Solar Master Plan

Financing Options for Solar Installations on K-12 Schools

Updated March 2017

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Financing is the key to making a solar PV project a reality in any school district. Securing financing that does not put new pressure on a district's General Fund overcomes what is typically a major impediment to PV projects. If the financing creates a new revenue stream for the district (i.e., if the combined value of the avoided electricity costs and any incentives is greater than the cost of the financing), then the district will have more money in its General Fund for teachers, programs, and other district needs.

This chapter provides an overview of the two primary models for procuring PV projects in public schools: ownership by the district and ownership by a third party (through a power purchase agreement). The overall benefits of district ownership are significant, especially over the lifetime of the PV system. Nevertheless, some districts do not have access to low-cost financing or voter-supported bonds that would make district ownership possible. In these cases, a district may find that a well-crafted power purchase agreement or other third-party arrangement is the more effective option.

Financing options for school district PV projects are always changing. This chapter was originally written in 2011, and has been revised in 2017 to provide an overview of current financing mechanisms; options may have changed by the time a district begins to seriously consider how to finance a solar PV project. Districts looking at ways to finance their PV projects should find current, reliable, and unbiased sources to help guide them through this very important and evolving element in a renewable energy system transaction.

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List of Acronyms and Abbreviations

AC	alternating current
ARRA	American Recovery and Reinvestment Act of 2009
CCA	Community Choice Aggregation
CDoE	California Department of Education
CEC	California Energy Commission
CREB	Clean Renewable Energy Bond
DC	direct current
DOE	U.S. Department of Energy
DSA	Division of the State Architect
DSIRE	Database of State Incentives for Renewables and Efficiency
ECM	energy conservation measure
EE	energy efficiency
EERE	U.S. Office of Energy Efficiency & Renewable Energy
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
FMV	fair market value
FY	fiscal year
GHG	greenhouse gas
GO Bond	General Obligation Bond
IOU	investor-owned utility
IRS	U.S. Internal Revenue Service
ITC	Investment Tax Credit
kW	kilowatt
kWh	kilowatt-hours
MACRS	modified accelerated cost recovery system
MW	megawatt
NEM	Net Energy Metering
NMTC	New Market Tax Credit
NREL	National Renewable Energy Laboratory
O&M	operations and maintenance
PG&E	Pacific Gas and Electric Company
POU	publicly owned utility
PPA	power purchase agreement
Proposition ("Prop") 39	The California Clean Energy Jobs Act
Proposition ("Prop") 51	California Public School Facility Bonds Initiative (2016)
PV	photovoltaic
QTCB	Qualified Tax Credit Bond
QZAB	Qualified Zone Academy Bond
REC	Renewable Energy Certificate
RFP	Request for Proposals
RFQ	Request for Qualifications
SMP	Solar Master Plan
STEM	Science, Technology, Engineering, and Mathematics
W	watt
Wp	watt-peak

Executive Summary

The original version of this document was published in 2011, when the Sequoia Foundation supported three California public school districts—Oakland, Berkeley, and West Contra Costa Unified School Districts—in the development of Solar Master Plans (SMPs), documents that were intended to be incorporated into the districts' Facilities Master Plans. The National Renewable Energy Laboratory (NREL) provided technical assistance to these school districts and the Sequoia Foundation as part of the U.S. Department of Energy (DOE) Solar America Showcase program.[1] One element of this assistance was the development of this resource guide for financing the installation of photovoltaic (PV) systems on California's public schools.

Much has changed in the California solar world since 2011. The California Solar Initiative (CSI), a state funded rebate program for residential and commercial solar installations has expired. Some of the federally backed bonds offered through the American Recovery and Reinvestment Act of 2009 (ARRA) that school districts used to build solar projects are no longer available. Net Energy Metering (NEM) has been maintained by the investor owned utilities (IOUs), but revised to add some charges to solar projects that are intended to avoid passing the cost of solar to non-solar customers. In the near future, we will also see changes to "time of use" rates from the IOUs, which are likely to affect the economics of solar.

On the other hand, the cost of solar has fallen dramatically while electricity rates continue to increase – both of which enhance the value of solar to school districts. We are also seeing the launch of Community Choice Aggregation (CCA) programs throughout California. CCAs take over the responsibility for procuring and/or generating electricity on behalf of the businesses and residents within the jurisdictions that establish the CCA program. To date, these new programs are offering enhancements to the existing NEM programs that are intended to encourage the installation of more local solar projects, including schools.

This updated document focuses on financial options developed specifically for renewable energy and energy efficiency projects, including the traditional methods of financing capital investments at schools. Section 1 provides an introduction to financing PV on schools, including consideration of energy efficiency, roof viability, and educational opportunities. Section 2 discusses the direct-ownership option, wherein the district selects a solar developer through a request for proposal (RFP) process, and finances the project's purchase price with cash (i.e., cash reserves or General Obligation bond), debt financing (which could include traditional tax-exempt municipal bonds), leasing, or taxable bonds that provide a form of federal subsidy. Section 3 focuses on the third-party finance model, including Power Purchase Agreements (PPAs). The "Resources" page includes a number of pertinent documents related to financing solar installations on public schools and other public facilities.

It is important to remember that all aspects of financing renewable energy systems—regardless of whether they are in school districts or in other settings—are very fluid and dynamic. Laws are changing, incentives are being offered or exhausted, federally subsidized bonds come and go, and interest rates rise and fall. Establishing the cost of projects—whether owned by a district or by an investor—also changes based on local economic conditions, tax law, installation costs,

[1] U.S. Department of Energy: Solar America Showcase
http://apps1.eere.energy.gov/news/progress_alerts.cfm/news_id=19824

utility tariffs, and how much profit an investor must make in order to participate in a third-party installation. This document is intended to provide an overview of the basics of PV projects and PV financing. Once you have a good understanding of your options, you are encouraged to seek additional help from trustworthy sources in the industry who work exclusively for school districts. While we have attempted to make the information here as accurate as possible, it is intended only to get you started. Any decisions a school district makes on this topic should be supported by professionals in the field and not solely upon what is described in this chapter.

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1. Introduction to Financing Solar Installations on K–12 Public Schools

Solar energy systems installed on public schools have a number of benefits that include utility bill savings, reductions in greenhouse gas (GHG) emissions and other toxic air contaminants, job creation, demonstrating environmental leadership, and creating learning opportunities for students. In the recent economic environment, the ability to generate General Fund savings because of reducing utility bills has become a primary motivator for school districts trying to cut costs. To achieve meaningful savings, the size of the photovoltaic (PV) systems installed (both individually on any one school and collectively across a district) becomes much more important; larger systems are required to have a material impact on savings. Larger PV systems require a significant financial commitment, and financing therefore becomes a critical element in a school district's decision to pursue solar installations.

School districts can use two primary types of ownership models to obtain solar installations and cost savings across the district. The PV installations can be financed and owned directly by the districts. Alternatively, there are financing structures whereby another entity such as a solar developer or its investors actually installs, owns, and operates the PV systems on behalf of the school district. This is commonly referred to as the "third-party ownership model" which is documented as a Power Purchase Agreement ("PPA"). Both methods have advantages and disadvantages that should be weighed carefully. There is a great deal of competition among solar vendors, especially those that specialize in K-12 school districts, so we recommend that any entity interested in a solar PV project understand all available options before entering into a contract.

1.1 Direct Ownership

If a district owns its PV systems, then it receives all of the electricity savings, any available rebates or other incentives, and also retains the associated renewable energy certificates (RECs) that allow a district to publicly claim that its PV systems are reducing the district's GHG emissions.

When a school district uses voter-approved General Obligation ("GO") bonds for the purchase of a PV system, or when the cost of repaying the loan or bond used to purchase the PV system is less than the utility bill savings, these excess funds can be used for other needed school services, such as funding teachers, materials, and programs. Given the productive life of a PV system (25–40 years), it is likely that any debt incurred to finance the project will be paid off well before the end of the useful life of the system.

A major challenge to direct ownership is the capital commitment involved. School districts rarely have cash reserves and might not have voter-approved bonding authority or access to the financial mechanisms needed to purchase PV systems. The District also simply might be unwilling to incur any new debt. Additionally, with a direct purchase, the District is responsible for operations and maintenance (O&M) for the systems, unless it signs a maintenance agreement with the solar developer—an option that is now very common. Lastly, the federal investment tax credits (ITC) available to tax-paying entities are not applicable for public entities directly purchasing a PV system.

1.2 Third-Party Ownership

The advantages of third-party financed PV installations for school districts include: little to no up-front capital investment is required on the part of the school district; districts are not responsible for O&M; private-sector tax incentives can be incorporated into the transaction, which should result in a reduction in the cost of the electricity sold to the district; and the districts can purchase the system for "fair market

value" (FMV)[1] at the end of the contracted term.

The disadvantages of the various third-party finance models and of the third-party power purchase agreement (PPA) model in particular, include the following:

- A PPA is a complicated transaction that requires the school district to invest time and money in assuring that it negotiates a fair and equitable contract. Utility bill savings will be less than if the District directly owns the system, because 100% of the solar electricity generated by the PV system must be purchased by the school from the third-party investor at a negotiated price that is less than if the electricity is purchased from the local utility.

- A PPA generally allocates the RECs to the investor, in which case the district is not entitled to claim the environmental benefits associated with clean electricity production. If the District negotiates to keep the RECs, the price of the electricity purchased from the investor will be higher.

- If, in the future, the district decides to purchase the PV system from the investor, there is no way to determine the exact purchase price in advance because the system must be sold for its "fair market value" at the time of sale.

- Unless the school district exercises its buyout option to purchase the system at the end of the PPA term, the district will not own the PV system. In such cases, the PPA should include a provision for the removal of the PV system at the investor's expense.

Regardless of how a school district decides to finance or acquire PV installations on its buildings, several key issues should also be considered, namely, benchmarking of district energy use, energy efficiency, PV siting considerations (including roof condition), the potential for school closings during and after project installation, using battery storage to avoid "demand charges" during times of peak use, and the integration of the solar PV technology into the classroom.

1.3 Energy Efficiency and Benchmarking

Energy conservation measures (ECMs) are the most cost-effective way to save energy and realize utility-bill savings. Energy efficiency improvements, if not already undertaken, should be incorporated in the planning stages prior to installing a PV system. The return on investment in PV can be enhanced when the building hosting the system is already energy efficient.

Schools can implement energy efficiency measures either prior to the PV installations or in combination with the installation. To identify schools that are most in need of energy efficiency upgrades, the schools' energy use should be benchmarked. A simple way to do this is to compare the energy use intensity—the energy use per square foot, determined by dividing total annual energy use by total facility square footage—for all schools.[2] Those with the greatest energy use intensity should be a priority for energy audits and ECM identification. The U.S. Environmental Protection Agency (EPA) offers a free benchmarking tool called ENERGY STAR Portfolio Manager, which can help identify the energy performance of a district's schools and facilities.[3] Schools with high energy performance

[1] Solar Energy Industries Association: *Valuation of Solar Generation Assets.* http://www.seia.org/research-resources/valuation-solar-generation-assets

[2] U.S. Environmental Protection Agency, ENERGY STAR. *What is energy use intensity (EUI)?* https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics/what-energy

[3] ENERGY STAR Portfolio Manager https://www.energystar.gov/buildings/facility-owners-and-managers/existing-

metrics are eligible for an ENERGY STAR certification. In some cases, the local utility can assist with energy audits and might provide rebates for some of the audit's recommended efficiency upgrades.

1.4 Solar PV System Design Considerations

Photovoltaic arrays convert sunlight to electricity without moving parts and without producing fuel wastes, air pollution, or greenhouse gases (GHGs). They require very little maintenance and make no noise. Arrays can be mounted on almost any type of building or structure, as well as in parking lots or other open spaces. A PV system generates direct current (DC) electricity, which, with the help of an inverter, can be converted into grid-quality alternating current (AC) electricity for immediate onsite consumption or for export to the grid.

1.4.1 Battery Storage

Alternatively, the DC electricity can be used to charge onsite storage batteries: in this application, batteries are not intended to provide backup power, but rather are used to avoid peaks in electricity consumption that can trigger "demand charges," which can add many thousands of dollars to a district's energy bills. As of 2016, the inclusion of battery storage is usually most advantageous for large PV projects. Additionally, some battery storage companies are offering a PPA-like arrangement where they install and own the batteries and share in the savings from reduced demand charges. Battery prices are dropping rapidly, which will make them more affordable in the future. Reflecting trends in consumer energy use throughout the day, the California Public Utilities Commission is considering shifting the peak consumption hours from mid-day (when solar panels are most productive) to several hours later in the afternoon. In this scenario, new solar PV projects may include more battery storage options to avoid these peak demand charges. This change in policy may further encourage the use of storage. Energy storage is an evolving technology and should be part of any discussion with potential solar vendors.

1.4.2 Roof Condition

Photovoltaic systems should only be installed on roofs that are in good condition and on buildings that can reasonably be expected to remain in use for the expected lifetime of the PV system (at least 25 years). Roofs should therefore be relatively new or be upgraded prior to the PV installation. Ideally, roofs that need repair or are slated for a replacement can be improved or replaced in conjunction with the installation of the PV system. It generally is not cost effective to remove a previously installed PV system to replace or upgrade a roof, although certain rooftop-PV mounting systems have been approved for installation on flat roofs by using ballasts (instead of roof penetrations) to secure the panels in place against wind and seismic forces.[4] Structural assessments might also be required to confirm that the roof can support the additional weight and wind loading. If the best sites for solar are those that need new or improved roofs, then this near-term capital expense must be budgeted for accordingly.

1.4.3 Availability of Parking Lots and Other Open Spaces

It is becoming more common for solar arrays to be installed in school parking lots, playgrounds, and lunch areas, where they provide shade while generating electricity. Because they serve multiple purposes, these PV arrays may be more likely to gain community support. Along with the benefit of shade, freestanding arrays avoid many of the structural and permitting requirements of rooftop

buildings/use-portfolio-manager

[4] California Department of General Services, Division of the State Architect. *Solar Photovoltaic and Thermal Systems Review and Approval Requirements.* 2012. IR 16-8. https://www.documents.dgs.ca.gov/dsa/pubs/IR_16-8_rev10-16-12.pdf

installations. Additionally, because they are not constrained by the design and orientation of the roof, freestanding arrays can be built to maximize their generation potential, thus generally making them more efficient than roof-mounted arrays. Such freestanding structures may be more expensive to install due to the geological surveys and pylon drilling required to ensure a solid foundation. Districts can plan restriping and repaving of parking lots to coincide with installation of solar carports.

1.4.4 School Closings

With an expected lifetime of 25 years or more, once installed, a PV system will generate electricity to offset a school's electricity load for a long time. To the degree possible, it is best to identify sites that are expected to remain in service for the foreseeable future. Although a PV system can be removed from a roof and reinstalled elsewhere in the district, this can be a costly process that also results in lost electricity production during system downtime. State regulations are evolving on the issue of whether the electricity generated by a PV system has to be consumed onsite. It is generally most beneficial for the electricity to be used onsite, though it might be possible to continue generating electricity from a school that has been closed and apply the value of the generated electricity to other electric accounts in the district.

1.4.5 Solar in the Classroom

Utility-bill savings are becoming an important motivation for school districts to install PV systems. The impact of an onsite solar installation, however, goes beyond the value of the electricity produced and the greenhouse gases avoided. Photovoltaic installations sited throughout a school district create an excellent platform from which to discuss energy issues with students, teachers, and the school community. The solar panels also provide real-world data for use in science, technology, and engineering subjects should be a key element in any district-wide solar program. The following key activities will maximize the PV system's educational benefits for students, teachers, and the school community:

- Curriculum development
- Data acquisition/monitoring system with Web access
- Training for teachers
- Training for facility staff
- Lobby displays showing real-time electricity generation, and other appropriate signage.

With large system purchases, these activities are often provided by the PV provider as part of the negotiated contract. For those districts whose contract will not include these activities, but who are still interested in incorporating the solar project into curriculum, there are organizations that can assist in this endeavor.[5] With these general concepts in mind, the remainder of this introductory report focuses on the financial alternatives available to school districts as they implement their Solar Master Plans.

[5] HELiOS Project. *Resources: Curriculum.* http://www.heliosproject.net/app_pages/view/15

2. Direct Ownership of Photovoltaic Systems

Many schools throughout the country have already benefited from on-campus solar projects. As the cost of solar installations continues to drop and panel efficiency levels increase, we anticipate that many more school districts will explore PV projects of their own. In recent years, local governments and school districts have often been the beneficiaries of low-interest or 0% interest bonds backed by the federal government. In some cases, the bonds have been used to purchase PV systems. Prior to 2009, school districts had to think creatively about financing options if they wanted their schools to become energy generators. Some California school districts chose to enter into power purchase agreements. Other districts used voter-approved bonds, school modernization grants from the state, and up-front rebate payouts to help underwrite the cost of their PV systems.

One way to avoid the "boom-and-bust" cycle associated with PV financing for school districts is to incorporate the cost of solar installations into the next request that a district makes to its residents for general obligation bonds that support school construction projects. General Obligation ("GO"), tax-exempt, municipal bonds are common financing tools for schools. Photovoltaic projects can be bundled with other investments into a much larger bond transaction. The bond cycle is relatively infrequent for school districts (every 5 to 10 years), so planning is critical if these bonds are going to be used for PV installations. The development of Solar Master Plans is a key element in this planning process. Specific sites can be identified, their solar resources can be characterized, and an estimate of costs can be determined to create a priority list of installations. By creating this list of qualified projects, a district will be ready to include them in the next funding cycle, instead of inserting vague language stating that some of the proceeds will be used for renewable energy projects and taking the risk of losing them to other investment priorities.

In addition to General Obligation Bond financing, a school district can directly purchase, own, and operate PV systems using a variety of other financing mechanisms. These include using existing reserves available from the General Fund, traditional tax-exempt lease-purchase / Certificates of Participation financing, proceeds from state transfers of funds (e.g., state school construction and modernization funds) and a variety of qualified tax credit bonds. With the exception of qualified tax credit bonds, the other mechanisms are relatively common ways that school districts traditionally finance their capital investments and are not discussed in detail. Utility rebates, if still available, also can be used to supplement the financing of the PV system.

Check the Database of State Incentives for Renewables and Efficiency (DSIRE) for all state and federal incentives, including rebates from investor owned utilities (IOUs).[6] Municipal utilities or publicly owned utilities (POUs) may also offer solar rebates; oftentimes, the cost of the electricity delivered by a municipal utility has typically been too low to make districts served by POUs attractive candidates for PPAs. That situation appears to be changing as POU rates have been increasing while solar prices continue to fall. If a school district decides to finance and own a solar energy system, it can certainly finance it with voter-approved general obligation bond proceeds and other forms of traditional tax-exempt financing, or it could use cash on hand, if available.

2.1 Using Cash on Hand

Although it is unlikely that a public school district has available General Fund resources on hand to directly purchase a PV system without financing, it is not out of the question. A district could be the recipient of grant funding, mitigation awards, or, as a result of a sale of unused property, could have the

[6] Database of State Incentives for Renewables and Efficiency (DSIRE). http://www.dsireusa.org/

resources to purchase and install a PV system. If this is the case, then the school district would install the system and immediately begin accruing utility bill savings.

2.2 State of California: Proposition 51

In November 2016, California voters approved Proposition 51, which authorizes $9 billion in general obligation bonds for public schools, reestablishing the availability of funds from the California Office of Public School Construction. This proposition will provide $3 billion for New Construction and $3 billion for Modernization of K-12 public school facilities; $1 billion for charter schools and vocational education facilities; and $2 billion for California Community Colleges facilities.[7] These funds have been used in the past for the installation of renewable energy systems on new and modernized schools. Districts should check with Office of Public School Construction to determine which of their schools are now eligible for funding.[8] It is possible the schools that were not eligible when the previous bond funding ran out, may now be old enough to qualify for Prop 51 funding.

2.3 Funds Administered by the California Energy Commission (CEC)

2.3.1 Proposition 39: California Clean Energy Jobs Act

All public school districts in California are entitled to funds resulting from the California Clean Energy Jobs Act (Prop. 39). Signed into law in 2012, the Act closed loopholes in the corporate income tax code and allocated the projected revenue to the Clean Energy Job Creation Fund. The initiative is in place for five fiscal years, beginning with FY 2013-14, and has resulted in up to $550 million available annually for eligible local educational agencies' projects to improve energy efficiency and generate renewable energy.[9] School districts must create Energy Expenditure Plans (EEPs), which must then be approved by the CEC. The California Department of Education distributes these funds. In September 2016, new guidelines came into effect, the most significant being a change in cost-effectiveness determination: the savings-to-investment ratio (SIR) requirement decreased from $1.05 to $1.01, making it more likely that energy projects will be approved for a Prop. 39 program award.[10] In order to assure funding, school districts must submit their EEPs to the CEC by August 1, 2017 to meet the statutory allocation deadline of June 30, 2018.

2.3.2 Low-Interest Loans for Energy Efficiency and Renewable Energy

Using funds resulting from Proposition 39, the CEC has a low-interest loan program available for public entities, including schools.[11] The list of eligible projects includes renewable energy projects and a host of energy efficiency measures. There are two loan types available, with interest rates of 0% and 1% per annum, respectively. With a maximum loan amount of $3 million for both types, the maximum term cannot exceed 20 years. The loan is repaid using the energy savings resulting from the project. Loans are given on a first-come, first-served basis and are based on available funding.

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[7] Ballotpedia: *California Proposition 51, Public School Facility Bonds (2016)* https://ballotpedia.org/California_Proposition_51,_Public_School_Facility_Bonds_(2016)

8 Office of Public School Construction – Project Manager District Assignments: By County http://www.dgs.ca.gov/opsc/AboutUs/PMList.aspx

[9] California Energy Commission: *The California Clean Energy Jobs Act (Proposition 39 K-12 Program).* http://www.energy.ca.gov/efficiency/proposition39/

[10] CEC: *Proposition 39: California Clean Energy Jobs Act –2016 Summary of Changes to Program Implementation Guidelines.* http://www.energy.ca.gov/efficiency/proposition39/documents/2016-07-13_Summary_of_Changes.pdf

[11] CEC: *Energy Efficiency Financing.* http://www.energy.ca.gov/efficiency/financing/

2.4 Tax-Exempt Financing

Government agencies (including school districts) can borrow from investors at tax-exempt interest rates, which are lower than taxable rates because the investor does not have to pay taxes on the interest earnings. This benefits the borrowing district because the low cost of capital provides more funds for projects while staying within their debt constraints. In addition to the aforementioned General Obligation bonds, there are several other types of tax-exempt borrowing tools available to schools. When considering the use of tax-exempt debt, borrowing agencies should consult with a financial advisor and legal counsel.

2.4.1 Municipal Leasing

Leasing equipment instead of purchasing it is another way for schools to finance certain hard assets (e.g., vehicles, software, computers, and office equipment). Leasing is used much less frequently, however, for solar installations due to the fact that the financing term necessary to provide annual cash flow coverage often exceeds typical lease terms of 12 years or less. Additionally, the owner of the PV system ("lessor") is unable to receive the federal tax incentives, given that the school, as the user of the equipment ("lessee"), is not subject to U.S. income taxes. Investment tax credits are so valuable that alternatives to a tax-exempt lease often are more attractive. For some school districts, however, the low cost and familiarity of a tax-exempt lease combined with any state rebate programs and the ability to execute a lease without voter approval could outweigh the loss of the tax credits in the transaction.

2.4.2 Qualified Tax Credit Bonds

A number of qualified tax credit bonds (QTCBs) have proven to be suitable vehicles for financing solar installations on schools, including the New Clean Renewable Energy Bonds (New CREBs) and Qualified Zone Academy Bonds (QZABs). These obligations are not tax-exempt; rather, they are taxable bonds that are eligible for a federal subsidy. The federal subsidy covers all or a portion of the interest cost, often resulting in net interest rates below the tax-exempt rate. By providing allocations of federal tax credits for certain categories of projects, the cost of capital is reduced and, ideally, more of these projects are built. CREBs are tax credit bonds aimed at renewable energy generation investments. QZABs are directed at schools and are defined broadly enough to also include renewable energy and energy efficiency. For school districts with access to allocations of different types of tax credit bonds, issuing QZABs are more likely to result in nearly interest-free financing, given the greater subsidy available for these bonds versus CREBs. Qualified Zone Academy Bonds (QZABs) and Clean Renewable Energy Bonds (CREBs) may be issued under either taxpayer-supported general obligations or as General Fund-supported obligations.

2.4.2.1 Clean Renewable Energy Bonds

Initially authorized under the Energy Policy Act (EPAct) of 2005, Clean Renewable Energy Bonds (CREBs) are an attempt to level the playing field for public entities unable to benefit from the tax incentives available to private entities. These bonds must be used for qualified renewable energy projects; in California, many school districts have used CREBs to help finance their purchase of solar PV systems.

In March of 2015, the IRS announced the availability of close to $1.4 billion in remaining funds for so-called "New" CREBs, opening the application window for governmental bodies, including public school districts (so-called "Old" CREBs were available until 2009). CREBs can also be combined with other tax credit bonds or with more traditional tax-exempt financing. CREBs differ from traditional tax-

exempt bonds in that the tax credits issued through CREBs are treated as taxable income for the bondholder.[12] As of March 1, 2017, approximately $154.2M was still available for governmental bodies.

2.4.2.2 Qualified Zone Academy Bonds

Created in 1997, Qualified Zone Academy Bonds (QZABs) are directed at schools serving significant numbers of low-income students. QZABs provide a source of funding that can be used for purchasing renewable energy systems, renovating school buildings, purchasing equipment, developing curricula, and training school personnel, but cannot be used for new building construction. There is an additional requirement: partnering with a private sector entity which makes a financial contribution worth 10% of the project cost. This contribution may include equipment donations, professional development opportunities for teachers, internships for students, and experiential learning opportunities. Most major solar vendors providing installations in K-12 schools can assist the district in making the 10% match. QZABs can be used to finance energy efficiency and solar projects, and the partnership requirements can result in relevant solar energy education and technology programs for school districts.

In 2016, the California allocation of QZABs was $49,866,000.[13] Individual school districts can apply to the California Department of Education for an allocation, or districts can apply jointly.[14]

2.4.3 Certificates of Participation / Lease Obligations

This type of obligation is typically a General Fund obligation that must be approved by the governing board and annually appropriated for payment from the General Fund (or other designated source). Certificates of Participation ("COPs") are structured with an underlying lease / lease-back structure that uses the solar installation, or other district asset(s) as security for the obligation. This lease structure may be preferable to tax-exempt leases because they often are able to carry a longer term. COPs may be sold to investors through either a direct placement or as a capital markets offering.

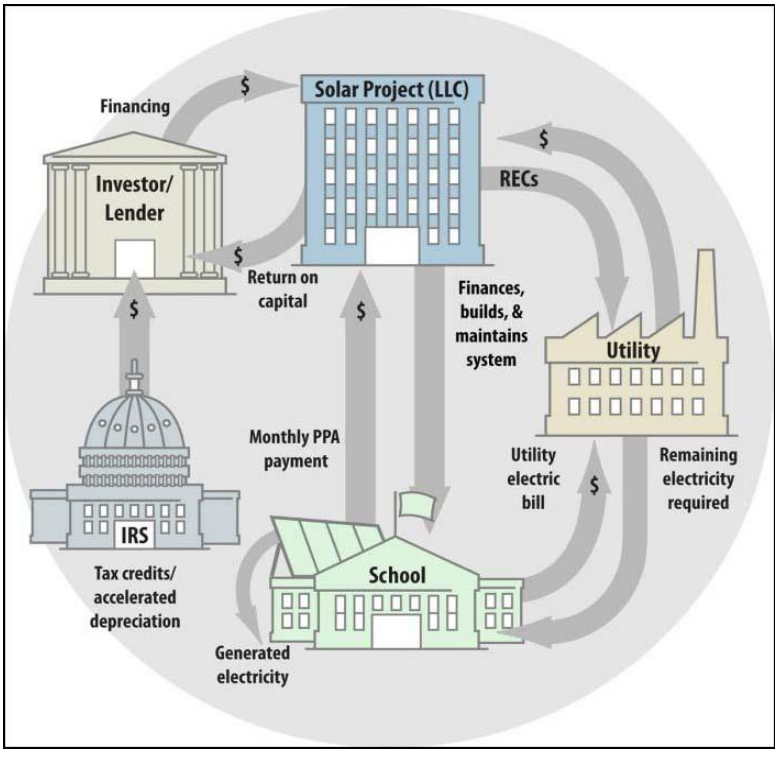
[12] U.S. Department of Energy: *Clean Renewable Energy Bonds.* https://energy.gov/savings/clean-renewable-energy-bonds-crebs

[13] National Education Foundation: *State Allocations.* http://www.qzab.org/state-allocations/

[14] *QZAB Allocations*. California Department of Education. http://www.cde.ca.gov/ls/fa/qz/introd.asp

3. Third-Party Ownership of Solar Photovoltaic Systems

Third-party ownership of solar projects is a particularly useful strategy for non-tax-paying entities, such as school districts, which cannot otherwise benefit from federal tax incentives. Here we describe how power purchase agreements (PPAs) can benefit a school district that hosts onsite PV systems, requiring little or no up-front capital investment. There are other forms of third-party ownership structures (e.g., energy savings performance contracting, or ESPC), however, these structures are not discussed here because of their limited use by California public school districts.



A visualization of the parties and transactions involved in a Power Purchase Agreement
(National Renewable Energy Laboratory, 2010)

3.1 Power Purchase Agreement

Under the terms of a solar PPA, the solar developer/investor owns, operates, and maintains the PV system and sells 100% of the solar electricity produced to the host (school district) at a fixed price for a negotiated term of up to 25 years.[15] The federal tax incentives available to businesses— the business energy investment tax credit (ITC) and accelerated depreciation—can offset as much as 50% of the installed cost of a PV system.[16] The PPA provider can then pass a portion of the savings on to the school in the form of a lower PPA cost of electricity. As a result, the third-party ownership model can be a cost-effective arrangement for many public entities that are interested in pursuing solar but lack access to the necessary funding or prefer to forego ownership for other reasons. Additionally, buyout options can be negotiated into the contract for the host to purchase the system sometime after 5 years and up

[15] Until recently, Power Purchase Agreements were commonly structured with an initial price per kilowatt-hour of electricity in the first year, combined with an annual rate of escalation in the range of 2% to 5%.
[16] Bolinger, M. *Financing Non-Residential Photovoltaic Projects: Options and Implications.* Lawrence Berkeley National Laboratory, January 2009. http://eetd.lbl.gov/publications/financing-non-residential-photovoltai

through the end of the PPA term at the PV system's "fair market value."[17]

In 2016, a number of California public school districts chose to finance their first solar projects with PPAs, including Novato Unified, Fairfield-Suisun Unified, Acalanes Union High, Rincon Valley, and Old Adobe Union School Districts. The West Contra Costa Unified School District had previously purchased solar PV systems for four of its schools, and wanted to expand to other sites in the District. Because it lacked the capital to purchase the solar PV systems directly, the District has entered into a PPA with a third party to install solar PV at 33 of its 64 school sites.

3.1.1 Advantages of Third-Party Ownership and PPA Models

- **Ability to benefit from the federal Business Investment Tax Credit.** Commercial entities can benefit from the 30% ITC. By lowering the cost of the project to the solar developer and its investors, a lower PPA price can be offered to the public-sector host of the PV system. In December 2015, legislation extended the 30% ITC through 2019, for both commercial and residential projects, so PPAs continue to be a viable financing option for school districts. The credit will decrease to 26% in 2020, then to 22% in 2021. Starting in 2022, the ITC for solar projects will drop to 10% for commercial projects and will be discontinued for residential projects.

- **Ability to benefit from the Modified Accelerated Cost Recovery System (MACRS).** Photovoltaic installations can be depreciated over a 5-year period rather than over the expected useful life, which is much longer. After five years, the investor has capitalized on all available tax incentives, and can then transfer ownership to the host. Depreciation is treated as an expense for accounting purposes and reduces the income that is subject to taxes. As it relates to PV projects, the impact of depreciation usually is greater losses for the investors, which then are used to offset other taxable gains. Like the ITC, the host benefits from accelerated depreciation in that it could allow for a lower price per kilowatt-hour of electricity in the PPA.[18]

- **No up-front capital investments.** Although installed costs are declining, the required initial investment to install a PV system is still significant. The cost of a 100-kW PV system on an elementary school, for example, can exceed $400,000. Using the third-party PPA model, it is the solar developer and investors that finance and own the system, thus eliminating the need for the host to invest its own capital into the project.

- **Stable and predictable electricity prices for 20 years.** Current PPAs offer a fixed electricity price per kWh for the length of the contract. In today's economic environment, the initial PPA price is likely to be below the utility rates that a school is currently paying. The cost of solar PPA electricity with no annual escalation is likely to be higher than a price with an annual escalation.

- **Operation and maintenance responsibility is handled by the system owner.** The system owner operates and maintains the PV system, removing this responsibility from the system's host. This includes replacing the system's inverters should that be necessary after the standard 10-year warranty but prior to the end of the PPA term.

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[17] Solar Energy Industries Association: *Valuation of Solar Generation Assets*. http://www.seia.org/research-resources/valuation-solar-generation-assets

[18] Solar Energy Industry Association: *Depreciation of Solar Energy Property in MACRS*. http://www.seia.org/policy/finance-tax/depreciation-solar-energy-property-macrs

- **Buyout option provides ownership potential.** Often PPAs can be structured so that the host has the option to buy the system from the developer at various points during the life of the PPA. The first option to buy the system takes place sometime after year 5, because ownership of the PV system cannot change before then without significant tax penalties. After that, the next available buyout opportunity could be every year, every five years, or whatever period is negotiated by the parties. If the buyout option is exercised, then the price should be discounted to reflect the tax benefits that the developer has received during the first five years. It is common in a PPA to calculate the buyout price as the greater of either a predetermined termination value or the system's "fair market value."

- **Risk avoidance.** The risk of electricity production is borne by the PPA provider. The host only is obligated to purchase what the system produces. Additionally, the PPA provider commonly guarantees a certain level of minimum production of electricity, compensating the host for any shortfall. This is especially important if retail electricity rates from the utility are greater than the PPA rates, as the host would have to purchase more expensive power from the utility to make up the shortfall of the PV system. Conversely, PV systems should not be oversized – producing more electricity than the school is likely to consume. In that case, the school district will be liable for the cost of electricity the PV system produces, but does not need.

3.1.2 Disadvantages of Third-Party Ownership

- **No free electricity.** Although the PPA electricity price should be less than retail utility prices, the host does not own the PV system; therefore, it will continue to pay for all of the electricity consumed at the facility.[19] This stands in stark contrast to owning a PV system, which generates "free electricity" (finance costs notwithstanding). In the case of a school district, which has access to funds that it doesn't have to repay directly (e.g., taxpayer-financed bonds, transfers from the state, mitigation funds), owning a PV system reduces utility bills and frees up cash in the General Fund to be used for other purposes.

- **No ownership of the "clean energy" attributes produced by a PV system.** Whoever owns the PV system claims its environmental benefits, unless those benefits have been sold to another party, such as the utility. If a school district has signed a PPA, it cannot make explicit environmental claims, such as being "solar-powered", unless the PPA allows the district to retain the renewable energy certificates (RECs). Allowing the district to retain the RECs, however, can make the transaction less attractive for the solar developer unless it can negotiate a higher PPA price. Therefore, electricity-only PPAs are most common. If the solar RECs have not been bundled with the electricity, public claims of being "solar-powered" must be tempered, given that only the owners of the RECs can make such a claim. One solution, however uncommon in school district transactions in California, is to purchase RECs—usually less-expensive wind or biomass RECs—to "green up" the project.

- **Transaction costs are high.** Negotiating a PPA is very labor intensive: an RFP is developed and issued to select a solar developer, with whom the PPA and the lease agreement must then be negotiated. This negotiation process can easily take 3 months or more. To recoup some of these transaction costs, some PPAs include a requirement that the solar developer must reimburse the host for expenses incurred. These costs, of course, are in turn recouped by the developer, usually

[19] A district is obligated to purchase all the electricity produced by the PV system it hosts. If additional electricity is required, then it must be purchased from the local utility at the utility's standard rates.

in the form of an increased PPA price.

- **Project will likely need a large, "anchor" PV system.** The PPA providers will seek the opportunity to install one or more large PV systems in a school district for the transaction to benefit from economies of scale. Placing numerous small PV systems on many school buildings is unlikely to be cost effective. Ideally, for example, a high school that can host a system as large as 1 MW or greater to anchor a system-wide PPA project could be required. In the absence of a large installation, costs will increase. Projects that rely on a number of small systems also risk falling apart should the "anchor" drop out.

- **Facility access by third parties is necessary.** The developer and its subcontractors need access to the site to install the PV system and then to maintain. For school districts, access must be coordinated so that students and faculty are not disrupted during the installation process. For certain facilities, this might be a concern; for others, such as a maintenance facility, it could be less so.

4. Conclusion

We have presented a variety of options and considerations for school districts that are planning energy efficiency and renewable energy projects. Both district owned and third-party ownership alternatives are feasible, depending on the particular circumstances of each district. If you are interested in further exploring the feasibility of solar for your school district, we encourage you to review the resources below.

Trailblazers are another excellent source of inspiration: consider reaching out to those school districts in your region that have already "gone solar." Due to a variety of factors, however, every district presents unique opportunities and challenges for solar projects. Keep in mind that while your neighboring school district chose Vendor A, your district may be better served by the solar solutions offered by Vendor B. A well-crafted RFP will solicit proposals that allow for an "apples to apples" comparison of vendors, and will ultimately identify a solution that is tailor-made for your district. To ensure that you get the most from the RFP process, we highly recommend working with an independent solar procurement consultant to craft the RFP and assist with the vendor selection process. The consultant will advocate for your district to ensure that you get the best value deal possible. And finally:

Never sole-source a solar project. Always use an independent solar procurement consultant to develop your RFP and then put your project out to public bid.

5. Resources

5.1 Online Resources for Impartial, Up-to-Date Information

- Updated information and resources are available on the HELiOS Project website: http://www.heliosproject.org
- "Energize San Carlos Schools" program is funded through Prop. 39 and implemented by the nonprofit Strategic Energy Innovations. http://www.energizesancarlosschools.org
- Energy Efficiency Financing. California Energy Commission. http://www.energy.ca.gov/efficiency/financing/
- Clean Renewable Energy Bonds. U.S. Department of Energy. https://energy.gov/savings/clean-renewable-energy-bonds-crebs
- Qualified Zone Academy Bond (QZABs). U.S. Department of Education. http://www2.ed.gov/programs/qualifiedzone/index.html
- ENERGY STAR Portfolio Manager. U.S. Environmental Protection Agency. https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager
- SunShot Initiative. U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy. http://energy.gov/eere/sunshot/sunshot-initiative
- Go Solar California: The "Go Solar California!" campaign is a joint effort of the California Energy Commission and the California Public Utilities Commission. The goal is to encourage Californians to install 3,000 megawatts of solar energy systems on homes and businesses by the end of 2016, making renewable energy an everyday reality. The program also has a goal to install 585 million therms of gas-displacing solar hot water systems by the end of 2017. http://www.gosolarcalifornia.ca.gov
    - Database of Solar Installers, Contractors, and Retailers in California http://www.gosolarcalifornia.ca.gov/database/search-new.php
- The Solar Access to Public Capital (SAPC) working group has completed development of standard residential lease and commercial power purchase agreement (PPA) contracts available for use by developers, customers, and third-party finance providers in the solar industry. https://financere.nrel.gov/finance/solar_securitization_public_capital_finance

5.2 Sample Requests for Proposals (RFPs)

Below are examples of RFPs that have been used by California schools districts that resulted in the completion of successful solar projects.

San Carlos School District

- In June 2015, this district released an RFQ for a solar consultant http://www.scsdk8.org/wp-content/uploads/RFQ-San-Carlos-Solar-Procurement.pdf

San Rafael City Schools

- RFP released in March 2017: http://www.heliosproject.net/files/managed/Document/241/SRCS%20RFQ-P%20for%20Solar%20Procurement%203-2-17.pdf

5.3 Third-Party PPA Documents

- Milpitas Unified School District Power Purchase Agreement with Chevron Energy Solutions: https://musd-ca.schoolloop.com/cms/page_view?d=x&piid=&vpid=1217983977356

- National Renewable Energy Laboratory: *Power Purchase Agreement Checklist for State and Local Governments*. http://www.nrel.gov/docs/fy10osti/46668.pdf

- Solar Power Purchase Agreements: A Toolkit for Local Governments. Interstate Renewable Energy Council (March 2015). http://www.growsolar.org/wp-content/uploads/2015/08/IREC-PPA-Toolkit.pdf

- The Solar Access to Public Capital (SAPC) working group has completed development of standard residential lease and commercial power purchase agreement (PPA) contracts available for use by developers, customers, and third-party finance providers in the solar industry. https://financere.nrel.gov/finance/solar_securitization_public_capital_finance

- Writing a solar Request for Proposals (RFP) http://www.thesolarfoundation.org/steps-to-a-successful-solar-request-for-proposal/