# How-To Guide

## FOR SCHOOLS GOING SOLAR

PUBLISHED BY Generation180

IN PARTNERSHIP WITH The SOLAR FOUNDATION™ for a bright future

# This guide will help your school get started with solar to gain all the benefits: financial savings, educational opportunities for students, energy resilience, and healthier families and communities.

We explain the solar development process, step-by-step, and offer best practices and tips to consider along the way. We hope this guide helps your school achieve a brighter future through clean energy.

COVER PHOTO: CHAFFEY JOINT UNION HIGH SCHOOL - ONTARIO, CA | CREDIT: PFMG SOLAR

# How-To Guide for Schools Going Solar

## 1 Identify Solar Champions and Assemble a Team

- Include students, teachers and staff from facilities and procurement
- Work together to educate the school community about solar
- Consider help from outside experts

## 2 Understand Energy Needs and Estimate Solar Potential

- Review history of electricity use, costs and demand charges
- Estimate both project costs and potential savings
- Estimate solar potential, conduct a solar site assessment

## 3 Compare Financing Options

- Assess ownership options including direct or third-party (PPAs)
- Investigate federal, state and utility incentives

## 4 Identify Local, State and Utility Hurdles

- Learn local planning and zoning requirements and permitting processes
- Talk to local solar experts to identify potential regulatory hurdles
- Investigate net-metering opportunities

## 5 Prepare and Issue the Request for Proposal

- Ensure the RFP meets statutory requirements
- Clearly define the project
- Include educational opportunities

## 6 Evaluate and Select the Solar Developer

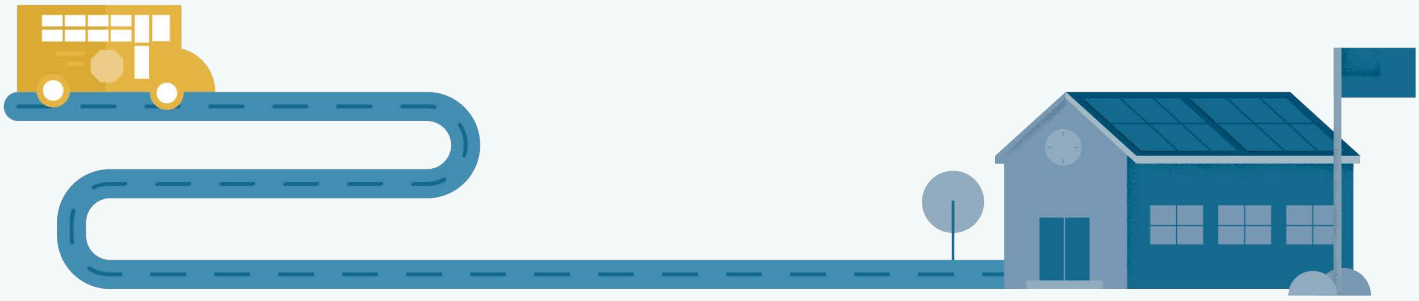
- RFP review team can include students and others along with key staff
- Develop a list of key criteria and a scoring plan in advance
- Be sure to get and check references

## 7 Oversee Construction and Installation

- Hold regular meetings to monitor progress on milestones
- Properly document regulatory compliance and system performance
- Perform regular inspections

## 8 Monitor Performance, Operations and Maintenance

- If necessary, develop an Operations and Maintenance agreement
- Ensure ongoing safety of the solar installation site



# STEP 1:
# Identify Solar Champions and Assemble a Team

## A solar schools campaign begins with the recruitment of a core team that includes a variety of stakeholders.

Identify solar champions who can help lead the effort and think about what other stakeholders and decision makers need to be involved. Build a broad base of support that includes students, teachers, parents, school and district staff, and community members. Engaging students to join in the discussion creates authentic learning and leadership opportunities. Student-driven initiatives can also help win the support of school and district decision makers.


**Do you need help convincing your school or district leadership to go solar?**

Generation180 has developed a Solar Schools Campaign Toolkit that provides step-by-step guidance and resources to help you be a clean energy champion and win a commitment to go solar from your school or district.

### INCLUDE DISTRICT LEADERSHIP

The team should ideally involve a facilities, energy or operations manager who is knowledgeable about the school's facilities and understands the building's energy needs. It is also helpful to bring onto the team staff members who are responsible for the finances and legal contracts that will be part of the solar procurement process.

For public schools, large or multischool projects will need to be approved by the school board. Identify solar champions on the school board early and involve them in these beginning steps.

### BRING IN OUTSIDE EXPERTISE

As you continue to build your team and gain support, you may want to bring in outside expertise to answer questions and address concerns. Find technical support for your team, such as a facilities manager from a neighboring school that has gone solar, a solar installer, nonprofit organizations in the community, or a consultant. If nearby districts have solar, you can organize a tour to see their operations firsthand.

**LEARN MORE**

SolarforAllSchools.org

Download the Solar Schools Campaign Toolkit

Find a solar school near you on our interactive map

STEP 2:

# Understand Energy Needs and Estimate Solar Potential

With a team of solar supporters in place, the next step is to evaluate your energy needs and costs and estimate your solar potential.

## UNDERSTAND YOUR ENERGY NEEDS

To determine how much solar you need and how much money you can save by going solar, you have to first understand your energy consumption. Facilities staff should review electric utility bills from the previous 12 months and establish current energy use and costs. This review will provide a baseline for energy costs from which you can estimate potential cost savings from a solar system.

Consider how your electricity needs might be changing in the future. If your district is adding electric vehicle chargers in the parking lot or planning to replace gas furnaces with electric heat pumps, you will want to account for the additional load when considering how much solar you need.

## EXAMINE ALL ENERGY COSTS

Be sure to examine and include all costs, including demand charges or other utility charges. A demand charge is an additional fee based on a customer's highest amount of power drawn during a defined time interval (e.g., 15 minutes) during a billing period. Demand charges are typically applied to commercial and industrial customers, including schools. They can make up 30%- 70% of the total electricity bill.

A solar system can reduce demand charges, particularly if the school's highest consumption occurs during the afternoon when solar is most productive. Adding batteries can also help to reduce demand charges. For example, if the school knew its most energy-intensive events, it could discharge energy that was stored in the batteries during those times in order to reduce the event demand on the grid, thereby reducing or eliminating the demand charge.

**LEARN MORE**

Learn more about reducing energy consumption at schools:

National Renewable Energy Lab's Zero Energy Buildings Resource Hub
https://zeroenergy.org/project-types/schools/

Alliance to Save Energy's PowerSave School Program
https://www.ase.org/projects/powersave-schools

**Sun Number**
SunNumber.com

**Google's Project Sunroof**
Google.com/get/sunroof

**National Renewable Energy Laboratory's PVWatts Calculator**
PVwatts.nrel.gov

**REopt Lite**
Reopt.nrel.gov/tool

**Solar for All Schools**
For a list of more technical resources, visit SolarForAllSchools.org and check out the **Help Desk**.

PARRAS MIDDLE SCHOOL - REDONDO BEACH USD, CA | CREDIT: PFMG SOLAR

## ESTIMATE SOLAR POTENTIAL

Start with an inventory of the physical space and assets that are available, including rooftops, parking lots for shade structures, and open space for ground-mounted systems. From that inventory, evaluate which spaces are most suitable for solar. For rooftop systems, determine the roof condition and age and whether the structure can support the loads associated with the solar installation. Because solar photovoltaic panels typically have a 25-year performance warranty, prioritize rooftops that are less than 10 years old or rooftops that are already scheduled for replacement.

There are several free online tools that can help you estimate your solar potential and projected potential cost savings, such as Sun Number, Google's Project Sunroof, National Renewable Energy Laboratory's PVWatts Calculator and REopt Lite.

Because this can get complicated, it helps to work with a solar company or consultant to provide a full solar site assessment. The feasibility assessment should include an evaluation of site characteristics, including site orientation, available space and amount of shading during peak solar hours.

## STEP 3:
# Compare Financing Options

Once the school or district has a general idea of feasibility, site suitability and solar potential, the next step is to identify financing options.

Though the installed cost of solar has fallen quickly over the past few years, these systems still represent a significant investment, usually requiring some form of financing. When considering financing options, a school should decide between purchasing and owning the system or allowing a third-party to finance and own the system.

More than **three-quarters** of the cumulative solar capacity installed on schools nationwide was funded through a form of third-party ownership.

### THIRD-PARTY OWNERSHIP

More than three-quarters of the cumulative solar capacity installed on schools nationwide was funded through a form of third-party ownership.[1] The advantage of third-party ownership is that the third party finances, builds, owns and maintains the system, so there is little or no upfront capital investment. These arrangements are typically structured as power purchase agreements (PPA). In a PPA, the school agrees to pay the solar company an agreed-upon rate for the solar power generated by the system that is typically below the market rate. The rate may or may not escalate over the typical 15-to-25-year life of a PPA. The agreement can include options for the school to buy the panels at certain points during the contract term or after it ends.

Another advantage of a PPA is that the solar developer, as owner of the system, can benefit from federal tax incentives, such as the solar Investment Tax Credit (ITC). Because of their tax-exempt status, schools cannot take advantage of the tax incentive directly. However, the third-party owner receives the tax benefit, presumably passing on some of the savings to the school by offering a favorable rate in a competitive bid.

CREDIT: TUCSON UNIFIED SCHOOL DISTRICT

## DIRECT OWNERSHIP

In direct ownership, the school is directly responsible for the financing, development and operations of the system. Unlike a PPA, the school will see direct reductions on their electricity bill based on what the solar energy system produces. Direct ownership often generates the highest return on investment, especially if the state has favorable public incentives and financing options. Schools will typically need to first determine if the solar system will be part of a larger school expansion or building improvement capital campaign. In those cases, the larger components of the funding package will likely drive the financing approach.

A common financing arrangement that school districts leverage for direct ownership is the general obligation (GO) bond. A GO bond is one type of municipal bond that is backed by the general revenue and credit of the issuing government entity. GO bonds are backed by the full faith and credit of the government entity. They are typically repaid from general revenue, such as fees and tax collections. Local jurisdictions issue GO bonds typically to fund projects, such as government buildings, roads and schools that don't have a revenue source. Because of the high transaction costs for bond financing, solar development is typically combined with other capital improvements. Since GO bonds encumber the taxing authority's debt capacity, they often require a public referendum.

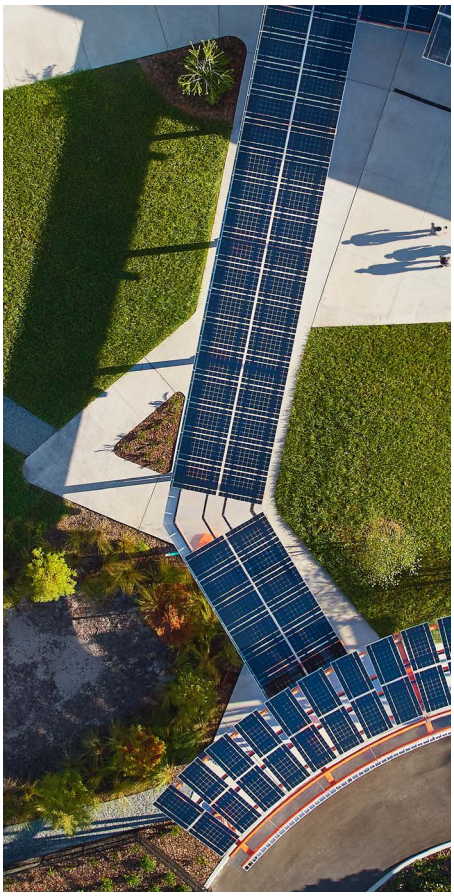
**VISIT**

SolarForAllSchools.org and download the Financing Guide for more information on different financing options.

STEP 4:

# Identify Local, State and Utility Hurdles

## Identify any potential regulatory hurdles presented by local, state and utility policies and make plans to address them.



NEOCITY ACADEMY - KISSIMMEE, FL
CREDIT: LITTLE DIVERSIFIED ARCHITECTURAL CONSULTING

**VISIT**

SolSmart.org to find a list of localities designated for solar-friendly policies.

Ensuring state and local requirements are satisfied should mainly be the responsibility of the solar contractor. The solar customer typically absorbs the time and money to comply with these rules in the form of increased project costs. Customers benefit from lower-priced bids from developers when there are low levels of regulatory uncertainty.

In contrast, if uncertainty is high, the installers will need to increase their bids accordingly. When the time comes to select an installer for your project, make sure to ask them about their experience with local and state regulations. Get specific feedback from them on how to navigate the regulatory landscape.

### LOCAL PLANNING AND ZONING

Planning and zoning requirements and permitting, inspection and interconnection processes can drive up the "soft" costs (the nonhardware or business process costs) of going solar. Taken together, these soft costs accounted for 56% of the total cost of nonresidential installed solar in the U.S. in 2019.[2]

Find out if your locality has implemented any solar-friendly policies that help reduce regulatory uncertainty and lower soft costs. These include incorporating solar energy into local planning processes and zoning codes and streamlining and expediting the solar permitting process. If your city or county has earned a SolSmart designation, it has already taken steps to make it faster, easier and more affordable for residents and businesses to install solar energy systems.

## NET METERING POLICIES

With net metering, a utility provides a financial credit for any excess energy exported to the grid. The credit typically reflects the retail rate (or is close to it). The credits can help offset the cost of grid electricity that the school uses at night or other times when solar systems are not producing enough electricity to meet on-site needs. When classes are in session and the school is consuming a large amount of energy, schools may not contribute much electricity to the grid. During summer months when energy demand is low and the solar system is still producing a lot of electricity, a school might generate excess solar power. The net metering policies in your state or utility territory can have a major impact on the economic feasibility of your solar energy system. Make sure to work with your solar contractor to understand how net metering policies affect your project's feasibility.

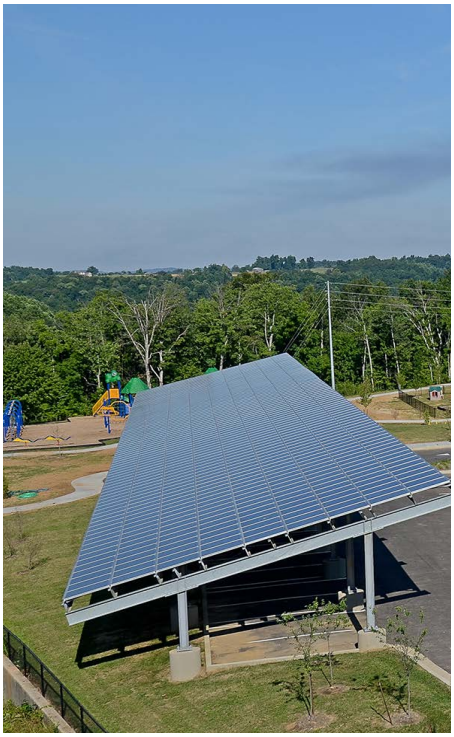
Most utilities in 40 states and Washington, D.C. are required to offer net metering programs to their solar customers, but the rules can look very different depending on where you live.[3] States and utilities are putting limits on system size, location, credit and the overall amount that can be sold to the grid. For instance, net metering can be limited by restricting the size of a solar energy system. In some cases, the system is limited to only serve the school's annual electricity load, and it cannot be oversized to sell energy to the grid. In other cases, a utility might limit the aggregate amount of solar energy that its customers can put back on the grid. Once that cap is reached, new systems can't benefit from net metering. Net metering rules can also affect solar array location. Net metering may be available for on-site solar but not for solar developed off-site. Additionally, states are starting to reduce the net metering credit and pay less than full credit or the retail rate for energy put back on the grid. If you are in a state that doesn't require net metering, your local utility may still offer it or your state may have an alternative way to compensate solar customers.

NEOCITY ACADEMY - KISSIMMEE, FL | CREDIT: LITTLE DIVERSIFIED ARCHITECTURAL CONSULTING

STEP 5:

# Prepare and Issue the Request for Proposal

After the school or district gathers the information it needs, the next step is to prepare and issue a request for proposal (RFP) to find an installer.



RICHARDSVILLE ELEMENTARY, LEXINGTON, KY
CREDIT: SHERMAN CARTER BARNHART ARCHITECTS

## TIPS FOR A REQUEST FOR PROPOSAL

The solar procurement process shares similarities with many other large equipment purchases. For example, in developing the RFP, the district needs to meet state procurement statutory requirements. The RFP should require that the responses be provided in a common format so that it will be relatively easy to compare proposals. The RFP also needs to convey the development opportunity. It should include information on project feasibility and regulatory requirements so that the installer has enough information to provide a meaningful response. If the district intends to own the system, it should seek engineering, procurement and construction firms, typically referred to as EPCs. If the district wants a PPA, it should seek solar developers who, in turn, secure financing and install the system or contract with an EPC.

The unique nature of solar energy also necessitates the inclusion of particular elements in RFPs. School districts can seek the help of a consultant to review the technical feasibility of the project, evaluate financing options, and make recommendations on the project details to include in the request for proposal.

**A list of potential solar-specific RFP elements may include, but is not limited to:**

- Protection of roof integrity and warranties
- Provisions for performance monitoring/guarantees
- System technical specifications
- Specification of a contractor required interconnection fee allowance
- Requirements for an operation and maintenance plan
- Leveraging project educational value with online data monitoring and curriculum

STEP 6:

# Evaluate and Select the Solar Developer

Once you have issued your RFP, it is critical to establish a protocol to assess the responses and select the best partner for your institution and project.

You should choose at least three submissions to consider. To ensure that the RFP evaluators are consistent in their assessments, you should establish a list of criteria and weights for those criteria in advance.

## SUGGESTED SOLAR DEVELOPER EVALUATION CRITERIA

### Knowledge & experience with similar size & type projects

- What is the quality and quantity of other solar projects completed?

### Regulatory knowledge & experience

- Have they successfully navigated your region's regulations?
- Does their team have relationships with decision makers?
- Are they realistic with timelines for regulatory approval and interconnection?

### Project leadership

- Do they identify a key contact? What is that person's experience?
- What is their time commitment to the project, and what other projects will they be managing?

### Financial return

- What is the expected return on investment for the school or district?

### Financial capacity to complete proposed deal

- Review financial reports and audits.
- How do they intend to select an EPC contractor?
- For a PPA, has the contractor already secured investors? Can they point to a track record of securing investor funding?

### Solar curriculum & training

- Do they provide curriculum or teacher professional development to support classroom instruction?
- Do they include online monitoring of solar production that can be made available to students?

### Operations & maintenance

- How adequate is their proposed operations and maintenance plan?

### Technical specifications

- What is the quality of their proposed equipment, including panels, inverters, monitoring equipment and balance of system components?

### Thoroughness & clarity of the response

- Did the contract meet all the requirements and provide sufficient information and detail?

### Customer references

- Were negotiations fair to both parties?
- Was the final negotiated agreement consistent with the spirit of the proposal?
- After the agreement, were they responsive to customer concerns?
- Were they consistent and transparent with how they track and report costs?
- Did they meet their project timeline?
- Did the solar system perform as promised?
- Is the system being maintained as promised?

## STEP 7:
# Oversee Construction and Installation

Once the solar developer is chosen, resources should be dedicated to oversee the construction and installation process and maintain regular communication with the developer throughout the process.

SANTA FE HIGH SCHOOL, SANTA FE, NM
CREDIT: SANTA FE PUBLIC SCHOOLS

### THE DISTRICT SHOULD MONITOR PROGRESS TOWARD MAJOR PROJECT MILESTONES:

- Financing
- Installer procurement
- Major regulatory approvals
- Interconnection
- Testing and commissioning
- Community relations and communications

The district may want to retain a consultant that specializes in solar project management oversight, especially if it has contracted for installation on multiple schools and buildings. Besides the items noted above, oversight should include regular inspections of the system to ensure proper performance. It is especially important to ensure that regulatory compliance is properly documented and that the systems are performing properly prior to contract closeout.

If the school district agrees to third-party ownership, the chosen developer will be responsible for selecting the installer and overseeing the installation process. Because the developer will own the system, they have a financial incentive to make sure the system is properly installed and efficiently producing electricity. Nevertheless, the district facilities staff should hold regular meetings with the developer and installation manager to review the schedule and potential change orders.

A district that plans to retain ownership will typically hire a full-service solar EPC company to install the system. Since the EPC company is not financially tied to the long-term performance of the system, the district should take a more active role in monitoring the cost, schedule and quality of installation. Districts should regularly assess the risks and risk mitigation strategies associated with those factors.

STEP 8:

# Monitor Performance, Operations and Maintenance

## After the system is built and goes into operation, monitoring and maintenance becomes necessary.

To ensure the solar energy system operates as it should for decades to come, school districts often contract with a solar company for that service.

If the district has a PPA, the developer will be responsible for these tasks throughout the term of the agreement. Otherwise, the district will typically enter into an operations and maintenance (O&M) agreement with the EPC company or another third party. The O&M agreement should delineate a schedule to monitor, inspect, and clean the equipment and help enforce the warranty. For ground-mounted systems, the agreement should cover maintenance of the grounds including mowing and any environmental commitments, such as the preservation of pollinating vegetation.

The O&M contractor should monitor system safety and report on performance. A PV system is an electrical generator, and precautions must be taken to keep schoolchildren and nonauthorized personnel away from the system. Ideally, the system is set up so that students can learn to monitor it as part of their educational experience with adequate supervision.

The contract should not only address ongoing maintenance but also the replacement of key parts. If major replacements aren't part of the O&M contract, the district should set up a reserve account to fund them. Batteries and inverters are typically the largest replacement cost items, and they typically last 10–15 years.

### HOW LONG WILL MY SOLAR PROJECT TAKE?

Timelines for solar projects can vary widely depending on the complexity of a project, internal approval processes, regulatory hurdles, and more. Below are some general benchmarks on potential project timing:

The solar development timeline to complete a project on multiple schools can take up to **two years** from inception to completion. This assumes the district is planning to install systems to meet a significant portion of the schools' electricity needs.

- School community buy in, feasibility, funding and procurement can take up to **six months**.
- Following developer selection, the permitting and interconnection process can be unpredictable depending on the state. The selected contractor might spend a **few months to over a year** addressing regulatory requirements and performing other predevelopment work.
- Time of construction will be related to project size and other complexities, such as placement of energy storage and commissioning of the system. Actual construction on-site can usually be performed in a **three-month window**, allowing for schools to schedule such work around the time of summer recesses to minimize school disruption.

How-To Guide
FOR SCHOOLS GOING SOLAR

# INTRODUCTION TO SOLAR FINANCING

HIGH SCHOOL SOLAR EDUCATION PROGRAM, PHILADELPHIA, PA | CREDIT: SOLAR STATES

# Solar Financing Options

There are a wide variety of ways that schools can finance a solar project, and this resource will introduce some of the more common ones.

When reviewing different financing options, the school or district should compare the options available for both third-party ownership and direct ownership.

**BENEFITS OF THIRD-PARTY OWNERSHIP**

- No upfront capital costs
- No maintenance costs
- Pay less than utility retail rate
- Immediate and long-term cost savings

**BENEFITS OF DIRECT OWNERSHIP**

- Potential for greater energy savings than third-party ownership
- Opportunity to add solar into construction projects and building upgrades

## Third-Party Ownership

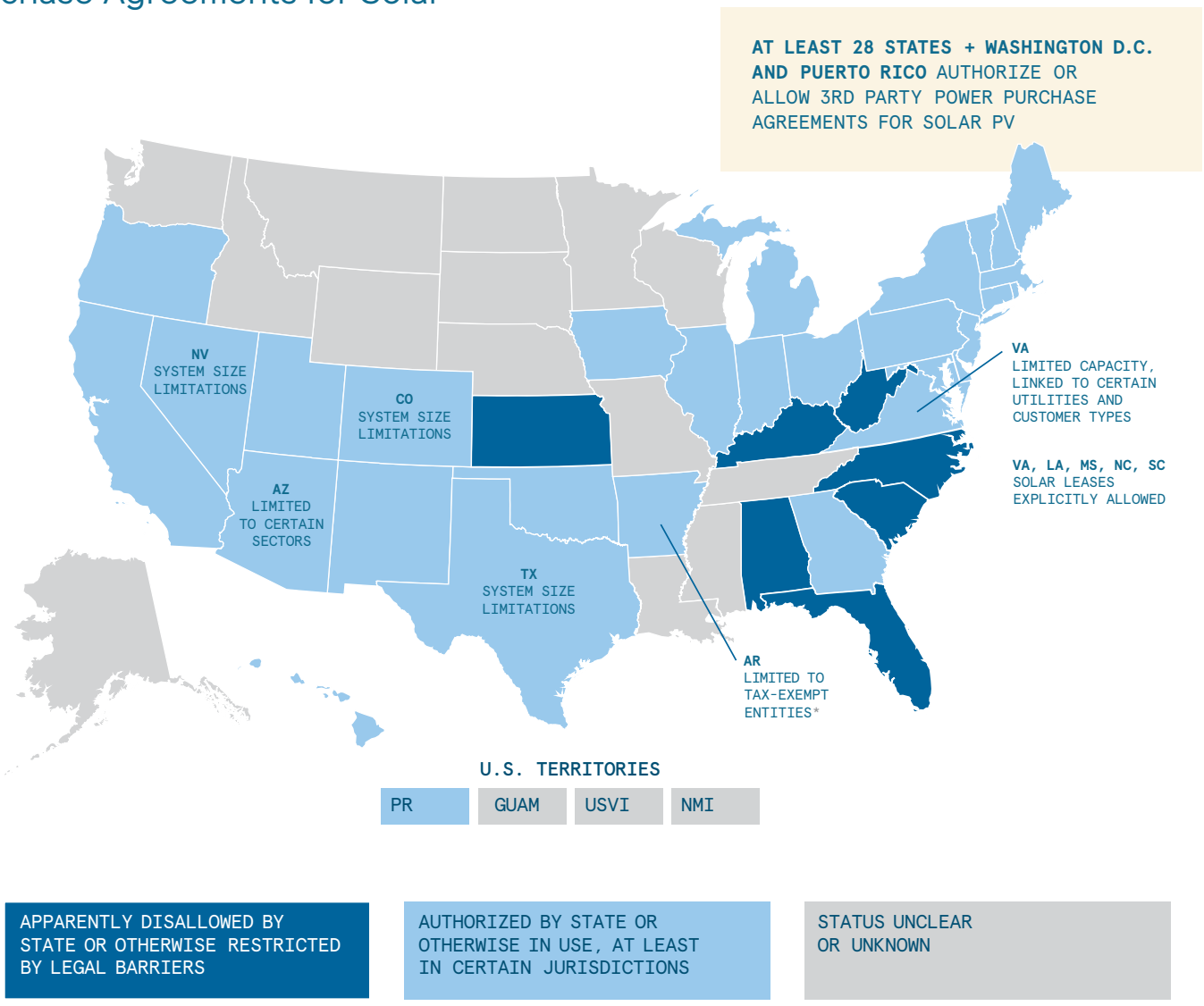
More than three-quarters of the cumulative solar capacity installed on schools nationwide was funded through a form of third-party ownership. The advantage of third-party ownership is that the third party finances, builds, owns and maintains the system, so there is little or no upfront capital investment. These arrangements are typically structured as power purchase agreements (PPAs). In a PPA, the school agrees to pay the solar company an agreed-upon rate for the solar power generated by the system that is typically below the market rate. The rate may or may not escalate over the typical 15-to-25-year life of a PPA. The agreement can include options for the school to buy the panels at certain points during the contract term or after it ends.

Another advantage of a PPA is that the solar developer can, as owner of the system, benefit from federal tax incentives such as the solar Investment Tax Credit. Because of their tax-exempt status, the schools do not receive these benefits directly. However, the third-party owner receives the tax benefit, presumably passing on some of the savings to the school by offering a favorable rate in a competitive bid.

**More than three-quarters of the cumulative solar capacity installed on schools nationwide was funded through a form of third-party ownership.**

However, third-party ownership is currently only allowed in 28 U.S. states and DC.[4] The states that allow third-party ownership account for 91% of the installed solar capacity on schools. The remaining 22 states only provide 9% of the solar installed by schools. To determine if your state allows third-party ownership, go to the NC Clean Energy Technology Center's DSIRE database at dsireusa.org/resources/detailed-summary-maps to find a map of states with third-party solar power purchase agreement policies.

## State Policies on Third-Party Power Purchase Agreements for Solar




CREDIT: DSIRE, JUNE 2019

**Only 7%** of installed solar capacity at schools was funded by a direct purchase through cash, loans, bonds or other mechanisms.

## Direct Ownership

In direct ownership, the school is directly responsible for the financing, development and operations of the system. Unlike with a PPA, the school will see direct reductions on their electricity bill based on what the solar energy system produces. Direct ownership often generates the highest return on investment, especially if the state has favorable public incentives and financing options. With direct ownership, the district will likely secure traditional financing through mechanisms such as bonds and capital budgets. Schools will typically need to first determine if the solar system will be part of a larger school expansion or building improvement capital campaign. In those cases, the larger components of the funding package will likely drive the financing approach.

Traditional financing may require the district to put together a package of grants, loans, rebates, and solar renewable energy certificates (SRECs), and more information is available below on such options. While such funding sources can offer a higher return on investment to the district, creative financing efforts can be time consuming and costly, as the district must negotiate with various funding sources to secure commitment and bear the cost of financial advisors and issuance.

The financing efficiency of the various mechanisms described here changes over time as tax benefits and other incentives, project costs, and market changes come into play. Some of the preferred school financing vehicles for direct ownership include general obligation bonds, revenue bonds, tax-exempt lease purchases and energy services performance contracts (ESPCs).

### GENERAL OBLIGATION BONDS

A general obligation (GO) bond is one type of municipal bond that is backed by the general revenue and credit of the issuing government entity. They are repaid from general revenue, such as fees and tax collections. Local jurisdictions issue GO bonds typically to fund projects, such as government buildings, roads and schools that don't have a revenue source. Because of the high transaction costs for bond financing, solar development is typically combined with other capital improvements. Since GO bonds encumber the taxing authority's debt capacity, they often require a public referendum.


SOLAR RIBBON CUTTING - TUSCON USD, AZ | CREDIT: CONSTELLATION

## REVENUE BONDS

Revenue bonds are municipal bonds that are paid back from earnings of the facility acquired or constructed with the issued bonds. Examples include projects that generate revenue, such as parking garages, toll roads, utilities and higher education. In this case, the bond proceeds fund the system, and the energy cost savings are used to repay the principal and interest due to bondholders. Since repayment depends on the success of the project or projects funded, investors typically require a higher interest rate than for general obligation bonds. But because they don't typically encumber the government's debt capacity, they usually don't require a public referendum.

## TAX-EXEMPT LEASE PURCHASES

Schools are also somewhat unique in their ability to enter into a tax-exempt lease purchase agreement. Also known as a "municipal lease," this financing mechanism allows some local governments or districts to lease solar energy equipment from a solar company at lower payments and longer terms than other leasing options. Lease payments to the solar company are low because, like a municipal bond, the company, as the investor, is not taxed on the interest they receive through repayment.

These agreements are usually not considered long-term debt, with lease payments made from operating rather than capital budgets. Unlike a true lease, title is granted to the school district when the lease is signed.[5] Therefore, neither party can take advantage of federal solar tax incentives through these arrangements. In considering this option, schools should weigh the benefits of low tax-exempt interest payments and a longer lease term against alternatives, such as PPAs, that do allow for tax incentives to be passed on to the solar company.

## ENERGY SERVICES PERFORMANCE CONTRACTS

Energy services performance contracts (ESPCs) can provide schools with another cost-effective means of investing in solar. Through these agreements, customers contract with an energy services company (ESCO) to assess the current energy use at one or more buildings and to propose a package of energy conservation measures to reduce consumption. The ESCO provides a customer with a guaranteed level of performance for these energy upgrades and ensures a minimum level of cost savings. A portion of these energy cost savings is used to compensate the ESCO for the energy upgrades, with the remainder retained by the customer.

While ESPCs have typically involved energy efficiency measures with a relatively short payback (such as energy efficient lighting, building envelope improvements, etc.), these contracts can also include upgrades with a slower payback, such as solar PV. In states that allow for third-party ownership, tax-exempt customers, such as public schools, could enter into a PPA with the ESCO for the solar PV system to be included as part of the performance contract. This allows for the customer to invest in solar with little or no upfront cost and for the ESCO to take any available tax credits and pass their value on to the customer.

CREDIT: TUCSON UNIFIED SCHOOL DISTRICT, AZ

**VISIT**

The U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy website at Energy.gov/eere/slsc/energy-savings-performance-contracting to learn more about ESPCs.[6]

# Solar Incentives

No matter which financing mechanism your schools uses, you should make sure to identify any applicable financial incentives that might support your solar development. However, because of the tax-exempt status of public schools and the local nature of some of these programs, not all options will be available in every case.

For information on specific incentives or programs for which your school may qualify, check with state renewable energy offices and organizations, other solar schools, and local solar professionals.

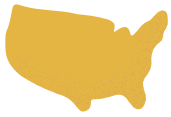
DSIRE®

**VISIT**
NC Clean Energy Technology Center's DSIRE database for a comprehensive list of federal, state and utility incentives.

dsireusa.org/resources/detailed-summary-maps

RICHMOND PUBLIC SCHOOLS SOLARBRATION, VA | CREDIT: NEED & DOMINION ENERGY

Listed below are three different types of solar incentives that may be available:



## FEDERAL INCENTIVES

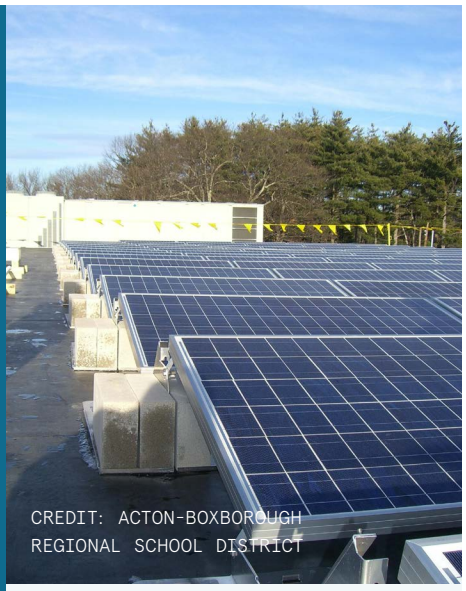
The federal incentives only apply if the school is financing through third-party ownership, such as a PPA. The two primary federal incentives supporting solar are the Investment Tax Credit (ITC) and the Modified Accelerated Cost-Recovery System (MACRS). The ITC currently provides a federal income tax credit equal to 26% of total installed system costs for commercial solar systems, including projects at schools. The ITC is available provided that construction starts by 2020, after which it will decrease to 22% in 2021, and 10% thereafter. Meanwhile, MACRS allows nonresidential solar customers to recover the value of investments in solar equipment through accelerated depreciation deductions on federal taxes.

## STATE INCENTIVES AND FINANCING

Many states offer some form of incentives or other financing options for solar. Common incentives and programs include tax credits, deductions or exemptions with as well as grants, loans or rebates. Solar renewable energy credits (SRECs) create opportunities for revenue in states which mandate renewable energy through their renewable portfolio standards (RPS) – requirements for investor owned utilities to derive a certain percentage of their retail electricity sales from renewable sources by a target year. These SRECs represent the environmental or nonenergy attributes of solar electricity, and the district can use them to offset greenhouse gas emissions. If SRECs are available in a state, they can be traded and sold and provide system owners with a significant revenue stream. When sold, the purchaser then receives credit for offsetting the greenhouse gas emissions.[7]

## UTILITY INCENTIVES AND FINANCING

Utilities may also offer consumer grants, loans or rebates for solar energy. Some utilities provide performance-based incentives (PBIs) for their solar customers. Rather than being based on the cost of the investment in solar (as is the case with grants, loans or rebates), PBIs are tied to the amount of electricity produced by a solar energy system. This provides an incentive for installers and system owners to focus on proper installation, maintenance, and performance of their systems. For example, some utilities arrange to purchase all the electricity produced by an eligible solar energy system at a rate higher than the retail price of electricity. In these “buy all, sell all” arrangements, solar customers receive larger total payments as their systems generate more electricity.



CREDIT: ACTON-BOXBOROUGH REGIONAL SCHOOL DISTRICT

**SOLAR + STORAGE IS CHEAPER THAN SOLAR ALONE**

In Massachusetts, the Acton-Boxborough Regional School District offers an example of how solar and storage can lead to greater cost savings than just solar alone.

The district is constructing a new **177,000 square foot** elementary school that will have rooftop solar, operated under a power purchase agreement, along with **4MWh** of battery storage.

If the school district had opted for solar alone, the school's energy cost would be **9 cents/kWh**. With the addition of energy storage, which can be monetized in the market, the cost falls to **4 cents/kWh.**

# Financing Solar + Storage

## Costs for adding storage to a solar energy system vary dramatically depending on the complexity of the system.

According to a study from the National Renewable Energy Lab, the costs of microgrids range from $2 - $4 million/MW. However, the pioneering school districts that are building microgrids are generally not paying for this on the taxpayer dime, but instead taking advantage of grants, utility partnerships, tax incentives, third-party ownership, and revenue from selling power back to the grid so that the project becomes cost neutral or reduces overall energy costs.

Energy resilience systems can be financed in a similar fashion, using no-money down models. Sometimes called microgrid-as-a-service, resilience-as-a-service or energy-as-a-service, these approaches are generally designed to either reduce a school's monthly electricity costs or deliver electricity at a rate no higher than what it would otherwise pay to the local utility — while adding the resilience benefits. The as-a-service approach also removes the need for schools to devote staffing to operating these sometimes complex systems. Instead, the installer generally owns and operates the microgrid. In addition, newer software-driven microgrids undertake many functions autonomously, and installers can monitor the microgrid remotely.

CREDIT: U.S. DEPARTMENT OF ENERGY, AMY KIDD

## FLORIDA HOSTS THE FIRST WAVE OF SOLAR + STORAGE AT SCHOOLS

**Florida's SunSmart Schools and Emergency Shelters program was the first mass deployment of solar with battery back-up on schools that double as emergency shelters in the United States.**

More than 115 schools in the state received 10-kW photovoltaic (PV) solar systems with battery storage, totaling over one megawatt of solar power. The project was funded by the American Reinvestment and Recovery Act of 2009. Florida's State Energy Program received the $9.8 million grant from the federal government, as well as $900,000 in matching funds from Florida utilities.

The technologies achieve cost savings in several ways which largely involve their ability to leverage their relationship with the electric grid and its frequently changing prices. Sophisticated systems monitor electric grid pricing and then operate their on-site power to achieve the lowest costs. For example, schools may charge their batteries when grid prices are low. Then when electricity prices rise, they stop using grid electricity and instead rely on the battery.

They may also participate in demand response, a program where the local utility pays the school to reduce its energy use during times when the grid is under strain, such as a severely hot or cold day. The school reduces its use of grid power by relying instead on its own on-site system during these periods.

In addition, the school may sell output and services from its on-site system. For example, the grid sometimes needs quick injections of energy when supply and demand are out of balance. Microgrids, nanogrids and solar plus storage systems can supply this energy and are paid for doing so.

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6 Learn more by downloading the guide "Energy Savings Performance Contracting: A Primer for K-12 Schools," at https://www.energy.gov/eere/slsc/energy-savings-performance-contracting

7 More information on SRECs can be found via SRECTrade (www.srectrade.com) and Flett Exchange (www.flettexchange.com).

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