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Solar Update Summary for the Borough of Media

By Celentano Energy Services – 10/4/2019 – Final Draft

This is a brief summary report that includes the following topics:

- Quick Overview of Solar PV in the U.S.
- Status of Solar PV Installed in the Pennsylvania
- Current Status of Solar PV Systems – Borough of Media
- Short Term Plans for Existing Solar Systems - Repairs, Alterations and SREC Ownership
- Discussion on Solar System Maintenance Responsibility
- PECO Interconnection Issues
- Pennsylvania Solar Future Plan
- Strategies for Future Solar Development for Borough of Media

A. Quick Overview of Solar PV in the U.S.

Most all the solar photovoltaic (PV) systems can be characterized either as one of the following:

Distributed Generation (Solar DG) - Both residential and non-residential solar PV systems (rooftop and ground mounted) interconnected to the distribution system on the customer's side of the utility meter (aka – "behind the meter"). Typically these systems offset conventional grid power at the customer's site, reducing the electric bill through net metering.

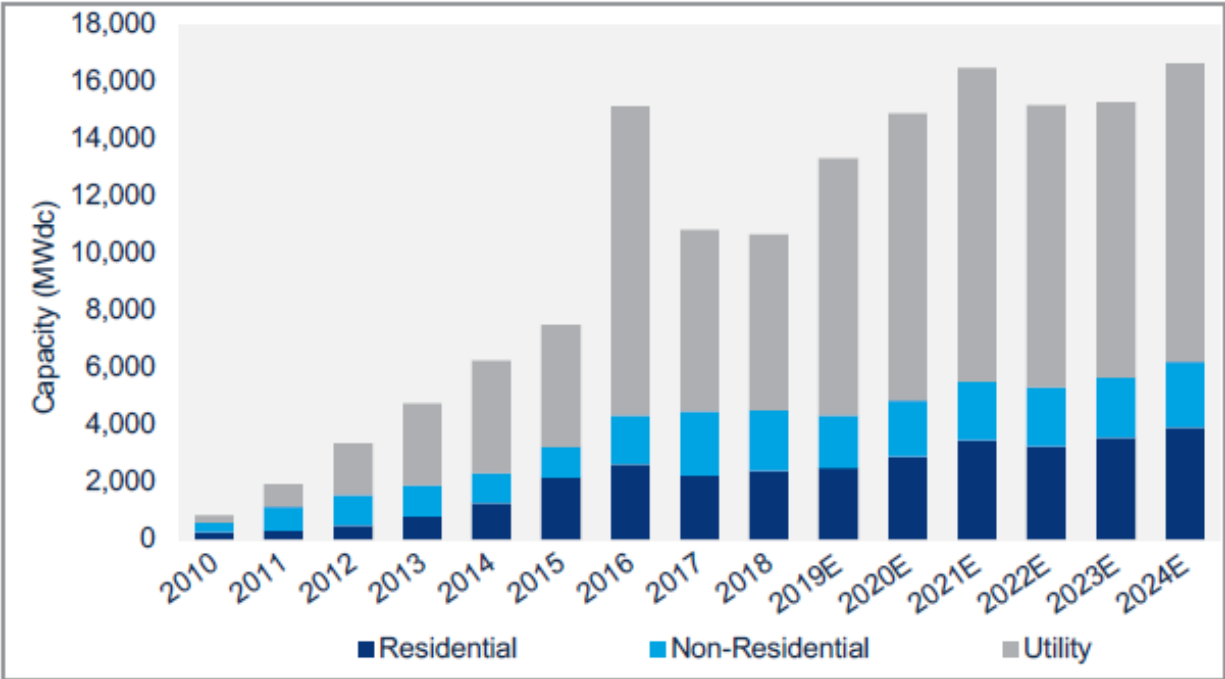
- Residential PV systems typically range from 3 kW to 15 kW;
- Non-residential PV (commercial, non-profits, hospitals, etc.) typically range from 15 kW - 250 kW, but can be 3 MW or more.

Grid Scale or Utility Scale – These are very large solar PV systems, such as solar farms, which are directly interconnected onto the transmission or distribution lines, where the power is typically sold to an off-taker through the given transmission system operator (i.e., such as PJM), depending on the project location. These systems typical range from < 3 MW to 20 MW, to over 100 MW in size.

There are exceptions to solar PV systems falling squarely in one of these two groups, such as off-grid systems, micro-grid systems, community solar projects, etc.

As of the second quarter of 2019, there are over 2 million solar PV systems installed in the United States, totaling over 67 GW of solar capacity. **Figure 1** below shows the annual installations of solar PV system capacity, from 2010 actual to 2024 – forecasted:

Figure 2.4 U.S. PV installation forecast, 2010-2024E



Source: Wood Mackenzie Power & Renewables

Figure 1. Annual actual and projected solar PV capacity in the United States

The stacked bars breakdown the residential and non-residential (solar DG), and the utility or grid scale systems.

The following in **Figure 2** show the turn-key installation cost for solar PV over the last 15 years, broken down by these three market groups (residential, non-residential and grid scale systems).

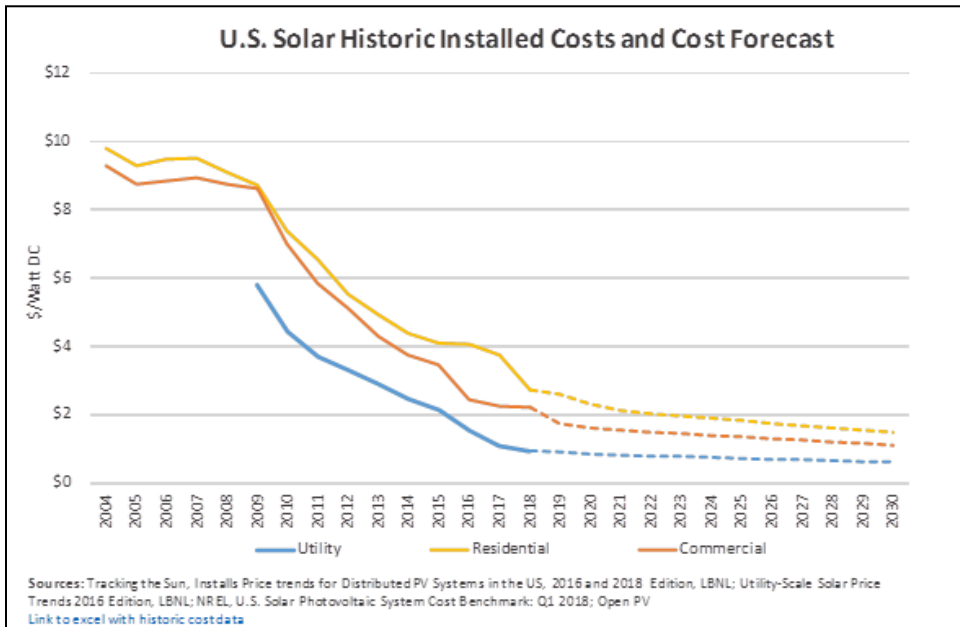


Figure 2. First Costs of Solar PV Installation Over Time in the United States

B. Status of Solar PV Installed in Pennsylvania

As of 8/13/2019, about 404 MW of solar PV capacity is generating power in Pennsylvania, from over 21,700 PV systems. This is depicted in the following figures, which show the annual and cumulative solar PV capacity and number of systems installed over time.

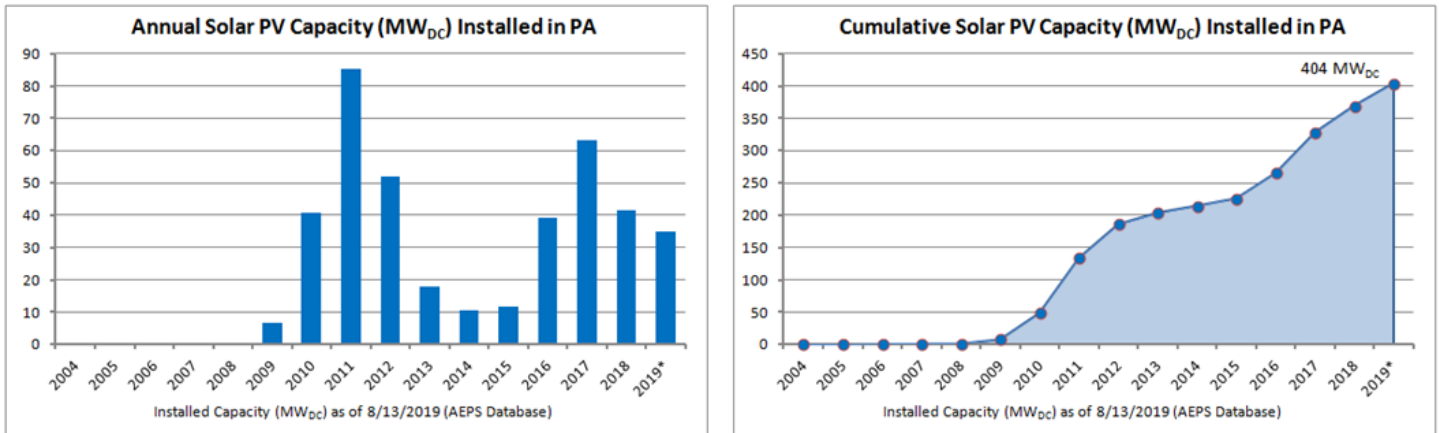


Figure 1a. Annual and cumulative solar PV capacity installed in Pennsylvania

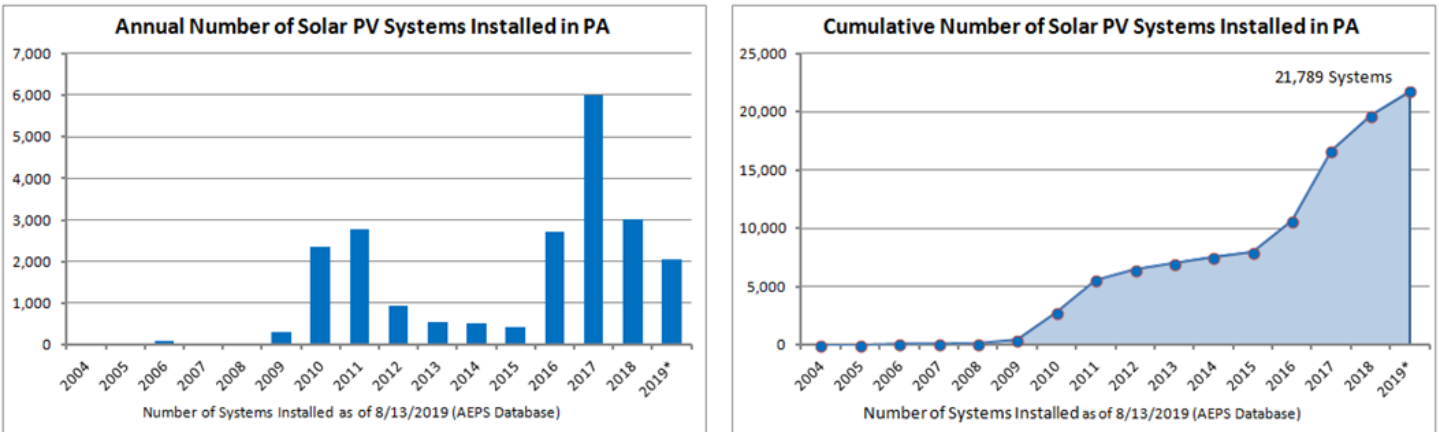


Figure 1b. Annual and cumulative number of solar PV systems installed in Pennsylvania

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This is broken down by system size category shown in **Table 1**, below:

Cumulative PV Installed in PA		
Capacity (DC)	# of Systems	Total MW
≤ 15 kW	18,960	145
> 15 kW to ≤ 250 kW	2,658	101
> 250 kW to ≤ 1 MW	128	59
> 1 MW to ≤ 3 MW	33	52
> 3 MW to ≤ 5 MW	8	30
> 5 MW to ≤ 10 MW	1	6
> 10 MW	1	12
Total	21,789	404

* as of 8/13/2019 as per PA AEPS (PUC)

Table 1. Solar System Size Breakdown

By county, Lancaster is leading the State with 62.94 MW installed, followed by Bucks and Chester counties with 30.49 MW and 28.46 MW installed, respectively. Delaware County is in 9th place with 11.08 MW installed.

However, this total solar PV capacity of 404 MW in Pennsylvania is tracking far below our solar requirement under the Alternative Energy Portfolio Standard (AEPS). The equivalent solar PV capacity requirement is about 568 MW by 5/31/2020, and then about 645 MW by 5/31/2021, after which the AEPS program schedule ends with no additional growth requirements under the Tier 1, Tier 2 and solar resources.

The reason for this lag is due to how the AEPS law and regulations originally allowed out-of-state solar systems sell their solar renewable energy credits (SRECs) into the PA AEPS compliance market. But, the law was revised in October, 2017, with Act 40, now restricting the solar requirement to be met by only SRECs generated from solar PV systems installed in the Commonwealth, though there are still exceptions. The market is now slowly catching up with this important requirement change.

In fact, there has been a significant surge of grid scale sized project proposals that have been announced, as well as started the interconnection application phase at PJM (with regard to solar farm sized projects). As of mid-August, 2019, there were 103 grid scale solar applications with active status, which are summarized in **Table 2** below, followed by where most of those prospects are located in the Commonwealth, shown in **Figure 3**.

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Total Solar Capacity (MW)	4,468.3 MW
Smallest Project (MW)	5.0 MW
Largest Project (MW)	183.0 MW
Average Sized Project	43.4 MW
Number of Counties w/Applications	37

Table 2. New service applications for grid scale solar projects in the PJM Planning Queue

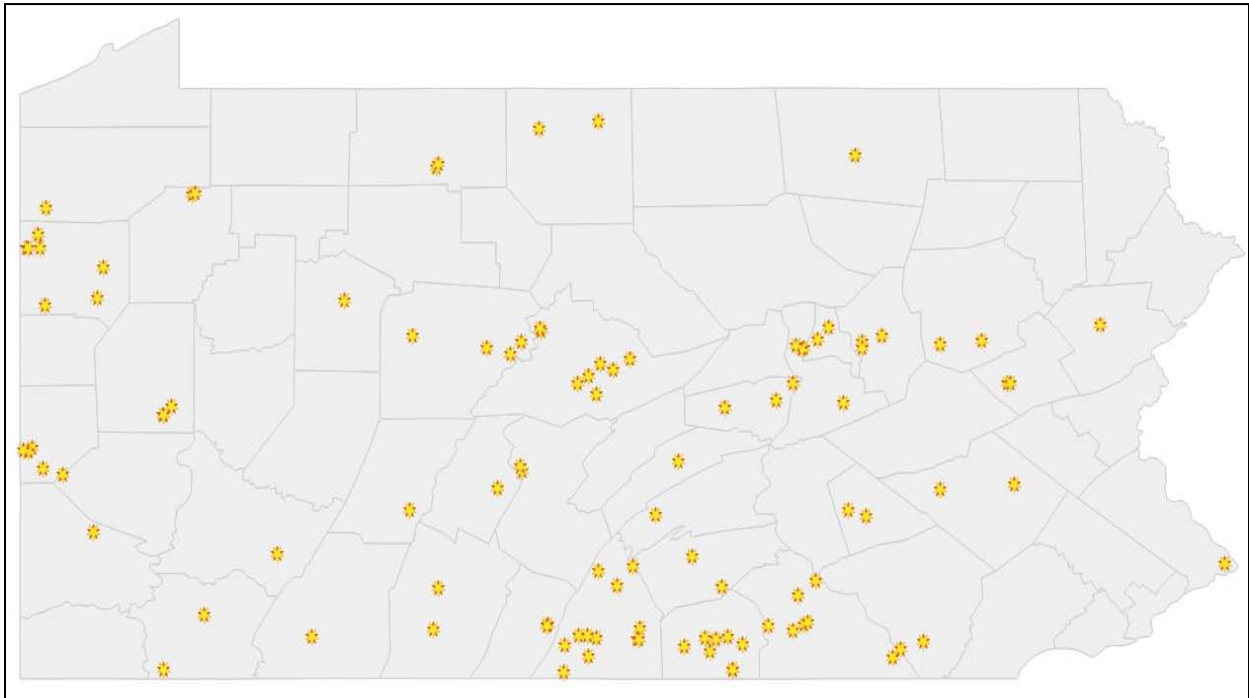


Figure 3. Locations of most of the grid-scale application prospects in the Commonwealth

Note, that only a fraction of these applications will likely result in installed solar projects; though it is highly contingent on Pennsylvania solar policy improvements in the very near future.

C. Current Status of Solar PV Systems – Borough of Media

The Borough of Media was a pioneer municipality to have solar PV systems installed under the Borough's authority. This started in 2004 with the first system installed at the Armory Building, providing power for the Pennsylvania Veterans Museum. This was the first of seven small solar PV systems installed over the next several years, which were fully funded by the Sustainable Development Fund (SDF) Solar PV Grant Program and the PA Department of Environmental Protection (DEP). Two more systems were installed after that, also funded by DEP. **Table 3** below shows this list of installations.

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Location:	Funding:	System:	Annual Energy Production	Cost:	Direct Cost to MB
Armory Installed 2004	1. DEP-Energy Harvest Program 2. Sustainable Development Fund Solar Photovoltaics Grant Program	5.16 kW	5.7 MWh (est)	\$ 15,760.00 \$ 23,146.00 \$ 38,906.00	\$ -
Library Installed October 2005 BP panels replaced 2013	1. DEP-Energy Harvest Program 2. Sustainable Development Fund Solar Photovoltaics Grant Program	5.16 kW	5.7 MWh (est)	\$ 19,291.26 \$ 19,200.00 \$ 38,491.26	\$ -
Media Elementary School Installed 10/26/05 BP panels replaced 2013	1. DEP-Energy Harvest Program 2. Sustainable Development Fund Solar Photovoltaics Grant Program	5.16 kW	5.7 MWh (est)	\$ 19,291.26 \$ 19,200.00 \$ 38,491.26	
Firehouse Installed Spring 2006 Solar Monitor Installed Dec. 2013	1. DEP-Energy Harvest Program 2. Sustainable Development Fund Solar Photovoltaics Grant Program 3. Media Borough	5.16 kW w/Locus Monitoring	5.7 MWh (est)	\$ 27,162.00 \$ 20,000.00 \$ 1,500.00 \$ 48,662.00	 \$ 1,500.00
Media Theatre Installed Spring 2007 Digital meter (Sunny Boy) Solar Monitor Installed Dec. 2013	1. DEP-Energy Harvest Program 2. Sustainable Development Fund Solar Photovoltaics Grant Program 3. Media Borough	5.16 kW w/Locus Monitoring	5.7 MWh (est)	\$ 27,162.00 \$ 20,000.00 \$ 1,500.00 \$ 48,662.00	 \$ 1,500.00
Borough Hall Installed 7/1/08 Solar Monitor Installed Dec. 2013	1. DEP-Energy Harvest Program 2. Sustainable Development Fund Solar Photovoltaics Grant Program 3. Media Borough	4.725 kW w/Locus Monitoring	5.2 MWh (est)	\$ 17,930.00 \$ 25,000.00 \$ 1,290.00 \$ 500.00 \$ 44,720.00	 \$ 1,290.00 \$ 500.00 \$ 1,790.00
Sweney Building Installed 7/1/08	1. DEP-Energy Harvest Program 2. Delaware County	5.0 kW (?)	5.5 MWh (est)	\$ 20,108.00 \$ 22,822.00 \$ 42,930.00	
Garage Installed 1/15/10 4.725 kW system	1. DEP-Energy Harvest Program 2. Media Borough	4.725 kW	5.2 MWh (est)	\$ 38,962.00 \$ 3,968.00 \$ 42,930.00	\$ 3,968.00
Media Youth Center Installed Summer 2009	Sustainable Development Fund via PA Clean Energy Communities Campaign	1.26 kW	1.4 MWh (est)	\$ 10,000.00	
TOTAL:		41.51 kW	45.8 MWh (est)	\$ 353,792.52	\$ 10,548.00

Table 3. Solar PV Systems Installed Under the Borough of Media's Authority

The above table shows details about each of these PV system installations, including location, system size, funding source, estimated annual generation, and cost information. However, the systems at the Library and the Sweney Building have both been removed in recent years, as those original buildings were demolished and reconstructed. The solar PV modules and inverters from those systems are being stored at the Borough Hall Building, and may be combined and used as a recycled solar PV installation for the Community Center; this is currently under review.

The follow show pictures of the solar PV arrays installed at the Armory, Elementary School, Firehouse, Media Theatre, Borough Hall, and the Media Youth Center.

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Armory Building



Elementary School



Firehouse



Media Theatre



Borough Hall



Media Youth Center

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A more recent development for these systems was the installations of Locus monitoring equipment. Currently the Armory, Elementary School, Firehouse, Media Theatre, Borough Hall and the Garage had monitoring systems installed, which can be viewed online, though some of these still need to be configured. **Figure 4** shows the hourly solar production from solar PV system for the Elementary School over the first three days in September, 2019.



Figure 4. Locations of most of the grid-scale application prospects in the Commonwealth

Eventually all of these systems, with the exception of the Media Youth Center, which is very small, will be viewable on the Borough of Media website.

D. Repairs and Other Near Term Tasks/Plans

Repairs - Currently some of the solar PV systems are having some problems, but these will be rectifying in the very near future. Several years ago, some of the solar PV modules had been replaced, due to a manufacturer's recall – which included the Elementary School and the original Library systems. Also, some of the inverters were replaced after they failed over their normal lifetime span. Some of the solar arrays consist of an early version of SunPower modules, which are unique and need special inverters to operate properly. These special inverters are now hard to find, but enough of these were recently purchased in time, and are in storage as a preventative measure, when the original inverters eventually fail and need to be replaced.

SREC Ownership - Currently the solar renewable energy credits (SRECs) generated by several of these solar PV systems are currently being managed by the SDF. However, the SREC ownership will be transferred from SDF to the Borough of Media in the very near future, so they will apply to the Borough's carbon offset goals. The Borough had agreed that SDF would have ownership of the SRECs for some indefinite period of time, in exchange for the original SDF grants that were provided for these installations. But, it has been agreed that SDF will pass the SREC ownership back to the Borough.

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New Solar PV Prospect Using Recycled Modules – As mentioned above, the solar PV arrays from the original Library and the Sweney buildings have been removed from those locations and are in storage in the basement of the Borough Hall. These PV modules still have many years of life left to generate electricity, so different locations were considered for installing both of these systems. Tentatively, one promising location would be on the roof of the Community Center, as shown below:



Rendering of Recycled Library and Sweney Solar PV Arrays on the Community Center Roof

At the time of this draft design, the proposed cost, including labor, new inverters, monitoring system and other equipment was estimated at about \$25,724, for the 9.89 kW system, which would generate about 12,000 kWh per year.

E. Discussion on Solar System Maintenance Responsibility

There have been internal discussions about who bears the operating and maintenance (O&M) costs of these solar PV systems, given that many of them are not installed on the Borough's property. All these systems were fully funded by other entities (i.e., SDF, DEP, and others), and the SDF has assisted with some funding for maintenance and repair in the past. But, going forward these systems need some O&M budget. As mentioned above, many of the solar PV modules have already been upgraded, and several inverters have already been replaced. In addition, inverters have already be purchased for future replacement.

So, technically, the O&M costs should be minimal. In addition, now having the monitoring systems installed, will provide the operational status of the solar PV systems, which can be observed remotely, thus reducing the O&M cost impact. The electric bill savings from these systems is not great, because the commercial rates are very low. However, it is possible that if the SRECs were sold

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through the PA Alternative Energy Portfolio Standard (AEPS) program, the revenue could be banked for O&M and repair costs. But, then the SRECs could not be used towards the Borough's carbon offset goals, as the SRECs cannot be double counted.

A realistic annual O&M budget needs to be estimated for these solar PV systems, in addition to determining what entity would be responsible for preparing those budgets and overseeing this function.

F. PECO Interconnection Issues

For the past several years there have been significant problems with PECO regarding solar interconnection applications. This has been mostly attributed to PECO's antiquated low voltage distribution system, of which about 30% is rated at 4 kilovolts, or 4 kV. The rest of their distribution wiring is mostly 13 kV and 33 kV, as well as 69 kV, 138 kV and 230 kV. By comparison, all of the other Pennsylvania utilities' distribution systems at least start at 13 kV, as they have upgraded their wiring over the years. The Borough of Media has been significantly sensitive to interconnection application denials over the years, probably because much of it is served by the 4 kV distribution wiring.

When solar electricity is being generated, the inverter of a grid-tied solar system naturally increases the AC voltage a little higher than the system voltage fed to the electric panel from the grid. The 4 kV distribution wiring is particularly problematic because it doesn't allow for much increased voltage, depending on where the interconnection point is located on the distribution line. As a result, many solar interconnection applications are initially rejected or denied, although PECO may sometimes offer simple solutions, such as downsize the inverter capacity, and/or upgrade the service wiring to the house or facility. But, more often the customer needs to resubmit an upgraded application (i.e., Level 2), in addition to a starter engineering study fee at a cost of about \$600 for residential PV systems, with no guarantees that further engineering fees may follow, and that additional hardware costs and upgrades will probably be required. Sometimes this could result in many thousands of dollars, making the solar PV project cost prohibitive.

Another more recent solution PECO may provide is to adjust some of the inverter settings, such as the power factor (i.e., dropping it from the default of 1.00 to 0.95), which would result in smaller voltage increases. But, this will also result in slightly less solar power generation that contributes to electric bill savings and solar renewable energy credit (SREC) production.

Time delays are also a problem with interconnection approvals, utility meter replacements, and even the expensive upgrades on the distribution line that PECO may require to have done (PECO carries out these upgrades, but they may take many weeks or months for the work to be done). The engineering studies alone can take one to two months before PECO provides possible solutions. And in some rare cases, PECO will conclude there are no solutions and the customer would not be approved for installing a grid-tied solar PV system at all.

PECO has gotten a barrage of complaints over recent years about the interconnection issues from applicants, advocates, legislators, Public Utility Commission, and other officials and professionals. And PECO has made significant strides with streamlining their interconnection application process, creating a subdivision specifically for interconnection applications, an online grid map or DER Interconnection Viability Map, and most recently they have developed an extended website section

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for solar energy project resources under the heading of, **My Green Power Connection**, which can be found using the following link:

<http://www.peco.com/SmartEnergy/MyGreenPowerConnection/Pages/default.aspx>

This PECO website section shows the following resource categories:

My Green Power Connection

Green Power Connection is our resource for customers interested in generating their own electricity and connecting to the smart energy grid.

- Solar for Home & Business**
Learn about the process for installing rooftop and commercial solar energy systems. Use our solar calculator to estimate your installation costs and energy savings. Get tips on how to find a contractor and apply for interconnection.
- Developers & Contractors**
Find resources for helping customers apply for interconnection.
- FAQs**
We have compiled a list of frequently asked questions that may be helpful when making the decision to go solar.

My Green Power Connection
Solar for Home & Business
Solar Calculator
Getting Started
Solar 101
Solar Incentives & Credits
Developers & Contractors
DER Interconnection Viability
Net Metering
Private Solar
Smaller Generators
Transmission Interconnection
FAQs

Even though PECO has responded to the range of complaints and has improved the interconnection application process, there are still many issues that still need to be addressed, as stated above. PECO continues to feel the pressure from the solar industry, customers that want to go solar, and many others – hopefully many of these issues will continue to be resolved.

G. Pennsylvania Solar Future Plan



Finding Pennsylvania's Solar Future was a 2017-2019 statewide planning project, funded by a DOE SunShot grant, which was led by PA Department of Environmental Protection (DEP) to equip Pennsylvania to produce more solar energy by 2030.

The goal of Finding Pennsylvania's Solar Future was to create a shared vision statewide for the most effective ways Pennsylvania could reach its objective of 10% of in-state electricity sales generated by in-state solar energy – which equated to about 11 GW as compared to about 400 MW of solar PV installed in PA today.

Stakeholders explored likely pathways to achieving the target and identified, through modeling, associated economic, environmental, and health impacts. The process undertaken was not meant to reach a consensus but create a robust and open process, for the identification and documentation of strategies and information. The Project team took significant input from both the committed partners and the robust stakeholder group composed of over 500 members.

The stakeholder engagement process worked to identify the most impactful and realistic strategies that would move Pennsylvania towards the target of in-state solar generation to provide 10 percent of in-state electricity consumption by 2030. The stakeholders ultimately identified fifteen strategies that may be pursued, including **cross cutting strategies** that will advance solar implementation sector-wide, as well as strategies specifically aimed at promoting **distributed generation** solar (such as rooftop solar) and **grid scale** solar (such as solar farms) The fifteen strategies are listed below:.

Cross-Cutting Strategies

- 1. Alternative Energy Portfolio Standards (AEPS)** - Implement an increase in the AEPS solar PV carve-out to between 4 and 8 percent by 2030 and ensure creditable Solar Renewable Energy Credits (SRECs) are limited to those generated in Pennsylvania wherever possible.
- 2. Access to Capital** - Increase access to capital by expanding availability of solar lending products to residential and commercial projects to enable solar ownership.
- 3. Access to Capital** - Provide loan guarantees to lower interest rates and incentivize deployment of solar generation.
- 4. Carbon Pricing** - Implement a carbon pricing program and invest the proceeds in renewable energy and energy efficiency measures.
- 5. Siting and Land Use** - Support the creation and adoption of uniform policies to streamline siting and land-use issues while encouraging conservation.
- 6. Tax Incentives** - Evaluate the state tax policy and consider exemptions that encourage the development of solar PV systems.

- 7. Tax Incentives** - Assist solar project sponsors in identifying investors and/or companies that have sufficient tax equity appetite to take full advantage of the federal Investment Tax Credit (ITC) and Modified Accelerated Cost Recovery System (MACRS) depreciation if sponsors cannot do so themselves.

Distributed Generation Strategies

- 8. Virtual Net Metering** - Expand customers' ability to use net metering.
- 9. Community Solar** - Identify and remove the barriers to the deployment of community solar systems in Pennsylvania.
- 10. Alternative Ratemaking** - Ensure alternative ratemaking is addressed in a manner that does not create a disincentive for solar deployment.
- 11. Property Assessed Clean Energy (PACE)** - Enable and encourage municipalities to offer PACE programs that include solar projects.
- 12. Addressing Interconnection Issues** - Accelerate use of smart inverters to manage overvoltage concerns on low voltage distribution lines and avoid unnecessarily adding costs on small solar distributed generation projects.

Grid Scale Strategies

- 13. Long-Term Contracts** - Develop guidelines for limited use of long term contracts (LTCs) for a period of 10 or more years to ensure Pennsylvania benefits from grid scale solar energy.
- 14. Long-Term Contracts** - Evaluate and consider utility ownership of solar generation especially in cases where market-driven deployment may be insufficient to achieve public goals and/or reliability concerns. This may include solar for low income and Customer Assistance Programs in particular.
- 15. Grid Modernization** - Investigate opportunities for grid modernization to enable increased solar generation.

Stakeholder input was informed by a process of modeling and data analysis investigating three primary scenarios: the **Solar A Scenario**, the **Solar B Scenario**, as well as a **Reference Scenario**, which presented a business as usual context as a baseline reference.

The Solar A and Solar B Scenarios provide two contrasting pathways for achieving 10 percent solar energy production, using the same total energy consumption as in the Reference Scenario. In both scenarios, the majority of new solar development comes from grid scale solar that is connected directly to the transmission and distribution system. **Table 4** shows comparison of the basic assumptions of the three primary scenarios.

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	Reference	Solar A	Solar B
Target for in-state solar	0.5% by 2020	10% by 2030	10% by 2030
Total solar capacity in 2030	1.2 GW	11 GW	11 GW
Distributed capacity in 2030	0.6 GW	3.9 GW (35% of total) 50% residential 50% commercial	1.1 GW (10% of total) 50% residential 50% commercial
Grid scale capacity (>3MW) in 2030	0.6 GW	7.1 GW (65% of total)	9.9 GW (90% of total)

Table 4. Comparison of the basic assumptions of the three primary scenarios

Although it is clear that most of this solar generation will come from utility or grid scale solar projects, community solar projects will certainly be part of the distributed generation portion of the growing solar market, though legislation will be needed to remove barriers and open opportunities.

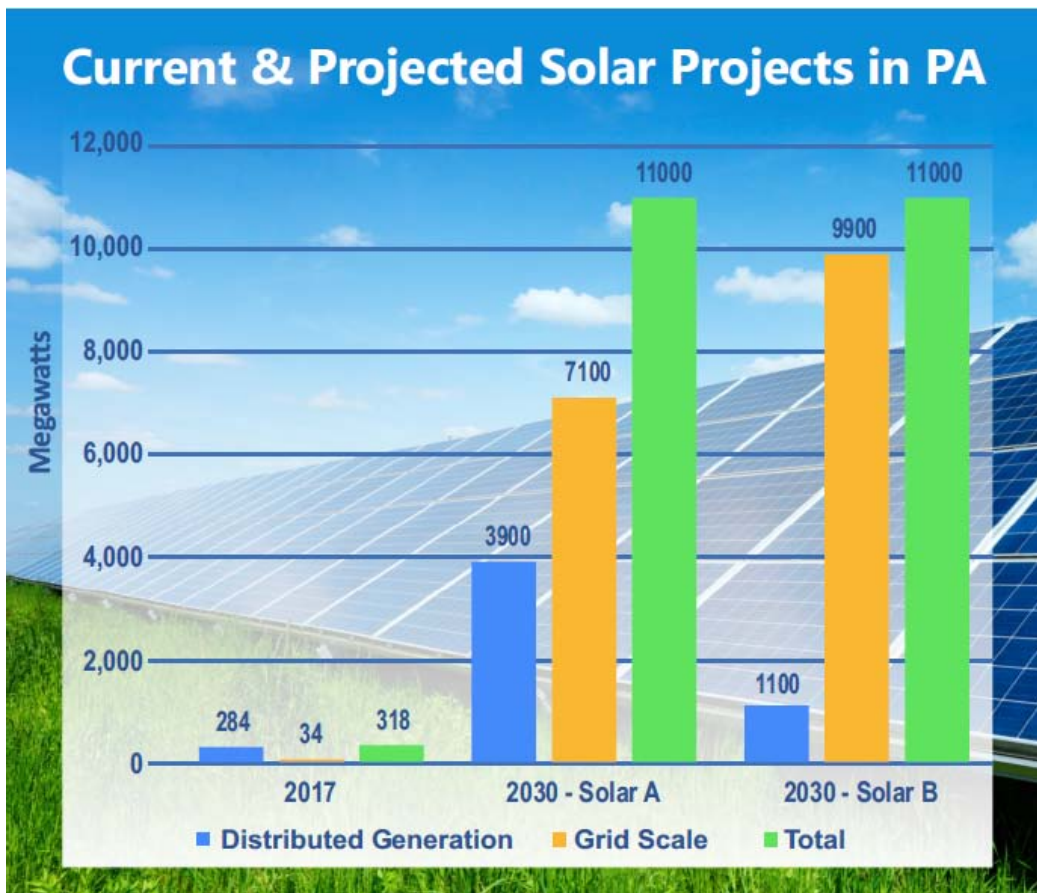


Figure 5. Current and Projected Solar Projects in Pennsylvania

The *Finding Pennsylvania's Solar Future* study concluded with:

Solar Powered Electricity = Significant Benefits to Pennsylvania

- **More jobs:** 60,000 to 100,000+ jobs, depending on the ratio of smaller systems to larger systems. From installers to system designers, these solar jobs have median wages of \$20–\$38 per hour, and will be available in rural, urban, and suburban areas.
- **Reduction in greenhouse gas emissions:** Emissions from the electricity generation sector will likely decrease up to 9.3 percent, which will help reduce health problems and negative environmental impacts of these pollutants.
- **Economic development opportunities:** There are opportunities to site solar development in ways that complement the working landscape and rural economy, such as using solar on buffer zones, disturbed lands, and in conjunction with grazing or pollinator friendly perennials.
- **Net benefit of free fuel and cost savings:** The combination of fuel savings (free sunlight) and anticipated cost savings (avoided public health and environmental damages) could result in a net benefit of over \$1.6 billion annually from 2018 to 2030.

The *Pennsylvania Solar Future Plan* and supporting documents can be found on the DEP's website at: <https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/SolarFuture/Pages/Finding-Pennsylvania%E2%80%99s-Solar-Future.aspx>.

H. Possible Strategies for Future Solar Development for Borough of Media

The following include five recommended actions that the Borough can take with regard to advancing solar in the community. Six are listed, but #5 on Community Solar, is pending upon enacted legislation, so no action can be recommend for that yet. Some of these address solar for the Borough of Media facilities directly, and others are for what the Borough can do to help facilitate more solar opportunities for those in the community.

1. Solar Friendly Municipality

As previously mention under the *Current Status of Solar PV Systems* section above, the Borough of Media was in the forefront with implementing solar PV projects in the early 2000s compared to most any other municipality in Pennsylvania. In addition, the Borough of Media was an early participating community in Delaware Valley Regional Planning Commission's (DVRPC) SolSmart project where they very recently earned enough points to be qualified for Bronze designation.

SolSmart is a national designation program that provides a framework for municipalities and counties to reduce soft costs and take action to become more supportive of solar PV in their communities. Local governments that achieve the appropriate actions under SolSmart become designated as "solar friendly". DVRPC received funding under the Solar Ready II project and SolSmart, under the U.S. Department of Energy's SunShot program.

The Borough earned points for incorporating solar in the permitting, planning/zoning, construction, and community engagement categories. Specifically, this includes the following developments:

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Media Borough Solar Permitting Checklist
Solar in Media Borough Comprehensive Plan
Solarize Greater Media
Solar Ready New Construction Checklist
Historic Preservation Guidance for Solar

The Borough of Media is encouraged to reach the next tier of SolSmart designation, which may include:

- Provide cross-training of inspection and permitting staff on solar PV
- Codify in the zoning ordinance that accessory use solar PV is explicitly allowed by-right in all major zones
- Provide a streamlined permitting pathway for small PV systems (no more than 3 days)

Technical assistance is available at no cost to participants in the SolSmart program.

More information about the DVRPC's SolSmart project can be found at:

<https://www.dvrpc.org/solar/#solsmart-communities>

2. Solarize Greater Media

As one of the accomplishments noted above for the Borough of Media under the SolSmart project was *Solarize Greater Media*. This was a solarize campaign, which is defined as a community-driven outreach campaign and support system to assist residential and commercial customers overcoming financial and logistical barriers to going solar. Typically this is group buying program designed to bring down the price of solar and build customer confidence.

Solarize Allegheny and Solarize NW Philadelphia were the first solarize campaigns in Pennsylvania. Then in 2015, Solarize Greater Media was started by Transition Town Media (TTM), with the assistance of DVRPC, Delaware County Planning Department, and others. After TTM held at least 10 informational events and did extensive marketing, over 300 people had expressed interest with wanting at least a proposal for having a solar PV system installed. Of those, at least 50 people signed contracts for solar installations with the selected solar contractor, Solar States. But, as indicated above, there were significant problems with the PECO interconnection process and PECO initially denied about 30% of the applications. Over time, many of these were eventually approved, while others were withdrawn - and by the end of 2017, 43 homes had solar PV systems installed totaling over 300 kW of PV capacity, making Solarize Greater Media a great success.

Since then, the Philadelphia Energy Authority launched the Solarize Philly program (with some early assistance from TTM on lessons learned); it is now being the largest and most successful solarize campaigns in the country, with over 363 signed contracts for over 1.6 MW of solar PV capacity by end of 2018. Solarize Philly is now in its Phase 3, offering solar power purchase agreements (PPAs) and also offers an affordable option for low- and moderate-income households. Two other solarize campaigns started up as well, Solarize Lehigh Valley and Solarize Southeast PA.

The Borough of Media is encouraged to engage TTM to start up another round of Solarize Greater Media, as the interest in solar has grown considerably since the last go round. But, more importantly, the current Federal Tax Credit of 30% for solar installations is starting to step down to

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26% in 2020, 22% in 2021, then 10% and 0% in 2022 for non-residential and residential projects, respectively. In addition, the bidding SREC price under the AEPS is about \$30/SREC today, which is up considerably since the when Solarize Greater Media last ran.

3. C-PACE

Commercial Property Assessed Clean Energy (C-PACE) is an innovative financial tool for property owners to obtain low-cost, long-term financing for energy efficiency, renewable energy, and water conservation projects.

C-PACE can provide up to 100% funding of total project costs by placing a special voluntary assessment on the property that repays the costs of the upgrades. Because C-PACE is attached to a property assessment, it is a very secure form of financing

Governor Wolf signed the C-PACE bill into law (Act 30) in the Summer of 2018. Act 30 authorizes PA counties or municipalities with community or economic development departments to pass a local resolution and adopt guidelines for C-PACE. Therefore, C-PACE programs would still need to be developed by county and/or municipality throughout the state in order to utilize this financing tool.

Once a county or municipality passes a resolution, the program guidelines are finalized and approved by the county/municipality. At that time, commercial and agricultural property owners may develop a clean energy project and secure a capital provider to finance the project. The loan amount is added to the property taxes and collected as an assessment by the county/municipality.

To date, the C-PACE program has been adopted in Chester County, Northampton County, Allegheny County, Wayne County, and Philadelphia County, with six more counties voting on adopting C-PACE over the next 4 to 8 weeks.

PPL Sustainable Energy Fund (SEF) offers to act as the Program Administrator for any local unit of government in the Commonwealth of Pennsylvania. As a nonprofit, SEF provides any county or municipality opting into the program (outside of the city and county of Philadelphia) a uniform, turn-key C-PACE program administration platform that can be adopted at no cost to the County or Municipality. SEF offers a single point of access for Property Owners, Local Units of Government, Qualified Contractors, and C-PACE Capital Providers. The Program Administrator reviews and certifies projects that are eligible for C-PACE financing.

SEF has financial, technical, and programmatic staff. As a program administrator, SEF will use its financial and technical staff to ensure proposed projects meet approved program guidelines. The programmatic and marketing staff will promote the program to commercial, industrial, and agricultural businesses, contractors, financial institutions, and C-PACE capital providers.

C-PACE offers a great opportunity for financing commercial solar installations in the Borough of Media. Therefore, **the Borough of Media is encouraged to reach out to the SEF to learn about adopting C-PACE at the municipality level, and to develop a program for commercial customers.**

More information about C-PACE can be found at:

http://pennsylvaniacpace.org/?page_id=9
<https://www.theseef.org/get-financing/c-pace/>

4. Aggregate Municipalities with Grid Scale Solar PPA to Meet Carbon Offset Goals

A growing number of municipalities across the state have adopted renewable energy goals for their own energy use. However, they are too small to access favorable terms and pricing. The City of Philadelphia recently selected the solar developer, Community Energy, through their RFP process, to power 22% of their government facilities from a 70MW solar Power Purchase Agreement (PPA) in Adams County, Pa. The solar PPA includes a competitive electric supply rate for 20 years, in addition to bundling in the solar attributes, which will provide a significant impact towards the city's clean energy goal of sourcing 100% of its electricity from renewables by 2030.

This same concept can be used for groups of smaller municipalities with similar goals. By aggregating these small municipalities together, it will be possible to initiate a collective solar PPA for five or six of them with a single solar developer and a single grid scale solar generation system. The participating municipalities would benefit from long term contracts of competitively fixed electricity supply rates, bundled with solar attributes to help meet their renewable energy or carbon offset goals.

Depending on what the contract(s) the Borough of Media has with their current electric supplier and the term of that contract, it is possible that the Borough could initially prepare a request for information (RFI) for grid scale solar developers to see if there is a reasonable venture to pursue. Some analysis should first be conducted to estimate the annual electric usage for the Borough accounts and estimate the solar PV capacity to meet that usage, or at least part of it. Seeking out other like minded municipalities that could be interested in teaming up with the Borough would also be a good initial step. Reaching out to the Philadelphia Energy Authority and DVRPC would also be valuable to learn more about drafting an RFP and finding other possible partners.

The Borough of Media is encouraged to look into this prospect, as a way of locking in on long term electric supply costs, as well as meeting some or all of the Borough's commitment to Ready for 100% Renewable Energy, under the Delaware County's sustainability campaign.

5. Community Solar

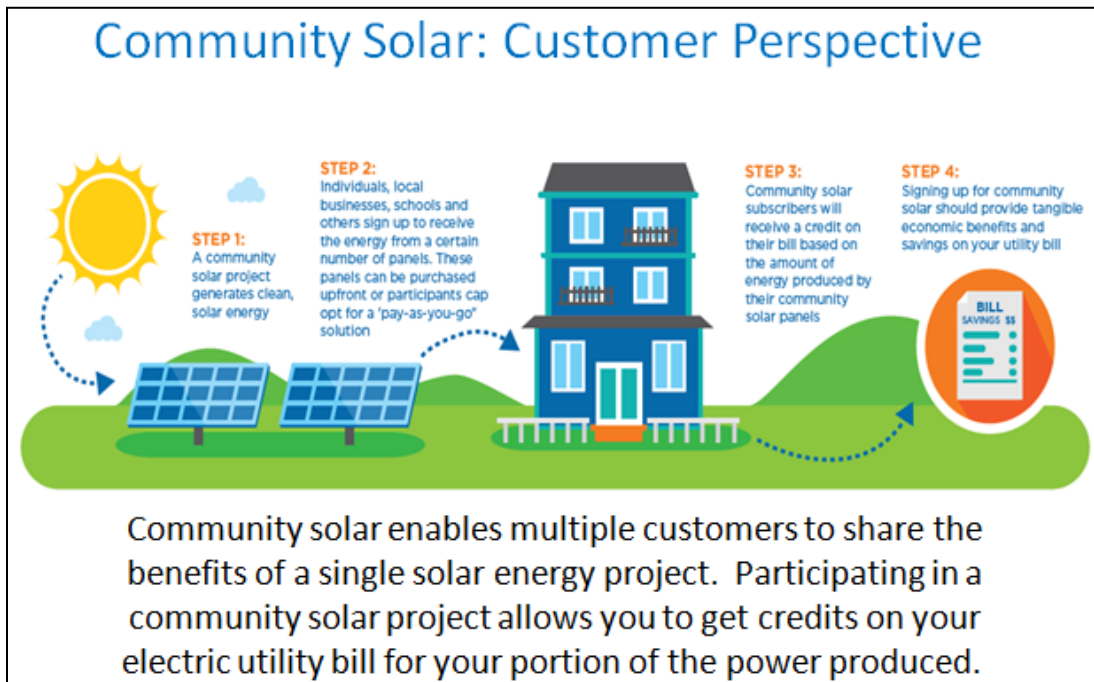
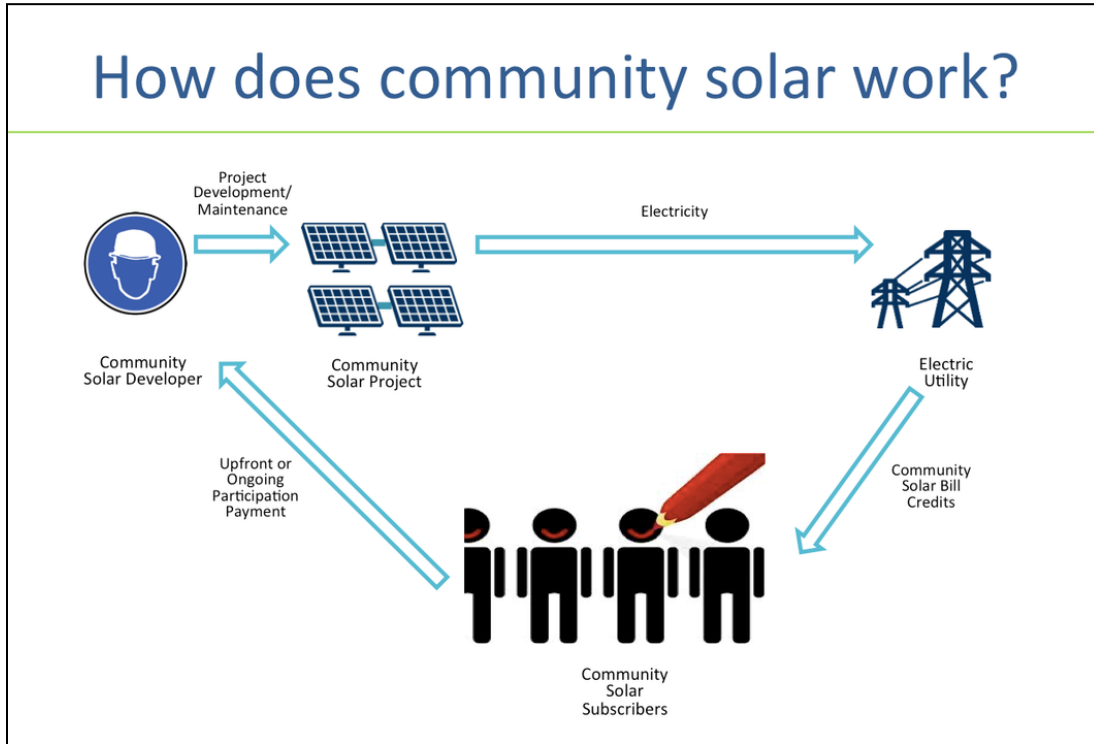
Currently, community solar is not allowed in Pennsylvania, except in electric cooperatives and electric municipalities, because they do not fall under the PUC's authority. However, there is an exception under *virtual meter aggregation* where a very limited form of community solar is allowed – this option is further discussed in the next prospect item.

A community solar project is a single solar PV system that generates electricity for multiple electric consumers (a.k.a. subscribers). These projects allow multiple electric account holders to invest in, or lease or purchase electricity from, one solar energy project, such as a large solar PV array on the rooftop of a community center, apartment building, or warehouse - or a ground mount structure. The predetermined share of the solar electric generation from the large PV system offsets a portion of each of the customers' utility electric bills as credit on the bill, via net metering billing mechanism.

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PA House (HB531) and Senate (SB705) bills have been introduced for community solar in the Commonwealth, and they have significant bipartisan support. But, the electric utilities are not particularly in favor of community solar, though some of them are cautiously interested in it.

The following two figures depict how community solar works:



Solar Update Report for the Borough of Media

It doesn't seem likely that the community solar bill will be passed in 2019, but possibly in 2020. Though it is important that the Tier 1 of the Alternative Energy Portfolio Standard is also increased, such as outlined in Senate and House bills, SB600 and HB1195, which propose increasing the renewable energy requirement currently set at 8% by 2021 to 30% by 2030; this also includes increasing the current 0.5% in-state solar requirement to 10% by 2030. The in-state solar requirement must significantly increase beyond 0.5% in order to for community solar to succeed.

Not until community solar is passed in Pennsylvania, the Borough cannot take advantage of this great opportunity, as in other nearby states. But, it is briefly summarized here as a potential option that may be available soon.

6. Virtual Meter Aggregation

As stated above, currently there is a very limited form of community solar that is allowed in Pennsylvania. Virtual meter aggregation (VMA) is an exception to the current net metering law and regulations, such that multiple electric accounts can be served by a single solar PV system, but under specific circumstances. All the participating accounts or meters must be in the same customer name, and all meters and the solar PV system must be located within two miles of each other. Finally, the solar PV system must be interconnected to an existing account/meter.

For example, what is currently not allowed is to install a large solar PV ground mounted system in an open field that has no existing facility or electric load on site (i.e., no account or meter at the location). But, an oversized solar PV system could be installed on a very large roof or on open land with an existing electric service, that would generate significantly more than the annual electric consumption at the given site, and the surplus generation can offset electric bills at other sites located with a 2 mile radius under the same account holder. This could be applicable to schools or other local government facilities.

The Bureau of Media is encouraged to evaluate the possibility of utilizing virtual meter aggregation with a large solar PV system (3 MW to 5 MW, max) for multiple local government facilities.