pick the research topic, design and conduct the project, document their observations, and share their findings in a poster presentation. In addition to studying changes in seasonality, students have measured and compared temperatures of the garden’s solar arrays versus those over the parking lot, how the shape of solar panels can affect what you plant and where, and whether rain-water collected from solar panels is better for watering plants.



TUCSON UNIFIED SCHOOL DISTRICT TUCSON, ARIZONA

School District

- 47,200 students at 89 schools
- Third largest school district in Arizona

Solar Installation

- 23.8 MW of solar shade canopies at 80 schools
- Largest K-12 solar producer in Arizona

Energy Offset

47% of district’s annual electricity use

Cost Savings

- \$8.3 million since 2013
- \$43 million over 20 years

Financing

20-year third-party solar services agreement with no upfront costs (SSA)



RINCON HIGH SCHOOL | TUCSON, AZ | CREDIT: UNIVERSITY OF ARIZONA

TUSD is home to two agrivoltaics gardens, one on the shared campus of Rincon High School and University High School and the second at Manzo Elementary School. Both gardens are making science accessible to students, giving them opportunities to engage in outdoor learning and see answers come to life through hands-on research.

“Many aspects of our agrivoltaics work at UA fall in that sweet spot of being interesting and something that students can help us conduct,” explained Greg Barron-Gafford, associate director of the UA Community and School Garden Workshop. “This collaboration allows us to crowdsource our science with an able, creative, and excited team of kids!”

At Manzo Elementary School, students use the agrivoltaics garden as an outdoor classroom where they are encouraged to think like scientists – to make observations, ask questions, and test things. On any given day, you can find students out in the garden taking measurements and tracking daily patterns for things such as soil moisture, temperature, relative humidity, incoming light, and wind speed. The young student scientists share their enthusiasm by leading tours of the school’s agrivoltaics garden and showing the adults how to take measurements.

“Gardens have a way of developing how a student feels and sees themselves,” said Greg Barron-Gafford. “Working in the garden feeds their natural curiosity and helps them develop self-confidence and an appreciation for their abilities to engage in science.”

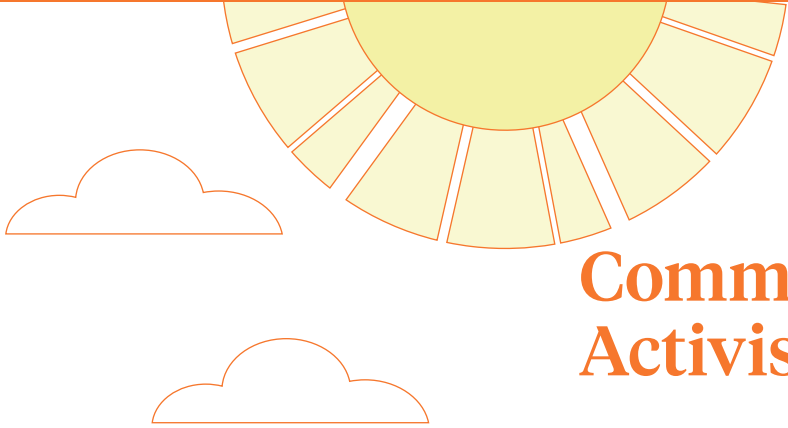
RINCON HIGH SCHOOL | TUCSON, AZ
CREDIT: UNIVERSITY OF ARIZONA

What is Agrivoltaics?

Agrivoltaics is the practice of using land for the mutually beneficial use of solar energy and agricultural production. Solar panels provide shade for plants to grow more efficiently with less water. The cooler and wetter microclimate created by the plants helps the solar panels cool down and operate more efficiently. Another example of agrivoltaics is raising sheep or llamas in a solar field, where the grazing animals benefit from the shade and help to naturally maintain the grass.

“Gardens have a way of developing how a student feels and sees themselves.”

GREG BARRON-GAFFORD
ASSOCIATE DIRECTOR OF
THE UA COMMUNITY AND
SCHOOL GARDEN WORKSHOP



Community Activism


MIAMI-DADE COUNTY PUBLIC SCHOOLS Miami Students and Parents Spark Progress Toward 100% Clean Energy

The harmful effects of climate change are already a daily reality in Miami, Florida, a city that grapples with having the country’s highest risk for hurricanes¹³ and sea-level rise. In 2019, a group of students and parents in Miami-Dade County Public Schools who were deeply concerned about climate change decided to step up to make sure their school, district, and state were taking serious action to protect their futures.

As a ninth grader, Thomas Brulay joined the Green Champions at his high school, Maritime and Science Technology (MAST) Academy. The student-led group is working toward a goal of making their school the first zero-energy and zero-waste school in Florida. With support from parent Michele Drucker, a leader of the school’s Parent Teacher Student Association, the Green Champions made huge strides toward this goal. The students secured a \$40,000 grant from the Village of Key Biscayne to install a 26 kW solar array on the school’s PE field.

While they were making progress at their own school, they recognized that they needed to address the climate impacts of the entire district. As the fourth largest district in the country with 522 schools and over 350,000 students, Miami-Dade County Public Schools has a sizeable footprint. The district spends \$65 million per year on electricity, which is predominantly fueled by methane gas. With an ambitious vision to get their district to 100% clean energy, Michele, Thomas, and other climate advocates began working on plans to transform district policy and state legislation in support of their goal.

As Environmental Chair for the Miami-Dade County Council Parent Teacher Association (PTA), Michele drafted and introduced a resolution that called on the district to take urgent climate action and commit to 100% clean energy by 2030. In March 2021, 200 people attended a virtual meeting to show their support, and the PTA voted unanimously in favor of the groundbreaking resolution.



MIAMI-DADE COUNTY PUBLIC SCHOOLS
MIAMI, FLORIDA

School District

- 340,000+ students at 522 schools
- Fourth largest school district in the United States

Solar Installations
161 kW at 18 schools

Energy Offset
< 1% of district’s electricity consumption

Financing
Grants and donations

Clean Energy Commitment
100% clean energy by 2030 for all buildings, vehicles, and operations



With the PTA's endorsement and a groundswell of support from the community for climate action, the resolution was presented to the Miami-Dade County Public Schools School Board to officially adopt the 100% clean energy goal. At the April 21, 2021 school board meeting, Thomas was one of several students to speak in favor of the resolution. He told the board members: "You now have an opportunity to show tremendous leadership by becoming the first school district in the South to make such a bold commitment. A goal of 100% [clean energy] signals to students like me that you truly care about our future." The school board unanimously passed the resolution, committing to a goal of 100% clean energy by 2030.

Right after the resolution passed, a bill was introduced in the state legislature that would enable schools, municipalities, and tax-exempt nonprofit organizations to go solar with no upfront costs and make the transition to 100% clean energy affordable for the district. The Green Champions encouraged their school community and school board members to speak to their legislators about supporting the bill. Thomas started a petition and secured over 1,200 signatures in favor of the legislation. Michele wrote op-eds to newspapers and participated in advocacy events to garner public and legislator support. Unfortunately, the bill did not pass.

During the 2021–2022 school year, Michele served as vice chair of the district's Clean Energy 2030 Task Force, which was commissioned by the school board to review current district sustainability measures and issue a report with an implementation plan and recommendations for moving forward. Based on the task force's recommendations, the district is hiring its first Sustainability Director to lead the charge in achieving 100% clean energy.

Thomas graduated from MAST Academy in 2022 but remains firmly committed to clean energy advocacy. During his senior year, he continued to work toward getting his school to zero energy, meeting with solar developers and school board members about a plan for solar leasing and energy retrofits.

"What makes me the proudest is the amount of awareness on climate change and clean and renewable energy that now exists among students, parents, teachers, faculty, and board members in my community due to our advocacy and community work," said Thomas. "Even school district leaders have realized that this issue is of great importance and are working hard to get our schools to become 100% net zero by 2030."



MICHELE DRUCKER, THOMAS BRULAY,
MARCEL BORGES, JAQUELINA HENRIQUEZ-
REYES | CREDIT: MICHELE DRUCKER

**"A goal of 100%
[clean energy]
signals to students
like me that you
truly care about
our future."**

THOMAS BRULAY
STUDENT AT MAST ACADEMY

MOUNT DESERT ISLAND REGIONAL SCHOOL SYSTEM
Student Action Leads to First
100% Solar-Powered School in Maine

At Mount Desert Island High School (MDIHS) in Bar Harbor, Maine, a group of passionate students is driving clean energy and climate change initiatives. In 2016, a high school senior research project found that the school roof could hold enough solar panels to power MDIHS’s electricity needs. With support from local nonprofit A Climate to Thrive, the student project became a plan supported by principal Matt Haney to make MDIHS the first school in Maine to be 100% powered by solar.

The student-led ECO (Environmental Concerns Organization) Team played a significant role in the solar project. Students helped review bids from solar installers and made recommendations on the selected proposal. Their efforts paid off in the fall of 2019 when MDIHS’s solar array went online, reducing the school’s carbon emissions by 810,000 pounds of carbon dioxide per year. ECO Team students educated their peers about the project’s benefits and held a school assembly to celebrate the new solar array. In 2020, MDIHS was one of two Maine schools recognized as a U.S. Department of Education Green Ribbon School.

Following the solar project, the ECO Team created Project Legacy, an initiative to expand on what they started and bring clean energy to their community and other Maine schools. Through Project Legacy, students are involved in obtaining a commitment from the school board to make the district carbon neutral by 2030, integrating climate change and renewable energy topics across the curriculum, and studying impacts of climate change on diverse communities.



MOUNT DESERT ISLAND REGIONAL SCHOOL SYSTEM
BAR HARBOR, MAINE

School District
1,400 students at 9 schools

Solar Installation
425 kW rooftop array (1,450 PV panels) at Mount Desert Island High School

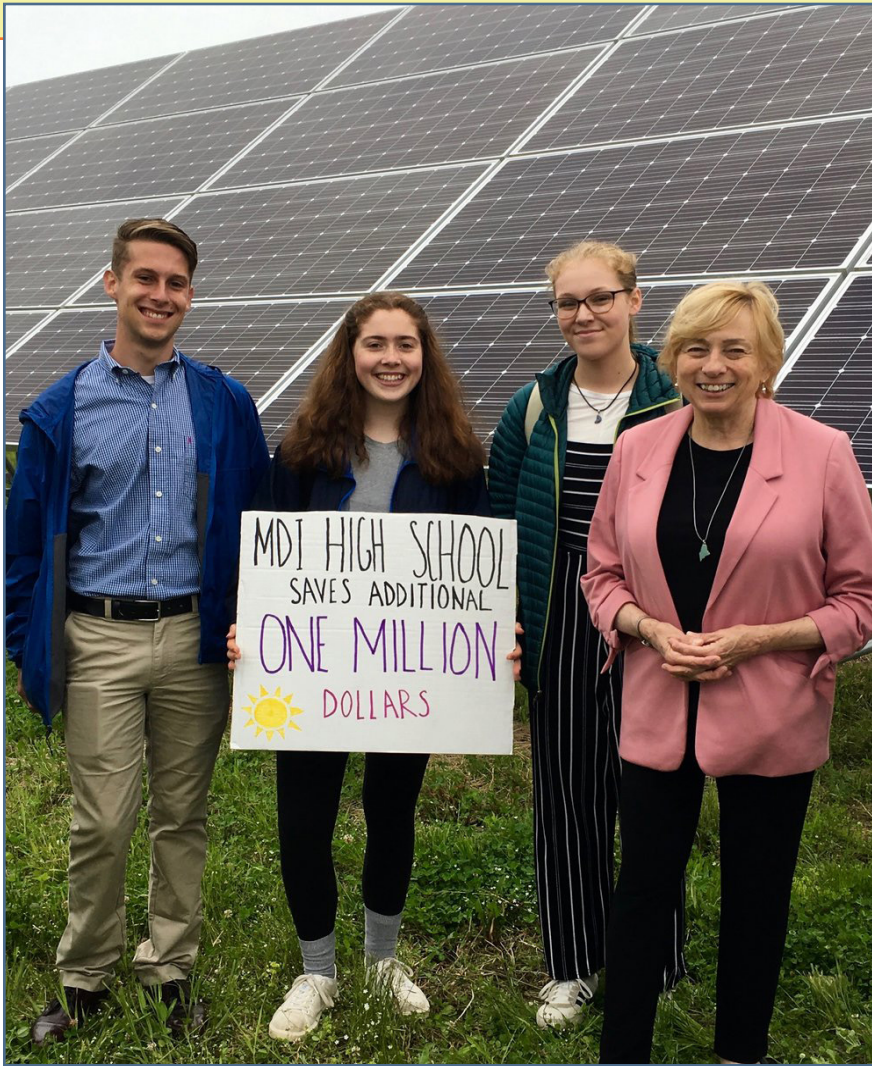
Energy Offset
100% of high school’s annual electricity consumption

Cost Savings
\$1,460,000 over 25 years

- Financing**
- Power purchase agreement with Sundog Solar at no upfront cost
 - In 2025, array will be purchased by district at 50% of original cost



MOUNT DESERT ISLAND HIGH SCHOOL | BAR HARBOR, ME | CREDIT: SUNDOG SOLAR



MOUNT DESERT ISLAND HIGH SCHOOL | BAR HARBOR, ME | CREDIT: A CLIMATE TO THRIVE

The ECO Team’s clean energy advocacy is having a ripple effect in the community. Sparked by MDIHS’s solar project and student-led publicity efforts, two large community solar farms were installed on Mount Desert Island. Several students wrote a white paper explaining how MDIHS went solar to provide a road map for others to follow, and several schools around Maine have since committed to solar projects. The ECO Team is also inspiring long-term change by building trust in the community. Recently, ECO Team students secured commitments from two town councils to create climate task forces that will address issues raised by students.

Principal Haney is proud of what his students have accomplished. “Making the transition to clean energy in our schools and communities is more likely to happen when students can advocate with decision-makers beyond the school,” he said. “Our community believes in and trusts our students. There’s more power in their words than in mine.”

“Making the transition to clean energy in our schools and communities is more likely to happen when students can advocate with decision-makers beyond the school. Our community believes in and trusts our students.”

MATT HANEY
MDIHS PRINCIPAL

Going Beyond Solar to Carbon Neutral

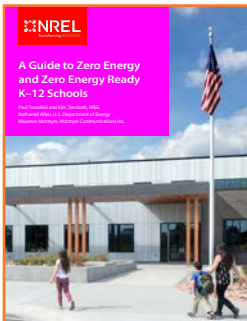
The momentum of schools switching to clean energy is building, and the education sector's impact on climate change is growing. The 1,644 MW of solar installed by U.S. K-12 schools generates enough clean energy to supply the electricity needs of 300,000 homes per year. Schools with solar are now eliminating 1.56 million metric tons of carbon dioxide emissions per year, but that is only a fraction of the estimated 60 million metric tons of carbon dioxide emitted annually by our country's schools.

Schools are beginning to plan beyond going solar and are mapping out next steps toward becoming carbon neutral. Schools and school districts are taking a variety of steps to move toward carbon neutrality, some of which are listed below.

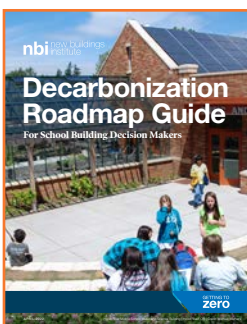
RESOURCES FOR GOING BEYOND SOLAR



A Guide to Zero Energy and Zero Energy Ready K-12 Schools



Decarbonization Roadmap Guide



Zero-Energy Buildings

The education sector is a market leader in developing zero-energy buildings, which are energy-efficient buildings that generate at least as much on-site renewable energy as they consume. According to nonprofit National Buildings Institute, there are currently 241 zero-energy educational buildings in the country, making up more than one-third of all zero-energy buildings in the United States.¹⁴

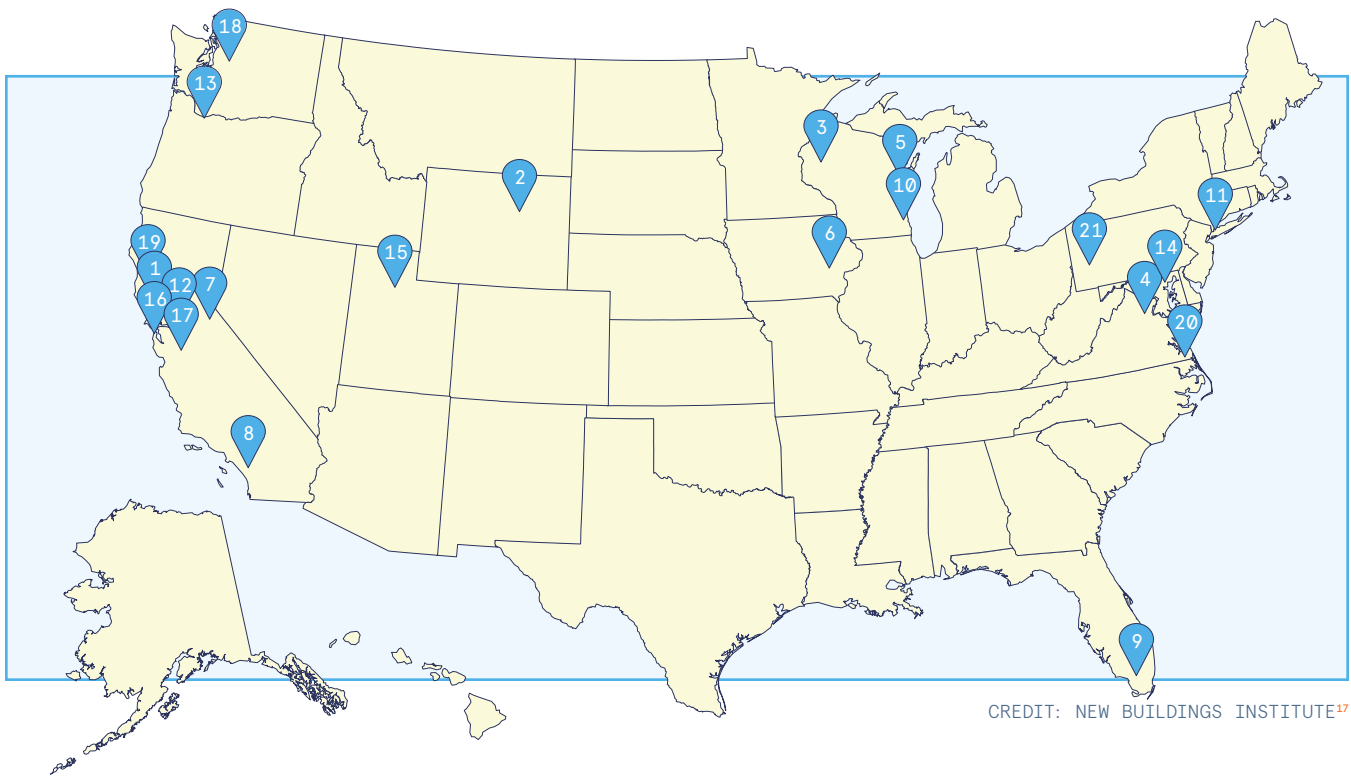
Carbon-Neutral Buildings

Like a zero-energy building, a carbon-neutral building will also offset all the electricity consumed with on-site renewable energy. In addition, a carbon-neutral building must be all-electric and eliminate on-site fossil fuel combustion, which is often used for space heating, hot water heating, and cooking in schools.¹⁵

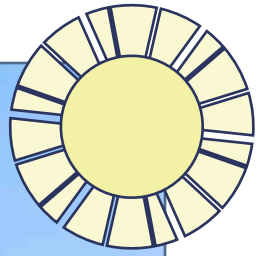
Carbon-Neutral School Districts

School districts are getting on the path to carbon neutrality by stating their intentions and setting goals for individual buildings and for their entire building portfolio. These goals can incorporate energy-use intensity targets, reductions in greenhouse gas emissions, zero-energy or carbon-neutral construction practices, and indoor air quality standards. New Buildings Institute has identified 21 school districts across 12 states that have adopted measures that declare an intention to be carbon neutral, and more are in the process of drafting formal resolutions.¹⁶ Many other districts have not yet made public commitments but are moving forward by benchmarking and reporting energy performance and developing a decarbonization road map.

School Districts with Commitments to Become Carbon Neutral

CREDIT: NEW BUILDINGS INSTITUTE¹⁷

- 1 Berkeley Unified School District, CA
- 2 Denver Public Schools, CO
- 3 Eau Claire School District, WI
- 4 Fairfax County Public Schools, VA
- 5 Green Bay Area School District, WI
- 6 Iowa City Community School District, IA
- 7 Lake Tahoe Unified School District, CA
- 8 Los Angeles Unified School District, CA
- 9 Miami-Dade County Public Schools, FL
- 10 Milwaukee Public Schools, WI
- 11 New York City Department of Education, NY
- 12 Oakland Unified School District, CA
- 13 Portland Public Schools, OR
- 14 Prince George's County School District, MD
- 15 Salt Lake City School District, UT
- 16 San Francisco Unified School District, CA
- 17 Santa Clara Unified School District, CA
- 18 Seattle Public Schools, WA
- 19 Sebastopol Union School District, CA
- 20 Virginia Beach City Public Schools, VA
- 21 Woodland Hills School District, PA



Our path toward a brighter future requires a shift toward 100% clean energy, and our schools have a critical role to play.

By significantly reducing greenhouse gas emissions with solar energy, our schools are modeling the path forward for their students, staff, neighbors, and community leaders. The schools joining the clean energy movement will ensure that the next generation of leaders are prepared to continue our progress toward a carbon-neutral society.

If your school has already switched to solar and has seen the benefits, we hope you keep advocating for more clean energy at your school, district, and in the surrounding community. You can become an ambassador for solar schools by sharing your knowledge and connecting with nearby schools and districts to help them start their solar journeys. You can support students and other community advocates in their efforts to bring about positive change. You can help advocate for better clean energy policies with your utility and in your state.

If your school has not yet gone solar, explore our toolbox of resources for getting started at SolarForAllSchools.org. The *Solar Schools Campaign Toolkit* provides the guidance and resources to advocate for solar. The virtual Help Desk offers a collection of articles and resources to answer frequently asked questions. The updated *How-To Guide* offers step-by-step instructions for going solar and includes an introduction to solar financing. Once you are ready to move forward, Generation180 and its partners can offer you free technical assistance.

Generation180 needs your help achieving our vision for all schools to access the benefits of solar. Join the movement!

VISIT [SOLARFORALLSCHOOLS.ORG](https://SolarForAllSchools.org) TO LEARN MORE.



Methodology

Key Findings

The methodology used for collecting and analyzing data for this report was developed by Generation180 for its national census and report *Brighter Future: A Study on Solar in U.S. Schools*. The process outlined below builds on the methodology developed by Solar Energy Industries Association and The Solar Foundation that was used for the first three editions of the *Brighter Future* report.

School Data Collection

The census includes all public, private, and independent K-12 schools in the United States. The National Center for Education Statistics (NCES), the primary federal entity for collecting and analyzing data related to education, was the primary source of information on schools used in this report. NCES databases provided comprehensive lists of all U.S. public and private K-12 schools, with corresponding geographic and demographic information. The NCES list of U.S. public schools with corresponding data was sourced from the Common Core of Data for the 2019-2020 or 2020-2021 school year, when available. The report's defining of school district were aligned with NCES' definition of a 'regular district', which exclude regional education service agencies and supervisory union administrative centers, state-operated agencies, federally operated agencies, and other types of local education agencies, such as independent charter schools. This report uses the NCES dataset for regular public school districts, which excludes the list of U.S. private schools, which was obtained through the Elementary/Secondary Information System and sourced from Private School Survey data, which was available through the 2019-2020 school year.

Solar Data Collection and Analysis

The census of U.S. schools with solar includes data on operational solar energy systems that are above 1 kW in installed capacity and were installed prior to the year 2022. To be included, the solar installation must either be installed on the property of or be providing electricity to a public school, private school, or educational center that services students in grades preK-12. In cases where a school district installed a solar array that is intended to power multiple buildings or the energy is used to offset the district's total electricity consumption, then all applicable schools in the district are included in the census data as a school with solar.

Data for this report were collected primarily between fall 2021 and spring 2022 from a variety of online sources, including state databases, utility lists, solar developer websites, press releases, school websites, and newspaper articles. Schools and solar installers across the country were contacted for data collection and verification.

All new data were integrated into Generation180's existing national database for solar schools. Data were cross-checked across sources and database editions to prevent double-counting and to verify new information. The statistics in the Key Findings section of the report utilize published data about U.S. solar schools from the third edition published in 2020 (which includes projects installed through the end of 2019). The statistics for growth over time use data points from these reports as benchmarks for comparison.

Generation180 accepts and verifies solar data that it receives from the public on an ongoing basis through its website. Readers are encouraged to submit any new information on solar installations by U.S. K-12 schools at SolarforAllSchools.org.

State Rankings for Solar Schools CUMULATIVE THROUGH 2021

Rank	Cumulative Solar Capacity on K-12 schools (kW)		Number of Schools with Solar		Number of Students Attending a Solar School	
	STATE	TOTAL KW	STATE	TOTAL	STATE	TOTAL
01	CA	703,507	CA	2,819	CA	2,394,896
02	NJ	194,388	NJ	662	NJ	421,399
03	AZ	127,225	IL	508	IL	309,972
04	MA	77,629	AZ	411	FL	300,990
05	IL	56,237	MA	309	AZ	255,906
06	IN	50,809	NY	281	MA	208,621
07	CT	49,731	FL	281	NY	200,372
08	NY	44,975	CT	279	CT	174,336
09	VA	43,845	WI	225	MD	138,248
10	WA	29,415	MD	188	WI	136,285
11	PA	28,830	MN	177	TX	126,068
12	OH	28,297	NV	174	MN	114,446
13	MN	23,159	VA	154	VA	106,094
14	NV	20,578	TX	136	NV	94,273
15	MD	19,652	CO	129	PA	88,614
16	WI	14,231	HI	118	CO	87,101
17	TX	12,399	UT	115	WA	85,559
18	HI	11,983	WA	112	HI	84,446
19	CO	11,323	IN	108	UT	83,942
20	DC	10,793	PA	108	IN	69,185
21	NM	8,690	OH	96	MO	55,430
22	VT	7,731	MO	94	NC	50,786
23	TN	7,022	MI	79	OH	50,434
24	NH	6,765	OR	76	OR	50,319
25	MI	5,960	NC	70	MI	45,683
26	OR	5,685	DC	69	GA	45,655
27	NC	5,303	TN	66	NM	41,773
28	AR	4,955	VT	63	TN	36,178
29	FL	4,826	NM	56	SC	36,137
30	MO	3,018	SC	51	DC	29,862
31	KY	2,868	GA	48	VT	21,313
32	IA	2,860	MT	47	NH	18,796
33	GA	2,841	NH	42	MT	17,928
34	SC	2,801	ME	38	OK	16,735
35	ME	2,606	ID	33	ID	16,588
36	UT	2,452	IA	31	ME	15,679
37	OK	2,002	OK	25	RI	15,588
38	DE	1,516	RI	25	IA	10,232
39	KS	1,088	KY	18	KY	9,888
40	MS	1,046	AR	15	WV	9,223
41	WV	853	KS	13	KS	9,016
42	MT	747	MS	12	AR	8,374
43	ID	601	DE	11	DE	7,197
44	LA	390	WV	11	MS	6,155
45	RI	366	LA	8	LA	5,982
46	WY	230	WY	5	NE	2,840
47	ND	80	NE	5	WY	1,975
48	AK	38	AK	4	AL	1,063
49	AL	28	AL	3	AK	573
50	NE	19	ND	1	ND	180
51	SD	0	SD	0	SD	0

Endnotes

- 1 K-12 schools account for 7.7% of primary energy use in commercial buildings, or 536 trillion BTU out of 6,963 trillion BTU. According to EIA's Annual Energy Outlook, the total energy-related carbon dioxide (CO₂) emissions of the commercial sector in 2021 were 776 million metric tons. By taking 7.7% of 776 million metric tons, then K-12 schools were responsible for 59.8 million metric tons of CO₂. Using the EPA GHG Equivalencies calculator, this equals the CO₂ emissions of 16 coal-fired power plants. This calculation assumes that 1) K-12 schools have similar geographic distribution to all commercial buildings and 2) K-12 schools' proportion of energy use among fuels (electricity, natural gas, oil) is roughly similar to the average of commercial buildings. U.S. Energy Information Administration. (2012). Commercial buildings energy consumption survey, Table PBA3 Sum of major fuel consumption totals and gross energy intensities by building activity subcategories. Retrieved from: <https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/pba3.php>; U.S. EIA, Annual Energy Outlook 2022, Table 18. Energy-Related Carbon Dioxide Emissions by Sector and Source. Retrieved from: <https://www.eia.gov/outlooks/aeo/data/browser/#/?id=17-AEO2022&cases=ref2022&start=2020&end=2050&sourcekey=0>; U.S. Environmental Protection Agency. (n.d.). Greenhouse gas equivalencies calculator. Retrieved from: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>. Updated March 2022.
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