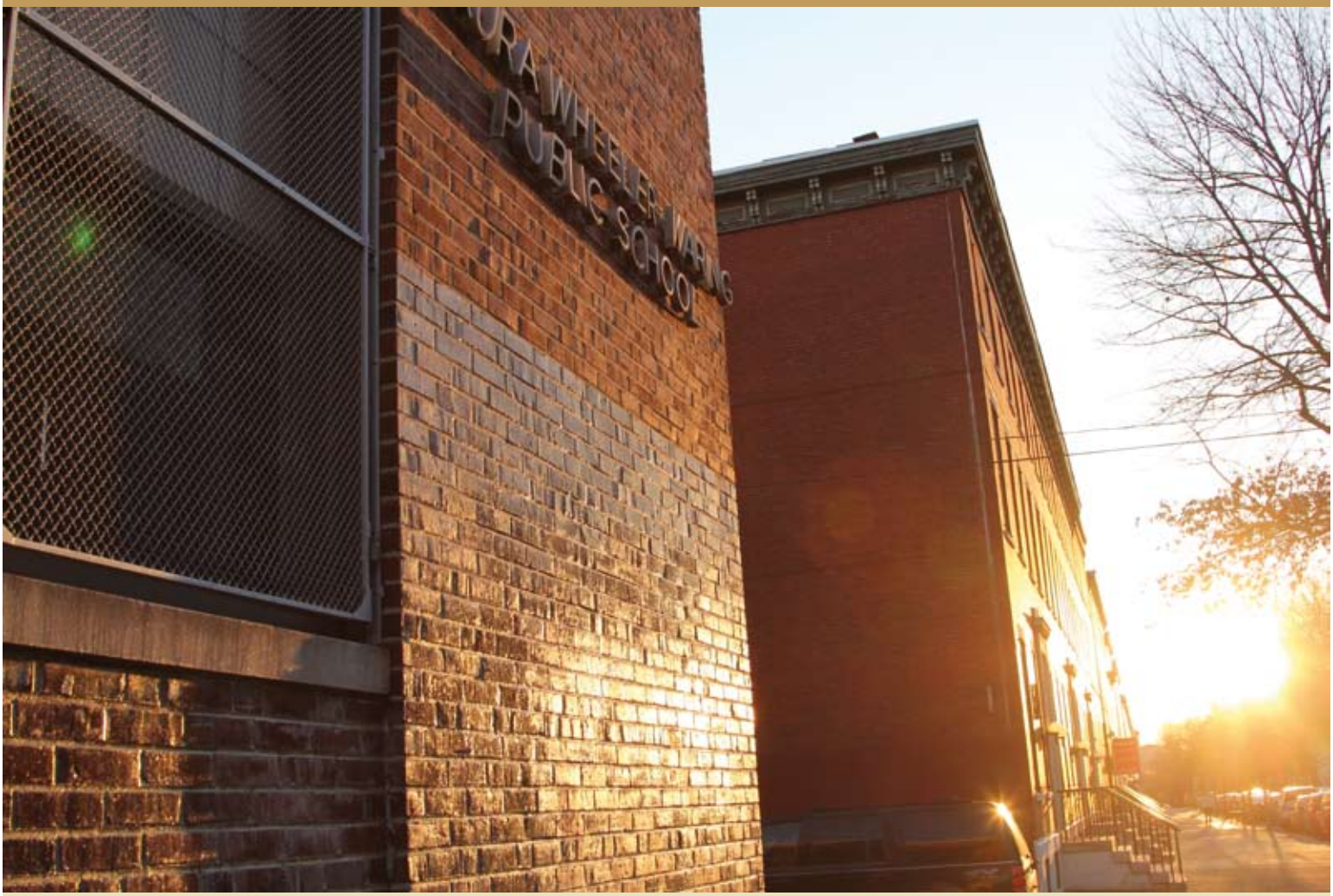

Solar Schools for Philadelphia

Clean Air, Green Jobs, And Financial Savings

PennEnvironment
RESEARCH & POLICY CENTER

FRONTIER GROUP

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Executive Summary

Solar energy is booming across the country, and with good reason. Solar panels generate emission-free energy, at a price increasingly competitive with electricity generated from dirty fossil fuels. Philadelphia's schools, taxpayers, and environment would benefit from an effort to put solar panels on every Philadelphia school.

Philadelphia's public schools could cover nearly 40 percent of their energy needs by installing solar panels on their 100 acres of usable rooftop space. "Going solar" would save taxpayers tens of millions of dollars on electricity bills for school buildings, while creating local jobs, offering educational and training opportunities for city students and reducing pollution.

Solar panels and Philadelphia schools go great together:

- Solar energy can help Philadelphia reduce global warming pollution from power plants. Pennsylvania power plants emit the second-most global warming pollution of any state in the country.
- Solar energy is increasingly cost competitive with fossil fuel energy. From 2009 to 2013, large non-utility solar energy systems dropped in price by more than half.
- Solar energy provides budget certainty for school administrators and protects taxpayers against the highly volatile costs of fossil fuel energy.
- Solar panels on schools present a great learning opportunity for students, particularly in the STEM fields—science, technology, engineering and math.
- Because schools use most of their energy during the day when the sun is shining, most solar energy they generate could be used on-site, which would increase reliability and reduce costs for schools and all Philadelphia consumers.
- Pennsylvania and Philadelphia policies—including strong net metering rules and the allowance of power purchase agreements—make Philadelphia a great place for an ambitious solar schools program. Federal policies create the opportunity for further savings.

Philadelphia schools have more than 100 acres of rooftop space available for solar panels. If every Philadelphia school installed solar panels on all available space:

- Solar panels could generate 71 gigawatt-hours of electricity per year, equivalent to 37% of the school system's annual electricity use, or equivalent to the electricity used by 7,000 Pennsylvania homes.
- Solar panels could offset 62,000 metric tons of carbon dioxide emissions per year (equivalent to the annual emissions from 13,700 of today's cars), along with 64 tons of smog-forming nitrogen oxide, and 127 tons of asthma-linked sulfur dioxide. Reducing harmful air pollution benefits Philadelphia's children, who suffer from asthma at a rate nearly double the national average.
- Philadelphia taxpayers could save more than $13 million in 2016 dollars over the assumed thirty-year lifetime of the solar installation. That's *before* accounting for federal, state and local incentives.

- The project could create the equivalent of 750 one-year local jobs that cannot be outsourced.

The Commonwealth of Pennsylvania, the City of Philadelphia and the School District of Philadelphia should work together to:

- Commit to putting solar panels on all Philadelphia schools to make the city a leader in clean energy production.

- Require that any extensive school renovations include plans to study the cost effectiveness of solar panels, and require that any new school buildings use solar panels.

- Strengthen Pennsylvania's statewide commitment to solar energy, including increasing the solar energy requirement of Pennsylvania's Alternative Energy Portfolio Standard (AEPS), and requiring that all solar renewable energy credits be generated in-state.

Introduction

Solar energy is taking off across the country, with America's solar energy capacity growing more than seven-fold since 2010.[1] Solar energy's growing popularity is no mystery: Solar panels generate emission-free electricity, and solar installation costs have dropped dramatically since the beginning of the decade.

More and more, schools are starting to reap the benefits of this solar power revolution: Nearly 4,000 schools across the country now generate their own electricity from the sun.[2] Schools and their students have a lot to gain from solar energy. Solar energy's environmental benefits matter most for the young children who will grow up with global warming, and who are most sensitive to the pollution emitted by the burning of fossil fuels. And solar energy's affordability and immunity from volatile fossil fuel prices are important for schools, which spend more money on energy than any other budget line item after personnel.[3]

Philadelphia schools are a great place for solar panels, and also present an opportunity for the city to be a national leader in the effort to promote clean energy. Today, in terms of solar energy per capita, Philadelphia ranks just 41st among America's major cities.[4] As the biggest city in one of the worst-polluting states in the country, Philadelphia should be doing all it can to reduce its reliance on dirty energy sources. By committing more fully to solar energy, Philadelphia can also tap into solar energy's economic opportunity, including many new local jobs that cannot be outsourced.

As this report shows, putting solar panels on Philadelphia schools would be good for the environment and makes good economic sense. With commitments from city and state leaders, many of Philadelphia's public schools could soon be generating much of the electricity they use with clean solar power.

Philadelphia Schools and Solar Panels Are a Great Fit

Solar Panels are Good for the Environment and Economically Smart

The best reasons for Philadelphia schools to "go solar" are the same reasons that hundreds of thousands of home and business owners have already done it: Solar panels are great for the environment, and they save money.

Electricity generation is the United States' number one source of carbon dioxide pollution, which in turn is the leading contributor to global warming.[5] Reducing the state and nation's reliance on fossil fuel power plants will cut emissions of carbon dioxide, as well as other air pollutants connected with threats to human health.

Going solar is especially important in Pennsylvania, where the state's electric power industry emits more carbon dioxide and nitrogen oxide pollution than any state except Texas; and more sulfur dioxide, which is linked to asthma, than all but two states (Texas and Ohio).[6]

Solar energy also makes economic sense. From 2009 to 2014, the median cost per watt of solar photovoltaic systems fell by more than half.[7] As prices fall, solar energy is becoming cost-competitive with fossil fuel energy. For some U.S. grid customers, solar energy has already reached "grid parity," meaning solar energy costs the same as energy from the grid.[8] In Philadelphia, solar energy is expected to reach grid parity—without incentives—by 2018.[9] Solar panels also are a hedge against fossil fuel price volatility.

Finally, solar energy creates local jobs, many of which cannot be outsourced. Nationally, the solar industry is a leading job creator, adding workers 12 times faster than the rest of the American economy and accounting for more than 1 percent of all jobs created in the United States in 2015.[10] The U.S. solar installation sector now employs 77 percent more people than the U.S. coal industry.[11]

Schools are Great Locations for Solar Panels

Schools are often ideal locations for solar panel systems. They usually have big spaces suitable for panels, including open, unshaded rooftops and parking lots with room for solar canopies. The ability of schools to house large solar energy systems also creates economies of scale that reduce the cost of those installations on a per watt basis.[12]

Schools also use most of their energy during the school day when the sun is shining, which means that much of the electricity generated by solar panels can be used on-site.[13] Using electricity on-site reduces costs both for solar panel owners and for all consumers, by reducing the need for transmitting electricity through the grid.[14] Any schools that generate more electricity than they use during the summer will feed electricity back into the grid, helping to create a cleaner and more efficient electric system with reduced energy losses from long-distance transmission and distribution.[15]

Solar panels also provide learning opportunities, and have been used as such by schools that have installed them.[16] For example, students at one school in Utah used their solar installation as inspiration for a project in which they designed sun tracking devices for solar panels.[17]

Those benefits have led many schools across the country to "go solar." Across the nation there are

nearly 4,000 schools with PV installations, with nearly 500 megawatts (MW) of capacity—about as much capacity as the world's largest utility-scale solar PV plant.[18] There are already 41 schools in Pennsylvania—including three in Philadelphia—that have installed solar panels, with a total capacity of about 11 MW.[19] (The Philadelphia schools with existing solar installations are Albert Greenfield School, A. Philip Randolph Career and Technical High School and the private school Chestnut Hill Academy.)[20]

Solar Schools in Philadelphia Would Have Access to Important Financing Options and Incentives

There are a wide variety of policies in Philadelphia and Pennsylvania that, combined with federal policy, make solar panels on schools an even better investment.

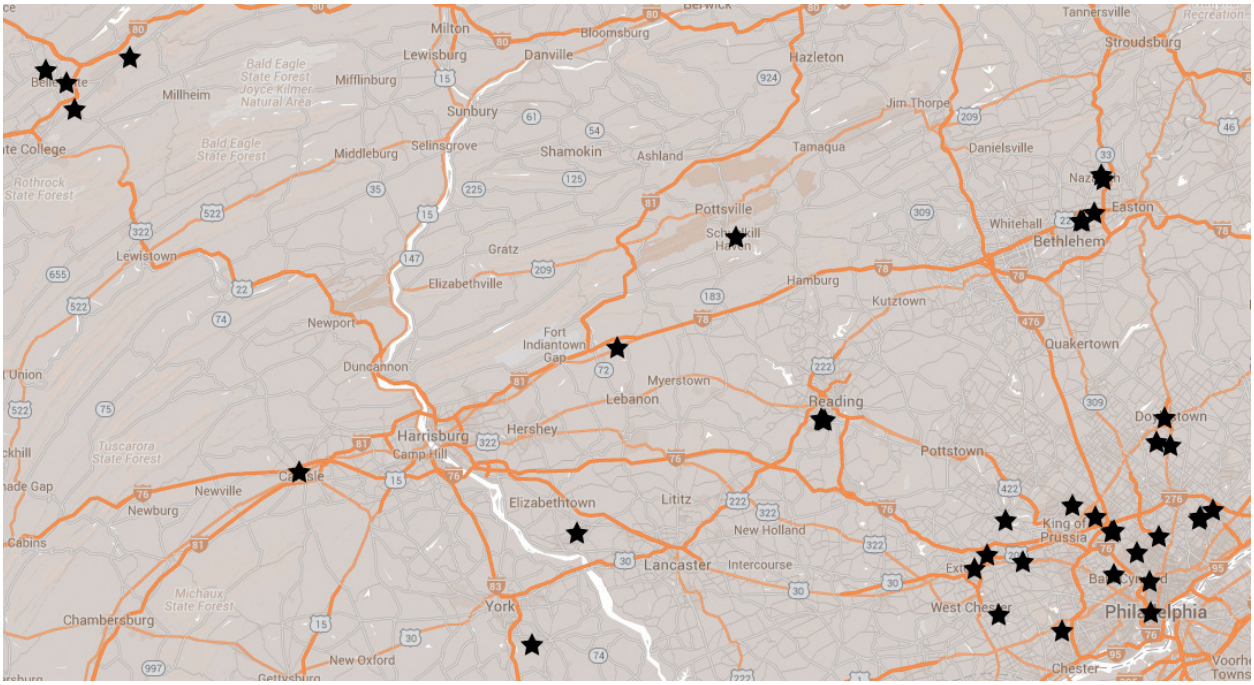
Financing Options

Most schools that install large solar energy systems do not pay for them directly—rather, they use third party ownership agreements called power purchase agreements, or PPAs.[22] Pennsylvania is one of 24 states to explicitly allow PPAs, meaning that schools here can take advantage of these sometimes financially advantageous agreements that also reduce financial risk.[23]

Under a typical PPA, a third party retains ownership over the solar panels and retains responsibility for their upkeep, and then sells electricity produced by the system to the buyer at a set price. Many solar providers also offer performance guarantees on their systems. PPAs can allow non-taxpaying entities, including schools, to see financial benefits from federal solar tax credits. (See "Federal Incentives" below.)

Schools can also enter into tax-exempt lease purchase agreements. These agreements, also known

Figure 1. Southeast Pennsylvania Schools That Have Already "Gone Solar" [21]



Map data: ©2016 Google.

as municipal leases, let schools purchase and own solar energy equipment while making low, tax-exempt interest payments. However, these agreements do not afford access to the federal solar tax incentives available through PPAs.[24]

State and Local Policies and Incentives

A number of policies at the state and local levels make solar panels a good choice for Philadelphia schools.

Net metering: Pennsylvania's net metering policy allows solar energy producers to receive full credit for any electricity they generate but do not use, by essentially allowing power meters to "run backward" when electricity is fed back into the grid.[25] This policy ensures that schools and other solar panel owners are fairly compensated for any excess solar power generated on rooftops.

Grant and rebate programs: Pennsylvania and Philadelphia have had grant and rebate programs that could help fund school solar panels. *High Performance Green School Planning Grants* are grants to defray some of the planning costs that go into renewable energy (and efficiency) projects. The *Sustainable Development Fund Financing Program* is a loan program that provides financing to renewable energy projects in southeastern Pennsylvania (PECO service territory). Gov. Tom Wolf and some members of the state legislature have proposed restoring funding to the *Sunshine Solar program*, a popular solar rebate program originally created in 2008 that provided rebates for up to 10 percent of the cost of solar energy systems.[26]

Solar Renewable Energy Credits (SRECs): Under Pennsylvania's Alternative Energy Portfolio Standard, Pennsylvania utilities are required to obtain gradually increasing levels of electricity from solar power every year, up to 0.5 percent in 2021.[27] Because utilities can purchase credits from rooftop solar owners, selling SRECs can be a valuable source of revenue for solar energy system owners. Unfortunately, some shortfalls in the current law—particularly the low solar energy requirement, and the fact that SRECs can be purchased from out of state—mean that Pennsylvania's SREC market is currently oversupplied, and that without reform, it may not play a big role in helping schools generate revenue from solar panels.[28]

Federal Incentives

Because schools do not pay taxes, they cannot directly take advantage of the two important federal solar incentives, the Investment Tax Credit (ITC) and the Modified Accelerated Cost Recovery System (MACRS), which allows solar customers to recover some of the costs of their solar investment through depreciation deductions on their federal taxes. Through third-party power purchase agreements, however, for-profit companies can take advantage of these tax credits, and reflect those savings in the amount they charge schools for power.[29] The savings can be substantial: the ITC, for instance, provides a 30 percent tax credit against the cost of installing solar energy systems.[30]

In addition to tax credits, schools can take advantage of federal bond programs, including Qualified Energy Conservation Bonds (QECBs) and Clean Renewable Energy Bonds (CREBs). These programs can help schools raise money for solar panels through bond issuances while paying very low interest rates.[31]

The Benefits of Solar Panels on Philly Public Schools

Rooftop Solar on Philly Schools Could Supply 37 Percent of School Electricity Needs

Philadelphia schools have more than 100 acres of usable rooftop space. By installing solar panels on all usable rooftop space, Philadelphia schools could generate 71 gigawatt-hours of electricity per year. To put it in perspective, that electricity:

- Is enough to supply 37% of annual school electricity use;[32]
- Is equivalent to the electricity usage of 7,000 average Pennsylvania homes.[33]

Philadelphia Schools Have More Than 100 Acres of Rooftop Space Available for Solar Panels

The city of Philadelphia has 204 school buildings with rooftop space available for solar panels. (See Figure 2.) Those buildings have a combined 100 acres of rooftop space available for solar panels. (See Methodology for details on calculation of usable space.) There are other spaces on school property that could fit potentially large amounts of solar capacity, including parking lots (on which solar canopies could be installed), but those areas are not considered here.

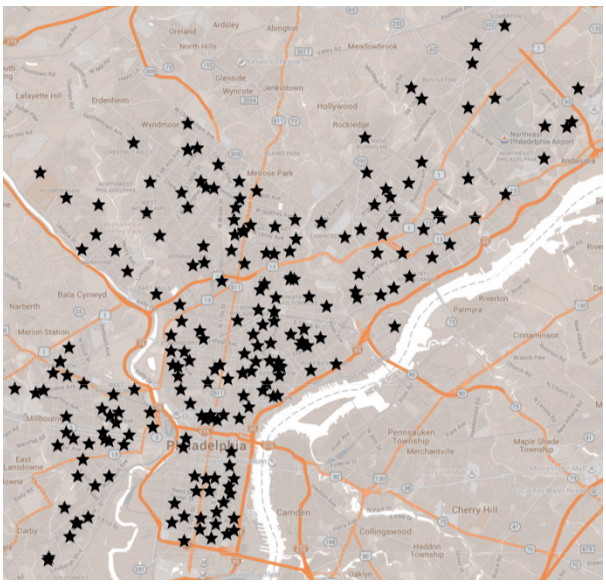
With more than 133,000 square feet of usable rooftop space, Northeast High School could fit a solar panel system with a capacity of 1.7 MW—more than any other public school in Philadelphia.[35] (See Figure 3.) A solar panel system of that size could generate more electricity than Northeast High School uses in a year, or could produce as much electricity as is used in 210 typical Pennsylvania homes.[36]

Even the typical Philadelphia school can support a large solar panel system. The school with the median solar energy capacity, the Thomas Morton Elementary School, could support a rooftop panel system with a capacity of 204 kilowatts. (See Figure 4.) The average capacity of all 204 schools with usable rooftop space is 296 kilowatts—enough capacity to produce as much electricity as is used in 34 average Pennsylvania homes every year.

Solar Schools Could Avert the Release of 62,000 Metric Tons of Carbon Dioxide Pollution per Year

Solar panels generate emission-free electricity—and every unit of energy they produce is one less unit of energy that needs to be generated

Figure 2. Philadelphia's 204 Schools with Rooftop Space for Solar Panels[34]



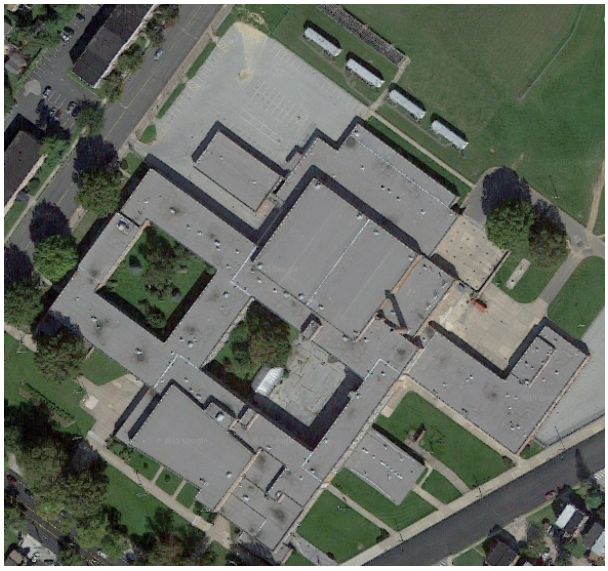
Map data: ©2016 Google

by burning fossil fuels. If all Philadelphia schools were to install solar panels on all usable rooftop space, every year they would offset 62,000 metric tons of carbon dioxide emissions, the leading cause of global warming.[37] That's equivalent to the emission reductions resulting from taking 13,000 cars off the road annually.[38]

In addition, if Philadelphia schools "go solar" they could:

- Offset 64 tons of nitrogen oxide emissions, which contribute to the formation of smog.[39]
- Offset 127 tons of sulfur dioxide emissions, which are associated with respiratory diseases such as asthma, bronchitis and emphysema.[40] This can only benefit Philadelphia children, for whom asthma hospitalization rates doubled between 2000 and 2010, and who suffer from asthma at a rate nearly double the national average.[41]

Figure 3. Northeast High School Has the Most Rooftop Solar Panel Space of Any Philadelphia School



Imagery: ©2015 Google.

Figure 4. Thomas Morton Elementary School Has the Median Rooftop Solar Panel Space Among Philadelphia Schools

Imagery: ©2015 Google.

Solar Schools Could Save Philadelphia Taxpayers Money

If all Philadelphia schools were to "go solar," Philadelphia taxpayers could save more than $13 million in 2016 dollars (net present value) over the lifetime of the solar installations.[42]

The total installation and maintenance costs of a district wide system would amount to approximately $150 million, without accounting for incentives that could potentially reduce total system costs by millions of dollars. The installation would bring taxpayers a net $13 million benefit after accounting for the approximately $7 million worth of electricity the solar energy system would generate per year throughout its assumed 30-year lifetime. (See Methodology for more on the assumptions used in estimating costs and benefits.)

Neither the School District of Philadelphia, nor taxpayers, would necessarily have to bear the upfront cost of the system. A variety of options exist for financing the project through means other than upfront payments, including private financing through a third-party ownership agreements, which is the type of financing used by most school solar installations in the United States. (See "Financing Options" on page 8.)

Solar Schools Could Create Hundreds of Local Jobs

The project development, installation, operation and maintenance required to put solar panels on all usable rooftop space would likely create the equivalent of 750 one-year jobs.[43]

Solar energy installations create local jobs and require extensive local labor that cannot be outsourced.[44] The jobs created by "going solar" would add to a solar job market that is already becoming an important part of the Pennsylvania economy: Pennsylvania has 476 solar companies, including manufacturers, contractors, and developers.[45] These companies employ 2,800 people.[46]

Policy Recommendations

The rooftops of Philadelphia schools have immense potential to expand local access to clean, renewable energy. With more than 100 acres of usable rooftop space, solar panels on Philadelphia schools could generate much of the school district's annual electricity use, while providing students with educational opportunities and creating local employment. It is also an investment that could save the city millions of dollars in the years to come—and, with certain types of financing, could require almost no upfront costs.

The Commonwealth of Pennsylvania, the City of Philadelphia and the School District of Philadelphia should work together to:

- Commit to putting solar panels on all Philadelphia schools to make the city a leader in clean energy production.
- Require that any extensive school renovations include plans to study the cost effectiveness of solar panels, and require that any new school buildings use solar panels.
- Strengthen Pennsylvania's statewide commitment to solar energy, including increasing the solar energy requirement of Pennsylvania's Alternative Energy Portfolio Standard (AEPS), and requiring that all solar renewable energy credits be generated in-state.

Methodology

Estimating Available Rooftop Space

The usable rooftop space of 407,789 square meters (100.1 acres) was estimated by adding the area of school building rooftops with Daft Logic's "Google Maps Area Calculator Tool."[47] The usable space estimate reflects a best effort attempt to account for shaded areas, physical obstructions, small or awkwardly shaped roof areas, appropriate margins around installations, and any other factor visible through satellite imagery that could impact solar panel placement. The usable space estimate was calculated by Meghan O'Connor of the University of Pennsylvania, who reviewed satellite imagery and estimated usable solar panel space for each school.

Estimating System Capacity, Generation, Financial Results and Job Impacts

The solar energy system's DC nameplate capacity was estimated assuming panel efficiency of 17.6 percent and a packing factor (which accounts for space between modules and other system components) of 1.25. Efficiency reflects an estimate of typical panel efficiency in 2017, projected with a linear trend based on the efficiency change between 2013 and 2014 of solar energy systems in Lawrence Berkeley National Laboratory's *Tracking the Sun VIII*. The packing factor is based on the National Renewable Energy Laboratory's (NREL) *Rooftop Photovoltaics Market Penetration Scenarios*.[48] For our nameplate DC capacity calculation we assumed Standard Test Condition solar irradiation of 1,000 watts per square meter.[49]

The final capacity calculation was:[50]

407,789 m^2 * (1/1.25) * 1 kW/ m^2 * 17.61% = 57,461 kW

(Area * Packing Factor * STC Irradiation * Efficiency = Capacity)

Electricity generation and system costs and benefits were calculated using NREL's System Advisor Model, or SAM.[51] Our estimate of costs and generation is not meant to substitute for a detailed economic analysis. The school system was modeled as a single system, not school by school, with installation costs incorporated into the system costs.

Notable modeling assumptions:

Financing: Although a citywide solar school project would likely use third-party ownership, to measure net present value we used a simplified commercial ownership model, assuming 20-year, 100-percent financing at 3 percent interest. That interest rate is in line with some past solar school financing that takes advantage of federal bond programs.[52] A discussion of the cost implications of different financing models can be found in NREL's 2014 report *To Own or Lease Solar: Understanding Commercial Retailers' Decisions to Use Alternative Financing Models*.[53]

System costs and lifetime: $2.66 per watt. Price reflects an estimate of cost per watt in 2017, projected with linear trends based on price change between 2013 and 2014 for "Non-Residential ≤500 kW" systems in Lawrence Berkeley National Laboratory's *Tracking the Sun VIII*.[54] We assumed solar panels would have a 30-year lifetime, reflecting SolarCity's estimate of solar panel lifetime.[55]

Electricity Rate and Total School Electricity Consumption: Assumed electricity rate of 10 cents per kWh, and annual electricity consumption of 190 million kWh, based on communication with School District of Philadelphia staff.[56]

Other notable parameters (all are SAM default values unless details are noted):

- Weather Station: USA PA Philadelphia (TMY2)
- Inflation rate: 2.5%/year
- Real discount rate: 5.5%/year
- System degradation rate: 0.5%/year
- Fixed cost by capacity: $15/kW-yr
- DC to AC ratio: 1.1
- Inverter efficiency: 96%
- Module Type: Standard
- Array Type: Fixed Open Rack
- Azimuth: 180°
- Tilt: 10° (Optimal tilt is 20° according to NREL's PVWatts tool. For this model, less than ideal tilt was assumed to account for panels with sub-optimal placement, or on roofs angled away from the sun.)
- Hourly electric load model: In order to anticipate variations in daily and monthly energy use, the electricity load of the school district was modeled from the hourly load of a typical secondary school in Baltimore, Maryland (the closest city with reference model available).[57] As noted above, total annual electricity consumption was provided by school district staff.

Job impacts were estimated using the National Renewable Energy Laboratory's Jobs and Economic Development Impact (JEDI) modeling tool. Inputs for jobs estimate were consistent with modeling assumptions detailed above. This report refers to "one-year jobs" created instead of JEDI's terminology of "job-years."

Estimating Carbon Dioxide Emission Reductions

Carbon dioxide emission reductions from solar energy generation were calculated assuming that solar energy added to the grid would offset fossil fuel generation only, and would offset coal and gas-fired generation in proportion to their contribution to Pennsylvania's electricity mix. The assumption that renewable energy overwhelmingly offsets fossil fuel generation, even at high levels of penetration, is supported by recent analyses of high renewable energy penetration scenarios in both the western and eastern U.S.[58]

The emission reduction rate for each state was based on the electricity generation mixes for RFC East (RFCE) and RFC West (RFCW), the EIA EMM regions of which Pennsylvania is a part. The EIA's *Annual Energy Outlook* provided data on actual annual electricity generation and emissions for coal and natural gas power plants in these regions for 2013 (compiled from EIA Form 759). We assigned Pennsylvania's EMM region (RFCE) to Pennsylvania's interconnection region identified by the North American Electric Reliability Corporation (NERC), using maps of EMM regions and NERC regions. We estimated an emissions factor for fossil fuel-fired generation for each NERC region, using the generation and emissions data for the constituent EMM regions. We used 2013-specific emissions factors for the year 2014. To arrive at an emissions factor, we determined the percentage of electricity sales in Pennsylvania that come from within each NERC region, using data from U.S. Department of Energy, Energy Information Administration, Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861, 29 October 2013. Pennsylvania emission factors were created by multiplying Pennsylvania's percent of sales per NERC region in 2012 by its regions' emission factors.

Finally, to estimate total emissions savings, we multiplied annual solar school generation by Pennsylvania's emission factor of 0.87 metric tons of carbon dioxide per megawatt hour. The carbon dioxide emissions estimate contained in this report does not account for any difference between Philadelphia's energy mix and the state's as a whole.

Appendix: Individual School Solar Capacity Potentials

SCHOOL NAME	Usable Rooftop Space (Sq. Feet)	Solar Capacity Potential (KW)
ACADEMY AT PALUMBO	6,007	79
ADAIRE, ALEXANDER SCHOOL	21,186	277
ALLEN, DR. ETHEL SCHOOL	28,092	368
ALLEN, ETHAN SCHOOL	8,786	115
AMY 5 AT JAMES MARTIN	6,881	90
AMY NORTHWEST	7,608	100
ARTS ACADEMY AT BENJAMIN RUSH	57,726	756
BACHE-MARTIN SCHOOL	6,732	88
BALDI MIDDLE SCHOOL	57,466	752
BARRY, JOHN ELEMENTARY SCHOOL	16,348	214
BARTON SCHOOL	9,027	118
BARTRAM, JOHN HIGH SCHOOL	36,009	471
BEEBER, DIMNER MIDDLE SCHOOL	27,028	354
BETHUNE, MARY MCLEOD SCHOOL	34,350	450
BLAINE, JAMES G. SCHOOL	25,460	333
BLANKENBURG, RUDOLPH SCHOOL	5,934	78
BODINE, WILLIAM W. HIGH SCHOOL	4,789	63
BREGY, F. AMEDEE SCHOOL	7,197	94
BRIDESBURG SCHOOL	14,017	183
BROWN, HENRY A. SCHOOL	16,397	215
BROWN, JOSEPH H. SCHOOL	8,748	115
BRYANT, WILLIAM C. SCHOOL	11,705	153
CARNELL, LAURA H. SCHOOL	12,457	163
CASSIDY,LEWIS C ACADEMICS PLUS	6,885	90
CATHARINE, JOSEPH SCHOOL	7,448	98
CAYUGA SCHOOL	5,911	77
CENTRAL HIGH SCHOOL	42,279	553
CHILDS, GEORGE W. SCHOOL	7,313	96
CLEMENTE, ROBERTO MIDDLE SCHL	43,358	568
COMEGYS, BENJAMIN B. SCHOOL	7,359	96
COMLY, WATSON SCHOOL	16,824	220
CONWELL, RUSSELL MIDDLE SCHOOL	6,155	81
COOKE, JAY ELEMENTARY SCHOOL	26,847	351
COOK-WISSAHICKON SCHOOL	17,504	229

SCHOOL NAME	Usable Rooftop Space (Sq. Feet)	Solar Capacity Potential (KW)
CRAMP, WILLIAM SCHOOL	28,051	367
CREATIVE AND PERFORMING ARTS	10,502	137
CROSSAN, KENNEDY C. SCHOOL	4,800	63
DAY, ANNA B. SCHOOL	16,974	222
DEBURGOS, J. ELEMENTARY	23,016	301
DECATUR, STEPHEN SCHOOL	43,569	570
DICK, WILLIAM SCHOOL	19,758	259
DISSTON, HAMILTON SCHOOL	5,085	67
DOBBINS, MURRELL HIGH SCHOOL	19,219	252
DOBSON, JAMES SCHOOL	7,714	101
DUCKREY, TANNER SCHOOL	26,193	343
DUNBAR, PAUL L. SCHOOL	3,816	50
EDISON, THOMAS A. HIGH SCHOOL	109,494	1,433
EDMONDS, FRANKLIN S. SCHOOL	26,413	346
ELKIN, LEWIS SCHOOL	25,804	338
ELLWOOD SCHOOL	16,729	219
EMLEN, ELEANOR C. SCHOOL	10,824	142
FARRELL, LOUIS H. SCHOOL	26,251	344
FELL, D. NEWLIN SCHOOL	10,239	134
FELS, SAMUEL HIGH SCHOOL	64,821	849
FELTONVILLE ARTS & SCIENCES	18,897	247
FELTONVILLE INTERMEDIATE	25,534	334
FINLETTER, THOMAS K. SCHOOL	6,976	91
FITLER ACADEMICS PLUS	5,430	71
FITZPATRICK, A. L. SCHOOL	18,147	238
FORREST, EDWIN SCHOOL	5,894	77
FOX CHASE SCHOOL	16,124	211
FRANK, ANNE SCHOOL	43,001	563
FRANKFORD HIGH SCHOOL	32,635	427
FRANKLIN LEARNING CENTER	12,755	167
FRANKLIN, BENJAMIN HIGH SCHOOL	24,200	317
FRANKLIN, BENJAMIN SCHOOL	7,053	92
FURNESS, HORACE HIGH SCHOOL	11,125	146
GIDEON, EDWARD SCHOOL	15,612	204

GIRARD ACADEMIC MUSIC PROGRAM	10,872	142
GIRARD, STEPHEN SCHOOL	15,397	202
GIRLS, PHILA HIGH SCHOOL FOR	41,776	547
GOMPERS, SAMUEL SCHOOL	22,742	298
GREENBERG, JOSEPH SCHOOL	19,652	257
GREENFIELD, ALBERT M. SCHOOL	10,687	140
HACKETT, HORATIO B. SCHOOL	20,517	269
HAMILTON, ANDREW SCHOOL	15,492	203
HANCOCK, JOHN SCHOOL	24,771	324
HARDING, WARREN G. MIDDLE SCH	19,322	253
HARRINGTON, AVERY D. SCHOOL	8,340	109
HARTRANFT, JOHN F. SCHOOL	27,917	365
HENRY, CHARLES W. SCHOOL	13,692	179
HESTON, EDWARD SCHOOL	15,682	205
HIGH SCHOOL OF THE FUTURE	40,554	531
HILL-FREEDMAN WORLD ACADEMY	18,950	248
HOLME, THOMAS SCHOOL	27,412	359
HOPKINSON, FRANCIS SCHOOL	8,828	116
HOUSTON, HENRY H. SCHOOL	11,313	148
HOWE, JULIA WARD SCHOOL	4,621	60
HUEY, SAMUEL B. SCHOOL	18,055	236
HUNTER, WILLIAM H. SCHOOL	22,139	290
JACKSON, ANDREW SCHOOL	5,526	72
JENKS ACADEMY ARTS & SCIENCES	9,181	120
JENKS, ABRAM SCHOOL	6,687	88
JUNIATA PARK ACADEMY	32,995	432
KEARNY, GEN. PHILIP SCHOOL	13,930	182
KELLEY, WILLIAM D. SCHOOL	20,639	270
KELLY, JOHN B. SCHOOL	57,235	749
KENSINGTON BUSINESS, FINANCE	10,144	133
KENSINGTON CAPA	18,402	241
KENSINGTON HEALTH SCIENCES	12,904	169
KEY, FRANCIS SCOTT SCHOOL	6,331	83
KING, MARTIN LUTHER HIGH SCH.	80,393	1,052
KIRKBRIDE, ELIZA B. SCHOOL	5,032	66
LABRUM,GEN HARRY MIDDLE SCHOOL	21,056	276
LAMBERTON,ROBERT E ELEMENTARY	24,603	322
LANKENAU HIGH SCHOOL	9,805	128
LAWTON, HENRY W. SCHOOL	26,864	352
LEA, HENRY C.	29,749	389

LEEDS, MORRIS E. MIDDLE SCHOOL	37,707	494
LINCOLN, ABRAHAM HIGH SCHOOL	84,642	1,108
LINGELBACH, ANNA L. SCHOOL	10,634	139
LOCKE, ALAIN SCHOOL	24,241	317
LOESCHE, WILLIAM H. SCHOOL	37,890	496
LOGAN, JAMES SCHOOL	7,724	101
LONGSTRETH, WILLIAM C. SCHOOL	17,497	229
LOWELL, JAMES R. SCHOOL	13,967	183
LUDLOW, JAMES R. SCHOOL	4,546	60
MARSHALL, JOHN SCHOOL	5,463	72
MARSHALL, THURGOOD SCHOOL	13,642	179
MASTBAUM, JULES E. HIGH SCHOOL	12,868	168
MASTBAUM, JULES E. HIGH SCHOOL	12,868	168
MASTERMAN,JULIA R. HIGH SCHOOL	5,795	76
MAYFAIR SCHOOL	20,350	266
MC CALL, GEN. GEORGE A. SCHOOL	10,792	141
MC CLURE, ALEXANDER K. SCHOOL	8,286	108
MC MICHAEL, MORTON SCHOOL	29,105	381
MCCLOSKEY, JOHN F. SCHOOL	20,611	270
MCDANIEL, DELAPLAINE SCHOOL	8,768	115
MCKINLEY, WILLIAM SCHOOL	36,254	475
MEADE, GEN. GEORGE G. SCHOOL	16,164	212
MEEHAN, AUSTIN MIDDLE SCHOOL	49,877	653
MEREDITH, WILLIAM M. SCHOOL	8,721	114
MIFFLIN, THOMAS SCHOOL	10,424	136
MITCHELL ELEMENTARY SCHOOL	12,751	167
MOFFET, JOHN SCHOOL	12,804	168
MOORE, J. HAMPTON SCHOOL	32,918	431
MORRIS, ROBERT SCHOOL	15,226	199
MORRISON, ANDREW J. SCHOOL	14,864	195
MORTON, THOMAS G. SCHOOL	15,564	204
MOTIVATION HIGH SCHOOL	13,532	177
MUNOZ-MARIN, HON LUIS SCHOOL	35,813	469
NEBINGER, GEORGE W. SCHOOL	6,569	86
NORTHEAST HIGH SCHOOL	133,151	1,743
OLNEY ELEMENTARY SCHOOL	4,077	53
OVERBROOK EDUCATIONAL CENTER	3,104	41
OVERBROOK ELEMENTARY SCHOOL	4,754	62
OVERBROOK HIGH SCHOOL	24,619	322
PARKWAY CENTER CITY HIGH SCHL	8,206	107

PARKWAY WEST HIGH SCHOOL	16,576	217
PATTERSON, JOHN M. SCHOOL	5,867	77
PEIRCE, THOMAS M. SCHOOL	12,545	164
PENN ALEXANDER SCHOOL	10,679	140
PENN TREATY HIGH SCHOOL	13,717	180
PENNELL, JOSEPH ELEMENTARY	9,642	126
PENNYPACKER, SAMUEL SCHOOL	7,553	99
PENROSE SCHOOL	12,339	162
POLLOCK, ROBERT B. SCHOOL	30,605	401
POTTER-THOMAS SCHOOL	33,618	440
POWEL, SAMUEL SCHOOL	7,309	96
PRINCE HALL SCHOOL	37,182	487
RANDOLPH TECHNICAL HIGH SCHOOL	69,791	914
RHAWNHURST SCHOOL	24,774	324
RHOADS, JAMES SCHOOL	13,948	183
RHODES ELEMENTARY SCHOOL	53,907	706
RICHMOND SCHOOL	6,329	83
ROBESON, PAUL HIGH SCHOOL	9,030	118
ROOSEVELT ELEMENTARY SCHOOL	39,831	521
ROWEN, WILLIAM SCHOOL	12,616	165
ROXBOROUGH HIGH SCHOOL	29,467	386
SAUL, WALTER B. HIGH SCHOOL	33,625	440
SAYRE, WILLIAM L. HIGH SCHOOL	71,068	930
SHARSWOOD, GEORGE SCHOOL	11,559	151
SHAWMONT SCHOOL	12,381	162
SHEPPARD, ISAAC A. SCHOOL	4,749	62
SHERIDAN, PHILIP H. SCHOOL	11,047	145
SOLIS-COHEN, SOLOMON SCHOOL	48,895	640

SOUTH PHILADELPHIA H.S.	48,044	629
SOUTHWARK SCHOOL	9,887	129
SPRING GARDEN SCHOOL	2,668	35
SPRUANCE, GILBERT SCHOOL	39,202	513
STANTON, EDWIN M. SCHOOL	4,755	62
STEARNE, ALLEN M. SCHOOL	2,444	32
STEEL, EDWARD SCHOOL	20,584	269
STRAWBERRY MANSION HIGH SCHOOL	51,368	672
SULLIVAN, JAMES J. SCHOOL	5,808	76
SWENSON ARTS/TECH HIGH SCHOOL	53,326	698
TAGGART, JOHN H. SCHOOL	10,317	135
TAYLOR, BAYARD SCHOOL	12,778	167
TILDEN MIDDLE SCHOOL	5,208	68
VARE-WASHINGTON ELEMENTARY	11,852	155
WAGNER, GEN. LOUIS MIDDLE SCH.	18,685	245
WARING, LAURA W. SCHOOL	10,503	137
WASHINGTON, GEORGE HIGH SCHOOL	114,039	1,493
WASHINGTON, GROVER JR. MIDDLE	27,602	361
WASHINGTON, MARTHA SCHOOL	9,847	129
WEBSTER, JOHN H. SCHOOL	15,652	205
WELSH, JOHN SCHOOL	10,671	140
WEST PHILADELPHIA HIGH SCHOOL	34,178	447
WIDENER MEMORIAL SCHOOL	79,956	1,047
WILLARD, FRANCES E. SCHOOL	29,854	391
WILSON, WOODROW MIDDLE SCHOOL	20,217	265
WISTER, JOHN SCHOOL	19,125	250
WRIGHT, RICHARD R. SCHOOL	31,658	414
ZIEGLER, WILLIAM H. SCHOOL	21,625	283

Notes

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