

Tri-County Regional Planning Commission

SOLAR ENERGY SYSTEMS

MODEL ORDINANCE

Introduction

A model ordinance has been created to regulate the installation, operation and use of solar energy systems. The model ordinance is based on the Pennsylvania Governor's Solar Working Group's model ordinance and ordinances used in other municipalities.

The model ordinance is an "all-inclusive" ordinance. The model is intended to provide a thorough review of all aspects of solar energy systems that could be regulated. Municipalities should review this ordinance, examine their local situation, and adopt the regulations that make the most sense for their municipality, modifying anything they deem appropriate.

In some cases, there could be multiple ways to regulate a certain aspect of solar energy systems. In these cases the word "OR" has been placed in the text of the ordinance. Municipalities should choose the option that works best with their existing ordinances and regulatory framework. In some instances, a range of options may be provided. In these cases, the sample range is provided in brackets with the regulations commonly found in other ordinances and an "XX" (15', 20' XX) to indicate that municipalities may want to adopt a different standard.

Municipalities with historic district guidelines may wish to adopt additional regulations governing solar energy systems within their historic districts.

This model ordinance is intended to be advisory only and is not intended to be relied upon as legal advice. A municipality is not required to adopt this ordinance. Municipal officials are urged to seek legal advice from their solicitor before enacting such an ordinance.

What is a solar energy system?

There are two primary forms of solar energy systems: photovoltaic systems and thermo-solar systems.

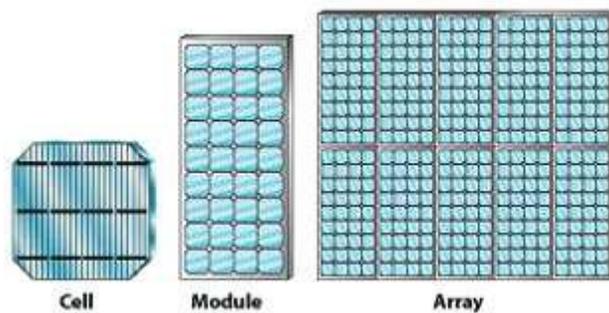
Photovoltaic Systems

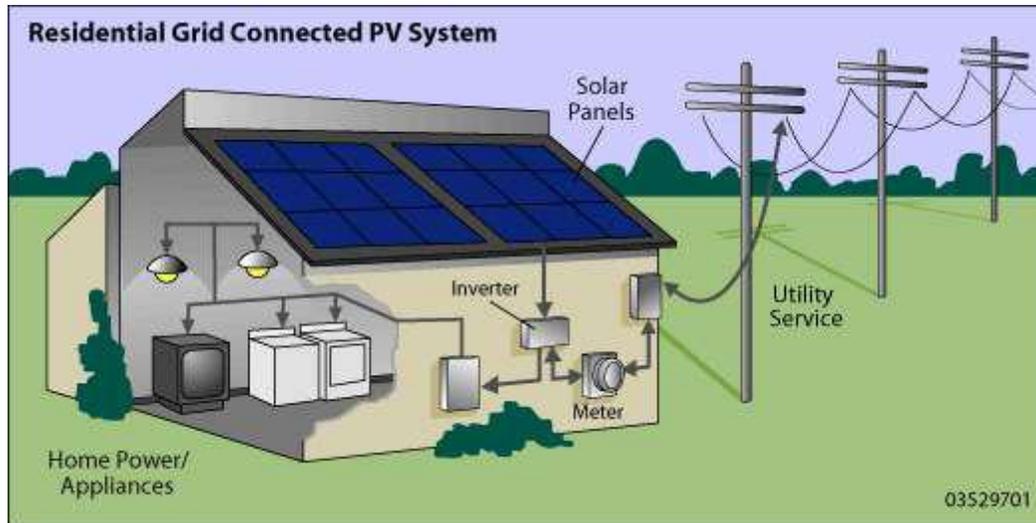
Photovoltaic (PV) systems convert sunlight into electricity, powering everything from lamps to electronic devices and even electric cars. Contrary to popular belief, solar systems do not need strong sunlight to function properly and can be used effectively throughout Pennsylvania. Of course, stronger sun combined with days of sunlight increase system performance; however solar photovoltaic can produce electricity even on cloudy days.¹

A photovoltaic system is made up of multiple solar cells. An individual photovoltaic cell is usually small. To boost the power output of PV cells, they are connected together to form larger units called modules. Modules, in turn can be connected to form even larger units called arrays, which can be interconnected to produce more power. Therefore, PV systems can be built to meet almost any electric power need, small or large.ⁱⁱ

In solar PV systems, a flow of direct current (DC) electricity is produced when sunlight strikes an array of solar modules. Appliances and machinery, however, operate on alternating current (AC), such as the electricity supplied by a utility. The DC energy produced by the modules is fed into an inverter that converts DC power into AC power and feeds into the main electrical panel that powers a home or business.ⁱⁱⁱ

The majority of solar photovoltaic systems are grid-tied. This means they are directly connected to the power grid and do not require battery storage. These systems will not operate during a power outage unless they have a battery backup. Solar electrical energy can provide power to a home or business, reducing the amount of power required from the utility; when the solar photovoltaic system power generation exceeds the power needs at the home or business, the surplus power automatically back feeds into the grid. A special utility meter will record the “net” power coming in from the grid and the surplus power exported to the grid from the solar system. The solar photovoltaic system can be installed on a roof, integrated into the building or roof structure or ground mounted on poles or racks. Tracking systems on poles enable the modules to follow the sun during the course of the day to increase overall output of the solar photovoltaic system between 20% and 25% more annually than a stationary fixed mounted array.^{iv}





Solar-Thermal Systems

Solar-thermal systems use solar energy to typically heat a fluid, such as water or an antifreeze solution, or heat a gas, such as air. Solar thermal systems are most commonly utilized for heating residential hot water systems, though they are also used for space heating, spas or swimming pools and even space cooling. Another type of solar thermal system utilizes concentrating solar power (CSP) to reach extremely high fluid temperatures in utility scale solar thermal plants to generate electricity. However, these large, central solar thermal stations have been developed in the western U.S. and outside the country, where they work best with high beam solar radiation (compared to diffuse solar radiation) and are not considered commercially viable in the eastern U.S.^v

Solar water heating systems collect solar radiation from a flat plate collector or evacuated tubes. Most systems transfer the heat to a safe antifreeze solution, which is pumped into a solar heat storage tank to store each day's hot water supply. This is used as preheated water before conventional energy to finish heating the water to a set temperature. Often solar thermal energy meets almost all the residential hot water needs in the summer months, requiring very little conventional energy for backup.^{vi}

Solar-thermal systems are most commonly roof mounted, but can also be installed on the side of a building or ground mounted on racks. A single 4' x 8' solar panel can potentially heat 20 gallons of water from 56 degrees Fahrenheit to 113 degrees Fahrenheit in 1 hour. In the summer, two solar panels with a storage tank can supply hot water for a family of five. The storage tank configuration may consist of a single integrated tank capable of both directly storing the solar heating from the solar panels, and supplying the backup conventional water heating, such as from typical gas or electric water heater; it may also consist of being only a storage tank that feeds into an existing conventional water heater through a heat exchanger. Solar thermal systems used for heating pools use unglazed collectors to circulate pool water directly and can increase temperatures by 10 or 15 degrees depending on the size of the pool and other factors.^{vii}

Active solar space heating systems are generally the most complicated type of the different solar thermal systems discussed above, except for the concentrating solar power plant. Depending on the type of solar heating system, it may use water or antifreeze, pipes, pumps and water storage tanks; or it may use air, fans, air ducts and thermal mass storage in the form of rocks, concrete, water, or special paraffin or salts. Unfortunately, the down side to active solar space heating systems is that they are only useful during the cold months when the heat is needed. However, it may be possible to utilize this technology to provide some space cooling relief through careful design.^{viii}

ORDINANCE CONSIDERATIONS

When regulating solar energy systems, a distinction should be made between accessory solar energy systems and principal solar energy systems:

- An accessory solar energy system supplies electrical or thermal power primarily for the principal on-site use. Typically accessory systems are rated between 1 and 10 kW (kilowatt).
- A principal solar energy system generates electric or thermal power for offsite commercial use. Principal systems are typically rated over 10 kW. Large principal solar energy systems can generate hundreds of megawatts (MW) of energy.

Both types of solar energy systems should be defined and regulations developed for each type of use. Only providing for accessory systems could be construed as exclusionary. Further, regulating all solar energy facilities with a one-size fits all approach will result in inconsistent and inappropriate regulation.

It is also critical to examine industry standards when developing ordinances for solar energy systems. Technology is changing at a rapid pace and failure to seek advice from industry professionals may result in an ordinance that may not reflect the requirements and capabilities of the industry.

In 2008, the Governor's Office and the Department of Environmental Protection convened the Solar Working Group. One of the tasks identified by the group was to provide information to local officials, residents and businesses. In December 2009, updated in March 2010, the publication Solar Energy Systems, A Guide for Pennsylvania Municipal Officials was released and provides information and guidance on developing ordinances regulating solar energy. Following is a summary of ordinance considerations from the Solar Working Group and other models for both accessory and principal solar energy systems.

Accessory Solar Energy Systems (ASES)

- **Zoning District / Use Standards:** ASES are generally permitted by right as an accessory use in all zoning districts where structures are permitted.

- **Height Restrictions:** Building and roof mounted ASES should not exceed the maximum allowed building height in the zoning district. Ground or pole mounted ASES should not exceed the maximum accessory structure height within the zoning district.
- **Setbacks:** At minimum, the ASES and associated structures should meet the accessory structure setbacks for the zoning district. Additional setbacks should be considered for ground mounted ASES (and accessory structures) as they could reach heights of up to 15 feet depending upon the specific installation and type of technology.
- **Location:** The municipality should consider where on the property or building the ASES should or should not be located (i.e. front, side or rear, within and outside of required setbacks). Municipalities can exercise broad discretion in how closely to regulate the location of ASES. Municipalities may consider prohibiting the installation of ground mounted ASES between the principal structure and the street right-of-way. Similarly, roof mounted systems could be oriented away from street rights-of way. It should be noted that access to open south facing skies is a location requirement for solar which should be reasonably accommodated.
- **Impervious Cover:** The area beneath ground mounted ASES is typically not considered impervious cover. ASES do not block the infiltration of precipitation to the underlying ground surface. Rather, ASES are typically designed with gaps between each module which when combined with the south slanting orientation, allows water to drain and infiltrate the underlying ground. The only area considered impervious should be the foundation systems of the solar panels themselves, generally less than 2% of the ground surface assuming that the solar energy systems are mounted upon driven piles or monopoles or helical screws with or without small (generally one foot diameter) concrete collars.

Municipalities should require grass surfaces beneath the panels that allow infiltration of precipitation into the underlying soils as a Best Management Practice (BMP) for stormwater management. “No Mow” mixes of low growing grass species like certain fescue grasses should be encouraged. These “No Mow” formulations, if properly installed and maintained, should only need one annual mowing. In addition the low growing grasses are necessary to avoid shading of the solar modules which would occur from higher growing warm season grasses.

- **Design and Installation:** The ASES should be required to comply with all applicable building and construction codes and any regulations adopted by the PA Department of Labor and Industry. The design of the ASES should be required to conform to applicable industry standards, including those of the State Electric Code, National Electric Code and the American National Standards Institute. The applicant should be required to submit certificates of design compliance obtained by the equipment manufacturers from Underwriters Laboratories (UL), Institute of Electrical and Electronics Engineers (IEEE), Solar Rating and Certification Corporation (SRCC), Electrical Testing Laboratory (ETL), Florida Solar Energy Center (FSEC) or other similar certifying organizations.

Some municipalities require applicants to use or meet the requirements of installers on the Pennsylvania Department of Environmental Protection's Approved Solar Installer list. Solar installers on this list have certifications, technical training, insurance requirements, and a proven track record of successfully installing ASES equipment.

- **Utility Notification:** The owner of an ASES should be required to provide written confirmation that the public utility company has been informed of the customer's intent to install a grid connected system and approved of such connection.
- **Glare / Visual Appearance:** Industry experts indicate glare is not an issue as solar panels are designed to absorb light and not reflect light. Further, measuring and regulating glare for enforcement purposes will prove a challenging, if not unnecessary task. On-site electrical power and transmission lines or plumbing lines associated with or connected to the ASES should be required to be located underground.
- **Signage:** Warning signs concerning voltage should be placed near ASES equipment. Aside from manufacturer's identification, no ASES should be used for advertising purposes.
- **Decommissioning:** The municipality should consider requiring owners to decommission ASES that are inoperable for a period of time, such as 6-12 months.
- **Applicability:** The ordinance should apply to all ASES installed and constructed after the effective date of the ordinance. Any upgrades, modifications or changes that materially alter an existing ASES should be required to comply with the ordinance.
- **Permit Requirements / Registration:** Zoning and/or building permit applications for ASES should be accompanied by horizontal and vertical drawings. The drawings should show the location of the system on the building or property, including property lines. Applications for roof mounted ASES should be accompanied by engineer stamped plans that demonstrate the structural sufficiency of the roof to hold the weight of the ASES.

Principal Solar Energy Systems (PSES)

- **Zoning District / Use Standards:** PSES should be considered a principal use and should be restricted to agricultural, rural, commercial and industrial districts. Typically these districts have the larger lot sizes required for PSES. PSES are generally not permitted by right, but are permitted by conditional use or special exception. With appropriate regulations in place, municipalities may consider allowing PSES by right, which in turn can accelerate project schedules and decrease overall project costs. Disparate views exist on the appropriateness of PSES in agricultural districts, particularly those on prime agricultural soils. PSES do not remove or disturb the soil, thereby prime soils still exist and could be farmed after the PSES use ends. In addition, PSES provide farmers with nonfarm income which could be a viable alternative to selling the farm and developing it for another use. Alternatively, the land on which PSES are constructed cannot be actively

farmed; therefore the prime agriculture soils may be taken out of production until/if the PSES use ends.

- **Height Restrictions:** Ground mounted panels should be subject to the building height regulations in the zoning district. However, if the maximum permitted height is very tall, the municipality may want to consider a maximum height for the ground mounted panels themselves.
- **Setbacks:** At a minimum, the PSES, associated accessory structures and mechanical equipment should comply with the building setback requirements for the zoning district where the PSES is installed.
- **Impervious Cover:** The area beneath ground mounted PSES systems is typically not considered impervious cover unless it is paved or otherwise covered by an impervious surface. PSES do not block the infiltration of precipitation to the underlying ground surface. Rather, PSES are typically designed with gaps between each module which when combined with the south slanting orientation, allows for water to drain and infiltrate the underlying ground. The only area considered impervious should be the foundation systems of the solar panels themselves and any accessory structures. Generally less than 2% of the ground mounted PSES surface is impervious assuming that the solar energy systems are mounted upon driven piles or monopoles or helical screws with or without small (generally one foot diameter) concrete collars.

Municipalities should require grass surfaces beneath the panels to allow and encourage infiltration of precipitation into the underlying soils as a Best Management Practice (BMP) for stormwater management. “No Mow” mixes of low growing grass species like certain fescue grasses should be encouraged. These “No Mow” formulations, if properly installed and maintained, should only need an annual mowing. In addition, the low growing grasses are necessary to avoid shading of the solar modules which would occur from higher growing warm season grasses.

- **Design and Installation:** The PSES should be required to comply with all applicable building and construction codes and any regulations adopted by the PA Department of Labor and Industry. The design of the PSES should be required to conform to applicable industry standards, including those of the State Electric Code, National Electric Code and American National Standards Institute. The applicant should be required to submit certificates of design compliance obtained by the equipment manufacturers from Underwriters Laboratories (UL), Institute of Electrical and Electronic Engineers (IEEE), Solar Rating and Certification Corporation (SRCC), Electrical Testing Laboratory (ETL) Florida Solar energy Center (FSEC) or other similar certifying organizations.
- **Glare:** Industry experts indicate glare is not a major problem with PSES as solar panels are designed to absorb light and not reflect light. Major solar installations exist at the Denver International Airport, Nellis Air Force Base and many other flight paths, thereby demonstrating that glare is typically not a real issue with PSES. Further, measuring and

regulating glare for enforcement purposes will prove a challenging, if not unnecessary task.

- **Decommissioning:** The applicant should be required to have a plan for decommissioning of the PSES. The owner should be required to be responsible for the removal of the facility if the owner ceases use of the facility for a period of time, such as 6-12 months, or the facility becomes obsolete.
- **Warnings and Safety Measures:** A clearly visible warning sign concerning voltage should be placed at the base of all pad-mounted transformers and substations. The site should be completely enclosed by a fence with a self-locking gate. The spacing and location of the PSES equipment should provide for access roads that allow for the maintenance of the PSES and emergency vehicle access.

On-site electrical power and transmission lines or plumbing lines associated with or connected to the PSES should be located underground.

- **Signage:** Aside from manufacturer's identification, no PSES should be used for advertising purposes.
- **Permit Requirements/Registration** – As a principal use, the PSES would be subjected to the municipal subdivision and land development process and the requirements contained therein.

Solar Easements

A solar easement means a right, expressed as an easement, restriction, covenant, or condition contained in any deed, contract, or other written instrument executed by or on behalf of any landowner for the purpose of assuring adequate access to direct sunlight for solar energy systems.^{ix} Solar easements require agreements between landowners that:

- Describe the dimensions of the easement including vertical and horizontal angles measured in the degrees or the hours of the day, on specified dates, during which direct sunlight to a specified surface or structural design feature may not be obstructed;
- Restrict the placement of vegetation, structures, and other objects which may impair or obstruct the passage of sunlight through the easement;
- Enumerate terms and conditions, if any, under which the easement may be revised or terminated;
- Explain the compensation for the owner of the real property subject to the solar easement for maintaining the easement and for the owner of the real property benefiting from the solar easement in the event of interference with the easement.^x

Several states have enacted solar easement statutes that provide the opportunity for neighboring property owners to voluntarily negotiate easements between themselves to provide for unobstructed solar access now and into the future. Other states have also enacted legislation to mandate the right to solar installations. Pennsylvania has not adopted any solar easement or

access statutes. Thus, municipalities should consider what role, if any, they will assume in requiring solar easements. Typically solar easements would be recorded as part of a property's deed and run with the land. Disputes and enforcement actions would be the responsibility of the property owners to settle through civil litigation.

Fire Safety^{xi}

Developing guidance for the risk of fire is important to increase public safety for all structures equipped with solar energy systems. There is particular concern regarding roof-mounted solar systems, which can create limitations to firefighters to access, maneuver and specifically penetrate the roof to ventilate and suppress a building fire. Solar arrays are difficult and dangerous to cut through and time consuming to move, therefore, in the face of a fire, solar systems can pose risks including shock and trip hazards.

States like California under their Office of the State Fire Marshall developed installation fire safety guidelines for photovoltaic (PV) solar systems. Guidelines like these could be applied in Pennsylvania and include:

1. Marking – The guidelines specify that high-contrast, reflective and consistent wording should be used for all solar related conduits, electrical panels and disconnects.
2. Assess, pathways and smoke-ventilation space – The fire marshal recommends that providing a 3-foot setback from the edges of roofline from gutter to ridge ensures that firefighters can access the roof in a quick and safe manner. A 3-foot setback along the roof's ridgeline is also recommended to provide the available space if there is a need to penetrate the roof to create ventilation.
3. Conduit runs – Chain saws are often employed to create vertical ventilation for fire suppression. Therefore, it is recommended that conduit runs should be kept 10-inches below roof decking to minimize the chance of being cut into.



**SOLAR ENERGY SYSTEMS
MODEL ORDINANCE**

ORDINANCE NO __ - __

**AN ORDINANCE OF [MUNICIPALITY], PENNSYLVANIA, FOR THE REGULATION
OF SOLAR ENERGY SYSTEMS AND DEFINING TERMS USED HEREIN.**

SECTION 1. TITLE

This ordinance shall be known and may be cited as the Solar Energy Systems Ordinance.

SECTION 2. AUTHORITY

The [Council – Board] of [municipality], under, and by virtue of and pursuant to the authority granted by [enabling authority/code] does hereby enact and ordain this ordinance as authorized by Act 247, Pennsylvania Municipalities Planning Code.

SECTION 3. APPLICABILITY

(A) This ordinance applies to solar energy systems to be installed and constructed after the effective date of this ordinance, and all applications for solar energy systems on existing structures or property.

(B) Solar energy systems constructed prior to the effective date of this ordinance shall not be required to meet the requirements of this ordinance.

(C) Any upgrades, modifications or changes that materially alter the size or placement of an existing solar energy system shall comply with the provisions of this ordinance.

SECTION 4. PURPOSE

The purpose of this ordinance is to promote the use of solar energy and to provide for the land planning, installation and construction of solar energy systems in [municipality], subject to reasonable conditions that will protect the public health, safety and welfare.

SECTION 5. DEFINITIONS

The following words, terms and phrases, when used in this ordinance, unless the context indicates otherwise, shall have the following meanings ascribed to them:

Accessory Solar Energy System (ASES) - An area of land or other area used for a solar collection system used to capture solar energy, convert it to electrical energy or thermal power and supply electrical or thermal power primarily for on-site use. An accessory solar energy system consists of one (1) or more free-standing ground, or roof mounted solar arrays or modules, or solar related equipment and is intended to primarily reduce on-site consumption of utility power or fuels.

Glare - The effect produced by light with an intensity sufficient to cause annoyance, discomfort, or loss in visual performance and visibility.

Principal Solar Energy System (PSES) - An area of land or other area used for a solar collection system principally used to capture solar energy, convert it to electrical energy or thermal power and supply electrical or thermal power primarily for off-site use. Principal solar energy systems consist of one (1) or more free-standing ground, or roof mounted solar collector devices, solar related equipment and other accessory structures and buildings including light reflectors, concentrators, and heat exchangers, substations, electrical infrastructure, transmission lines and other appurtenant structures.

Solar Array - A grouping of multiple solar modules with purpose of harvesting solar energy.

Solar Cell - The smallest basic solar electric device which generates electricity when exposed to light.

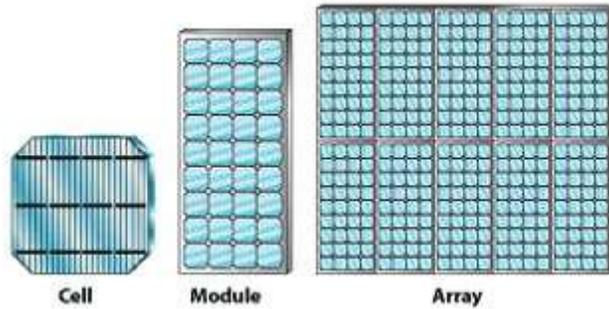
Solar Easement - A right, expressed as an easement, restriction, covenant, or condition contained in any deed, contract, or other written instrument executed by or on behalf of any landowner for the purpose of assuring adequate access to direct sunlight for solar energy systems.

Solar Energy - Radiant energy (direct, diffuse and/or reflective) received from the sun.

Solar Module - A grouping of solar cells with the purpose of harvesting solar energy.

Solar Panel - That part or portion of a solar energy system containing one or more receptive cells or modules, the purpose of which is to convert solar energy for use in space heating or cooling, for water heating and/or for electricity.

Solar Related Equipment - Items including a solar photovoltaic cell, module, panel, or array, or solar hot air or water collector device panels, lines, pumps, batteries, mounting brackets, framing and possibly foundations or other structures used for or intended to be used for collection of solar energy.



SECTION 6. REGULATIONS FOR ACCESSORY SOLAR ENERGY SYSTEMS (ASES)

Sec. 6.1. Exemptions

(A) ASES with an aggregate collection and/or focusing area of (10, 100, XX) square feet or less are exempt from this ordinance.

(B) ASES constructed prior to the effective date of this Ordinance shall not be required to meet the terms and conditions of this Ordinance. Any physical modification to an existing ASES whether or not existing prior to the effective date of this Section that materially alters the size or placement of the ASES shall require compliance with the provisions of this ordinance.

Sec. 6.2. Where Permitted

ASES shall be permitted as a use by right in all zoning districts.

OR

ASES that have a maximum power rating of not more than (10kW, 15kW, XX) shall be permitted as a use by right in all zoning districts. ASES that have a power rating more than (10kW, 15kW, XX) shall comply with the requirements of Principal Solar Energy Systems.

Sec. 6.3. Compliance with Industry Standards

The ASES layout, design, installation, and ongoing maintenance shall conform to applicable industry standards, such as those of the American National Standards Institute (ANSI), Underwriters Laboratories (UL), the American Society for Testing and Materials (ASTM), Institute of Electrical and Electronics Engineers (IEEE), Solar Rating and Certification Corporation (SRCC), Electrical Testing Laboratory (ETL), Florida Solar Energy Center (FSEC) or other similar certifying organizations, and shall comply with the PA Uniform Construction Code as enforced by [municipality], regulations adopted by the Pennsylvania Department of Labor and Industry, and with all other applicable fire and life safety requirements. The manufacturer specifications for the key components of the system shall be submitted as part of the permit application.

Sec. 6.4. Installers

ASES installers must demonstrate they are listed as a certified installer on the PA Department of Environmental Protection's (DEP) approved solar installer list or that they meet the criteria to be a DEP approved installer by meeting or exceeding one of the following requirements:

- (a) Is certified by the North American Board of Certified Energy Practitioners (NABCEP) for PV installation.
- (b) Has completed an Interstate Renewable Energy Council (IREC) Institute for Sustainable Power Quality (ISPQ) accredited PV training program or a PV manufacturer's training program and successfully installed a minimum of three PV systems.
- (c) For residential applications, a registered home improvement contractor with the Attorney General's office.

Sec. 6.5. Maintain in Good Working Order

Upon completion of installation, the ASES shall be maintained in good working order in accordance with standards of [municipality] and any other codes under which the ASES was constructed. Failure of the property owner to maintain the ASES in good working order is grounds for appropriate enforcement actions by [municipality] in accordance with applicable ordinances.

Sec. 6.6. Underground Requirements

All on-site utility, transmission lines, and plumbing shall be placed underground to the extent feasible.

Sec. 6.7. Utility Notification

The owner of an ASES shall provide [municipality] written confirmation that the public utility company to which the ASES will be connected has been informed of the customer's intent to install a grid connected system and approved of such connection. Off-grid systems shall be exempt from this requirement.

Sec. 6.8. Signage

The display of advertising is prohibited except for reasonable identification of the manufacturer of the system.

Sec. 6.9. Glare (*see Ordinance Considerations*)

- (A) All ASES shall be placed such that concentrated solar radiation or glare does not project onto nearby structures or roadways.

(B) The applicant has the burden of proving that any glare produced does not have significant adverse impact on neighboring or adjacent uses either through siting or mitigation.

Sec. 6.10. Solar Easements (*see Ordinance Considerations*)

(A) Where a subdivision or land development involves the use of solar energy systems, solar easements may be provided. Said easements shall be in writing, and shall be subject to the same conveyance and instrument recording requirements as other easements. Any such easements shall be appurtenant; shall run with the land benefited and burdened; and shall be defined and limited by conditions stated in the instrument of conveyance. Instruments creating a solar easement shall include but not be limited to:

- (1) A description of the dimensions of the easement including vertical and horizontal angles measured in the degrees or the hours of the day, on specified dates, during which direct sunlight to a specified surface or structural design feature may not be obstructed;
- (2) Restrictions on the placement of vegetation, structures, and other objects which may impair or obstruct the passage of sunlight through the easement;
- (3) Enumerate terms and conditions, if any, under which the easement may be revised or terminated;
- (4) Explain the compensation for the owner of the real property subject to the solar easement for maintaining the easement and for the owner of the real property benefiting from the solar easement in the event of interference with the easement.

(B) If required, an ASES owner and/or operator must obtain any solar easements necessary to guarantee unobstructed solar access by separate civil agreement(s) with adjacent property owner(s).

Sec. 6.11. Decommissioning

(A) Each ASES and all solar related equipment shall be removed within twelve (12) months of the date when the use has been discontinued or abandoned by system owner and/or operator, or upon termination of the useful life of same.

(B) The ASES shall be presumed to be discontinued or abandoned if no electricity is generated by such solar collector for a period of twelve (12) continuous months.

(C) The ASES owner shall, at the request of [municipality], provide information concerning the amount of energy generated by the ASES in the last 12 months.

Sec. 6.12. Permit Requirements

(A) Zoning /building permit applications shall document compliance with this Ordinance and shall be accompanied by drawings showing the location of the system on the building or

property, including property lines. Permits shall be kept on the premises where the ASES is constructed.

(B) The zoning/building permit shall be revoked if the ASES, whether new or pre-existing, is moved or otherwise altered, either intentionally or by natural forces, in a manner which causes the ASES not to be in conformity with this Ordinance.

(C) The ASES must be properly maintained and be kept free from all hazards, including but not limited to, faulty wiring, loose fastenings, being in an unsafe condition or detrimental to public health, safety or general welfare. In the event of a violation of any of the foregoing provisions, the Zoning Officer shall give written notice specifying the violation to the owner of the ASES to conform or to remove the ASES.

(D) Prior to the issuance of a zoning/building permit, applicants must acknowledge in writing that the issuing of said permit for a solar energy system shall not and does not create in the property owner, its, his, her or their successors and assigns in title or, create in the property itself : (a) the right to remain free of shadows and/or obstructions to solar energy caused by development of adjoining or other property or the growth of any trees or vegetation on such property; or (b) the right to prohibit the development on or growth of any trees or vegetation on such property.

(E) Routine maintenance or like kind replacements do not require a permit.

Sec. 6.13. Roof Mounted and Wall Mounted Accessory Solar Energy Systems

(A) Location

- (1) A roof mounted or wall mounted ASES may be located on a principal or accessory building.
- (2) Roof mounted solar panels shall be located only on rear or side-facing roofs as viewed from any adjacent street unless the applicant demonstrates that, due to solar access limitations, no location exists other than the street-facing roof, where the solar energy system can perform effectively.

OR

Roof mounted solar panels may be located on front-facing roofs as viewed from any adjacent street when approved as a conditional use. The applicant shall demonstrate that, due to solar access limitations, no location exists other than the street-facing roof, where the solar energy system can perform effectively.

(B) Setbacks

- (1) Wall mounted ASES shall comply with the setbacks for principal and accessory structures in the underlying zoning districts.
- (2) Solar panels shall not extend beyond any portion of the roof edge.

(C) Height

- (1) ASES mounted on roofs or walls of any building shall be subject to the maximum height regulations specified for principal and accessory buildings within the underlying zoning district.

OR

The total height of a building with an ASES shall not exceed by more than (1 foot, 3 feet, XX) above the maximum building height specified for principal or accessory buildings within the underlying zoning district.

(D) Code Compliance

For roof and wall mounted systems, the applicant shall provide evidence that the plans comply with the Uniform Construction Code and adopted building code of [municipality] and that the roof or wall is capable of holding the load imposed on the structure. Applications for roof mounted ASES shall be accompanied by engineer stamped plans that demonstrate the structural sufficiency of the roof to hold the weight of the ASES.

(E) Fire Safety (*see Ordinance Considerations*)

Sec. 6.14. Ground Mounted Accessory Solar Energy Systems

(A) Setbacks

- (1) The minimum yard setbacks from side and rear property lines shall be equivalent to the accessory structure setback in the underlying zoning district.

OR

The minimum yard setbacks from side and rear property lines shall be equivalent to the principal structure setback in the underlying zoning district.

- (2) A ground mounted ASES shall not be located in the required front yard.

OR

Ground mounted ASES are prohibited in front yards, between the principal building and the public street.

OR

A ground mounted ASES may be located in the portion of the yard in front of the principal building and outside of the required front yard provided that vegetative screening is provided [*Need to include screening requirements: type, location, height, etc.*].

- (3) [Municipality] may authorize the installation of a ground mounted ASES in front of the principal building, outside the required front yard, if the applicant demonstrates that, due to solar access limitations, no location exists on the property other than the front yard where the solar panel can perform effectively [*Need to include if by-right, special exception, or conditional use*].

(B) Height

- (1) Freestanding ground mounted ASES shall not exceed the maximum accessory structure height in the underlying zoning district.

OR

Freestanding ground mounted ASES shall not exceed (15, 20, XX) feet in height above the ground elevation surrounding the systems.

(C) Coverage (*see impervious cover in Ordinance Considerations*)

- (1) The area beneath the ground mounted ASES is considered pervious cover. However, use of impervious construction materials under the system could cause the area to be considered impervious and subject to the impervious surfaces limitations for the underlying zoning district.

OR

The following components of a ground mounted ASES shall be considered impervious coverage and calculated as part of the impervious coverage limitations for the underlying zoning district:

- (a) Foundation systems, typically consisting of driven piles or monopoles or helical screws with or without small concrete collars.
- (b) All mechanical equipment of the system including any structure for batteries or storage cells.

OR

The surface area of the arrays of a ground mounted ASES, regardless of the mounted angle of any solar panels, shall be considered impervious and calculated in the lot coverage of the lot on which the system is located.

- (2) The total surface area of the arrays of ground mounted ASES on the property shall not exceed more than (XX) percent of the lot area. (*some models suggest not greater than 15%*).
- (3) The applicant shall submit a Stormwater Management Plan that demonstrates compliance with the municipal stormwater management regulations.

(D) Screening

- (1) Ground mounted ASES shall be screened from adjoining residential uses or zones according to the standards found in *(other screening requirement sections)* of this zoning ordinance.

OR

Ground mounted ASES shall be screened from any adjacent property that is residentially zoned or used for residential purposes. The screen shall consist of plant materials which provide a visual screen *(will need to provide specific requirements)*. In lieu of a planting screen, a decorative fence meeting requirements of the zoning ordinance *(or include specific requirements)* may be used.

(E) Safety/Warning Signage

Appropriate safety/warning signage concerning voltage shall be placed at ground mounted electrical devices, equipment, and structures. All electrical control devices associated with the ASES shall be locked to prevent unauthorized access or entry.

(F) Location Restrictions

Ground-mounted ASES shall not be placed within any legal easement or right-of-way location, or be placed within any storm water conveyance system or in any other manner that would alter or impede storm water runoff from collecting in a constructed storm water conveyance system.

SECTION 7. PRINCIPAL SOLAR ENERGY SYSTEMS (PSES)

Sec. 7.1 Exemptions

PSES constructed prior to the effective date of this Section shall not be required to meet the terms and conditions of this Ordinance. Any physical modification to an existing PSES, whether or not existing prior to the effective date of this Section that materially alters the PSES shall require approval under this Ordinance.

Sec. 7.2 Where Permitted

PSES shall be permitted by *right/special exception/conditional use (need to specify which)* in the XXXX Zoning District(s).

Sec. 7.3 Compliance with Industry Standards

The PSES layout, design and installation shall conform to applicable industry standards, such as those of the American National Standards Institute (ANSI), Underwriters Laboratories (UL), the American Society for Testing and Materials (ASTM), , Institute of Electrical and Electronics Engineers (IEEE), Solar Rating and Certification Corporation (SRCC), Electrical Testing Laboratory (ETL), Florida Solar Energy Center (FSEC) or other similar certifying organizations, and shall comply with the PA Uniform Construction Code as enforced by [municipality],

regulations adopted by the Pennsylvania Department of Labor and Industry, and with all other applicable fire and life safety requirements. The manufacturer specifications for the key components of the system shall be submitted as part of the permit application.

Sec. 7.4 Installers

PSES installers must demonstrate they are listed as a certified installer on the PA Department of Environmental Protection's (DEP) approved solar installer list or that they meet the criteria to be a DEP approved installer by meeting or exceeding one of the following requirements:

- (a) Is certified by the North American Board of Certified Energy Practitioners (NABCEP) for solar thermal installation.
- (b) Has completed an Interstate Renewable Energy Council (IREC) Institute for Sustainable Power Quality (ISPQ) accredited solar thermal training program or a solar collector's manufacturer's training program and successfully installed a minimum of three solar thermal systems.

Sec. 7.5 Maintain in Good Working Order

Upon completion of installation, the PSES shall be maintained in good working order in accordance with standards of [municipality] and any other codes under which the PSES was constructed. Failure of the owner to maintain the PSES in good working order is grounds for appropriate enforcement actions by [municipality] in accordance with applicable ordinances.

Sec. 7.6 Underground Requirements

All on-site transmission and plumbing lines shall be placed underground to the extent feasible.

Sec. 7.7 Utility Notification

The owner of a PSES shall provide [municipality] written confirmation that the public utility company to which the PSES will be connected has been informed of the customer's intent to install a grid connected system and approved of such connection.

Sec. 7.8 Signage

No portion of the PSES shall contain or be used to display advertising. The manufacturer's name and equipment information or indication of ownership shall be allowed on any equipment of the PSES provided they comply with the prevailing sign regulations.

Sec. 7.9 Glare (see Ordinance Considerations)

- (A) All PSES shall be placed such that concentrated solar radiation or glare does not project onto nearby structures or roadways.
- (B) The applicant has the burden of proving that any glare produced does not have significant adverse impact on neighboring or adjacent uses either through siting or mitigation.

Sec. 7.10 Noise Study

A noise study shall be performed and included in the zoning/building permit application. The noise study shall be performed by an independent noise study expert and paid for by the applicant. Noise from a PSES shall not exceed (45, 50, XX) dBA, as measured at the property line.

Sec. 7.11 Tree and Landscaping Removal

No trees or other landscaping otherwise required by the municipal ordinances or attached as a condition of approval of any plan, application, or permit may be removed for the installation or operation of a PSES.

Sec. 7.12 Contact Information

The PSES owner and/or operator shall maintain a phone number and identify a person responsible for the public to contact with inquiries and complaints throughout the life of the project and provide this number and name to [municipality]. The PSES owner and/or operator shall make reasonable efforts to respond to the public's inquiries and complaints.

Sec. 7.13 Solar Easements (see Ordinance Considerations)

(A) Where a subdivision or land development proposes a PSES, solar easements may be provided. Said easements shall be in writing, and shall be subject to the same conveyance and instrument recording requirements as other easements. Any such easements shall be appurtenant; shall run with the land benefited and burdened; and shall be defined and limited by conditions stated in the instrument of conveyance. Instruments creating a solar easement shall include but not be limited to:

- (1) A description of the dimensions of the easement including vertical and horizontal angles measured in the degrees or the hours of the day, on specified dates, during which direct sunlight to a specified surface or structural design feature may not be obstructed;
- (2) Restrictions on the placement of vegetation, structures, and other objects which may impair or obstruct the passage of sunlight through the easement;
- (3) Enumerate terms and conditions, if any, under which the easement may be revised or terminated;
- (4) Explain the compensation for the owner of the real property subject to the solar easement for maintaining the easement and for the owner of the real property benefiting from the solar easement in the event of interference with the easement.

(B) If required, a PSES owner and/or operator must obtain any solar easements necessary to guarantee unobstructed solar access by separate civil agreement(s) with adjacent property owner(s).

Sec. 7.14 Decommissioning

(A) The PSES owner is required to notify [municipality] immediately upon cessation or abandonment of the operation. The PSES shall be presumed to be discontinued or abandoned if no electricity is generated by such system for a period of twelve (12) continuous months.

(B) The PSES owner shall then have twelve (12) months in which to dismantle and remove the PSES including all solar related equipment or appurtenances related thereto, including but not limited to buildings, cabling, electrical components, roads, foundations and other associated facilities from the property. The owner shall also restore the land to its original condition, including forestry plantings of the same type/variety and density as the original. If the owner fails to dismantle and/or remove the PSES and restore the land within the established time frames, [municipality] may complete the decommissioning and land restoration at the owner's expense.

(C) At the time of issuance of the permit for the construction of the PSES, the owner shall provide financial security in the form and amount acceptable to [municipality] to secure the expense of dismantling and removing said PSES and restoration of the land to its original condition, including forestry plantings of the same type/variety and density as the original.

Sec. 7.15 Permit Requirements

(A) Zoning/building permit applications shall document compliance with this Ordinance and shall be accompanied by drawings showing the location of the PSES on the property, including property lines. Permits shall be kept on the premises where the PSES is constructed.

(B) PSES shall comply with [municipality] zoning and subdivision and land development requirements. The installation of PSES shall be in compliance with all applicable permit requirements, codes, and regulations.

(C) The PSES owner and/or operator shall repair, maintain and replace the PSES and related solar equipment during the term of the permit in a manner consistent with industry standards as needed to keep the PSES in good repair and operating condition.

(D) Prior to the issuance of a zoning/building permit, PSES applicants must acknowledge in writing that the issuing of said permit shall not and does not create in the property owner, its, his, her or their successors and assigns in title or, create in the property itself : (a) the right to remain free of shadows and/or obstructions to solar energy caused by development of adjoining or other property or the growth of any trees or vegetation on such property; or (b) the right to prohibit the development on or growth of any trees or vegetation on such property.

(E) Routine maintenance or like-kind replacements do not require a permit.

Sec. 7.16 Ground Mounted Principal Solar Systems

(A) Lot Size

(1) The PSES shall meet the lot size requirements of the underlying zoning district.

OR

(XX) acres (*some models suggest 1 acre*)

(B) Setbacks

- (1) PSES shall comply with the setbacks of the underlying zoning district for principal structures.
- (2) (XX feet) from adjacent residential districts or structures (*some models propose a 20' minimum*).

(C) Height

- (1) Ground mounted PSES shall comply with the building height restrictions for principal structures of the underlying zoning district.

OR

Ground mounted PSES shall comply with the accessory building height restrictions for the underlying zoning district.

OR

Ground mounted PSES shall not exceed (XX) feet in height (*Some models propose 15' or 20'*).

(D) Coverage

- (1) The area beneath the ground mounted PSES is considered pervious cover. However, use of impervious construction materials under the system could cause the area to be considered impervious and subject to the impervious surfaces limitations for the underlying zoning district.

OR

The following components of a PSES shall be considered impervious coverage and calculated as part of the impervious coverage limitations for the underlying zoning district:

- (a) Foundation systems, typically consisting of driven piles or monopoles or helical screws with or without small concrete collars.
- (b) All mechanical equipment of PSES including any structure for batteries or storage cells.
- (c) Gravel or paved access roads servicing the PSES.

OR

The surface area of the arrays of a ground mounted PSES, regardless of the mounted angle of any solar panels, shall be considered impervious and calculated in the lot coverage of the lot on which the system is located.

- (2) The PSES shall not exceed the maximum lot coverage requirements of the underlying zoning district.
- (3) The applicant shall submit a Stormwater Management Plan that demonstrates compliance with the municipal stormwater management regulations.
- (4) PSES owners are encouraged to use low maintenance and low growing vegetative surfaces under the system as a best management practice for storm water management. (*see impervious cover in Ordinance considerations*).

(E) Screening

Ground mounted PSES shall be screened from adjoining residential uses or zones according to the standards found in (*other screening requirement sections*) of this zoning ordinance.

(F) Agricultural Zoning Districts

In Agricultural Zoning Districts, no more than 50 percent of the entire area for development shall consist of Class I and Class II prime agricultural soils.

(F) Location Restrictions

Ground-mounted PSES shall not be placed within any legal easement or right-of-way location, or be placed within any storm water conveyance system or in any other manner that would alter or impede storm water runoff from collecting in a constructed storm water conveyance system.

(G) Security

- (1) All ground-mounted PSES shall be completely enclosed by a minimum eight (8) foot high fence with a self-locking gate.
- (2) A clearly visible warning sign shall be placed at the base of all pad-mounted transformers and substations and on the fence surrounding the PSES informing individuals of potential voltage hazards.

(H) Access

- (1) At a minimum, a 25' wide access road must be provided from a state or township roadway into the site.
- (2) At a minimum, a 20' wide cartway shall be provided between the solar arrays to allow access for maintenance vehicles and emergency management vehicles including fire apparatus and emergency vehicles. Cartway width is the distance between the bottom edge of a solar panel to the top edge of the solar panel directly across from it.
- (3) Access to the PSES shall comply with the municipal access requirements in the Subdivision and Land Development Ordinance.

(I) Lighting

The ground mounted PSES shall not be artificially lighted except to the extent required for safety or applicable federal, state, or local authority.

(J) Earth Disturbance

If a ground mounted PSES is removed, any earth disturbance resulting from the removal must be graded and reseeded. (see Sec. 7.14(B)).

Sec. 7.17 Roof and Wall Mounted Principal Solar Energy Systems

(A) For roof and wall mounted systems, the applicant shall provide evidence that the plans comply with the Uniform Construction Code and adopted building code of [municipality] that the roof or wall is capable of holding the load imposed on the structure. Applications for roof mounted PSES shall be accompanied by engineer stamped plans that demonstrate the structural sufficiency of the roof to hold the weight of the PSES.

(B) PSES mounted on the roof or wall of any building shall be subject to the maximum height regulations of the underlying zoning district.

(C) Fire Safety (see Ordinance Considerations)

i Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010
<http://www.mseia.net/pdf/SolarMunicipalGuide-FINAL-LastChance-2.pdf>

ii U.S. Department of Energy. Energy Efficiency and Renewable Energy
http://www.eere.energy.gov/basics/renewableenergy/pv_systems.html

iii Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010
<http://www.mseia.net/pdf/SolarMunicipalGuide-FINAL-LastChance-2.pdf>

iv Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010
<http://www.mseia.net/pdf/SolarMunicipalGuide-FINAL-LastChance-2.pdf>

v Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010
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vi Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010
<http://www.mseia.net/pdf/SolarMunicipalGuide-FINAL-LastChance-2.pdf>

vii Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010
<http://www.mseia.net/pdf/SolarMunicipalGuide-FINAL-LastChance-2.pdf>

viii Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010
<http://www.mseia.net/pdf/SolarMunicipalGuide-FINAL-LastChance-2.pdf>

ix Washington State Legislature, RCW 64.04.150
<http://apps.leg.wa.gov/rcw/default.aspx?cite=64.04.150>

x American Solar Energy Society, February 2010
http://www.ases.org/index.php?option=com_content&view=article&id=928&Itemid=23

xi Solar Energy Systems. A Guide for Pennsylvania Municipal Officials. 3/16/2010

<http://www.mseia.net/pdf/SolarMunicipalGuide-FINAL-LastChance-2.pdf>