POWERING A BRIGHTER FUTURE IN PENNSYLVANIA

A Report on Solar at Pennsylvania K-12 Schools

March 2024, 2nd Edition

Generation180

Generation180

About Generation180

Generation180 is a nonprofit working to inspire and equip people to take action to advance clean energy in their homes and communities. Through our nationwide Electrify Our Schools program, 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 Electrify Our Schools program catalyzes the positive effect that schools have in encouraging clean energy action throughout their communities and beyond.

Solar for All Schools

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 are connecting with school leaders, educating them on the benefits of clean energy, and providing free support and resources. Generation180 launched a campaign in 2022 to support Pennsylvania K-12 schools, and began providing free solar feasibility assessments and technical assistance to help schools move forward with solar energy projects. Visit our website.

Mapping the Solar Movement

Generation180 is mapping the movement of K-12 schools flipping the switch to clean energy. In our biennial national report, Brighter Future: A Study on Solar in U.S. K-12 Schools, we track the fast-growing number of schools that utilize solar energy, analyze the trends, and rank states for solar adoption. Our interactive online map helps you identify solar schools near you and learn more about their solar energy systems. In 2022, Generation180 released the first edition of Powering a Brighter Future in Pennsylvania, a report on solar at Pennsylvania K-12 schools. This second edition of the report provides an update on the solar landscape over the past two years.

Empowering and Connecting Educational Leaders

Generation180 is leveraging the knowledge and experience of school staff who are leading the charge toward clean energy. We created the School Leadership in Clean Energy (SLICE) Network of K-12 school leaders - such as superintendents, school board members, and operations and facilities directors - who have already flipped the switch to clean energy at their schools. Network members receive training and education, learn from each other, and support peers in adopting solar and related clean energy technologies. Explore our list of school leaders in Pennsylvania and across the country at Generation180.org/school-leadership-in-clean-energy.

Learn More / Generation180.org • SolarforAllSchools-PA.org
Contact Us / Solarschools@generation180.org

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- **Pennsylvania Department of Environmental Protection**
- **Pennsylvania Solar Center**
- **Solar Renewable Energy, LLC**
- **Steelton-Highspire School District**
- **The Efficiency Network**

COVER PHOTO: MIDD-WEST SCHOOL DISTRICT IN MIDDLEBURG, PA

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Introduction

With one of the largest public education systems in the United States, serving over 1.7 million students, Pennsylvania has an opportunity to prepare a generation of young people for a brighter and healthier future powered by clean energy. The momentum of clean energy adoption is gathering pace in the education sector. **Over the last decade, Pennsylvania nearly TRIPLED the cumulative solar capacity installed across its K-12 educational institutions and nearly DOUBLED the number of schools with solar energy systems.**

Despite this growth, the state still has a long way to go to shift away from its reliance on polluting fossil fuels. The integration of clean energy technology within its educational infrastructure remains underdeveloped, and **merely 2% of statewide K-12 schools have been equipped with solar energy systems.** Furthermore, there are notable gaps in solar adoption by schools along the northern border and throughout the western region of the state where fossil fuel extraction is prevalent.

The continued growth in solar adoption by schools will largely depend on access to opportunities that alleviate the burden of cost. Schools are increasingly utilizing third-party ownership, a financing mechanism that enables schools to fund solar projects with little or no upfront costs. Third-party ownership is the primary funding source for the ten largest solar projects installed at public school districts in Pennsylvania. Schools have also relied on state funding programs to lower the installed cost of solar energy systems. Nearly half of the 114 Pennsylvania K-12 schools with solar arrays have leveraged a grant or low-interest loan offered through state agencies.

New opportunities to lower project costs for schools and increase budget savings will be critical for expanding the transition to clean energy throughout Pennsylvania. Schools are now eligible to take advantage of federal tax credits and receive a payment for 30-60% of the cost of clean energy projects. Plans to develop a new state program to provide technical assistance and financing for solar energy systems at Pennsylvania schools under consideration at the time of this report's release.

Pennsylvania holds tremendous untapped potential to become a nationwide leader in clean energy. Expanding solar adoption at schools can deliver the benefits of clean energy to every neighborhood across the state. **If all K-12 schools in Pennsylvania installed an average-sized solar array (340 kW), this would eliminate carbon dioxide emissions each year roughly equivalent to closing five gas-fired power plants.** All Pennsylvania schools stand to benefit from this opportunity to generate locally-sourced clean energy that reduces burdensome electricity costs and generates savings that can be invested in students.

↓ SANDY RUN MIDDLE SCHOOL UPPER DUBLIN SCHOOL DISTRICT | CREDIT: EXACT SOLAR

State of Solar at Pennsylvania K-12 Schools

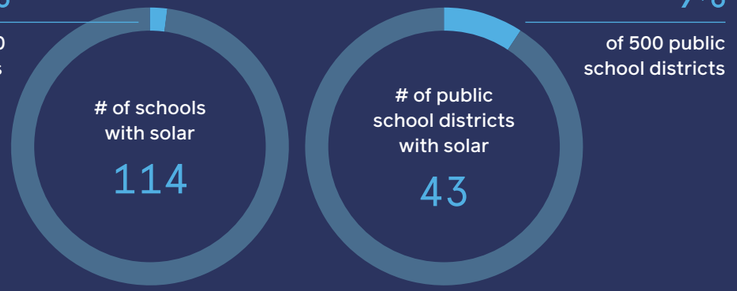
Key Findings

Data are cumulative through the end of 2023 and include Pennsylvania's K-12 public, charter, and private schools.

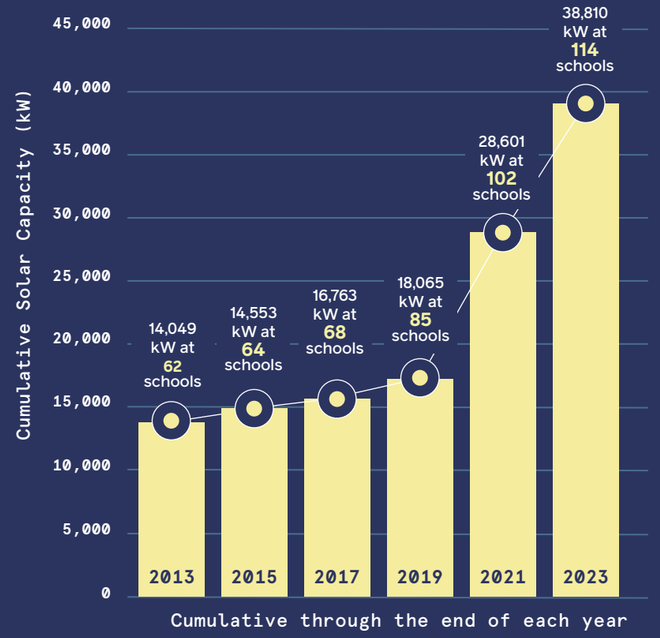
Cumulative Solar Capacity
38,810
KILOWATTS (kW)

Annual Emissions Reduction
33,409
METRIC TONS OF CO_2

Equal to Powering
6,500
HOMES' ELECTRICITY USE PER YEAR



Growth in Cumulative Solar Capacity at Pennsylvania K-12 Schools



Solar Growth Over 10 Years (2014 -2023):

The amount of solar installed at PA schools **nearly TRIPLED.**

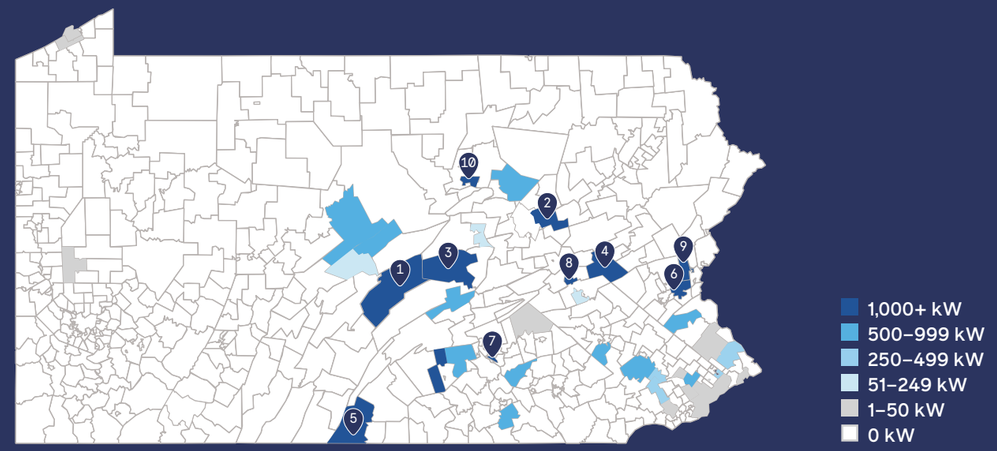
The number of schools with solar **nearly DOUBLED.**

Solar Growth Over 4 Years (2020-2023):

The amount of solar installed at PA schools **more than DOUBLED.**

The number of schools with solar grew by 33%.

Solar Adoption by Pennsylvania School Districts



Visit our website to find an interactive online map with more information about all Pennsylvania school districts and school sites with solar installations.

Top 10 Public School Districts in Pennsylvania Ranked by Installed Solar Capacity

01 / Mifflin County School District – 4,405 kW
02 / Central Columbia School District – 3,800 kW
03 / Midd-West School District – 2,540 kW*
04 / Tamaqua Area School District – 2,504 kW*
05 / Tuscarora School District – 2,000 kW
06 / Bethlehem Area School District – 1,625 kW
07 / Steelton-Highspire School District – 1,600 kW*
08 / Pottsville Area School District – 1,475 kW
09 / Nazareth Area School District – 1,174 kW
10 / Loyalsock Township School District – 1,101 kW

*Solar offsets 100% of school district's electricity use

Regional Gaps in Solar Adoption

Currently, only 43 out of Pennsylvania's 500 school districts have gone solar, and those projects are concentrated in the central and southeastern regions of the state. There are only three public school districts in western Pennsylvania that have installed small demonstration solar arrays. With a combined solar capacity of less than 40 kW, solar energy provides just a fraction of what is needed to power the buildings.

Things are beginning to change. In 2023, the Greater Johnstown Career and Technology Center, a school facility in Cambria County serving seven school districts, became the first K-12 building in the western region that is 100% powered by onsite solar power (see case study on page 7). Also, Moniteau School District in Butler County is installing a 2,000 kW array in 2024.

The SWPA Municipal Project Hub was launched in early 2024 to provide support and technical assistance to local governments and schools in Southwestern Pennsylvania to access federal infrastructure and clean energy funding.

Funding the Switch to Solar

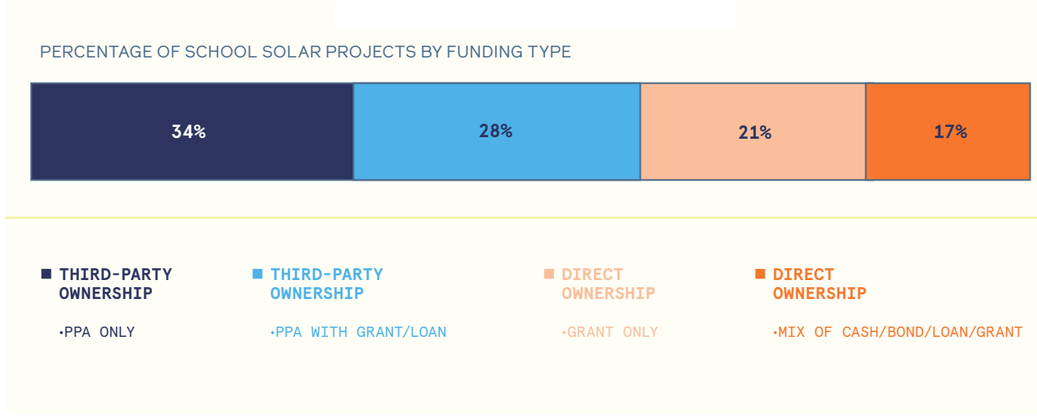
Overcoming the barrier of upfront costs

Access to funding is a top concern for cash-strapped school districts interested in making the switch to solar. Schools are leveraging a variety of funding sources to pay for solar projects. To minimize or avoid upfront costs, Pennsylvania schools have mainly relied on third-party ownership to fund solar projects. For the projects with available funding data, third-party ownership has been the primary funding source for a large share (62%) of the solar projects installed by Pennsylvania K-12 schools. More than one-third (38%) of solar projects are directly owned and funded by the schools. Grants and low-interest loans played a role in bringing down the costs for solar projects financed by both direct ownership and third-party ownership. (See chart below.)

A power purchase agreement (PPA) is the typical third-party ownership arrangement in which a solar developer funds, owns, and maintains the solar energy system for a set period, ranging from 5 to 25+ years. During the PPA term, the school pays the system owner for the solar energy produced, but usually at a lower rate than what the school would have paid the utility. In this arrangement, schools would expect to receive immediate energy savings that typically increase over time as the utility's electricity 'rates' rise. The benefits of a PPA include receiving stable and low-cost electricity with little-to-no upfront capital costs or ongoing maintenance costs.

For solar arrays larger than 500 kilowatts (kW), power purchase agreements have played an especially important role in financing solar projects at schools. Third-party ownership is the primary funding mechanism for the ten largest solar projects installed at public school districts in Pennsylvania (see page 3). The two largest solar energy systems at Pennsylvania K-12 schools (a 4,405 kW array at Mifflin County School District and a 3,800 kW array at Central Columbia School District) were installed in 2022 and relied solely on PPAs for funding.

How K-12 Schools Pay For Solar



Funding support from the state

State funding programs have played an important role in bringing down the cost of solar energy systems for Pennsylvania schools. According to data from the Pennsylvania Department of Environmental Protection (DEP) Energy Programs Office,1 $19.7 million in funding was provided by Pennsylvania DEP and the Commonwealth Finance Authority (CFA) between 2008 and 2020 to statewide K-12 schools for solar projects.

State funding programs supported solar projects at 53 schools across the state, which is close to half of the K-12 schools currently using solar energy. On average, the funds provided through these state programs have lowered the installed cost by 37%, with an average award of $371,060 per solar project. Nearly all of these funds were distributed as grants. One school district use the state funding for a low-interest loan that helped lower the cost of a power purchase agreement.

State Funding Programs For PA K-12 Schools

Solar projects supported by funding from the Pennsylvania Department of Environmental Protection and the Commonwealth Finance Authority (2008-2020)

$19,666,195	53	$371,060	37%
Total amount awarded to PA K-12 schools	# of K-12 schools awarded	Average award per K-12 school solar project	Average % of installed cost funded

The Energy Harvest Program, a retired state program that was managed by the Pennsylvania DEP, utilized a mix of state and federal funds to support solar projects. The Commonwealth Finance Authority oversaw the Solar Energy Program (SEP) and Alternative & Clean Energy (ACE) programs, which were initiated in 2008 under the Alternative Energy Investment Act. The CFA offered grants and low-interest loans for solar energy and other clean energy projects at schools until 2020.

While grants and low-interest loans have been effective in enabling more schools to access the benefits of solar energy, there has not been a consistent source of state funding for solar projects at schools in recent years. Pennsylvania State Representative Elizabeth Fiedler sought to change that by introducing the Solar for Schools Act (HB1032) in 2023, which would establish the first state grant program dedicated to providing funding for schools to install solar energy systems. Under the bill, eligible schools would include public school districts, intermediate units, career and technical schools, and community colleges. At the time of publication of this report, the bill was still under consideration by the Pennsylvania General Assembly.

1 Pennsylvania Department of Environmental Protection. (n.d.). Energy Programs Office Alternative Energy Viewer Retrieved from: https://gis.dep.pa.gov/EPOAlternativeEnergyViewer.

Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law, and the Inflation Reduction Act (IRA) are two landmark federal laws passed in the last few years that opened up new funding opportunities for schools to pay for solar energy projects and other energy upgrades. Listed below are two important new funding opportunities to help K-12 schools fund future clean energy projects.

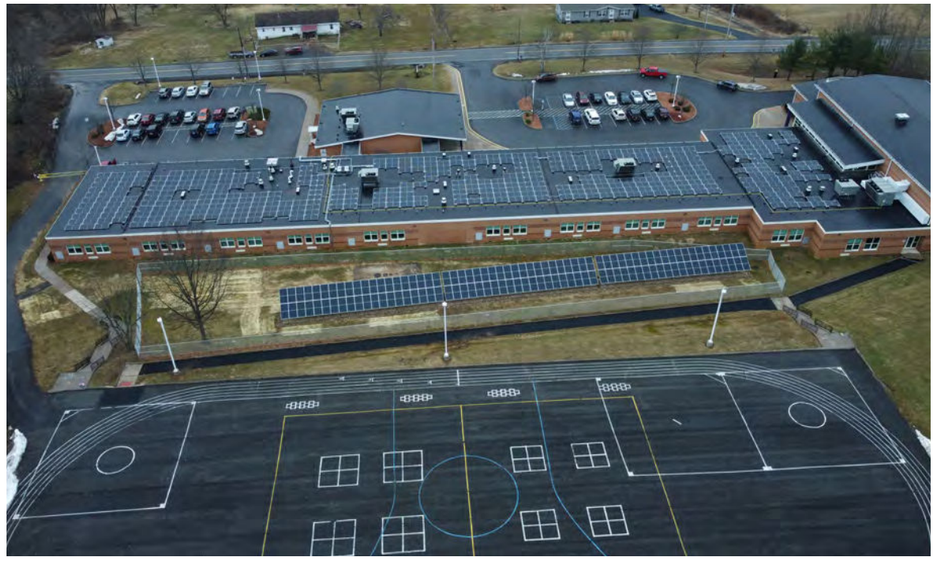
Renewing America's Schools Grant Program

The IIJA allocated $500 million to K-12 public schools for energy upgrades, and high-need communities will be prioritized. In 2023, the U.S. Department of Energy (DOE) awarded $178 million to 24 competitively selected applicants. William Penn School District in Yeadon, PA was awarded $7.2 million for renovations that will move Penn Wood High School - Cypress Street Campus toward net-zero energy standards, including a rooftop solar photovoltaic array, a high-efficiency heat pump, and LED lighting. New rounds of funding will be made available over the next few years until funds are depleted.

Elective Pay for Clean Energy Tax Credits

The Inflation Reduction Act created a new opportunity for tax-exempt entities, such as schools, local governments, and nonprofits, to take advantage of a variety of clean energy tax credits through a new process called Elective Pay (also known as Direct Pay). For example, a school is now eligible to receive the Investment Tax Credit (ITC) as a direct payment from the Internal Revenue Service for a solar array that is purchased and owned by the school. The value of the ITC may range from 30% to 60% of the solar project cost, depending on project qualifications for designated energy communities, disadvantaged communities, and use of domestic content. The U.S. Department of Energy provides a Energy Justice Mapping Tool for Schools that identifies which schools are located in disadvantaged communities that are prioritized for funding. In Pennsylvania, many census tracts have been listed as Designated Energy Communities that are eligible for one of the bonus credits.

↓ EAST DERRY ELEMENTARY SCHOOL MIFFLIN COUNTY SCHOOL DISTRICT | CREDIT: MCCLURE COMPANY



THE GREATER JOHNSTOWN CAREER & TECHNOLOGY CENTER (GJCTC)

Pennsylvania town powers workforce training with the sun

← CREDIT | SOLAR RENEWABLE ENERGY, LLC

The city of Johnstown, Pennsylvania, located 60 miles east of Pittsburgh, earned a reputation during the Industrial Revolution as a leader in steel production and rail manufacturing. The historic coal mining town is now forging a new path as a pioneer in clean energy. The Greater Johnstown Career & Technology Center (GJCTC), a regional hub for workforce development, now proudly claims the title of the first school in Western Pennsylvania to offset 100% of its electricity consumption with solar power.

In October 2023, the school flipped the switch on the ~2,000-panel ground-mounted solar array. The school anticipates saving $19 million on energy expenses over the next 25 years that can be redirected toward further enriching educational programs and improving the school's facilities. Integrating solar technology on campus has also sparked the idea to expand the job training programs offered at GJCTC to include clean energy careers.

Achieving 100% onsite solar power required making significant improvements to inefficient buildings that had not been updated since the 1970s. Before installing the solar array, John Augustine, Director of Greater Johnstown Career & Technology Center, moved forward with facility improvements that would both save energy and improve the learning environment. With a Guaranteed Energy Savings Agreement (GESA) through a partnership with The Efficiency Network (TEN), the school is able to pay for capital expenses over time with the energy savings. The school moved forward with the $17 million renovation that included the installation of over 3,000 efficient lighting fixtures, state-of-the-art air conditioning units, instantaneous hot water heaters, an updated building automation system, and building envelope enhancements. As the region's vocational technical school, GJCTC also made it a priority to ensure that the project prioritized local workers and supported the local economy.

GJCTC is blazing a trail in Western Pennsylvania for using local, clean energy resources to achieve energy independence and support the local economy. Other school districts are already looking at GJCTC as a shining example of what is possible.

JOHN AUGUSTINE, ADMINISTRATIVE DIRECTOR OF GREATER JOHNSTOWN CAREER & TECHNOLOGY CENTER

Solar Project Highlights

LOCATION
Johnstown, PA

SCHOOL
600 students
Serves seven school districts in the area

SOLAR INSTALLATION
1.07 MW ground-mounted array with 1,980 photovoltaic panels

ENERGY OFFSET
100% of the school's annual electricity use

SOLAR FINANCING
Power purchase agreement (PPA) with Duquesne Power and Light

ENERGY EFFICIENCY FINANCING
Guaranteed energy savings agreement (GESA) with The Efficiency Network (TEN)

COST SAVINGS SUCCESS STORY: STEELTON-HIGHSPIRE SCHOOL DISTRICT

Underfunded Pennsylvania school district shines as a clean energy leader

CREDIT | MCCLURE COMPANY

ENERGY COST SAVINGS CLOSES BUDGET GAP

Near the state capital of Harrisburg lies the town of Steelton, Pennsylvania, the home of America's first steel company and the birthplace of an industry that has long relied upon burning fossil fuels. Down the street from the 150-year-old steel mill is the campus of Steelton-Highspire School District (SHSD), which is forging ahead as one of the state's first school districts to power its buildings and buses with onsite renewable energy.

> "One hundred years ago, the challenge of that generation was to manufacture and build the modern American economy. What our generation has to tackle is how to transition our economy to a greener, carbon-free economy... I am so proud of this community because it is living up to its legacy. One hundred years ago, we were on the forefront. Now, we are on the forefront again of building the new future and the new America."
>
> – Rep. David Madsen
> 104th District of Pennsylvania House of Representatives

Solar Project Highlights

LOCATION
Steelton, PA

DISTRICT SIZE
1,290 students at two schools

INSTALLED CAPACITY
1.7 MW ground-mounted array (3,500 panels) built over a closed landfill

ENERGY OFFSET
100% of district's annual electricity use

COST SAVINGS
$3.6 million over 15 years

FINANCING
Power purchase agreement for solar project and energy performance contract for energy efficiency projects with McClure Company

The school district found its way to renewable energy out of financial necessity. Steelton-Highspire School District sought creative solutions to overcome its annual budget gap of $10 million per year and to provide the best educational experience for its diverse and predominantly low-income population of less than 1,500 students. SHSD found that energy efficiency and solar energy could provide significant operational cost savings to help the district balance its budget. The newly installed 1.7 megawatt (MW) solar array powers 100% of the district's electricity needs and is expected to provide $4 million in energy savings over the next two decades.

ENERGY EFFICIENCY LEADS TO SOLAR SAVINGS

Over the last two decades, SHSD has been lowering its energy bills with efficiency upgrades. The district worked with the energy service company McClure Company to upgrade its facilities without any upfront costs through a guaranteed energy savings agreement. In this budget-neutral arrangement, McClure Company invests in the capital improvements for the energy upgrades and guarantees an amount of energy savings. The district uses its energy savings over time to help pay for the project over the life of the contract.

The success of these efficiency projects led the district to explore more ways to save on energy costs and position itself as a leader in energy independence. In the process of exploring onsite solar energy options, the district was able to find a beneficial use for a 4.7-acre landfill on school district property that was built in the aftermath of Hurricane Agnes in 1972. This area could not be used for future buildings or athletic fields, but it was suitable for installing a solar array that could meet 100% of the district's electricity needs. Starting with energy efficiency helped the district reduce its energy demand and optimize the size of the solar array it needed.

SHSD entered into a power purchase agreement with McClure Company to finance the project without any upfront costs. SHSD purchases the electricity produced by the array from McClure Company at a lower rate than it would pay the utility, resulting in immediate energy cost savings. Since the solar energy system went live in late 2021, the district has been able to avoid two utility rate hikes and is now saving $200,000 per year in energy costs.

CHARGING AHEAD WITH ELECTRIC SCHOOL BUSES

SHSD is continuing to lead in its transition to clean energy as one of the first districts in the state to switch to electric school buses. In 2022, the district was awarded in a competitive selection process to receive a $2,370,000 rebate from the EPA's Clean School Bus Program to pay for six electric school buses. The district's location in a climate and economic justice community, based on its elevated risk of climate-related impacts, high rates of asthma, and percentage of low-income households, made it a priority for receiving federal funding through the White House's Justice40 initiative. The district is also plans to partner with Penn State Health on a study to research the air quality and health benefits to the community by reducing diesel emissions from its buses. The electric school bus batteries will be charged by the solar array and can store enough energy to power critical energy loads during outages, enabling the school campus to serve as a resiliency hub for the community during power outages or natural disasters.

> "We're looking for small wins, projects that save the taxpayers and the district money. This project enabled us to funnel money that would typically go to energy costs to programs that support the students. We are saving money, and students are learning about our energy use and generation through real-time data associated with the solar array."
>
> **Mick Iskric**
> Steelton-Highspire School District Superintendent

Methodology

The methodology for collecting and analyzing data for this report was developed by Generation180 for its biennial national census and report *Brighter Future: A Study on Solar in U.S. K-12 Schools*.

Schools Data Collection

The National Center for Education Statistics (NCES), the primary statistical agency of the U.S. Department of Education, is the main source of information on schools used for the national census and 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 obtained through the Elementary/Secondary Information System (ElSi) and sourced from the Common Core of Data (CCD) for the 2021-2022 school year. The list of U.S. private schools was obtained through the Elementary/Secondary Information System (ElSi) and sourced from the Private School Survey (PSS) data, which was available through the 2019-2020 school year.

The census for this report includes K-12 schools in Pennsylvania, including public schools, charter schools, private schools, career and technical centers, and intermediate units. The Pennsylvania Department of Education (PDE) was the primary source of information on Pennsylvania K-12 schools. The PDE website provided statistics, maps, school district boundaries, school lists, and other school data. If discrepancies occurred between NCES and PDE data, the data provided by the PDE were used.

Solar Data Collection & Analysis

The census of Pennsylvania 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 2024. To be included, the solar installation must either be installed on the property of or be providing electricity to a public school, charter school, private school, career and technical center, or intermediate unit that services students in grades pre-K through 12. In cases where a school district installs 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 of the applicable schools in the district are included in the census data.

The solar data for this report were collected on an ongoing basis through February 2024. Online sources include solar developer websites, press releases, school websites, and news articles. Data were also collected from publicly available sources provided by state incentive and net metering programs, such as the Pennsylvania Alternative Energy Credit Program and PJM's Environmental Information Services. Information on state grants and funds for solar projects was collected from the Pennsylvania Department of Environmental Protection website. Schools, school districts, and solar developers were also contacted for data collection and verification.

Statistics generated for this report are based on the best data available as of February 2024 and reflect any additions, updates, or corrections to solar installation data since the first edition of *Powering a Brighter Future in Pennsylvania* report was published in May 2022.

Generation180 accepts and verifies solar data that it receives from the public on an ongoing basis through its website. All new data about Pennsylvania schools are integrated into Generation180's existing national database for solar schools. Data are cross-checked across sources and database editions to prevent double-counting and to verify new information. Readers are encouraged to submit any new information on solar installations at U.S. K-12 schools at SolarforAllSchools.org.

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Solar for All Schools

SOLARFORALLSCHOOLS.ORG