

Highlights of Presentations with contacts and resources  
Oct 7, 2015  
Delaware Valley Friends School

# Sustainability Starts with Us Now

For CFOs, Business and Facility  
Managers and other school  
stakeholders

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## Background

All adult members of a school community are educators. Whether you work in the business office, facilities or in another administrative role, you are models and examples to our students and their families. You are an important resource to our students and further, to our communities. You have the expertise we need the most. You know how to run efficient buildings. You are the ones who can insist that our school buildings use the least energy possible – no one here wants to waste energy or anything else for that matter. What you do in your buildings to reduce waste, to create efficiency, improve conditions for health and safety and to lower emissions can be described, in our current context as nothing less than heroic. Your decisions and actions help speed the adoption of high efficiency products, reduce emissions and make efficiency and renewable energy visible – encouraging others to follow in your footsteps.

Our schools really matter in the transition to renewable energy. The question is no longer ‘Will the world one day be entirely supplied with renewable energy?’ but rather ‘When?’ In fact, an increasing number of cities and regions have already embarked on that journey by setting the goal of 100% renewable energy; some have even reached the target already. The key to successful implementation is to share the benefits of decentralized and modern power generation throughout society by including our schools and communities in the process.

What schools do to lead the way in Pennsylvania is important. Pennsylvania has less than 0.2 percent of the world population but approximately 1 per cent of global greenhouse gas emissions, Pennsylvanians emit much higher per capita emissions compared to the rest of the world. And because PA emits 1% of world GHGs, in a ranking of national emissions, were you to count states as individual nations, you would discover that we are ranked 11th globally. PA ranks third highest in US state emissions after Texas and California. The good news is that efficiency and solar adoption by K-12 schools has increased rapidly in the last few years. In 2013, Pennsylvania schools ranked 6th in the nation for solar capacity producing 11,000 KWH/per year.

While many schools have already realized the cost savings and other benefits of installed solar energy capacity, this opportunity is generally underutilized and is a key reason for this forum.

The large, flat rooftops typically found on public and private K-12 school buildings make many of these properties excellent candidates for rooftop solar photovoltaic (PV). School parking lots can be put to productive use with solar PV canopies, which provide the added benefit of shading parked vehicles on sunny days. Tracts of vacant land on campus can be used to support modestly sized solar PV farms. Taken together, this untapped potential for solar on K-12 schools is immense. If each of the more than 72,000 schools in the US for which solar could represent a cost-effective investment were to install an average-sized system, total PV capacity on K-12 schools would reach 5.4 GW – an amount equal to more than one-third of all the solar PV capacity currently installed in the United States. (Source: <http://www.seia.org/research-resources/brighter-future-study-solar-us-schools-report>)

## **The Agenda**

The program focused on 1) efficiency, 2) options for purchasing renewable electricity and 3) the process for considering and funding the generation of local renewable energy. We concluded with information regarding broad based sustainability opportunities for schools from the PA Green and Healthy Schools Partnership and closed with lessons learned from our host, Bob Mueller, the CFO from Delaware Valley Friends School.

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- While the target audience was Pennsylvania, we have included resources and links that will serve schools in all parts of the country.

## Focus 1A Conservation and Energy Efficiency

- Tom Schneider, Director of Facilities and Operations for North Penn School District.  
Contact: [schneit@npenn.org](mailto:schneit@npenn.org)
- Dianne Herrin and Paul Spiegel of Practical Energy Solutions.  
Contacts: [dherrin@practicalenergy.net](mailto:dherrin@practicalenergy.net), [pspiegel@practicalenergy.net](mailto:pspiegel@practicalenergy.net)  
Web: <http://www.practicalenergy.net/>

A surprising percentage of a school's reductions can be done without spending any money.

### **Benchmarking is the necessary first step.**

Look at your current energy performance. This is the most important part of energy management. Without benchmarking, you cannot identify your performance gaps or measure your progress. For example, many schools have conducted lighting upgrades, but have not tracked the results of these upgrades. Tracking energy and cost savings can provide valuable information to support future energy reduction projects. Many schools have reduced their emissions and as a result have avoided millions of dollars of energy expenses.

**One recommendation is to use the Energy Star Portfolio Manager.** This is a free online tool. Use it to inventory and assess all your buildings. The program allows you to compare yourself with comparable buildings in other parts of the country.

### ENERGY STAR (ES) Portfolio Manager

- *The simplest and most comprehensive benchmarking tool.*
- *Benchmarked against 50,000 other buildings.*
- *The ES Rating is understandable.*
- *This rating is directly proportional to the energy intensity of the building (kBtu/square foot/year).*
- *Rates buildings on a percentile basis from 0 to 100 with all ratings over 75 considered ENERGY STAR rated and high performing.*
- *You can also input data from previous years to track changes over time and assess the impact of particular upgrades or equipment purchases.*

### ENERGY STAR Case studies - Success in Two School Districts

#### Ø Council Rock School District

- 49% energy reduction in less than 60 months

#### Ø North Penn School District

- 37% energy reduction in 4 years (2008 to 2012)
- 28% of that reduction in 2 years (2011 to 2012) and maintaining that level through 2015

### **Recommendations**

- Always use the ES Rating or Energy Intensity (EI) when comparing building performance.
- Many people compare \$/Sq. Ft. to prove building performance. This is not an accurate comparison because of the differential cost of energy and different systems.

## Resources

Energy Star: <http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

<http://www.energystar.gov/buildings/about-us/how-can-we-help-you/benchmark-energy-use?s=mega>

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All of this information is easily downloaded from ENERGY STAR. The next step is to decide where to focus your efforts. It is best to focus on the “Biggest Bang for your Efforts”. We do this by comparing the Energy Intensity of a building, the buildings total annual expenditure as it relates to the total district expenditure.

**Aggressive conservation and efficiency measures are the second step** for schools, after benchmarking. In the transition to renewable energy, it is essential to only install a solar or wind system for the actual energy you need. In terms of spending, it is cheaper to create 100KW in efficiency than to generate 100KW. Whatever percent you reduce your actual use, you can apply to the size of the solar or wind system you install.

**Significant savings and emissions reductions may be achieved through both energy efficiency and energy conservation.** Conservation means using less or actually doing without a product or service. This is usually accomplished by behavior change and the use of mechanical controls and defaults. Energy efficiency means that you are getting the same output or service, but with less energy than was previously needed for the same service. Efficiency is often measured with the number of units of input in relation to the number of output units.

Practical Energy Solutions (of West Chester, PA) has 17 years of experience in energy education with schools. They have **identified 5 key elements for successful integration of conservation, efficiency and installation of renewable energy.** These include:

1. Prequalify schools. Behavior change programs don’t succeed in schools with significant deferred maintenance issues.
2. Include students directly in the assessments of energy use and in the presentation of the results to decision makers. Aside from being educational and more efficient (as often staff do not have time to undertake the inventory), the hands-on experience is transformational and empowering and can be used to support required state academic standards.
3. The efforts need to be motivational – in the sense of understanding that we are all motivated by what we believe works and what we see (and believe) other people are doing.
4. The program needs to remain visible and individuals must receive positive feedback for their efforts. Habits take time to develop.
5. Consider how you can support both a bottom up and top down approach to achieving your sustainability goals. Leadership is critical to success – a mandate of sorts is often

needed. Can you establish a sustainability coordinator position, a sustainability/energy committee at the faculty, board and parent level?

**The 4 keys areas where schools have the greatest opportunity for both efficiency and conservation**, thereby achieving significant reductions and savings include:

1. HVAC – for existing buildings purchasing highest possible efficiency models to replace equipment at or near the end of its usable life expectancy. For new buildings – consider the minimum, medium and high efficiency models and compare the cost difference and pay back periods.

2. Domestic hot water

3. Lighting – LEDs, dimmers, day lighting, sensors, etc. can have up to a 50% improvement in efficiency

4. The building envelope

### **Other recommendations**

Regular assessments of facilities and equipment are recommended every 5 years to determine what the best replacement options are. This prevents emergency purchasing which locks your institution into sub-optimal equipment for 15 years or more. Do your own research on the highest efficiency models.

Training your facilities and maintenance staff is critical. Likewise, orientations and training for students and teachers will improve your conservation outcomes.

### **Web resources:**

- [http://www3.epa.gov/statelocalclimate/documents/pdf/k-12\\_guide.pdf](http://www3.epa.gov/statelocalclimate/documents/pdf/k-12_guide.pdf)
- [http://apps1.eere.energy.gov/buildings/publications/pdfs/energysmartschools/ess\\_o-and-m-guide.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/energysmartschools/ess_o-and-m-guide.pdf)
- <https://www.school dude.com/Portals/0/Public%20Content/White%20Papers/wp-energy-k12.pdf>

## Focus 1B. Models for Funding Efficiency– Performance Contracts

Bruce Stultz, Program Advisor for PennSEF. Foundation for Renewable Energy & Environment (FREE) 717-686-7150 Contact: [bstultz@freefutures.org](mailto:bstultz@freefutures.org) Web: [freefutures.org/PENNSEF](http://freefutures.org/PENNSEF)

What if, rather than directly paying for energy upgrades, you were able to pay for the upgrades through the savings the upgrades allow? The information that follows is a case example in Pennsylvania; similar programs are available in many other states as well.

The Pennsylvania Treasury Department has partnered with the Foundation for Renewable Energy and Environment (FREE), offers a prudent, market-based investment vehicle that promotes energy and water efficiency, clean energy generation, economic development and environmental improvement.

To achieve this goal, FREE established The Pennsylvania Sustainable Energy Finance Program (the Program; also PennSEF). They will provide technical and legal assistance, as well as low-cost capital, for energy improvement projects by municipalities, universities, schools and hospitals – the so-called “MUSH” sector (including counties and governmental agencies).

Under the Program, participating organizations in the MUSH sector (Participants) will receive free energy audits from energy service companies, or “ESCOs.” Only projects whose proposed improvements are projected to generate sufficient savings to pay for themselves can be approved to move forward. Once projects have been defined and the Participants have decided to proceed, bonds will be issued to finance the improvement work. By aggregating the projects in a single financing, the Program will provide Participants with better financing terms than would be available individually. The energy and water cost savings from the projects will be guaranteed to be sufficient to repay the bonds.

### Key Features of Performance Contracts

Performance Contracting/Guaranteed Energy Savings Act in Pennsylvania (GESA) is a construction procurement tool. The contractor (ESCO) guarantees annual savings resulting from project upgrades will cover annual repayment costs. It is a Public/Private Partnership with shared benefits and risks. GESA has been primarily promoted by contractors (ESCO's).

### How does it work?

1. Participant enters into Lease with the Issuer in which it agrees to make quarterly payments for installation of energy/water conservation measures (“CMs”).
2. Participant enters into a Guaranteed Savings Agreement (“GSA”) with an Energy Service Company (“ESCO”), which constructs CMs and guarantees annual savings for the life of the agreement.
3. Participant and ESCO enter into Program Agreement and agree to report performance of the CMs and job creation.



4. Issuer issues bonds secured by payments under the Participants' leases.

#### General features

- Low financing rates are available in the bond markets
- Long-term financing allows deep retrofits to be self-funding
- Pooled financing saves on average financing costs and permits smaller projects to take advantage of bond financing
- Program provides negotiating leverage

#### Specific PENNSEF key features:

- Prequalification of local and national energy service companies (ESCOs) through an RFQ process
- Standardized documentation that facilitates pooled financing – which lowers costs for *all* participants
- Guaranteed Savings Agreement is a transparent construction contract with a strong guarantee and spells out a monitoring and verification (M&V) plan in detail
- Guarantee is based on energy and water savings alone – operational savings, deferred maintenance are a bonus
- FREE's legal, financial and technical team assists throughout negotiations

#### Thinking about an Energy Performance Contract

This is a budget neutral approach. You pay for your improvements based on savings over time. You do not incur additional debt. Upgrades are paying for themselves. All the costs must be in the agreement.

You need to know your facilities and what you want to accomplish. Look at developing a project and the time of the pay back based on the work you want done. The project can go up to 20 years; some can be under 10 years. If including deferred maintenance, it will likely take longer. Fifteen percent of project can be non-energy related.

As mentioned earlier, this is a public/private partnership, and unlike a traditional relationship with a contractor who does the work and leaves. In this case, the contractor has to stay involved to guarantee the savings are achieved.

Earlier Energy Performance Contracts began with a holistic approach. The contractors tried to consider all the facilities systems as an integrated whole. While logical, the projects were generally very large and expensive. Many schools found the entire prospect overwhelming. Most ESCOs only worked with large schools and high budget projects. Larger ESCOs like Siemens, Johnson controls, and Honeywell were only interested in projects of \$5 million and up.

More recently, new companies, which are not tied into any particular product, are willing to look at projects of \$500,000 to several million. They are willing to do projects in multiple phases and start with smaller projects.

In short, this is a procurement tool using your existing funds. You incur a form of debt, but now with PENNSEF program (or similar programs in other states) there is a great opportunity. PENNSEF can support you find funding for smaller projects to get low cost bond offerings. And they can guide you on understanding legal issues and offer practical consultations.

### **Resources**

- **The Energy Services Coalition (ESC)** is a national nonprofit organization composed of a network of experts from a wide range of organizations working together at the state and local level to increase energy efficiency and building upgrades through energy savings performance contracting. Web: <http://www.energyservicescoalition.org/performance-contracting>
- PennSEF Web: <http://freefutures.org/pennsef/about/>
- Powerpoint: <http://freefutures.org/pennsef/about/pennsef-in-a-nutshell/>
- Energy Star Document of Performance Contracts for Energy Web: [http://www.energystar.gov/ia/partners/spp\\_res/Introduction\\_to\\_Performance\\_Contracting.pdf](http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf)

## Focus 2: Purchasing from Renewable Sources (Paul Spiegel)

Another step schools can take to shift to renewable energy is to purchase electricity from renewable providers. We have all been conditioned just to ask what the lowest price is. But we don't ask, "What will it cost us to *not* poison our air or our water?"

As a bigger buyer, and one whose energy needs tend to decrease in the summer when electricity is more expensive, schools have the potential to get a good price for green energy or green energy certificates. This is especially true if schools purchase through an aggregator. Typically you can buy wind credits, which are often the cheapest.

Westtown School, for instance, sells its solar credits (SRECS) generated by the 44 kW solar panels on campus, and that more than covers the extra cost to the school to buy *100% wind credits for the entire campus*, locked in at a very competitive rate for 3 years. The School has been recognized by the EPA as a Green Power Partner and also received LEED credits towards its new Gold Certified Science center because of purchasing "green" electricity certificates – a win win win situation.

Additional information from DOE on purchasing renewable:

<http://energy.gov/energysaver/buying-clean-electricity>

You will get points for LEED applications, and will want to get green certified electricity.

Get the price on conventional electricity and renewable and compare. We have all been conditioned just to ask what the lowest price is. But we don't ask, what will it cost us to not poison our air or poison are water?

Generally schools look for fixed rather than variable rate. Lock in, if possible, for 2 or 3 years. You may pay a bit more, but you will have a rate you can count on in your budgeting process.

For additional information from DOE on purchasing renewable see Appendix D.

Several organizations offer green energy or renewable energy certificates that can be purchased separate from your current electricity service. (Source: <http://energy.gov/energysaver/buying-clean-electricity>)

### Resources:

Green Power Partnership on where and how to purchase green power.  
<http://www3.epa.gov/greenpower/buygp/index.htm>

Guide to Purchasing Green Power  
[http://www3.epa.gov/greenpower/documents/purchasing\\_guide\\_for\\_web.pdf](http://www3.epa.gov/greenpower/documents/purchasing_guide_for_web.pdf)

Short video on RECs. [https://www.youtube.com/watch?v=\\_12VYXms6-c](https://www.youtube.com/watch?v=_12VYXms6-c)

Non profit aggregators with renewable options:

- Groundswell (Mid-Atlantic) <http://groundswell.org/about/>
- Good Energy <http://www.goodenergy.com/store>

### Focus 3A.1 Models for Funding and Installing Solar PV – Option 1: PPA

- James Hayes, a Renewable Energy Professional from the Stone House Group Contact: [hayes@theshg.com](mailto:hayes@theshg.com) Office: 610-868-9600 Direct: 484-239-7398 Web: [www.theshg.com](http://www.theshg.com)
- Mark J. Connolly PE, RER Energy Group. Contact: [markjconnolly@gmail.com](mailto:markjconnolly@gmail.com)

Many schools are in a position to generate local electricity for school energy needs. Reasons for installing solar:

1. Over time, solar can serve as a key hedge against projected increases in utility rates.
2. As a clean energy technology, solar can provide deep reductions in greenhouse gas and criteria air pollutant emissions, helping to protect students' health.
3. Among its environmental attributes, solar PV on schools can also help to save water, as it uses a mere fraction of the water required to produce electricity by conventional means.
4. Solar installations on schools provide teachers with a unique opportunity to teach concepts in science, technology, engineering, and mathematics and pique student interest in these critical subjects.
5. Transmission losses are minimized with decentralized systems.

There is a federal solar tax credit of 30% currently in place which makes it possible to partner with a third party to make solar affordable for schools.

#### Federal Investment Tax Credits

- 30% tax credit for Solar, Wind, Biomass, Fuel Cells
- 10% tax credit for geothermal, CHP's

**This 30% tax credit will be reduced to 10% beginning in January 2017.** The tax credit is the base for the development of Power Purchase Agreements (PPA). When using a PPA, a third party who can take advantage of the tax credit provides the capital for a solar or wind installation. The school leases space on a building or buildings or on its grounds for the installation and your school agrees to purchase all its electricity through the PPA at a fixed rate, generally over the course of 20 to 25 years. (For additional information see the *Appendix C: First Steps for Going Solar – A Practical Guide*)

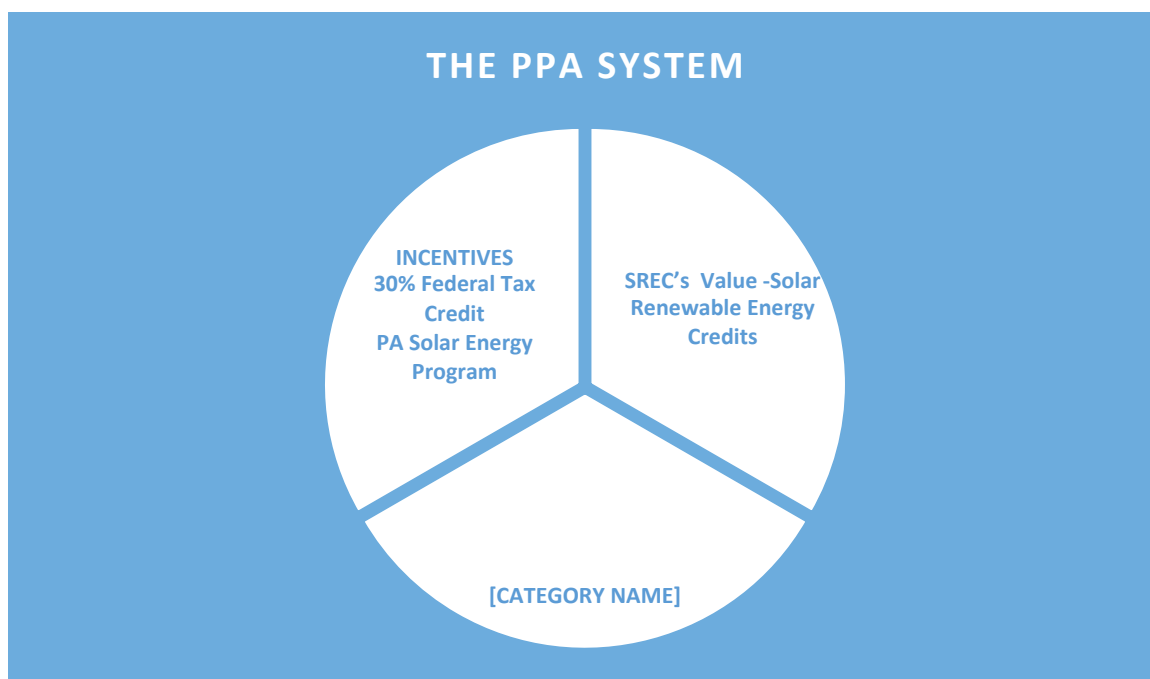
Examples include Elizabethtown College's 2 MW system which gives them a fixed rate around \$.08 for 20 years. Dickinson College has a PPA for 3MW system with a fixed price of under \$.08 per kWh for 25 years. PPA rates for both projects are below what each College is currently paying for electricity. Aggregating systems together to achieve economies of scale is what really helps to drive PPA rates down.

The best arrangement is to aggregate the energy needs to create economies of scale and drive construction costs down. The benefit of a fixed rate like this is that no other cost in your budget can be frozen and made so predictable. **PPAs are practical in Pennsylvania, particularly if schools can work together to reach an installation that totals 2-3 kWh with individual systems ranging in size for 50KW to a MW.**

## Case Study: Why did Solar Work Financially for PAISBOA?

### Goals for PAISBOA PPA Solar Installations

- Educational Benefits
- Environmental Statement
- Price Stability
- Price Reduction
- No O&M Costs
- No Construction Capital
- Aggregated Purchasing
- Vetted & Approved Contracts



### Solar Project Finance – roles of each stakeholder in a Power Purchase Agreement (PPA)

- PPA providers provide:
  - Capital for system installation
  - Management during solar installation
  - Ongoing O&M services
  - Online data
- PPA providers requires:
  - 20-25 year lease of land where array is installed

- Annual payments for electricity produced
- Investment Tax Credits
- SREC's produced by the system

#### **In a solar lease . . .**

##### **• School's Provide & Receive:**

- Capital for system installation (typically debt)
- Management during solar installation
- Ongoing O&M services
- Retain SREC's
- "Free" electricity

##### **• Tax Equity Partner Provides:**

- 10 year equipment lease w/ buyout
- Appetite for Investment Tax Credits

#### **Case study of the Berkshire School**

"PowerPlay Solar Development has developed and commissioned a 2 MW solar installation on the campus of [Berkshire School](#). It is the largest operating facility of its kind at any prep school in the country and one of the largest installations on the campus of any school, including colleges and universities (as well as one of the biggest solar installations in all of New England). The solar plant will generate approximately 45% of the school's electricity needs on an annual basis.

Berkshire School is an environmental leader among private schools and has a very aggressive plan of achieving carbon neutrality by 2016. The project is part of a sustainability master plan submitted by Berkshire students to the school's Board of Trustees. The school has locked in a lower cost of power through a long-term PPA (power purchase agreement). PowerPlay Solar is also working with Berkshire School on maximizing the value of all aspects of the project including; curriculum, public relations, alumni relations and community outreach.

PowerPlay Solar partnered with Spire Solar Systems, the engineering, procurement, construction firm (EPC) based in Bedford, MA, to construct the facility that occupies 9 acres on the east side of Berkshire's 500 acre campus. The Berkshire School ground-mounted system is composed of 8,332 solar panels manufactured in the USA." (Source: <http://www.powerplaysolar.com/berkshire.html>)

Additional article: <https://thejournal.com/articles/2011/11/17/massachusetts-school-completes-2-mw-solar-installation.aspx>

## PAISBOA Solar PPA Program - Phase I

PAISBOA offered Pennsylvania schools an opportunity to work together to develop a PPA for solar installation. Five schools participated in Phase I.

No. of Schools: 5 (3 roof, 2 ground)

Size: 2,692.76 kW (aka 2.7 MW)

Total Cost: \$13.1 mil.

Total Grant Awards: (\$ 3.1 mil.)

Total ITC Value: (\$ 3.9 mil.)

Net Cost: (\$ 6.1 mil)

Gross Cost per Watt \$4.85/Watt

Net Cost per Watt \$2.25/Watt

Total Construction by Schools: \$0

Average Large Solar Rate \$0.0677/kWh

Average Small Solar Rate \$0.0936/kWh

Average Electric Rate Reduction: 33%

Annual Direct Solar Savings: \$100,000

Schools	Size	Production	Grant	Annual kWh Savings	Annual Direct Solar Savings:
<b>Ancillae-Assumpta Academy</b>	101.64 kW (5 roofs)	112,000 kWh	\$127k	33%	\$44,600
<b>Delaware Valley Friends School</b>	83 kW (3 roofs)	90,700 kWh	\$125k	33%	\$4,900
<b>Springside Chestnut Hill Academy</b>	194.04 kW (5 roofs)	215,000 kWh	\$270k	36%	\$1,400
<b>Moravian Academy</b>	1296 kW (6 acres)	1,500,000 kWh	\$1.4 mil.	31%	\$44,600
<b>CFS, The School at Church Farm</b>	1018.08 kW (5 acres)	1,120,000 kWh	\$1.2 mil.	31%	\$33,100



## Focus 3A.2 Models for Funding and Installing Solar PV – Option 2: CPPA

Community PPAs may be an excellent strategy for schools.

“Community-owned PPAs are similar to traditional PPAs, with the exception that members of the community create a third-party entity to own the system on behalf of the school in order to take advantage of tax incentives. This third-party entity (made up of community members) owns and operates the solar system and the school pays this entity for the electricity produced by the panels on its building.

The benefit of a community-owned PPA is that members of the community can support a solar project financially while still earning a modest return on their investment [or choosing to forego a return]. Walnut Gulch School in California was one of the first schools to pioneer the community-owned investment approach and many others have since followed. [Sidwell Friends School](#) in Washington, DC teamed up with Common Cents Solar of Chevy Chase to install 120 solar panels on its gym roof. To fund the \$200,000 cost of the project, members of Sidwell Friends Community were invited to purchase solar bonds in increments of \$5,000, on which they earn a modest rate of return for about 10 years. Sidwell Friends will purchase the solar-generated electricity at fixed rates that protect it against inflating energy costs. After the investors are repaid, the school will reap solar energy at no cost for the rest of the predicted 30-year life of the system. The solar panels will also offset approximately 1 million tons of greenhouse gases, fulfilling the school’s commitment to a reduced carbon footprint.

This approach was also used to install solar on a church in [University Park, MD](#). If your school is interested in this model, the University Park Solar LLC can provide technical assistance and some of the documents necessary to create the third-party entity.” (Source: <http://www.communitypowernetwork.com/node/1096>)

The conventional PPA model includes investors who want a high return on investment. A Community PPA generally involves stakeholders whose focus is on providing renewable energy at a good price for institutions they care about.

Who are the players in a CPPA?

- The host facility (schools) will purchase electricity from a special third party entity (a solar LLC) incorporated to own the array
- The host provides the site and access for solar installation.
- They may choose to have the opportunity to own the facility in 15 years. It is the end of the investment but not the end of its performance.
- The investor side needs to understand they are responsible for maintenance of the system until when and if the system is passed on to the school. This method allows schools to involve alumni and parents and other members of the community to invest in helping bring solar to a school and keep their investment dollars in the community. Both investment and donation options can be made available.

### Resources for PPAs and CPPAs

A number of organizations can facilitate a PPA. Options include:

- The Stone House Group (contact James Hayes)
- Sunvestment [sunvestmentgroup.com/](http://sunvestmentgroup.com/)

- **RER** <http://www.rerenergygroup.com/> (contact Mark Connolly)
- A number of national companies frequently offer PPAs for schools. These include [SolarCity](#), [SunPower](#), and [Sungevity](#).

### **Resources on Solar Installations**

See excerpt from *A Brighter Future* in the Appendix C (*First Steps for Going Solar – A Practical Guide*) for more information about solar options.

Regarding solar contractors: <http://www.solarreviews.com/solar-power-installers/>

National: <http://www.solarreviews.com/solar-power-installers/>

NABCEP Certification is the one national certification for solar PV and solar thermal professionals: <http://www.nabcep.org/certified-installer-locator>

PA:

<http://mseia.net/directory/members-directory/>

<http://www.energywisepa.org/contractor>, and <http://www.energywisepa.org/>

**Financing Solar School Projects** The National Renewable Energy Lab (NREL) has produced an excellent report detailing the financial options schools have at their disposal as they go solar. The report explains various approaches and includes templates, signed project documents, and other reference materials for users to download and adapt.  
<http://www.nrel.gov/docs/fy12osti/51815.pdf>

**HELiOS Project** The HELiOS Project is an all volunteer, grassroots organization committed to reducing fossil fuel use in every K-12 school in California. Their website provides all sorts of resources and they can help your school start a solar project. <http://www.heliosproject.net/>

**Solar for Schools Resource Guide** Community Power Network has put together a guide to help schools understand the process of going solar. The guide includes information on evaluating your roof, finding an installer, and paying for a system. <http://communitypowernetwork.com/node/902>

### Focus 3B. Models for Funding Efficiency and Solar – Performance Contracts, non-governmental and government funding options

- Bruce Stultz, Program Advisor for PennSEF. Foundation for Renewable Energy & Environment (FREE) 717-686-7150 Contact: [bstultz@freefutures.org](mailto:bstultz@freefutures.org) Web: [freefutures.org/PENNSEF](http://freefutures.org/PENNSEF)
- Heather Cowley, Regional Energy Manager for the PA DEP. Contact: [hcowley@pa.gov](mailto:hcowley@pa.gov)

#### 3B.1 Solar Financing through Energy Performance Contracts: consult Focus 1B.

Resources (repeated here from Focus 1B):

- PENNSEF Web: <http://freefutures.org/pennsef/about/>
- Powerpoint: <http://freefutures.org/pennsef/about/pennsef-in-a-nutshell/>
- Energy Star Document of Performance Contracts for Energy Web: [http://www.energystar.gov/ia/partners/spp\\_res/Introduction\\_to\\_Performance\\_Contracting.pdf](http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf)
- **The Energy Services Coalition (ESC)** is a national nonprofit organization composed of a network of experts from a wide range of organizations working together at the state and local level to increase energy efficiency and building upgrades through energy savings performance contracting. Web: <http://www.energyservicescoalition.org/performance-contracting>

#### 3B.2 Energy Related Funding from Non-Governmental Sources

##### **Resources**

See also in the Appendix C - *First Steps for Going Solar – A Practical Guide* for more information on alternative forms of funding.

Articles which provide an overview of alternative financing here:

<http://cleantechnica.com/2014/03/28/nonprofits-new-frontier-solar/>  
<http://www.nm-ipl.org/financing-your-solar-energy-system-models-for-non-profits/>

Private companies/descriptions of options

<http://runonsun.com/html/solar-for-non-profits.html>  
<http://cleanenergydesign.com/services/solar-photovoltaic-energy-financing/>

Examples of community based loans and crowdsourcing (some can and do work in PA, although their base is elsewhere)

Collective Sun <https://www.collectivesun.com/>  
 Re-volv <http://www.re-volv.org/>  
 Mosaic <https://joinmosaic.com/why-mosaic>  
 Sun Club <https://www.greenmountainenergy.com/sun-club/>  
 Greenzu <http://greenzu.com/crowdfunded-solar>  
 Everybody Solar <http://www.everybodysolar.org/>  
<https://www.collectivesun.com/>

Tax credit information

<http://www.energymanagertoday.com/irs-approves-tax-credit-community-shared-solar-project-0115487/>

Specific funds

<http://www.trfund.com/>

### 3B.3 Energy Related Funding from Government Sources

**State funds for schools through the Commonwealth Financing Authority published November 2015:** <http://community.newpa.com/newsroom/commonwealth-financing-authority-announces-new-alternative-clean-energy-investment/> For more information about the ACE program, the CFA, or a complete list of approved projects, visit [www.newpa.com/cfa](http://www.newpa.com/cfa).

PA Department of Education offers, through PlanCon and Act 46, an additional 10% for LEED Silver or higher / Green Globes 2+ Globes through their construction reimbursement. PlanCon website still references Act 46 additional reimbursements on their website (Part J), despite PDFs indicating “INSTRUCTIONS EXPIRE 06-30-12” it is still in effect, open and taking applications:

<http://www.education.pa.gov/Teachers%20-%20Administrators/School%20Construction%20and%20Facilities/Pages/Reimbursable-Projects.aspx>

Link to Act 46:

<http://www.legis.state.pa.us/cfdocs/legis/PN/Public/btCheck.cfm?txtType=PDF&sessYr=2005&sessInd=0&billBody=H&billTyp=B&billNbr=0628&pn=2564PDE>

Pennsylvania's State Public School Building Authority offers low-interest financing to schools, which can include financing for energy upgrades or renewables:

<http://www.phefa.org/spsbamain.htm>

DCED Renewable Energy Program (REP)

<http://community.newpa.com/programs/renewable-energy-program-rep-geothermal-wind-projects/>

Loans for geothermal projects and grants or loans for wind projects are available for schools

- Max loan amount for a geothermal system is \$3 per sq. ft. or \$5 million, whichever is less
- Max amount for a wind energy project is \$1 million or 30% of total project cost, whichever is less

- Grants for planning and feasibility studies up to 50 percent of the total cost of the planning project or \$175,000, whichever is less

#### PECO Energy – Smart Ideas

<https://www.peco.com/Savings/Pages/default.aspx>

Database of State Incentives for Renewables & Efficiency® This is updated frequently for incentives both state and federal: <http://www.dsireusa.org/>

### **3B.4 Non-energy Sustainable Project Funding**

#### **Growing Greener**

[http://www.portal.state.pa.us/portal/server.pt/community/growing\\_greener/13958](http://www.portal.state.pa.us/portal/server.pt/community/growing_greener/13958)

- Eligible projects must improve water quality in watersheds – green roofs qualify
- Many schools apply via watershed protection organizations

#### **Municipal Recycling Program Grants**

<http://www.portal.state.pa.us/portal/server.pt?open=514&objID=589534&mode=2>

- **Opens once annually - deadline for 2015 is 11/20**
- Reimburse counties & municipalities 90% of eligible recycling program & development expenses
- K-12 school recycling projects are eligible for funding with municipal sponsorship
- For recycling infrastructure expenses only
- **Recycling Technical Assistance**

[http://www.portal.state.pa.us/portal/server.pt/community/technical\\_assistance/14066](http://www.portal.state.pa.us/portal/server.pt/community/technical_assistance/14066)

- Free recycling start-up & improvement technical assistance
- Up to a value of \$7500
- Requires municipal sponsorship
- Grant is available year-round

#### **Alternative Fuels Incentive Grant (AFIG) Program**

[http://www.portal.state.pa.us/portal/server.pt/community/alternative\\_fuels\\_incentive\\_grant/10492](http://www.portal.state.pa.us/portal/server.pt/community/alternative_fuels_incentive_grant/10492)

- Might open in 2015
- Schools are eligible
- Compressed natural gas (CNG), propane, electric, and biofuel vehicles are eligible

- Signup to be notified when program opens on AFIG webpage

### **DEP Environmental Education Grants**

[http://www.portal.state.pa.us/portal/server.pt/community/environmental\\_education/13903/grants/588549](http://www.portal.state.pa.us/portal/server.pt/community/environmental_education/13903/grants/588549)

- \$3,000 maximum in prior round
- Opens once annually
- Public schools, private schools, nonprofits, businesses, municipalities & universities are eligible
- Projects include environmental curriculum development, outdoor learning resources, environmental literacy, and mini projects
- A focus on STEM is encouraged

### **School Chemical Cleanout Campaign (SC3)**

<http://www.portal.state.pa.us/portal/server.pt?open=514&objID=589603&mode=2>

- Offered on an annual basis by PADEP
- Integrated chemical management and safety training for teachers and administrators in Pennsylvania schools
- PA schools that participate in chemical management training each fall are then invited to submit an application for assistance with the chemical cleanout process
- Email Kevin at [kbeer@pa.gov](mailto:kbeer@pa.gov) for training dates

## Focus 4 Going forward – Collaboration and Curricular Models for Sustainability

- Lori Braunstein, PA Green & Healthy Schools Partnership and MaGa Strategies, LLC.  
Contact: [lori@pagreenschools.org](mailto:lori@pagreenschools.org)

You are encouraged to join and learn more about the following collaborative school-focused sustainability efforts.

**PA Green & Healthy Schools Partnership** is a network. It grew out of an effort of the PA Department of Education (PDE) to coordinate and share resources for green and healthy schools as broadly as possible. The partnership seeks to:

1. Advocate at a statewide level for executive, legislative and local action to bring about systemic change to advance green and healthy schools in Pennsylvania.
2. Provide resources and support to school leaders, teachers and students through a comprehensive green schools program and website.
3. Recognize and celebrate schools that are taking steps towards integrating sustainability principles throughout their school buildings, operations and curriculum.

**You can follow on their website and their blog.** Web: [www.pagreenschools.org](http://www.pagreenschools.org)

### Green Ribbon Schools

The PA Green & Healthy Schools Partnership works closely with PDE to support and promote the US Department of Education Green Ribbon School program. The aim of this program is to inspire schools, districts and Institutions of Higher Education (IHEs) to strive for 21st century excellence, by highlighting promising practices and resources that all can employ.

Created in 2011, the U.S. Department of Education Green Ribbon Schools (ED-GRS) is a recognition award that honors public and private elementary, middle, and high schools, districts, and postsecondary institutions that are demonstrating leadership in three Pillars:

1. Reducing environmental impact and costs, including waste, water, energy use and alternative transportation
2. Improving the health and wellness of students and staff, including environmental health, nutrition and fitness
3. Providing effective sustainability education, including robust environmental education that engages STEM, civic skills and green career pathways.

In order to be selected for federal recognition, schools, districts, and postsecondary institutions must be demonstrating progress in all three Pillars, not just one area.

The award is a communications tool to encourage state education, health, and environment authorities, other stakeholders, and school communities to consider matters of facilities, health and environment comprehensively, strengthening the critical collaborations that ensure all of our nation's schools are healthier, safer, and more sustainable.

Since its initial year, Pennsylvania has had twelve diverse honorees. Ranging from school districts to elementary and middle schools, as well as private and disadvantaged schools, our

honorees have run the gamut. We even had a career & technology school and a community college as awardees. The one feature they do have in common is that they excel in all three pillars of a green school. Visit the [PAGreenSchools.org](http://PAGreenSchools.org) and click on Green Ribbon Schools to see a complete summary of our GRS honorees and their accomplishments.

- **Applications are now open for the 2016 awards and can be found at the [pathwaystogreenschools.org](http://pathwaystogreenschools.org) website that goes right to PDE. They are due by midnight on December 7th.**
- The applications themselves have been modified and simplified to be more of a narrative format with guiding questions for each pillar.
- Help is available during the PAGHSP “Office Hours” listed below or if you have a simple process question, then call Dave Bauman at PDE. Schools and School Districts – David A. Bauman: [davbauman@pa.gov](mailto:davbauman@pa.gov) For Higher Education contact Jennifer Muñoz Dugan: [ra-green\\_schools@pa.gov](mailto:ra-green_schools@pa.gov)
- For additional assistance, call in to speak to a panel of experts from PA Green & Healthy Schools who will answer your questions about the Green Ribbon School application. **November 10** from 3:00 – 4:00 pm. Phone: (855) 734-4390 PIN: 413457
- Green Strides. In 2013, PDE added Green Strides to connect all school communities with the free, publicly available resources from a variety of sources that these recognition award honorees effectively use. The Green Strides portal is intended as a one-stop-shop for resources, webinars, case studies, promising practices and collaboration so that all schools can make progress across every Pillar of the award. In 2015, to offer a more dynamic and user-friendly web portal, Green Strides was moved off of ed.gov through the generous assistance of the Center for Green Schools at the U.S. Green Building Council. Of course, you can also check out the [PAGreenSchools.org](http://PAGreenSchools.org) and [Eco-SchoolsUSA.org](http://Eco-SchoolsUSA.org) websites for additional resources and support.

### **National Wildlife Federation Eco-Schools**

- The PA Green & Healthy Schools Partnership has teamed up with National Wildlife Federation’s Eco-Schools USA to recognize and assist schools in Pennsylvania who aspire to begin, or are currently, making strides in sustainability.
- The goal is to acknowledge all those schools in Pennsylvania who are currently implementing green initiatives, no matter how big or small those steps may be, as well as to provide assistance to schools that need guidance along their path toward sustainability.
- Eco-Schools is an international program of the National Wildlife Federation that provides a FREE framework to help educators integrate sustainability principles throughout their schools and curriculum.
- It strives to model environmentally sound practices, provide support for greening the curriculum, enhance academic achievement, and foster environmental stewardship.



- The Eco-Schools USA program consists of a seven-step framework, starting with the creation of an Eco-Team and finishing with the development of an Eco-Code for your school.
- There are many pathways to sustainability- water, school grounds, transportation, sustainable food, healthy living (healthy person), biodiversity, healthy schools (healthy building), consumption & waste, climate change and, of course, energy.
- The Eco-Schools website has an environmental audit/checklist for each of these pathways, and students can use them to assess how their school is performing in regard to that pathway.

### **Web Resources**

- Green Ribbon Schools Web: [www2.ed.gov/programs/green-ribbon-schools/](http://www2.ed.gov/programs/green-ribbon-schools/)
- Eco-Schools Web: <http://www.nwf.org/Eco-Schools-USA.aspx>
- Green Flag Schools Web: <http://www.greenflagschools.org/Intro.htm>
- Green School Alliance Web: <http://www.greenschoolsalliance.org>
- National Survey on Schools and Sustainability with recommendations  
<http://projectgreenschools.org/wp/wp-content/uploads/2014/08/USGreenSchools12114.pdf>
- Database of Renewable Energy Lesson Plans **The** U.S. Department of Energy has put together an Energy Education program that includes a database of lesson plans, labs, projects and other activities for grades K-12. <http://energy.gov/eere/education/education-homepage>

## Appendices

### Appendix A: Forum hosts

- Emily Miller, Executive Director, PAISBOA Link: <http://paisboa.org> Contact for Sustainability Affinity Group: [emiller@paisboa.org](mailto:emiller@paisboa.org)
- Betsy Torg, Friends Council on Education and FEEN Link: [www.friendscouncil.org](http://www.friendscouncil.org) Contact: [betsy@friendscouncil.org](mailto:betsy@friendscouncil.org)
- Paula Kline, Westtown School and a Quaker renewable energy working group. Contact [kline.paula@gmail.com](mailto:kline.paula@gmail.com)
- Bob Mueller, Delaware Valley Friends School [muelr@dvfs.org](mailto:muelr@dvfs.org)

### Appendix B: About FEEN

Friends concern for the welfare of our students and the environment has taken many forms since awareness of climate disruption became evident more widespread in the 1990s. In 1999, a group of educators from Friends schools began the Friends Environmental Education Network (FEEN) to further environmental stewardship and green practices in our schools. Since then, FEEN has gathered each year in a different Friends school to share ideas, inspiration, and friendship. FEEN participants firmly believe that a commitment to sustainable living and environmental stewardship needs to be a fundamental component of a Quaker education.

To learn more go to:

<http://www.friendscouncil.org/Library/InfoManage/Guide.asp?FolderID=883&SessionID={F8E991C5-F029-4ED4-9CD8-E8CCCF3773E9}&SP=2>

## Appendix C: First Steps for Going Solar – A Practical Guide

From *Brighter Future: A Study on Solar in U.S. Schools*

<http://www.seia.org/sites/default/files/resources/9gFf68wIE7SOLAR-SCHOOLS-REPORT-FINAL.pdf>

Once a school or district has a clear understanding of its needs and values – and those of the surrounding community – and has translated these into one or more goals for the solar project, it is ready to begin the process of going solar. Though experiences with this process can vary in their details, there are a few steps common to most school solar projects. While not meant to be comprehensive, the process outlined below should provide readers with a general sense of the considerations and actions involved in pursuing a solar energy project

### Evaluate Energy Savings Potential

The first step toward becoming a solar school involves making a determination as to the energy savings potential a solar energy system can offer. Facilities staff should review school or district electric or gas utility bills over the previous 12 months to establish current energy usage and costs and provide a baseline to assess energy and cost savings. As the amount of energy that can be offset by solar is directly related to the size of the solar energy system, it will be necessary to estimate how large a system school rooftops or grounds can support. This can be done through a full solar site assessment, in which a solar installation company evaluates a number of site characteristics, including site orientation, available space, and amount of shading during peak solar hours. For rooftop systems, this process can involve determining roof condition and age and whether the structure can support the static and dynamic loads associated with the solar installation.

A school may not be ready or able to commit to a full site assessment right away. In these cases, facilities staff can use a number of free online tools to develop a general sense of a school's suitability for solar. Sun Number ([www.sunnumber.com](http://www.sunnumber.com)) provides users with a single score – based on building potential for solar, regional climate, utility electricity rates, and the cost of solar – demonstrating the potential for solar at a given site. While not currently available for the entire U.S., Sun Numbers are available for most sites in three dozen major cities and metropolitan areas. Another option is available through Geostellar ([www.geostellar.com](http://www.geostellar.com)), which has mapped the solar potential of rooftops in some parts of the country and provides free access to heat maps showing how much sunlight each portion of a given roof receives. In addition, some state and federal agencies have developed resources outlining the site screening process.<sup>34</sup>

Having obtained a basic idea of the system size that can be supported, staff can evaluate potential energy cost savings using a number of free online tools, including the National Renewable Energy Laboratory's PVWatts Calculator ([pvwatts.nrel.gov](http://pvwatts.nrel.gov)) or the System Advisor Model ([sam.nrel.gov](http://sam.nrel.gov)).

**Understand Solar Financing Options** Once the school or district has a general idea of site suitability for solar and how large a system can be supported, the next step in estimating energy

cost savings is to understand the costs of solar and available financing options. Though the installed cost of solar has fallen quickly over the past few years, these systems still represent a significant investment and therefore often require some form of financing. Fortunately, a number of public and private financing options have been developed to help overcome this barrier. Because of the tax-exempt status of public schools and the local nature of some of these programs, however, not all options will be available in every case. For information on specific incentives or programs for which your school may qualify, visit the Database of State Incentives for Renewables and Efficiency at [www.dsireusa.org](http://www.dsireusa.org).

## Federal Incentives

The primary federal incentives supporting solar are the residential and commercial solar Investment Tax Credit (ITC), providing a federal income tax credit equal to 30 percent of total installed system costs, and the Modified Accelerated Cost-Recovery System (MACRS), which allows non-residential solar customers to recover the value of investments in solar through depreciation deductions on federal taxes. Because both are tax incentives and public schools and districts do not have tax burdens, these customers are unable to take direct advantage of these key financing options, which can pose significant challenges for schools in areas with few state, local, or utility incentives or without access to private financing. In states that allow for third-party ownership of solar energy systems (explained in greater detail on page 36), schools and other tax-exempt entities are able to leverage these credits indirectly by acquiring solar through a **Power Purchase Agreement (PPA)**.

## State Incentives and Financing

Recognizing the value of solar energy in helping meet state renewable energy goals, more than 40 states offer some form of incentive or other financing options for solar.<sup>35</sup> Common incentives or programs include tax credits, deductions, or exemptions and grants, loans, or rebates supporting public and/or private investments in solar energy. In addition, some states have chosen to promote solar through their **Renewable Portfolio Standards (RPS)** – requirements for utilities to derive a certain percentage of their retail electricity sales from renewable sources by a target year – by mandating that solar electricity constitutes a defined portion of this renewable requirement. In a handful of states with “solar carve-outs,” these requirements have given rise to Solar Renewable Energy Certificate (SREC) markets. These SRECs represent the environmental or non-energy attributes of solar electricity and can provide system owners with a significant additional project revenue stream.<sup>36</sup>

## Utility Incentives and Financing

As with many states, utilities may also offer consumer grants, loans, or rebates for solar energy. In addition to or instead of these incentives and programs, 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. 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. In addition to these incentives, utilities in 43 states and the District of Columbia are required to offer net metering programs to their solar customers.<sup>37</sup>

With **net metering**, customers are credited by the utility for any excess energy exported to the grid. These credits can in turn be used to offset the cost of electricity used from the grid at night or other times when solar energy systems are not producing enough electricity to meet on-site needs. When classes are in session, schools consume the most energy at times when daily solar electricity production is greatest. Because demand tracks closely with system production during this period, it is possible that comparatively little electricity will be exported to the grid (versus a residential system, for which production peaks when on-site needs are low, as these buildings are usually unoccupied in the middle of the day). During summer months, however, when demand for electricity is much lower but system production is still high, net metering becomes much more important.

### **Other Public Financing Options**

While schools may be limited in their ability to leverage certain solar incentives, they have access to other funding mechanisms unavailable to private solar customers. As a special-purpose district of a local government, school districts may issue certain types of bonds to cover the up-front cost of going solar. Energy cost savings can then be used to repay the principal and interest due to bondholders. Because municipal bond holders are usually willing to accept lower interest rates than on other debt investments, schools projects can be funded at a lower cost of capital compared with most private sources of debt.

To help further reduce interest payments on municipal bond debts, the federal government has authorized \$3.2 billion in funding for state, local, and tribal governments to issue Qualified Energy Conservation Bonds (QECBs) to finance certain energy efficiency upgrades and renewable energy projects. Through these QECBs, the federal government provides bond issuers with direct interest rate subsidies. While the subsidy amount varies with U.S. Treasury Qualified Tax Credit Bond Rates, bond issuers have generally received subsidies between approximately 3-4 percent of the bond amount. In one example, a bond with a 6 percent interest rate received a 3.7 percent direct QECB subsidy, leaving the issuer to pay only 2.3 percent in net interest. More information on QECBs as well as updates on program changes and remaining bond authority can be found in a semi-annual report published by the Energy Programs Consortium.<sup>38</sup>

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. Due to the inclusion of non-appropriation language, these agreements are usually not considered long-term debt, with lease payments made from operating rather than capital budgets. At the end of the lease term, ownership can be transferred to the municipal customer either outright or for a nominal fee. As with some other

lease options, however, the school district is unable to take advantage of federal 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 that do allow for tax incentives to be passed on to the solar customer.

### **Private Financing Options**

In addition to the wide array of public financing options for solar, there exist a number of private alternatives. The leading private option for the last several years has been **third-party ownership** of solar energy systems. Under these arrangements, the solar customer serves as host for and receives the electricity from – but does not own – the installation. Instead, the solar developer retains ownership of the system, and either enters into a solar lease with the customer or sells them the electricity produced by the system outright through a **power purchase agreement (PPA)**. One of the main advantages of third-party ownership for schools is that – because the solar developer is a tax-paying private enterprise (and is often partnered with other private entities with even larger tax appetites) – tax-exempt solar customers are able to benefit from federal (or state, where available) tax credits through lower lease payments or PPA rates. In addition, the financing offered by the third-party system owner can significantly reduce or eliminate the upfront cost of going solar. Availability of PPAs as a financing option, however, depends on the state utility legal and regulatory framework. To date, only 22 states and the District of Columbia have expressly allowed for third-party solar PPAs.<sup>39</sup> In some cases, it may be possible to combine school district bond-issuing ability and third-party ownership into a bond-PPA hybrid (also known as the “Morris Model”, named after the New Jersey county in which the first hybrid deal was completed). Though reliant on a complex financing structure, the basic idea behind the model is relatively simple. Rather than using proceeds from a bond issuance to directly fund the installation of a solar energy system, the customer instead passes this capital on to the solar developer, providing them with lower-cost project capital than they would have otherwise been able to obtain. The developer then has the system installed and enters into a PPA with the customer, who receives the value of any tax credits in the form of a lower PPA rate. While this hybrid model can provide significant savings for the solar customer, these deals are often complex and replicability hinges on a number of different laws and regulations.<sup>40</sup>

**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 of 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 compensates the ESCO for their work in making the energy upgrades, with the remainder retained by the customer. While ESPCs have typically involved energy efficiency measures (such as energy efficient lighting, building envelope improvements, etc.) with a relatively short payback, 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 included as part of the performance contract, allowing 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. For more information on solar in ESPCs, see Integrating Solar PV into Energy Services Performance Contracts: Options for Local Governments Nationwide from the North Carolina Clean Energy Technology Center ([www.nccleantech.ncsu.edu](http://www.nccleantech.ncsu.edu)).<sup>41</sup>

While not in itself a financing mechanism, **net-zero building** can provide schools with another opportunity for investing in solar. The “net-zero” in this term refers to energy use – that is, the building produces and/or collects as much energy as it uses in a typical year of operation. Energy strategies for net-zero construction can include use of highly efficient equipment, building envelopes that minimize energy losses, passive solar design, and renewable energy generation technologies (such as solar PV), among others. Richardsville Elementary School in Warren County, Kentucky illustrates how net-zero building can provide great benefits to schools. The first net-zero public school in the nation, Richardsville Elementary has managed to not only reduce its energy costs to zero, but generated 47.8 MWh more energy than it consumed in 2012, earning the school more than \$40,000 that year. Such a dramatic savings was achieved through a combination of energy efficient systems, a high-performance building envelope, a geothermal HVAC system, daylight harvesting, and other measures, including a 208-kW thin film rooftop solar PV system and a 138-kW solar PV parking canopy.<sup>42</sup>

### Obtain Approval for Project

Once a clear understanding of the energy savings potential, costs, and financing options for a solar energy system have been developed, the next step is to obtain approval for the project. This process not only involves making the case for solar to decision makers within the school district, but to demonstrate to external stakeholders (including students, parents, and other community members) the value of an investment in solar and how such a project can help attain community goals or otherwise reflects local values. Community Power Network ([www.communitypowernetwork.com](http://www.communitypowernetwork.com)), a non-profit organization working to promote locally-based renewable energy projects and policies, outlines a step-by-step process for community engagement in the short guide Solar Schools: A Resource Guide to Help Your School Go Solar.<sup>43</sup>

### Draft and Issue Request for Proposal

While the solar procurement process shares many similarities with the steps involved in many other large equipment purchases, the unique nature of solar energy necessitates the inclusion of particular elements in requests for proposals (RFPs). A list of potential solar-specific RFP elements may include, but is not limited to:

- Protection of Roof Integrity and Warranties
- Requirements for an Operation and Maintenance Plan

- Provisions for Performance Monitoring/Guarantees
- Local Equipment or Labor Requirements
- System Technical Specifications
- Leveraging Project Educational Value
- Assigning Responsibility to Contractors for Obtaining Permits or Interconnection Agreements

Not all of these elements will be included for every project. Rather, different provisions will be included or omitted based on the goals set by the school for the project. For example, a project focused on tapping the economic development potential of solar deployment may include requirements for local materials or labor, whereas a system pursued mainly for educational purposes might place greater emphasis on how well the respondent leverages the project to enhance students' learning experiences. The Solar Foundation's Steps to a Successful Solar Request for Proposal (RFP) discusses many of the key elements of a solar RFP, as well as best practices in overall RFP development, in greater detail.<sup>44</sup>

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### **Additional Resources**

Coughlin/ National Renewable Energy Laboratory, J., & Kandt/ National Renewable Energy Laboratory, A. (2011). Solar Schools Assessment and Implementation Project: Financing Options for Solar Installations on K-12 Schools (TP-7A40-51815). Retrieved from National Renewable Energy Laboratory website: [www.nrel.gov/docs/fy12osti/51815.pdf](http://www.nrel.gov/docs/fy12osti/51815.pdf)

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## Appendix D: Purchasing Renewable Electricity

The electricity industry is changing. At least 50% of customers have the option to purchase renewable electricity directly from their power supplier, and everyone has the option of purchasing renewable energy certificates. Such power is sometimes referred to as "green power" or "clean power."

In most states, you can buy clean power through one or more of the following programs:

**Green Pricing** Some power companies provide an optional service, called green pricing that allows customers to pay a small premium in exchange for electricity generated from clean, renewable ("green") energy sources. The premium covers the increased costs incurred by the power provider (i.e., electric utility) when adding renewable energy to its power generation mix.

**Competitive Electricity Markets** In some parts of the country, you can choose not only how your electricity is generated, but also who generates it.

Just as the long-distance telephone industry was restructured, certain states have restructured their electricity industry in order to allow competition among electricity generators. In some of these states, clean power generators, who specialize in producing electricity using renewable sources, are taking advantage of the restructured market to sell clean power products to residential, commercial, and wholesale customers. Some default suppliers are also teaming with these competitive marketers to offer more green power options.

Efforts to sell clean power are aimed at consumers who will choose to pay slightly more for renewable energy products and services that reflect their environmental values. The small premium you pay offsets the additional costs power companies incur in purchasing and/or generating electricity from renewable sources.

**Green Certificates** Buying green certificates allows you to contribute to the generation of clean, renewable power even if you can't buy clean power from your power provider (i.e., electric utility) or from a clean power generator on the competitive market.

An increasing number of clean power generators are now separating the power that they sell to power providers from the environmental attributes associated with that power. These environmental attributes, called green certificates (also known as "green tags," "renewable energy certificates," or "tradable renewable certificates"), are then sold to companies and individuals who want to help increase the amount of clean power entering our nation's electricity supply.

By separating the environmental attributes from the power, clean power generators are able to sell the electricity they produce to power providers at a competitive market value. The additional revenue generated by the sale of the green certificates covers the above-market costs associated with producing power made from renewable energy sources. This extra revenue also encourages the development of additional renewable energy projects.

Several organizations offer green energy or renewable energy certificates that can be purchased separate from your current electricity service. Source: <http://energy.gov/energysaver/buying-clean-electricity>

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## Appendix E: Third-Party Ownership

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### About Third-Party Ownership

Third-party-financed PV installations are owned and operated by another entity, usually a solar developer or its investors. The school then pays the developer or investors for the electricity produced by the panels, sometimes at a rate lower than what they pay their utility.

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### Third-Party Ownership Models

A number of different third-party ownership models exist, most of them based on Power Purchase Agreements.

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### Power Purchase Agreement

The most common third-party ownership approach is called a Power Purchase Agreement (PPA). This approach is advantageous for schools because:

- PPAs allow the school to go solar without a large initial capital outlay;
- The project developer is responsible for maintaining the system for the length of the contract; and
- As private entities, developers are able to take state and federal tax incentives and pass those savings onto the school.

Third-party ownership does have some disadvantages, however:

- A PPA is a complicated transaction and schools must dedicate time and money to ensuring that they negotiate a fair and equitable contract with the solar developer.

- Under a PPA agreement, the solar system's SRECs are usually allocated to the investor. The school is therefore not able to claim the environmental benefits associated with clean electricity production (i.e., claim that the school is 100% powered by solar energy).
- At the end of the PPA contract period (usually 10 to 20 years), the school will not own the PV system (this is required by law so the owner can take the federal tax incentive). As a result the school must either choose to purchase the panels at fair market value or have the panels removed by the developer. Schools should make sure their PPA contract includes language that requires the developer to remove the system at no additional cost at the end of their contract, to avoid additional expense if they choose not to purchase the system at the end of the contract.
- Most PPAs apply an escalation rate to the solar-produced energy they will be providing. Sometimes those escalation rates are very steep, so make sure you look very closely at the fine print of the contract.

This approach to financing solar is only available in states where PPAs have been authorized.

As with any financing arrangement, it is important to have a committee in place to ask the right questions. [Issues to address](#) when considering a PPA include: Who owns the system? Who will maintain it? What happens to the system at the end of the 20-year contract period? What rates will the school pay for electricity over the life of the contract?

A number of national companies frequently offer PPAs for schools, community organizations, and businesses. These include [SolarCity](#), [SunPower](#), and [Sungevity](#). Source: <http://www.communitypowernetwork.com/node/1096>

## Appendix F: Building Standards

School buildings have multiple and continuing impacts on the environment. From construction or renovation to daily occupancy, our buildings use raw materials, generate waste and produce harmful emissions.

Building standards and rating systems, which take these impacts and emission into account, are relatively recent. The U.S. Green Building Council (USGBC) created criteria in 2000, to improve building performance by creating a rating system initially just for new construction called Leadership in Energy and Environmental Design (LEED). LEED certification is now also available for existing buildings.

Founded in 2002, the Collaborative for High Performance Schools (CHPS) created the nation's first green building rating program designed specifically for schools. The CHPS priorities are

improving health and student performance; reducing operating costs; and mitigating environmental impacts.

The state of Pennsylvania has 107 LEED certified schools and one Collaborative for High Performance Schools (CHPS) certified school.

**Resources**

- U.S. Green Building Council LEED: <http://www.usgbc.org/leed>
- Summary of LEED and schools: <http://www.usgbc.org/articles/green-school-facts>
- Collaborative for High Performance Schools (CHPS)  
<http://www.chps.net/dev/Drupal/national-core-criteria>