GUIDEBOOK FOR PENNSYLVANIA MUNICIPALITIES

Large-Scale Solar Development

Developed by:

Fair Shake
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Disclaimer and Note: The Stakeholders were interviewed as individuals and their substantive contributions and opinions may be different than those of their companies or organizations. Additionally, the Stakeholders' participation does not imply endorsement.

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FORWARD

Energy is at the core of Pennsylvania's identity and history. From the country's first oil well to its rich history of coal mining to the modern-day natural gas "boom," Pennsylvania is one of the most productive and energy-diverse states in the country. Pennsylvania's energy sector has continuously evolved for several decades, adopting innovations and best practices along the way that ensure energy systems are secure, clean, reliable, affordable, and resilient.

Desire for stable energy pricing and escalating corporate, community, and individual renewable energy goals are driving increased demand for solar. The next chapter of Pennsylvania's energy production will require us to look up, both literally and figuratively. Due to several priority shifts, policy incentives at both the state and federal level, and the fact that large-scale solar is now the least expensive form of electricity, energy companies around the world are expanding their solar operations through large-scale and community solar operations. Many of them have their eyes set on Pennsylvania due to its abundance of land and proximity to electricity transmission lines within the territory of PJM Interconnection - the country's largest regional transmission operator that coordinates electricity for thirteen states and the District of Columbia.

Pennsylvania municipalities with open space or under-utilized land with acreage to spare have potentially much to gain from supporting large-scale solar project development in their communities. While this chapter in the history of Pennsylvania is exciting, it is relatively new and may be daunting for municipal officials and leadership. This guidebook seeks to inform officials and municipal leaders of typical solar development processes, zoning, and ordinances as well as permitting and incentives. Special emphasis is placed on development and preservation of farmlands and agriculture and the benefits to local communities from solar. Additionally, this guidebook will provide an overview of what is coming in the world of solar development in Pennsylvania and offer a model solar ordinance to assist municipalities that are looking to move in this direction (see Appendix A for Model Solar Ordinance).

Chapters 1 and 2 provide a high-level overview of solar in Pennsylvania and basic information related to large-scale solar development. Chapter 3 covers policy objectives and considerations at the federal and state levels, and Chapter 4 is dedicated to land planning, zoning, and municipal ordinances. Chapter 5 addresses environmental permitting considerations, and Chapter 6 focuses on municipal permits for large-scale solar. Chapter 7 provides remarks and considerations on farmland development, and Chapter 8 discusses additional considerations for solar in Pennsylvania – such as brownfield development and community solar. Finally, the Guidebook concludes with Pennsylvania-specific case studies on large-scale solar as well as a model ordinances for municipalities.

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GLOSSARY OF TERMS

Agrivoltaics: The combination of agricultural production and solar electricity generation in the same location.; sometimes referred to "dual-use" or "agrisolar."

Array: An interconnected system of solar panels that function as a single electricity-producing unit. The panels are assembled to be one continuous structure, with common support or mounting.

Brownfield: A brownfield is a property in which the development or use of it may be influenced by the existence or potential existence of hazardous pollutants or contaminants.

Conservation Easement: A legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land in order to protect its conservation values, such as for wildlife habitat or productive farmland.

Easement: An easement is the grant of a nonpossessory property interest that grants the easement holder permission to use another person's land.

Grid: The grid is an interconnected network of electrical equipment that delivers electric power from generators to consumers. The grid consists of power stations, electrical substations, transmission lines to carry power long distances, and distribution lines to carry power to individual customers.

Infrastructure: Within this Guidebook, infrastructure refers to solar-related equipment, including solar arrays, racks, foundations, fencing, enclosures, electricity inverters, monitors, controllers, and other hardware required for the solar array.

Inverter: A device or circuitry that changes direct current (DC) that is generated by the solar panels to alternating current (AC).

Watt: A measure of electrical power which is equal to 1 joule of work per second.

Kilowatt (kW): A measure of electricity which is equal to 1,000 watts of electrical power. A typical PV system on a home in Pennsylvania requires a 7 kW solar array to cover the electricity needs over a year's time.

Megawatt (MW): A measure of electricity which is equal to 1,000,000 watts of electrical power.

Photovoltaic (PV): A means of converting photons from the sun directly into direct current electricity.

Photovoltaic System or PV System: A complete set of components used for converting sunlight into electricity, including the solar array and balance of system components.

Pollinator: Anything that carries pollen from one part of a plant to another part which fertilizes it (e.g. insects such as bees are pollinators).

Solar Energy: Electricity that is generated from sunlight through a photovoltaic system.

Chapter 1: **INTRODUCTION**

What is Solar Energy?

Solar energy is a form of renewable energy. The term "renewable energy" is defined by the U.S. Department of Energy (U.S. DOE) as "energy produced from sources... that are naturally replenished and do not run out."[1] Other common types of renewable energy include biomass (such as biofuels or biogas), wind, geothermal, and hydropower.[2] All electricity is produced by converting resources into usable forms of energy, and solar energy converts sunlight, a naturally replenished resource, into electricity. Over the past decade, the amount of electricity generated from renewable energy has doubled, currently representing about 20% of all U.S. electricity generation. Of this 20% renewable energy segment, approximately 2.8% of it is solar energy. According to the U.S. DOE, solar is expected to add more than 45% of the large-scale generating capacity to the U.S.,[3] and the U.S. Energy Information Administration predicts that solar will generate 20% of our nation's electricity by 2050.[4]

Solar energy offers many benefits to a broad scope of stakeholders. Solar provides homeowners, businesses, nonprofits, municipalities, schools, and farms with energy security from price spikes. It creates local jobs and supply networks across a growing number of services and products. Solar can even help preserve our Commonwealth's farmland, keeping land in the hands of farmers instead of selling for other development. Solar creates value for communities that have under-utilized land, like brownfields and abandoned mine lands. Solar energy advances the diversification of our energy mix to keep prices stable and our grid resilient when faced with disruptions. Solar also does not produce carbon dioxide (CO2) emissions during the electricity generation process which is important to improving local public health. Solar is a strong option for Pennsylvania communities facing a transition due to the everchanging energy landscape.

Solar energy does not come without any CO2 emissions. The U.S. National Renewable Energy Laboratory (NREL) calculated that solar energy systems during a lifetime cycle (mostly during the manufacturing process of the equipment) produce emissions of 40g of CO2 equivalent per kilowatt-hour.[5] This is drastically lower compared to the emissions of fossil fuel-burning power plants, which are approximately 442 grams CO2 per kWh for natural gas plants and 864 grams CO2 per kWh for coal-fired plants .[6]

Pennsylvania's Solar Future

Pennsylvania's solar industry is in the early stages of growth, and currently represents a small percentage of electricity generating capacity. However, electricity users are increasingly demanding solar energy through various avenues. In fact, Pennsylvania's current laws require that electricity customers have a choice when purchasing the electricity they consume, so customers can choose solar energy to supply their electricity. Another law on Pennsylvania's books, the Alternative Energy Portfolio Standards (AEPS), requires electric utilities to purchase a certain percentage of solar based on the number of customers they serve. These pol-

icies are enabling customers to drive electricity investment decisions that are local, clean, affordable, and secure–and solar meets these criteria.

In some circumstances, the solar energy that is purchased by Pennsylvanians is generated outside of the state, however, state policymakers are working to encourage that these investments are being made in Pennsylvania. For example, Pennsylvania is exploring opportunities to provide every Pennsylvanian the option to subscribe to a nearby solar project that would provide local residents and businesses with better access to the benefits of solar. These types of solar systems are called Community Solar that is described in more detail later in the Guidebook.

Solar energy's unique characteristics offer a flexible, modular electricity generation resource that provides an attractive option for landowners seeking a reliable, long-term investment. Pennsylvania's solar future is bright as homeowners, businesses, farmers, and neighbors recognize the diverse values solar provides for Pennsylvanians; a safe, reliable, low-cost electricity generation industry serving Pennsylvania's communities.

To learn more about the economic growth, job opportunities, and other benefits solar provides for Pennsylvania, please read "Finding Pennsylvania's Solar Future," a study supported by the U.S. Department of Energy that helps prepare Pennsylvania for the opportunities made possible by solar deployment.[7]

Financial Drivers of Large-Scale Solar

Developing a large-scale solar project requires significant, up-front capital expenditures before selling the electricity on wholesale electricity markets. Some of the cost considerations that can impact solar development include the cost of land, condition of the land, land preparation costs, fees for interconnection into the transmission grid, cost of solar equipment, proximity to transmission lines, permitting, and other indirect and soft costs.

Given the long-term characteristics and front-loaded cost requirements of solar, federal and state policymakers, as well as some electric utilities, have developed incentive programs for solar development. At the federal level, large-

scale solar owners may take advantage of an investment tax credit (ITC) that currently provides between 30% - 50% of the cost of large-scale solar projects that meet certain requirements. Solar owners can also access a production tax credit (PTC) which provides payments for solar power production over 10 years with the opportunity to receive bonus credits. Solar projects can also qualify to use a depreciation schedule called the Modified Accelerated Cost Recovery System (MACRS) which allows 100% of the solar asset to be fully depreciated in the first year, equating to another 25% - 30% savings. These long-standing programs have proven to be important tools for those who develop and own large-scale solar systems, which in turn, impact landowners who are leasing their property to the investors.

In some cases, solar developers will partner with an "offtaker" which is an entity that agrees to purchase the solar electricity generated from the project. The price of electricity that the offtaker agrees to purchase and the length of the power purchase agreement with the offtaker (which is typically 15-25 years or more) also impacts development decisions. For instance, Penn State University entered into an agreement to purchase the energy from a 70-megawatt (MW) project that was built in Franklin County, Pennsylvania. Penn State will purchase the power from the system that will meet approximately 25% of the University's electricity demand.

On the state level in Pennsylvania, the main program that impacts solar development financial decisions is the Alter-

native Energy Portfolio Standards which requires electric companies to purchase a certain percentage of electricity from "alternative" resources, including solar. Solar projects earn one Solar Renewable Energy Credit (SREC) for every megawatt hour of energy they produce (i.e., 5 megawatt hours = 5 SRECs). These SRECs are then sold on a market and are purchased by the Electric Distribution Companies (EDCs) and Electric Generation Suppliers (EGSs) to fulfill their requirements under the law. The revenue stream from the sale of these credits is a financial gain to solar owners as well. The current AEPS goal is 8.0% renewable energy by May 2021 with 0.5% to come from solar. The Pennsylvania AEPS targets were set in 2004 and the goals were met on time in 2021, but the Pennsylvania General Assembly has not updated the policy. However, legislation has been introduced to increase these goals over the past few years. Updating the AEPS would increase investments in renewable energy generation and enhance solar financing overall.

The Important Role of Municipalities

Recognizing that municipal officials and leaders have a profound role and responsibility in securing their community's vision for land-use, economic development and long-term community planning, the information contained in this Guidebook aims to equip municipal leaders with the key information and resources needed to realize the full scope of benefits provided by the continued development of solar projects in Pennsylvania. Large-scale solar projects will be increasing for many years to come, and the land required to undertake these endeavors is managed and overseen by many different stakeholders. Each of these stewards plays an important role in the continued growth of the solar industry.

Given the importance of Pennsylvania's solar future, many institutions and individuals are available to support municipal leaders better understand the opportunities offered by solar. Municipal leaders and officials are highly encouraged to seek advice from third-party sources before taking formal action to procure solar energy or regulate solar development. For more public information on considerations for Pennsylvania's local governments, consider reviewing the "Municipal Officials' Guide to Grid-Scale Solar Development in Pennsylvania"[8] developed by the Pennsylvania Department of Environmental Protection and Penn State University, the Pennsylvania Department of Environmental Protection's website for local governments on solar development[9] or reach out to a local nonprofit organization such as the Pennsylvania Solar Center to learn more about solar development in your community.

Chapter 2: **SETTING THE STAGE FOR SOLAR**

The Solar Stakeholders

A large-scale solar project requires many people, entities, and often, companies, work together to plan, collaborate, and implement the vision for bringing solar energy to a specific location. At a high level, the planning and design of the project comes from a solar developer, which is usually a company, that sees calculated opportunity to bring solar to a location that is conducive to a large-scale project. The developer usually understands market forces that drive a financial opportunity for solar in a particular location as well as how the solar project will connect to the PJM grid. Additionally, the solar developer has specialized knowledge of how the solar project should be laid out and planned according to the physical features of the land. The solar developer should have experience in and knowledge of obtaining the proper permits and mandatory clearances for a large-scale solar project. A solar developer may also be the entity that is the owner of the actual solar infrastructure.

Another very important stakeholder in a large-scale solar development is the landowner. Landowners include individuals, families and other entities with open space, farmland, or undeveloped land which is then leased (sometimes purchased) by a developer for the solar project. Some landowners may have had the land passed down through generations in their family and have special interests in how the land should be used. Some landowners may have easements or other obligations that dictate how and if land can be developed. Landowners hold a wealth of information for all solar stakeholders, particularly landowners with farmland who know the economics of Pennsylvania farming operations and are aware of the financial viability and value of their land.

Finally, the municipalities and agencies that govern land use and the environment in a community as well as the state of Pennsylvania are also considered stakeholders in large-scale solar development. Municipalities develop and implement regulations on how land is used in a township and whether such uses fit within the county's overall vision and plans for land development. Often, developers must obtain permits and approvals from municipalities before proceeding with large-scale solar projects. State agencies tasked with protecting the environment are stakeholders because such agencies enforce laws and regulations that a large-scale solar development needs to conform to, to ensure public and environmental health and safety.

Types of Solar Projects

There are three primary sizes of solar projects in Pennsylvania; 1) Distributed, 2) Community, and 3) Large-Scale. It is important to know these size categories because each includes a different set of land-use, contracting, and financial considerations. For the purposes of this Guidebook, large-scale solar developments include community solar and grid-scale projects as both of these have similar land development considerations.

Distributed Solar

Distributed solar refers to solar installations that are connected directly into the distribution grid owned by the local electric distribution company and the electricity generated by the solar array is used primarily on-site to meet the local electric demand of the property owner. These systems are typically installed on rooftops or on the ground of the property owner – a homeowner, business, nonprofit, school, etc.

When the on-site property doesn't need all the energy produced by its system, some excess power may go back out to the distribution grid for others to use. When this happens, the solar owner is compensated by the electric utility for the excess energy under a process called net metering. Please note that only public utilities are required to comply with net metering. Rural electric coops and municipal electricity utilities are not required but many of them do offer net metering.

Distributed solar represents the largest number of individual projects in the state (more than 30,000 of them as of 2023) with each project representing a relatively small amount of electric capacity. Per Pennsylvania's AEPS, in order to receive net metering benefits, residential distributed solar project sizes can be as large as 50 kilowatts (kW) and commercial distributed projects can be as large as 3 megawatts (MW), with some provisions for systems up to 5 MW.

Community Solar

Community solar is a solar-electric generation system that enables solar access to multiple community members.[10] The solar system does not need to be located on the site where the energy is used but is often located nearby in the community. Homeowners or organizations subscribe to a portion of a larger solar system and then are credited on their large bill for the energy that their "share" generates. Community solar allows renters and people who don't have good solar access on their properties to benefit from solar energy. Therefore, it facilitates more diversity in the siting and size of solar energy projects and allows for a wider range of members to participate, not just those with land or roof space to spare. For example, in states like New Jersey with robust community solar legislation and planning, community solar enables space-saving projects like solar parking lots.

It is worth noting that, as of the year this Guidebook has been written, community solar is not (yet) enabled in Pennsylvania, although efforts are being made at the legislative level to enable community solar.

Large-Scale (or Grid-Scale) Solar

Large-scale solar refers to a solar-electric generation system that feeds solar power directly into the electric transmission grid. The solar facility owner, which is often a company that designs, builds, owns, and operates large-scale solar

projects, typically enters into an agreement with the local electric utility or an "offtaker" that agrees to purchase the energy. The agreement fixes the terms of its electric supply and price for a set amount of time, typically 25-30 years. This timeframe is the same amount of time that a solar facility owner will seek when leasing land for a large–scale solar project. Given the size of these projects, large-scale solar developers look for large stretches of land near electric grid infrastructure that can accommodate high-voltage transmission of electricity.

Land Suitable for Large-Scale Solar Development

Solar developers for community solar and large-scale solar projects typically look for a few characteristics when scoping out land for their projects. They are looking for available land that is clear of obstructions, such as trees and other large vegetation to keep development costs low. They're also looking for land that is relatively flat or south-facing to maximize the amount of sun the panels receive and large, open spaces that don't contain wetlands; however, local topography, path of the sun, proximity to electrical infrastructure, capacity of the solar project, and other local considerations can influence a solar project's viability. If necessary and feasible, the developer may need to take steps to grade the property or remove vegetation, however, they often will try to avoid these activities to reduce project development costs. Advances in solar installation technology also may enable a project to be built on a property with undulations or steep slopes.

An important set of considerations involves access and proximity to electric transmission lines. Ideally, a project will be within two miles of electric grid infrastructure that can accommodate locally-generated voltage. Developers will coordinate with the local utility to identify specific points of interconnection as well as access roads and other items as necessary to ensure the safety and reliability of the system.

Solar Lease Considerations and Stages

Once signed and executed, a solar lease agreement can last 20 to 50 years and may even contain a renewal clause that elongates the relationship. Given these characteristics, an agreement of this kind has lasting impacts on property for several decades.

Solar lease agreements are typically separated into "stages." Often the agreement is divided into two to three stages. The **Options Stage** locks in a "due diligence" period of one to five years and gives a solar developer the right to execute a formal lease at a later time. In the Options stage, no physical indications of the development may be present, but significant work will likely be taking place. The developer will be working through the many preliminary steps to lift the project off the ground, such as obtaining the appropriate permits, performing a title search, looking into the recorded and unrecorded interests in the land (such as hunting leases and mineral rights), seeking additional investors, and strategizing on the potential "construction" stage (discussed below). The most important aspect of the options agreement is that it is unilateral: if the developer wants to proceed or withdraw from the agreement, the developer will have the ability to do so. Typically, the same power is not granted to the landowner once an agreement has been signed.

The **Construction Stage** is when the developer formalizes a payment scheme between the developer and the landowner in the event significant construction is required to facilitate the installation of solar panels. Despite the fact that solar systems are in large part pre-designed, preparatory work will typically be required prior to installment. Examples of construction during this time include grading of the property, securing the construction of roads for ingress and egress of construction vehicles, and facilitating interconnection. At the end of a successful construction stage, a fence is usually erected enclosing the portion of land with the panels. The fence will likely be around six to eight feet high to comply with electrical codes (and possibly, depending on the area of Pennsylvania, to prevent deer from entering the area).

The **Operational Stage** refers to the point of the agreement wherein solar panels are installed and producing electricity. The time spent on the land is minimal. Landowners will have visits from maintenance personnel a few times a year (usually on a quarterly basis) to ensure that that the solar system is functioning properly.

Agrivoltaics and Farmland Activity

Given the need for efficient land use and significant acreage to develop large-scale projects, solar developers and others are increasing dual-use solar photovoltaic and agriculture projects here in Pennsylvania, also known as agrivoltaics. Agrivoltaics refer to the combination of agricultural production and solar electricity generation in the same location.[10] Research is showing promising results on certain aspects of agrivoltaics across the state, where the type of crops that can be grown is dependent on the area in which the project is located. Successful examples include cultivating blueberry crops below solar panels in Maine and the placement of solar panels on top of alfalfa farms in Colorado. As policy objectives in Pennsylvania progress, we can expect to see a greater push for agrivoltaics to be incorporated in solar development projects.

"Solar grazing" is one form of agrivoltaics that is demonstrating considerable success in Pennsylvania. Grazing sheep may be an economical means of maintaining grass height around the solar infrastructure, which is vital to the functioning of the solar panels. Other grazing animals (such as chickens and goats) have the potential to damage solar panels over time and, thus, are less commonly used with solar.

Another form of agrivoltaics comes in utilizing "pollinator-friendly practices" with a large-scale solar development which can encourage wildlife conservation in the area. "Pollinator-friendly practices" refers to planting vegetation that can benefit local wildlife such as bees and birds, which has many benefits. First and foremost, by planting native vegetation on solar development, a site may not only provide carbon-free electricity, but also encourage migratory and local pollination.[11] Research conducted at the Argonne National Laboratory found that areas around solar panels can provide a suitable habitat for bees.[12] Thus, adding pollinator-friendly plantings underneath a solar installation may assist in crop diversity and production due to additional pollinators.[13] Incorporating seed mixes also has the potential to benefit the soil beneath solar panels.

Thus far, seven states have adopted pollinator-friendly solar development legislation in the form of voluntary standards and research incentives: Minnesota, Maryland, South Carolina, Vermont, New York, Illinois, and Michigan.[14] While Pennsylvania is not in this list, Pennsylvania residents can lead by example in increasing biodiversity of solar sites and benefit wildlife by using pollinator-friendly practices in a multi-dimensional manner.

Chapter 3: **SOLAR POLICY OBJECTIVES AND CONSIDERATIONS**

Energy policies aim to ensure our energy systems are secure, reliable, affordable, resilient, and clean. Financial incentives designed to maximize the benefits of large-scale solar development exist at the federal and state level and are offered by some utilities in Pennsylvania. For more detailed information on specific solar policies, please contact the Pennsylvania Solar Center (www.pasolarcenter.org).

Federal Policies

Given the long-term characteristics and front-loaded cost requirements of solar, federal policymakers have developed incentive programs for solar development. Solar owners may take advantage of an investment tax credit (ITC) that currently provides between 30% - 50% of the cost of utility-scale solar projects that meet certain requirements. Solar owners can also access a production tax credit (PTC) which provides payments for solar power production over 10 years with the opportunity to receive bonus credits. Solar projects can also qualify to use a depreciation schedule called the Modified Accelerated Cost Recovery System (MACRS) which allows 100% of the solar asset to be fully depreciated in the first year, equating to another 25% - 30% savings. These long-standing programs have proven to be important tools for landowners making investment decisions for solar energy.

Pennsylvania State Policies

On the state level in Pennsylvania, the main program that impacts solar development financial decisions is the Alternative Energy Portfolio Standards (AEPS) which require electric companies to purchase a certain percentage of electricity from solar. Solar projects earn one Solar Renewable Energy Credit (SREC) for every megawatt hour of energy they produce (i.e., 5 megawatt hours = 5 SRECs). These SRECs are then sold on a market and are purchased by the Electric Distribution Companies (EDCs) and Electric Generation Suppliers (EGSs) to fulfill their requirements under the law. The revenue stream from the sale of these credits is a financial gain to solar owners as well. The current AEPS goal is 8.0% renewable energy by May 2021 with 0.5% to come from solar. The Pennsylvania AEPS targets were set in 2004 and the goals were met on time in 2021, but the Pennsylvania General Assembly has not updated the policy. However, legislation has been introduced to increase these goals over the past few years. Updating the AEPS would increase investments in renewable energy generation and enhance solar financing overall.

Financial and Policy Drivers of Large-Scale Solar

There are a number of variables that can impact the decision to advance solar development including the cost of land, condition of the land, fees for interconnection into the transmission grid, proximity to transmission lines, permitting, and other indirect and soft costs. Furthermore, many developers will partner with an "offtaker," an entity that will agree to purchase the energy from the development. The price of energy that the offtaker agrees to and the length of the power purchase agreement with the offtaker (which is typically 15-25 years or more) that is sold also impacts development decisions. For instance, Penn State University entered into an agreement to purchase the energy from a 70-megawatt project that was built in Franklin County, Pennsylvania.

Because energy security is an important issue around the world, solar energy is playing an important role in energy strategies at the national, state, and local levels as well as to meet corporate energy goals and those of individuals. Meanwhile, private companies are following suit and investing heavily in technologies that reduce emissions. Demand for "climate-friendly" investments has sky-rocketed over the last few years.[15] Overall, there has never been a more opportune time for renewable energy production in the U.S.

Chapter 4: LAND USE PLANNING, ZONING, AND MUNICIPAL ORDINANCES

A main consideration in large-scale solar development is, does the solar project conform to the municipality's vision for land use? Does the municipality have land zoned for solar development? What characteristics does the solar project need to have or be defined by to fit with the municipality's zoning ordinances? These are important questions that are asked when a location is being evaluated for large-scale solar development.

Some recent studies have shown that much of Pennsylvania's over 2,000 municipalities do not discuss or provide for solar land developments in their zoning or ordinances. It is important to note that, despite this lack of specificity, solar projects continue to move forward. However, this means that solar developers must recognize, review, and plan around a locality's specific zoning and existing ordinances. In some municipalities, utility-scale solar is deemed only suitable in areas zoned "industrial." In other places, neither the zoning nor ordinances mention solar. The lack of consistent municipal oversight may create some uncertainty for solar stakeholders at various levels. The following few topics aim to inform and lead municipal officials and governments forward in planning for large-scale solar.

Unlike small, distributed solar installations, large-scale developments often come with additional considerations that result from the large size of the project (as described in Chapter 2). For example, safety, security, stormwater runoff, enhanced maintenance requirement, and grading can be factors which affect placement of a project and suitability to its location.

The Municipalities Planning Code

As far as regulations and ordinances go, it's relevant to note that it is generally legal for municipalities to enact solar regulations. The Pennsylvania Municipalities Planning Code (MPC) authorizes municipalities to enact land development, zoning, and ordinance controls to regulate the location, physical characteristics, and operation of large-scale solar projects. Section 604 of the MPC states that municipalities may craft ordinances "to promote, protect and facilitate any or all of the following: the public health, safety, morals, and the general welfare; ... the provisions of adequate light and air, access to incident solar energy, ... as well as preservation of the natural, scenic and historic values in the environment and preservation of forests, wetlands, aquifers and floodplains." Because the MPC is so broad on provisions that apply to solar development, it lends true that zoning and ordinances vary considerably for solar across the Commonwealth, depending on land features, population densities, and the goals of each municipality. At the very least, a solar project still needs to conform to the municipality's and state's electrical and building codes as well as the state-level environmental regulations, explained in more detail below.

Ordinances and Regulations for Ground-Mounted Solar Projects

A common thread amongst Pennsylvania localities' ordinances is lot coverage specifications. Lot coverage ordinances may not be specific to solar and can apply to many different applications, but generally defines the maximum percentage of the land or plot that may be covered by impervious surfaces. These regulations at-

tempt to maintain the character of a municipality, such as vegetation requirements to enhance aesthetics of the land, and improved drainage for stormwater flow to control erosion and soil loss. Encouraging vegetation across a municipality generally enhances the aesthetics of developed land. Such ordinances may dictate how big the solar installation can be, which may impact the project's feasibility in total. The municipal definitions of the lot coverage ordinance will determine exactly which structures in a large-scale solar project are considered impervious or otherwise contribute to the total coverage. For example, the solar cells and arrays themselves may not be considered impervious because they stand off the ground, but the concrete anchoring surfaces, if utilized, and racking posts most likely are impervious.

In addition to lot coverage regulations and ordinances, ground-mounted or free-standing solar developments may be required to comply with minimum structure "setback" requirements and/or maximum height restrictions, for the specific zoning district in which the solar project is planned. Setback and maximum height regulations help to preserve visibility, open spaces, access to light, vegetation, and landscaping in a community. While setback requirements usually refer to buildings, it is important to determine if a large-scale solar project would need to conform to any of these kinds of regulations.

Some ordinances separate setback requirements into two categories: those for principal structures and those for accessory structures. Principle structures generally refer to the main structure of a property, such as a house or office building, and the setback regulations for such are usually more restrictive. Accessory structures refer to accompanying structures of a property such as a garage or utility shed and generally have less restrictive setback requirements than principal structures.

If the planned solar project encompasses the main purpose of the land on which it will be built, the principal structure setback regulations should be applied. This scenario could influence the size, scope, and overall feasibility of the solar project. It is recommended that a locality's ordinances and supplemental regulations on setbacks and maximum height are easily accessible to the public to ensure easy understanding of the key factors for determining the requirements a large-scale solar project may need to conform to. Some communities have more relaxed setback requirements for solar installations which encourage solar development.

A utility-scale solar project certainly must be able to have good access to sunlight. This raises the question of whether any regulations or statutes exist to preserve access to light for solar projects. At present, Pennsylvania has no statutes that specifically protect access to sunlight from shade that a neighboring property may cast, whether the shade exists from structures or trees. It is also fairly well established in common law that a property owner will likely not be successful in bringing an action against a neighboring property owner for shading a solar installation. Shading may be a minor issue with a utility-scale solar project, wherein the outer edges of the installation may be the only sections affected by structures or trees. However, if it is desired to have perpetual good access to sunlight at all times of the day, it may be worthwhile for some property owners to ensure sunlight access by creating an easement on the neighboring property.

Lastly, it is important to also consider and evaluate how historical preservation and 'special use' zoning and ordinances may affect a large-scale solar project. Due to the expansive history that exists pertaining to pre- and post-colonial Pennsylvania, some municipalities in this state have historical and/or native lands preservation ordinances and some require a separate special review of new development in historical districts. Pennsylvania state statutes that protect the right to develop land for solar energy also may have exemptions for historical areas. Again, it's best to ensure easy access to information on the community's ordinances, especially those for historical preservation that may speak to how a solar installation will be accepted or not.

Chapter 5: FEDERAL AND STATE ENVIRONMENTAL PERMITTING CONSIDERATIONS

Depending on the location, surrounding landscape, and configuration of a utility-scale solar project, a variety of state and federal environmental permits and regulatory reviews may be required for construction and operation of the facility including erosion and sedimentation control plans, stormwater construction permits, post-construction stormwater management plans, water obstruction and encroachment permits, dredge and fill permits, and archeological and historic resource review. This chapter discusses these main environmental permitting considerations for large-scale solar.

Erosion and Sedimentation Control Plans

Per Pennsylvania law, written Erosion and Sedimentation Control Plans (E&S Plans) are required for all earth disturbance activities[16] 5,000 square feet or larger in area. Earth disturbances required to construct a large-scale solar facility can vary considerably depending on site characteristics including topography, slopes, soil types, solar array layout, and the types of solar arrays used.[17] Most large-scale solar facilities will be large enough and cause enough earth disturbances to trigger the need for an E&S Plan. The E&S Plan mandate comes from Pennsylvania Clean Streams Law[18] regulations found in Title 25, Chapter 102 of the Pennsylvania Code. The Pennsylvania Department of Environmental Protection (DEP) administers and enforces the Chapter 102 regulations, as do county conservation districts.

The Chapter 102 regulations require that E&S Plans show how the land and water will be protected from accelerated erosion and the resulting sedimentation through the use of Best Management Practices (BMPs). BMPs include, but are not limited to the following:

- Minimizing Earth Disturbances;
- Silt Fences;
- Mulch;
- Channels;
- Sediment Traps;
- Sediment Basins; and
- Permanent Stabilization.

In addition to identifying the BMPs that a project will use, the E&S Plan must also establish the full extent of the project site, the specific location of the BMPs, the timing and sequence of BMP installation and removal, and a variety of other site-specific calculations, information, and drawings.[19] The details of E&S Plan requirements are laid out in the Chapter 102 regulations and compliance guidance is available to the public from the DEP and the county conservation district.

Construction Stormwater Discharge Permits

For large land development projects that disturb one or more acres of land,[20] such as large-scale solar facilities, a National Pollutant Discharge Elimination System Permit (NPDES Permit) for Stormwater Discharges Associated with Construction Activities (Construction Stormwater) must be obtained from the Pennsylvania Department of Environmental Protection (DEP) prior to construction (in some

counties, the conservation district has been given authorization to review and issue Construction Stormwater NPDES Permits). Construction activities include clearing, grading, and excavating the land. There are one of two types of Construction Stormwater NPDES Permits required for these construction activities: 1) general permits, or 2) individual permits.

"General" Construction Stormwater NPDES Permits are developed and issued by the DEP and are available for most projects. A General Construction Stormwater NPDES Permit is one that has pre-established terms and conditions that are not individualized to any particular facility but apply equally to all facilities that are issued with the general permit. The general permit process is intended to be more streamlined than an individual, case-by-case permit application and issuance. A land developer can r equest to obtain coverage under the general permit's terms and conditions if certain eligibility criteria are met. The application through which a land developer obtains a general permit is called a Notice of Intent.

The Notice of Intent to be covered by the General Construction Stormwater NPDES Permit must be filed at least 60 days before construction begins, and must also include:

- a Pennsylvania Natural Diversity Inventory (PNDI) Receipt
- a PNDI Clearance Letter (if applicable)
- the E&S Plan (and related documents)
- the Post-Construction Stormwater Management Plan (PCSM Plan) (and related documents)
- the results of soil and geologic testing.[21]

The DEP reviews and approves PCSM Plans as part of the General Construction Stormwater NPDES Permit application process and will not issue a NPDES permit without a sufficient PCSM Plan.

The **Individual Construction Stormwater NPDES Permit** is very similar to the general permit except that the DEP requires more detailed applications and develops permit terms and conditions specific to the proposed facility. An Individual Construction Stormwater NPDES Permit is required in a variety of circumstances, including, but not limited to, if the proposed stormwater discharge will be to an exceptional value or high-quality stream, the proposed project has the potential to discharge toxic substances, or the permit applicant has a history of non-compliance.[22]

An application for an Individual Construction Stormwater NPDES Permit generally must include:

- The PNDI Receipt
- The PNDI Clearance Letter (if applicable)
- A Pennsylvania Historic and Museum Commission clearance letter (for projects involving 10 or more acres of earth disturbance)
- The E&S Plan and related documents
- The PCSM Plan and related documents
- The results of soil and geologic testing
- An antidegradation analysis
- A riparian buffer plan[23]

The required contents of an Individual Construction Stormwater NPDES Permit are nearly identical to what is required for a Notice of Intent for coverage under a General Construction Stormwater NPDES Permit, except that application materials for an individual permit must also include an antidegradation analysis, a plan for a riparian buffer, and a Pennsylvania Historic and Museum clearance letter.

Post-Construction Stormwater Management Plan (PCSM)

The PCSM Plan is the regulatory requirement for managing stormwater discharges after construction of a facility is completed. While the PCSM Plan is separate and distinct from E&S Plans, both plans must be consistent with each other. The PCSM Plan should, to the extent practicable, be created and conducted to achieve the following goals:

- Preservation of stream channels
- Maintain and protect the physical, biological, and chemical qualities of the receiving stream
- Prevention of increased stormwater runoff rates
- Minimization of increases in stormwater runoff volume
- Minimization of impervious areas
- Maximization of the protection of existing d rainage features and vegetation
- Minimization of land clearing and grading
- Minimization of soil compaction
- Prevention or minimization of changes in stormwater runoff by using structural or nonstructural BMPs.[24]

The DEP reviews and approves PCSM Plans as part of the General Construction Stormwater NPDES Permit application process and will not issue a NPDES permit without a sufficient PCSM Plan.

Antidegradation Analysis

An antidegradation analysis is required through the federal Clean Water Act and the Pennsylvania Clean Streams Law. It is done to maintain and protect the existing water quality of high quality and exceptional value waters and to protect the existing uses of all surface waters.[25] Antidegradation analysis is a complex task that varies considerably depending on the watershed in which a project is located. Consultants for large-scale solar facility developers will perform the antidegradation analysis if needed for a particular project.

Riparian Buffers

Riparian buffers are areas of permanent vegetation composed of mostly native trees and shrubs planted alongside of a waterway as a transition from land to water and act as filters for sediments and pollutants, protect against erosion, and stabilize stream banks and channels.[26] In Pennsylvania, riparian buffer requirements are triggered for all projects with earth disturbance activities that require an Individual Construction Stormwater NPDES Permit located within 150 feet of a waterway within an exceptional value or high-quality watershed.[27] Pennsylvania also allows alternatives to riparian buffers that are "substantially equivalent to a riparian buffer in effectiveness."[28] The size and characteristics of a riparian buffer vary depending on the designated use and quality of the watershed within which a project is located.[29] If applicable, a large-scale solar project will be designed to include all necessary riparian buffers.

Chapter 105 Permits Under the Dam Safety and Encroachment Act

It is also possible that large-scale solar projects may need a Chapter 105 permit for any stream crossings or obstructions of waterways that is necessary for conduit or other solar infrastructure. Chapter 105 Dam Safety and Encroachment permits also protect wetlands. Part of the Chapter 105 permit application requirements is to perform a Comprehensive Environmental Assessment that includes an impacts, antidegradation, and alternatives analysis for all structures and planned activities of the solar installation per 25 Pa. Code Chapters 93, 95, 102 and 105. If the solar project will impact one or more wetlands, the applicant must assess the cumulative impact of the whole installation, including "direct" and "secondary" impacts of the permanent type.[30] If an impact to a wetland is deemed temporary and is proposed to be properly restored, such an impact "will not be included as an adverse cumulative im-

pact on exceptional value wetland resources or a significant adverse cumulative impact on other wetland resources."[31] Although not included in the applicant's cumulative impacts description, the temporary impacts should otherwise be identified by the applicant.

Resources are available to a large-scale solar developer applicant to assist in finding and identifying existing and potential wetlands impacts beyond the applicant's control. These include (but are not limited to) field observation, remote sensing, geographic information systems (GIS), eMapPA, the Pennsylvania Bulletin, and light detection and ranging (LiDAR).

Endangered Species Considerations During Project Planning and Permitting

Since they often cover a lot of land, by their very nature large-scale solar facilities are large projects, and the developers of such facilities will have to comply with federal and Pennsylvania laws for the protection of endangered and threatened species. Those laws include the following:

- **The Endangered Species Act**[32] (providing protections for threatened and endangered species and enforced by the U.S. Fish and Wildlife Service);
- **The Pennsylvania Wild Resources Conservation Act**[33] (providing protections for threatened and endangered plant species and enforced by the Pennsylvania Department of Conservation and Natural Resources);
- **The Pennsylvania Fish and Boat Code**[34] (providing protections for fish, reptiles, amphibians, and aquatic organisms and enforced by the Pennsylvania Fish and Boat Commission); and
- **The Pennsylvania Game and Wildlife Code**[35] (providing protections for birds and mammals and enforced by the Pennsylvania Game Commission).

The agencies with jurisdiction over a type of threatened or endangered species are called the "jurisdictional agency."

The primary means that permit applicants use to comply with these laws, at least initially, is the Pennsylvania Natural Diversity Inventory Environmental Review Tool (PNDI ER Tool). This online application allows the public to screen potential projects for impacts to threatened and endangered species for a given site.[36] Permit applicants should make use of the PNDI ER Tool as early in the process as possible to avoid permitting delays, preferably before permit application.

Use of the PNDI ER Tool generates a "PNDI Receipt" summarizing the expected impacts, if any, that a proposed project may have on specific threatened and endangered species. If the PNDI Receipt indicates that there is an expected impact, it will also list the avoidance measures that are necessary to eliminate the identified impacts. The PNDI Receipt also lets applicants know the jurisdictional agency that they must contact for consultation on how to avoid the impacts.

Use of the PNDI ER Tool may not necessarily show whether threatened and/or endangered species are on the project site. A field survey is sometimes necessary to ensure that undocumented threatened or endangered species are not present. The jurisdictional agency identified for consultation on the PNDI Receipt will inform the applicant if there is insufficient information to show no impact to a threatened or endangered species, and, if that is the case, a field survey will be recommended. If threatened and/or endangered species are identified during a field survey, the jurisdictional agency should be contacted by the applicant for further consultation. A permit applicant may object to a jurisdictional agency's recommendation that a field survey be conducted. The Pennsylvania Department of Environmental Protection (DEP) has the final say in whether or not a threatened and endangered species field survey must be conducted as part of a permitting process.

If there are species listed as threatened or endangered under the federal Endangered Species Act (ESA) present on the proposed site, then the U.S. Fish and Wildlife Service (FWS) is the jurisdictional agency. Further, if the permit for which the PNDI ER tool has been employed is a federal permit, then the permit applicant must go through the ESA Section 7 consultation process. The Section 7 consultation is similar to the consultation required under Pennsylvania law. However, the federal process results in the FWS issuing a Biological Opinion. The Biological Opinion includes a determination on whether there is "jeopardy" to a threatened or endangered species or an "adverse modification" to critical habitat, and if such impacts exist, then the Biological Opinion must identify alternatives allowing the project to

proceed. If there are no alternatives that would allow the project to proceed and impacts to affected species are unavoidable, then the applicant may still be able to proceed if the FWS issues an "Incidental Taking Permit" with an accompanying habitat conservation plan.

Aside from the federal consultation process, when use of the PNDI ER Tool identifies potential impacts to a threatened or endangered species, those potential impacts must be resolved to the satisfaction of the jurisdictional agency and the DEP. Once the potential impacts are resolved, the jurisdictional agency will issue a "Clearance Letter" which must be submitted to the DEP for review during the permitting process. The Clearance Letter may include avoidance measures, and steps to mitigate or minimize impacts (the Clearance Letter, if a federally issued permit is involved, may also include a Biological Opinion or an Incidental Taking Permit issued by the FWS). The DEP has a strong preference for Clearance Letters prior to project approval, however, the agency may exercise its discretion when making a permitting decision.

Clean Water Act 404 "Dredge and Fill" Permits

In a minority of large-scale solar projects, it may be necessary to level a surface or provide support for the installation by placing structures or material in a waterway or wetland. In most cases, solar project planners and engineers try to avoid this kind of construction, but in some instances, such infrastructure may be necessary. If placing material, supports, or other construction implements in a waterway or wetland is necessary, Section 404 of the Clean Water Act (CWA) must be evaluated for applicability. Section 404 establishes a program to regulate the placement of fill material into "waters of the United States," including wetlands. Activities in such waters regulated under this program include fill for development and infrastructure development. Section 404 requires a permit before fill material may be placed into waters.

The basic premise of the Section 404 permitting program is that no fill material may be placed in certain waters if: (1) a practicable alternative exists that is less damaging to the aquatic environment or (2) the waters would be significantly degraded. Solar developers applying for the permit must first show that (1) steps have been taken to avoid impacts to wetlands, streams, and other aquatic resources; (2) potential impacts have been minimized; and (3) that compensation will be provided for all remaining unavoidable impacts.

If a solar developer knows construction materials will need to be placed in a stream or wetland, the developer may apply for a Section 404 permit, which will undergo a review process. For solar applications in which material needs to be placed in a stream or wetland with only minimal adverse effects, a general permit may be suitable. General permits are issued on a nationwide, regional, or state basis for particular categories of activities. The general permit process eliminates individual review and allows certain activities to proceed with little or no delay, provided that the general or specific conditions for the general permit are met.

An individual permit is required for potentially significant impacts from solar installation construction in a stream or wetland. In many cases, individual permits are reviewed by the U.S. Army Corps of Engineers. Permit applications are reviewed for public interest and also per the environmental criteria set forth in the CWA Section 404(b)(1) Guidelines and regulations promulgated by the U.S. Environmental Protection Agency.

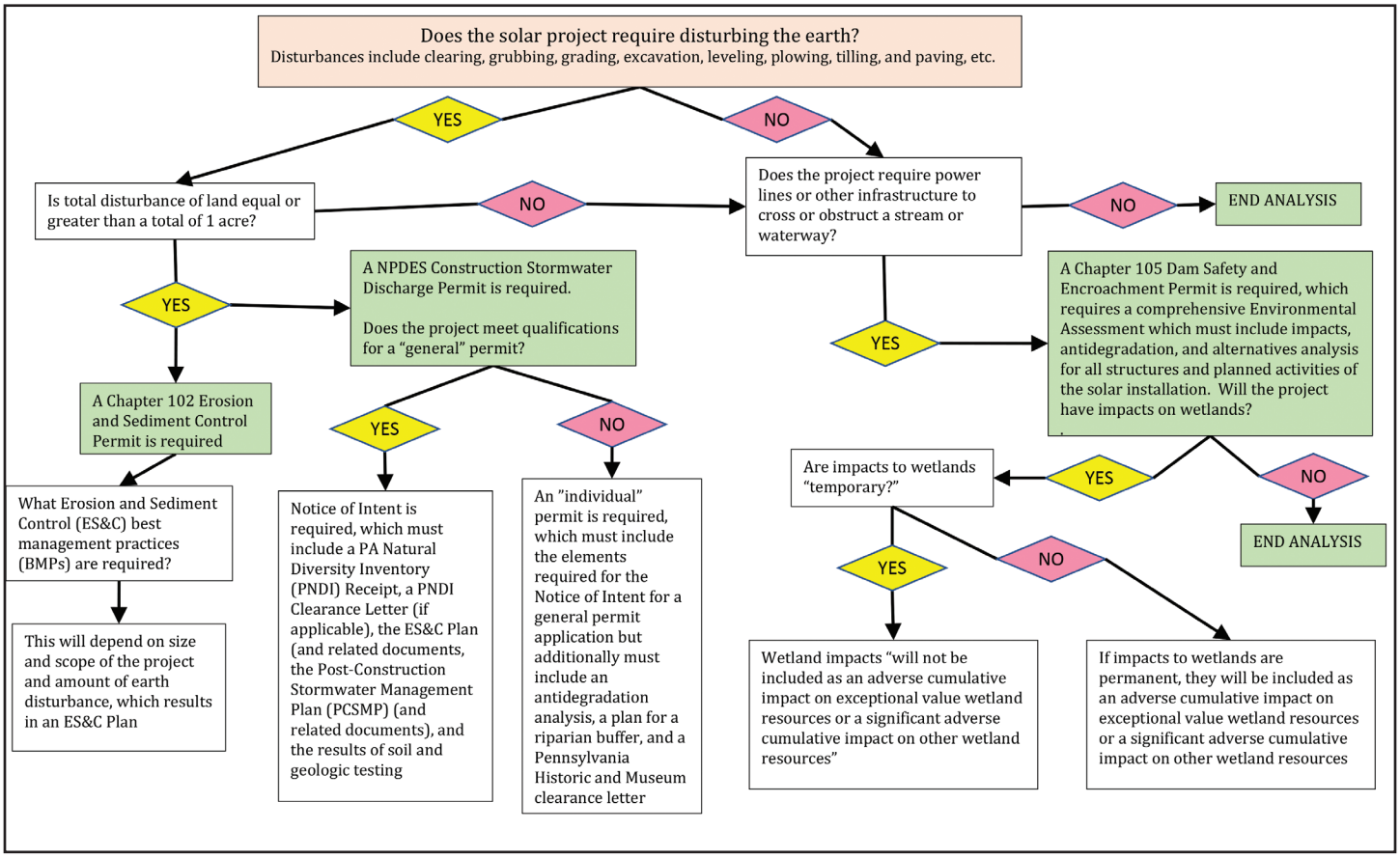
In addition to the U.S. Army Corps of Engineers review, the Pennsylvania DEP also requires a Section 404 permit to have a "401 Water Quality Certification." For projects that require both a Section 404 permit and a DEP Chapter 105 Permit, a Joint Permit Application is available through the DEP. The Joint Permit Application may be used and submitted to satisfy both the Section 404 and Chapter 105 Permit requirements.

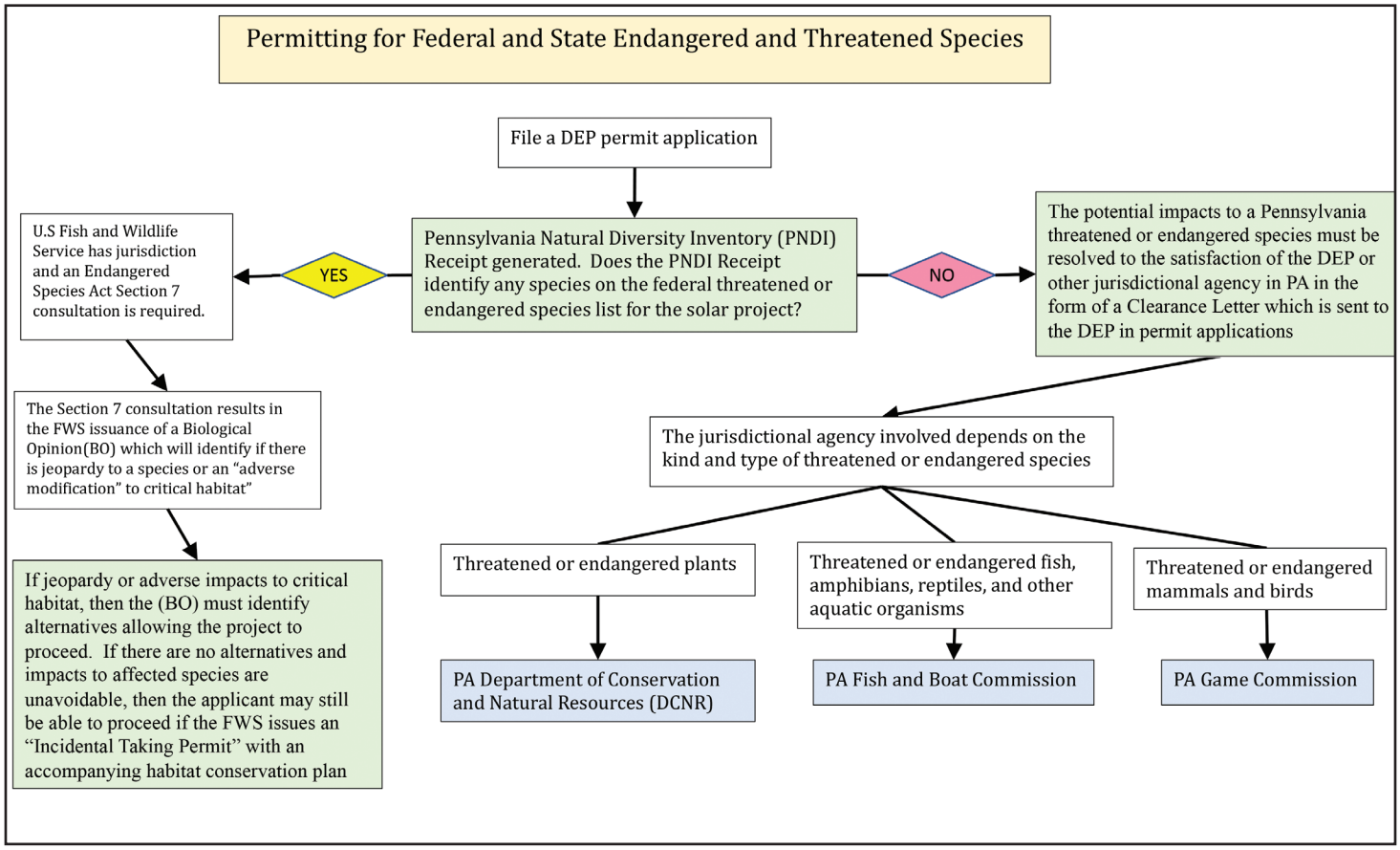
Historical and Archeological Preservation Considerations

Additional considerations for large-scale solar projects include planning for possible archeological impacts and historical preservation. Archeological and historical reviews are sometimes required in planning and permitting for large-scale solar projects. Certain types of state environmental permit applications undergo a cultural resource review by the Pennsylvania Historical and Museum Commission (PHMC), such as some stormwater management permits. If PHMC determines that the project location is a significant historical or archeological site, it may conduct an archeological study of the proposed solar project site. Although PHMC has no authority to deny a permit to a solar developer, PHMC may provide comments on the permit application that indicate archeological or historical aspects of the site will be adversely impacted by the solar installation. The DEP may use the comments in determining whether to issue the permit or not.

Permitting Process

The following two flowcharts provide decision trees that describe the different permits and processes necessary to develop solar as well as permitting for federal and state endangered specied.




Permitting for Federal and State Endangered and Threatened Species
File a DEP permit application
Pennsylvania Natural Diversity Inventory (PNDI) Receipt generated. Does the PNDI Receipt identify any species on the federal threatened or endangered species list for the solar project?
YES
U.S Fish and Wildlife Service has jurisdiction and an Endangered Species Act Section 7 consultation is required.
The Section 7 consultation results in the FWS issuance of a Biological Opinion(BO) which will identify if there is jeopardy to a species or an "adverse modification" to critical habitat"
If jeopardy or adverse impacts to critical habitat, then the (BO) must identify alternatives allowing the project to proceed. If there are no alternatives and impacts to affected species are unavoidable, then the applicant may still be able to proceed if the FWS issues an "Incidental Taking Permit" with an accompanying habitat conservation plan
NO
The potential impacts to a Pennsylvania threatened or endangered species must be resolved to the satisfaction of the DEP or other jurisdictional agency in PA in the form of a Clearance Letter which is sent to the DEP in permit applications
The jurisdictional agency involved depends on the kind and type of threatened or endangered species
Threatened or endangered plants
PA Department of Conservation and Natural Resources (DCNR)
Threatened or endangered fish, amphibians, reptiles, and other aquatic organisms
PA Fish and Boat Commission
Threatened or endangered mammals and birds
PA Game Commission

Chapter 6: **MUNICIPAL PERMITS**

Solar developers undertake steps to successfully develop and operate large-scale solar projects. This includes working with municipal officials and leadership on navigating municipal regulations, building permitting and, in some cases, preparing municipal stormwater management plans. Municipal officials are important stakeholders in the development process and provide access to important information and processes that developers and landowners seek. Ensuring that the information relevant to the development of large-scale solar is available and accessible for landowners as well as developers will ensure community and economic development goals are met and the integrity of the municipalities vision for land-use is upheld.

Building Permits

Building permits are required for all construction projects in Pennsylvania, and construction plans must conform to Pennsylvania's Uniform Construction Code Act, which was enacted in 2008. Large-scale solar developments fit into the category of "construction projects" so they require building permits just as other building projects do, such as office spaces or warehouses. The process of applying for a building permit allows a municipality to review the design and technical features of the development such as to ensure integrity and safety of the structures so the public is protected from unsafe designs. Under the Uniform Construction Code Act, Pennsylvanian municipalities must adopt the International Building Codes promulgated by the International Code Council (ICC). The ICC promulgates new codes every three years and the specific International Building Code that a municipality must employ is set by rulemaking of the Pennsylvania Uniform Construction Code Review and Advisory Council. The Pennsylvania Uniform Construction Code Review and Advisory Council has adopted the 2018 International Construction Codes as the Uniform Construction Code in Pennsylvania.[37] As such, large-scale solar projects would need to comply with the 2018 International Building Code, which includes the 2017 National Electrical Code, during design and construction.

In Pennsylvania, building codes are primarily enforced by individual municipalities through either municipal employees or third-party enforcement agencies. Approximately 90% of Pennsylvania municipalities have chosen to administer and enforce the Uniform Construction Code in their jurisdictions.[38] In municipalities that have not elected to enforce the Uniform Construction Code within their borders, the Pennsylvania Department of Labor and Industry is responsible for code enforcement at all commercial facilities.

Municipal Stormwater Management Plans

In addition to state-issued Construction Stormwater NPDES permits, many municipalities also have stormwater management ordinances that require Stormwater Management Plans distinct from, yet similar to, state E&S Plans and PCSM Plans. Such municipal Stormwater Management Plans are required for all land development, regardless of the size of the project. To comply with this requirement, large-scale solar facility developers must submit a stormwater management plan for municipal approval prior to any earth disturbance activities.

Conditional Use Permits, Use by Right, and Variances

Most of the municipalities across Pennsylvania do not have provisions for solar developments and are silent as to the applicability of solar development in their zoning and ordinances. In rare instances, solar projects are a 'use-by-right,' where zoning or ordinances specifically allow solar installations and usually are definitive on the requirements the installations must conform to. Use-by-right ordinances for solar are usually provided for distributed solar or rooftop solar rather than large-scale solar installations. In use-by-right code or in cases where municipal ordinances are clear as to the allowances for solar installations, it may be easy to determine the specifications a new solar project should obey. In the future, use-by-right and permitted uses may become more prevalent as there is a push to make solar installations permitted uses under the "Clean and Green" tax abatement program. However, use-by-right for solar is currently still rare in Pennsylvania for large-scale solar, as are any specific large-scale solar installation zoning or ordinances. Therefore, in many cases, large-scale solar projects go through a 'conditional use' application process per the local ordinances.

The conditional use permitting process allows municipalities to individually evaluate a solar project in its unique context and apply requirements as needed for the specific location. The conditional use permit is separate and apart from any permits that a solar project would need to obtain on a state or federal level and often, a conditional use permit approval is required before state or federal permits are granted. The conditional use process generally begins with applying for review of the solar project to the local Planning Commission, who evaluates whether the project is appropriate for the zoning district and land use plans in which it will be located. If the project is approved by the Planning Commission, it then undergoes review by the municipality's Board of Supervisors or Borough Council, which is usually subject to comment and evaluation by the public. Many factors could sway the Board of Supervisors' review of the project thus this review may present uncertainty for the development.

One way to relieve the uncertainty in the conditional use permitting process is to determine how, or if, the locality approved solar energy applications in the past. It is likely that, during prior permitting processes, the solar installation may have had additional requirements that supplement any existing ordinances. These additional conditions are usually unique to the specifics of the solar installation and help the community feel safe and more accepting of the new development.

In some cases, a municipality may require a developer to perform a "property value impact" assessment for home-owners near the solar project as a condition of the permit. Such an assessment attempts to determine the increase or decrease (or no change) in value of nearby homes and businesses with the solar development installed. These assessments are often difficult to perform accurately due to many variables that impact property values. Often, the assessments do not change the outcome of the permitting process so a municipality should consider if this is a necessary or wise step.

Developers whose large-scale solar projects do not meet local ordinances or permitting requirements have the option to a request variance in the municipality's Zoning Hearing Board or Zoning Board of Adjustments per Pennsylvania law. Such requests add time, cost, and risk to solar projects and, many times, variances are not granted. An alternative to requesting a variance is to change the zoning of a parcel intended for a solar installation. Changing the zoning may permit exceptions suitable for solar including allowances for lot coverage, impervious surfaces, and ground-mounted solar panels.

Chapter 7: **FARMLAND DEVELOPMENT**

Pennsylvania has a strong interest in farmland preservation, which includes crop soil preservation and protection of prime farmland. The state currently leads the nation in number of farms and acres preserved for agriculture. Pennsylvania accomplishes farmland preservation through a number of programs and partnerships in both the state government and nonprofit organizations. A few farmland preservation programs that may impact solar development include Pennsylvania's "Clean and Green" Tax Program, the Agricultural Conservation Easement Purchase Program, and the Agriculture Security Areas Program, all of which are administered by the Pennsylvania Department of Agriculture. (see below for more information)

Soil Characteristics

Farmland soil is also a key factor and hot topic in the development of large-scale solar. Research is currently underway at institutions across the country, including within Pennsylvania, for which the colocation of solar on farmland is being studied to better understand the opportunities to use land for food and energy production. Looking forward, researchers hope to enhance the efficiency of solar project sites by utilizing the shade provided from solar panels to grow different crops beneath them, to graze animals on the solar project sites, to use pollinator-friendly vegetation, and to develop farming equipment that can be used between rows of solar panels.

The loss of farmland in Pennsylvania and across the country is an important concern. In its nationwide study, *Farms Under Threat: The State of the States*, the American Farmland Trust found that low-density residential development has been the largest threat to farmland. Pennsylvania ranked eighth in the nation for the rate of conversion from agricultural land to low-density housing, and 70% of the 347,000 acres of farmland lost in the state between 2001 and 2016 is estimated to be lost to low-density housing.[39]

Once farmers sell their land for development, it is highly unlikely that land will ever return to farming and low-density housing encourages other types of development nearby. Farmland preservation is an important tool for communities and the state to assure that we keep prime farmlands in the ownership of farmers and for agricultural use. Pennsylvania has one of the most robust farmland preservation programs in the country.

Certain types of farmland preservation tools prohibit solar development altogether. On land that is not under these types of farmland preservation, there are techniques for developing solar that can maximize soil quality that will be beneficial for agricultural use in the future. Solar is a different type of land use than other developments and has characteristics that can also be beneficial to maintaining land for use for agriculture in the future. For most solar developments that occur on farmland, the farmer maintains ownership of the land and reaps financial benefits from leasing the solar, which provides income to allow them to continue farming other portions of their land or to keep the land in ownership of the farmer who may no longer be able to farm rather than selling it for other types of more detrimental development. In these cases, the land is available for future agricultural uses once the solar is removed and the soil health will be improved since the land has been fallow for many years.

Municipalities should weigh the benefits and considerations of limiting solar development on farmland, particularly if ordinances are silent about other types of more permanent development. Restricting farmers' use of their land or

limiting their income generating opportunities may set farmers up for outright sale of their property and permanent loss of that farmland.

Encouraging the use of existing farmland preservation tools is one of the best avenues to keep agricultural lands from all types of development. In addition, municipalities can encourage building solar on brownfield sites that will lessen the pressure on farmland; however, these sites are often more difficult and expensive to develop. Working with EPCAMR (Eastern Pennsylvania Coalition of Abandoned Mine Reclamation and WPCAMR (Western Pennsylvania Coalition of Abandoned Mine Reclamation) can help your community identify likely solar sites and focus on preparing them for development. For further reference, see the Pennsylvania Department of Agriculture's Farmland Preservation Guide.[40]

In addition, the American Farmland Trust issued a report entitled "Smart Solar Siting on Farmland: Achieving Climate Goals with Strengthening the Future for Farming in New York",[41] which highlights ways in which "smart solar siting" can benefit both goals for energy and food production. The recommendations for smart solar siting are to maximize renewable energy generation while supporting farm viability and protecting our most productive farmland by:

- Promoting siting solar panels on lands that will support farm viability and avoid high quality farmland
- Embracing agrivoltaics (with rigorous, well-defined standards), where solar energy production and farming occur simultaneously on the same piece of land
- Ensuring oversight for projects that will impact farmland, farms, and the farm economy to implement best practices in construction, operation, decommissioning, and regenerative soil management

While there is much to be developed in terms of solar guidance for Pennsylvania's farmland, there is ample opportunity for local governments and stakeholders to design and implement processes that welcome solar development as a farmland preservation tool.

Two important farmland preservation programs in Pennsylvania are the Clean and Green Tax Abatement Program and the Agricultural Easement Program.

Clean and Green Tax Abatement Program

Currently, the "Clean and Green" program offers a tax assessment incentive for landowners who use their land in its natural state. Clean and Green can lower a property's tax based on the land's use value rather than its market value. Typically, farmland, forestland, and open space properties qualify for lower taxes, however, the Clean and Green program does not offer incentives for enrollees planning to develop their land with solar unless most of the solar energy will be utilized on the enrolled tract.

If a property owner that has land under Clean and Green wishes to develop large-scale solar on the property, they would need to remove their land from this designation and pay the rollback taxes. The solar developer may offer to pay those back taxes.

A landowner who breaches the covenant of Clean and Green is subject to seven years of rollback taxes at 6% interest per year. The rollback tax is the difference between what was paid under Clean and Green versus what would have been paid, if the property had not been enrolled, plus 6% simple interest per year. A landowner may voluntarily remove their land from Clean and Green by notifying the county assessor by June 1 of the year immediately preceding the tax year for which removal is requested. Rollback taxes are due upon submission of the request.[42]

Agricultural Security Area (ASA) and Pennsylvania Agricultural Conservation Easement Purchase Program (ACEPP)

The Pennsylvania Agricultural Conservation Easement Purchase Program (ACEPP) and the Agriculture Security Areas Program were developed to strengthen Pennsylvania's agricultural economy and protect prime farmland.

Agricultural Security Areas (ASAs) are a tool for protecting our farms and farmland from non-agricultural uses. To establish an ASA, a petition is submitted to the township supervisors by the farmers. These security areas are re-evaluated every seven years; however, new parcels of farmland may be added to an established ASA at any time. A combined minimum of 250 acres is required for the establishment of an ASA. An ASA may include non-adjacent farmland parcels of at least 10 acres or be able to produce $2,000 annually from the sale of agricultural products.

The Agriculture Conservation Easement Purchase Program enables state and county governments to purchase conservation easements from farmers. The easements are designed to encourage preservation of farmland from non-agricultural uses, including large-scale solar. Thus, developers will avoid lands that have conservation easements for their solar project.

ASA is a prerequisite for the state ACEPP. Unlike the ASA designation alone, if the farm is also subject to a permanent agricultural conservation easement, the landowner is not permitted to engage in large-scale solar development. The deed of easement is in perpetuity and may not be extinguished. Energy primarily for use on the farm is permitted under the county farmland preservation program's rural enterprise criteria.

An ASA qualifies land for consideration under the ACEPP if the ASA is at least 500 acres.[43]

There are no restrictions or limitations related to commercial solar development on a property that is simply enrolled in the ASA, but not under an Agricultural Conservation Easement. However, the property will potentially be removed from the ASA when the township does a seven-year review if it no longer meets the evaluation criteria for inclusion in the ASA. No penalty exists for changing use or removing property. The landowner can also submit in writing that they no longer wish to be enrolled and be removed at any time.[44]

Once parcels of land are designated as an ASA, the municipality or county can then purchase Agricultural Conservation Easements for farms under the ACEPP. However, not all land under the ASA will necessarily be chosen to receive an easement.

Other Opportunities – Still in the Development Phase

Given the need for efficient land use and significant acreage to develop large-scale projects, solar developers and others are increasingly exploring dual-use solar photovoltaic and agriculture projects here in Pennsylvania, also known as agrivoltaics (see Chapter 8: Case Studies). With research showing promising results on certain aspects of agrivoltaics across the state, there are some constraints that can be alleviated by local officials to allow for expanding existing farming activities with the parallel use of solar as well as other key considerations to protect farmland.

Other opportunities for agrivoltaics are limited for large-scale solar in Pennsylvania. Pennsylvania's primary agriculture is in the form of milk, eggs, poultry, and crops such as fruits and corn.[45] These are not necessarily conducive to coexisting with solar, as these crops have high height requirements. In countries where agrivoltaics are more developed, such as Germany with its Fraunhoder Institute, solar panels are far more developed, with higher heights that allow for growth of tall crops underneath panels which enable tractor movement below.[46] Research in this area is still advancing, however, use of these techniques is often cost prohibitive. As these techniques mature, the cost of incorporating them will likely become more commonplace.

Examples of domestic agrivoltaic projects exist in other states. Notably, Jack's Solar Garden in Boulder, Colorado uniquely boasts use of several kinds of vegetation under/near the solar installation and provides national education and community development.[47] In Maine, a blueberry farm has successfully been growing underneath high-sitting solar panels.[48] California is attempting to cover irrigation canals with solar panels, which can reduce evaporation over time.[49]

Hopefully, by implementing agrivoltaics as much as possible within Pennsylvania and continuing research, large-scale solar development in Pennsylvania will become the face of impressive dual-use sites that demonstrate the nexus of food and energy production.

Chapter 8: **OTHER CONSIDERATIONS**

Brownfield Development

A brownfield is an "abandoned, idled, or under-used industrial or commercial site that is difficult to expand or redevelop because of environmental contamination."[50] Brownfields are typically abandoned urban industrial sites that have not been redeveloped for new residential or commercial use.[51] Brownfields are found in a wide range of communities and bring varying levels of contamination. While brownfields are found in both rural and urban areas, most are common in communities where heavy industry has moved on and left an employment and land development vacuum.[52] The U.S. Environmental Protection Agency (EPA) estimates that there are nearly half a million brownfields in the U.S. today.[53]

Contrary to popular perceptions, brownfields provide opportunities to businesses and municipalities. The federal brownfields legislation passed during the last decade has increased government funding of brownfield programs.[54] Brownfields that have been redeveloped for solar energy use, or "brightfields," typically include "ground-mounted solar installations on current or former brownfields, providing local economic opportunities."[55] Depending on the amount of space available and the local zoning ordinances, brightfields can utilize an entire land parcel for a solar system or incorporate mixed uses, for example by combining parking lots and garages with solar "canopies."[56]

Developing solar on brownfields offers municipalities the opportunity to introduce solar energy into their communities while making unusable plots productive, generating jobs and electricity.[57] Brightfields are a useful option to consider when the land in question has not been productive for many years. Municipalities, utilities, electricity customers and solar developers win by building profitable solar generation close to areas of high electricity demand while avoiding issues in land-constrained areas.[58]

There are two major barriers to brownfield redevelopment: (1) legal disincentives and (2) economic complications. Both barriers can be surmounted through effective project planning and by pursuing every possible EPA grant. The biggest legal disincentive to brownfield redevelopment is the fear of liability. Businesses and municipalities often fear that they will be sued and suffer serious financial penalties if they own highly contaminated land. This fear is reasonable when sites are subject to major federal legislation and/or are highly contaminated. But, despite popular misconceptions, liability for lightly polluted or simply undeveloped land and sites not subject to federal redevelopment laws is often less severe than feared.

CERCLA created the Hazardous Waste Cleanup Fund, which provides financial support for hazardous waste management and is jointly implemented by the EPA's Office of Solid Waste & Emergency Response and the equivalent state environmental agencies.[59] Under this framework, the EPA identifies the most heavily polluted sites for inclusion on its National Priorities List (NPL); listed sites are not included in national brownfield counts.[60] At present, there are 1,327 NPL sites nationwide (157 federal and 1,170 non-federal).[61] While the specific roles played by these laws is beyond the scope of this guidebook, it suffices to say that municipalities dealing with CERCLA issues are well-advised to make sure that their land-use policies are in compliance with these laws as well.

In addition to the legal liability disincentives, brownfield redevelopment is also discouraged by site economics, as redevelopers risk discovering heavier-than-expected contamination during redevelopment. However, despite beliefs to the contrary, "[m]any brownfields are, in fact, only lightly contaminated and can be investigated and cleaned up without rendering the site uneconomical for development."[62] Many of these perceived cost barriers come from CERCLA. Under CERCLA, costs incurred by municipal governments and landowners stem primarily from required remedial investigations and feasibility studies.[63]

Some states are taking steps to encourage transformation of these under-utilized sites to turn them into productive, solar energy generating assets. Neighboring states like New York and New Jersey are developing programs to support large-scale solar development of contaminated lands by identifying and mapping optimal locations where adequate interconnection access is available while also addressing site control and reducing developer liabilities. Pennsylvania may soon take steps to implement programs that streamline permitting and other reviews for solar projects on contaminated lands. Municipal leaders can take steps to attract these projects by encouraging coordination among stakeholders and supporting development by streamlining review and permitting requirements when developers seek to develop large-scale solar projects on abandoned minelands, brownfields, landfills, and other under-utilized land.

As mentioned previously, EPCAMR (Eastern Pennsylvania Coalition of Abandoned Mine Reclamation) and WPCAMR (Western Pennsylvania Coalition of Abandoned Mine Reclamation) are knowledgeable resources that can assist communities in brownfield redevelopment for solar.

Advancing Community Solar in Pennsylvania

Previously in Chapter 2, a brief description of community solar was provided but it was noted that community solar is not yet enabled in Pennsylvania. Community solar is a solar project where the financial benefits of a single photovoltaic array are distributed among a group of customers within a defined territory.[64] In many instances, community solar customers buy or lease a portion of the solar installation and receive a credit on their utility bill for the electricity generated by their share of the installation. Since the solar installation can be located off-site, the solar array can be strategically located where it is most beneficial. Two types of models for community solar exist: 1) the ownership model, which allows users to buy the appropriate number of solar systems or kilowatts for their energy needs with a single purchase, and 2) the subscription model, which allows users to make monthly payments with little to no upfront costs.

In some states, municipalities are turning towards community solar to reduce residents' monthly electric bills, create jobs, foster local economic development, and meet sustainability goals.[65] Although state legislation is not required to establish a solar project, 22 states and Washington D.C. have enabled community solar programs via regulation or legislation. Currently, Pennsylvania does not allow community solar programs because of utility laws, but the interest to do so is strong among politicians and constituents. The Pennsylvania Community Solar Economic Alliance conducted a poll of 704 registered voters. The results showed that 81% of the respondents said that they would support the availability of more choices in electricity source. 61% of the respondents said they would consider enrolling in a community solar project if one was available.[66] In 2021, two bipartisan bills were introduced in the state legislature that would authorize community solar and were described as "a simple fix that opens a new market sector…spurring almost $2 billion in economic investments."[67]

As Pennsylvania develops its community solar policy, the following components will be among the most important for municipalities to consider: 1) maximum solar array size requirements; 2) ratepayer location requirements; and 3) additional subscriber eligibility requirements. A program cap is the overall capacity limit for a statewide community solar program. Some states have no limit at all, while others are still developing their capacity size. In Vermont, eligible community solar projects may not exceed 500 kilowatts, while California allows a maximum project size of 20 megawatts. All states require a subscriber to be within the same electric utility service territory, but some states have additional location requirements. Subscriber eligibility requirements define the quantity of subscribers and how much individual customers can purchase. Finally, municipalities will need to determine whether policymakers have enacted legislation that encourages the inclusion of low-income individuals.[68]

Community solar projects are typically smaller than utility scale projects which allows for smaller parcels of land to qualify for solar development and permits the projects to be closer to the customer. Because of this, communities near larger population centers will likely have more community solar projects, whereas areas where there are larger tracts of land will see more interest from utility-scale solar developers.

Decommissioning/Termination, Removal, and Restoration

It is important for municipalities to be aware of any decommissioning plan included in the development of a solar project for when the project has reached the end of its useful life, when it is time for the array to be de-constructed and the land remediated based on the lease agreement. Of note, municipalities should ensure that the agreement between the landowner and developer has specified a reasonable end time for the solar panels and associated infrastructure to be removed from the land at the end of the project, if and when appropriate. In some instances, the solar developer may request to extend the agreement to use the land for solar production with new equipment. Most developers allocate a certain amount of funds in escrow for the removal, which should be reviewed in detail by the landowner to ensure the end-of-life treatment of the solar system aligns with the interests of the landowner and all other interested parties.

Landowners should also ensure that specific language is included in the lease in the event of bankruptcy or other early termination. The termination language should be clear, concise and with clear parameters of what the consequences will be in the event of early termination. Municipalities should inform landowners of these considerations when engaging in the local review process.

Municipalities can also include decommissioning and bonding language into their permitting requirements. Model Ordinances for large-scale solar developments are included in Appendix A, which have provisions for decommissioning.

Solar Myth-Busters

As large-scale solar projects continue to grow in Pennsylvania, some misinformation has developed regarding their physical attributes as well as the effect they have on communities. Here, several myths and truths are discussed in hopes of easing landowners', community members', and municipal officials' minds if a solar project is proposed or under construction nearby.

Myth #1: Solar Installations Create Glare

Most large-scale solar installations employ photovoltaic (PV) modules that are designed to absorb light – not reflect it. PV modules are constructed of dark, light-absorbing materials and covered with an anti-reflective coating that continues to be improved over time. Today's panels reflect as little as 2% of the incoming sunlight[69], thus do not create excess glare. Research shows that PV modules create less glare than windows, fresh snow, and bodies of water.[70] Others have raised concerns that a large-scale solar project can create glare that inhibits airline pilots from properly navigating airports. However, the Federal Aviation Administration has reported that this is not the case. In fact, many airports, such as Pittsburgh International Airport, have installed solar systems to help supply the vast amounts of power that airports require.

Myth #2: Solar Installations are Loud

If installed properly, solar arrays themselves create no sound. However, the inverters that are a component of a solar system generate a low buzzing sound as they convert direct current to alternating current electricity. The decibel rating (dB) of the solar system including the inverters is usually included in a land development plan which should be available for public inspection and review. The decibel rating of an inverter is typically about 60 dB from a distance of 10 meters, which is about the same rating of a regular conversation. Further, noise from an inverter is usually buffered because developers surround the inverters with hedges for visual reasons in many instances or place them in the center of the array such that distance to those nearby is increased. In almost all cases, the noise produced by inverters is not an issue, as only those who work on or come close to them will notice it.[71]

Myth #3: The Value of Properties Surrounding a Solar Installation Will Be Affected

A notion exists that properties that are immediately adjacent to a solar installation will not be as valuable as those in other areas of a community. However, current research shows that solar developments have a negligible effect on the sale prices of neighboring agriculture or residential properties. A study from the University of Texas surveyed approximately 400 property value assessors and asked whether neighboring solar installations had an effect on home prices. Most respondents believed that there was no impact. Many responded that there was a positive impact because the land previously had an unappealing use, and the long life of the solar arrays assured residents that the land would not be used unfavorably in the future.[72]

Myth #4: Solar Arrays Contaminate Underlying Soil with Toxic Substances

Some people think that solar arrays contain harmful substances that, when it rains, leach into soil and stormwater around a solar installation. Solar arrays are fully sealed and are manufactured to endure all weather conditions such that no threat exists that chemicals will leach from them if they are kept in proper condition. Even if a solar array was damaged, 95% of the materials inside are composed of crystalline-silicon, a non-toxic element. A study done by the International Energy Agency reported that metals leaching out of solar panels were below U.S. screening levels and water contamination levels were within the guidelines established by the World Health Organization.[73]

Chapter 9: **CASE STUDIES**

Case Study: The Gaucho Solar Project - Working Through Public Concerns, Zoning, and Conditional Use Permits

In June 2020, the University of Pittsburgh announced that it signed a 20-year solar power purchase agreement with Lendlease (now Vesper Energy) for a 20-megawatt solar development, known as Gaucho Solar Development.[74] When operational, the facility is estimated to provide 13% of the University of Pittsburgh's Oakland campus electrical needs and assist the campus in meeting their goal of carbon neutrality by 2037. Within the lease agreement, the University of Pittsburgh requires that all landscaping abide by the Pitt Landscape Design Guidelines, which require that the landscape buffers include plants for pollinators.[75] The facility would also serve as a living laboratory and allow students to learn and conduct research about energy and sustainability.[76]

The Gaucho Solar Development is located on 70 acres in Independence and Findlay Townships in Beaver and Allegheny Counties, respectively. The land is zoned for agricultural use in both townships and required the approval of conditional use permits from each township. The engineering company Civil & Environmental Consultants, Inc. was hired and testified at the township hearings as to the project's compliance with the conditional use permit ordinances. Both townships' ordinances contained specific provisions that a solar facility would have to meet to be granted a conditional use permit, pursuant to Independence Ordinance Article XVI § 200-84 and Findlay Ordinance Article VI § 117.604.76. These specific provisions require that applicants take effort to minimize visual impacts, maintain noise compliance, abide by specific setback and height requirements, and place powerlines underground.

At the public hearing held on July 8, 2020 in Independence Township, comments from citizens included general grievances about the visual impact of the facility, inquiries as to potential noise pollution, and concerns that their property values may decrease due to the proximity of the facility.[77] The project manager under Civil & Environmental Consultants responded to concerns of visual impacts by explaining that the landscape buffer designs and plans would incorporate pollinator-friendly plants. Counsel for Lendlease addressed noise pollution concerns and stated that the noise would not rise above ambient levels. The issue as to whether the property values of nearby residents may be affected seemed to be the most contentious. Despite counsel for Lendlease, Mr. Soininen, providing residents with information that displayed their property values should not be impacted, residents requested that the Board of Supervisors provide proximate residents a tax break. The Chairman directed residents to make such requests with the property assessment office. Comparatively, Findlay Township received no public comments at their hearings for the facility. This was likely because the project would only be located on approximately fourteen acres in Findlay Township.

The representatives were able to display compliance with the ordinances and were granted conditional use permits by Findlay and Independence Townships, on May 6, 2020,[78] and March 10, 2021,[79] respectively.

Case Study: Nittany 1 Project - Bringing Solar to Rural Pennsylvania

Hidden in the vast rural countryside that is southcentral Pennsylvania, lies an impressive solar project that contributes power to one of Pennsylvania's largest public universities. In February 2019, in conjunction with the Franklin County officials, Pennsylvania State University and Lightsource bp set forth on their project to erect three solar farms across 500 acres in Franklin County.[80] Operating with 150,000 solar panels at 70-megawatts, while outputting more than 100 million kilowatt-hours of electricity per year, this project provides 25% of Penn State's statewide electricity needs, while also contributing to Penn State's goal in reducing its greenhouse gas emissions.[81] Through Penn State's Power Purchase Agreement, Penn State will continue to purchase energy generated from this project for the next 25 years while also providing students with the opportunity to learn and study the positive effects and benefits of solar energy.[82] This case study will focus on Nittany 1, the project piece that operates on leased farmland in Lurgan Township.

Located in Lurgan Township, on Mowersville Road, Nittany 1 began operating in April 2019. Penn State and Lightsource bp chose this site because, according to Lurgan Township officials, the local farmers could not make use of the land as it is too dry for crop production. As such, the local farmers who leased the land to Lightsource bp were happy to do so and the process was without incident.[83] Additionally, because Lurgan Township is one of the many rural Pennsylvanian municipalities that does not have local zoning laws, the site developers were not required to secure conditional use or zoning permits in order to proceed with the project; instead a land use permit was submitted to the township for approval. Although Lurgan Township does have a local solar ordinance which the developers were required to comply with, informal correspondence revealed that the development and installation of Nittany 1 was without issue and that all parties involved are satisfied with the project.

Nittany 1 was the first of three solar sites to be established in Franklin County under the Penn State-Lightsource bp project. Taking nine years in total to complete, the focus of this project, outside of powering Penn State and helping meet its greenhouse gas emissions goals, is to provide Penn State students with the opportunity to actively study solar sites as they function in the real world. This solar site is the first in the state to be created with the underlying purpose of being a living laboratory.[84] Additionally, the site is one of the first in the state to support solar grazing, and therefore, has been seeded with a specially formulated seed mix named Fuzz and Buzz produced by Ernst Seeds in Meadville, PA —a type of grass that is specifically designed to support grazing at solar sites as well as pollinators.[85] Finally, this site offers benefits to locals as it provided jobs during development and continues to provide local landowners with compensation for the use of their land.[86]

Nittany 1 provides an excellent example of how solar projects can be successful in rural Pennsylvania. As in this case, many rural Pennsylvanians are often welcoming of solar projects because they bring value to local communities. However, other solar projects have not gone so smoothly. Solar projects in rural Pennsylvania may face difficulties in locating local ordinances and zoning laws because they often do not exist.[87] In cases like this, solar developers should check with the local municipality to determine what permits are required. In the Nittany 1 project case, the only permit that was required by Lurgan Township officials was a land use permit. Developers should be cautious and are reminded that other environmental laws may be applicable to a solar site (i.e., a NPDES permit may be required if more than one acre of land is disturbed, or if crossings of streams are needed or desired). Finally, developers should be mindful that, although solar projects bring many benefits to local communities, some rural Pennsylvanians are not convinced.[88] For that reason, developers should be prepared to engage in conversations with local stakeholders to ease concerns and answer questions.

CONCLUSION

As with any decision a municipality makes regarding their community that will change it for years to come, many considerations and experiences go into moving forward with large-scale solar development. No two solar development projects will be the same due to the unique history, location, physical features, and social aspects of the land on which a solar project is planned. The intent of this Guidebook is to inform Pennsylvania municipalities of the expanding opportunities in solar energy that can offer a source of revenue and protection for their community's land. Additionally, this Guidebook discussed a host of considerations that municipalities may find useful in navigating large-scale solar development.

APPENDIX A: MODEL ORDINANCE FOR LARGE-SCALE SOLAR FACILITIES IN PENNSYLVANIA

The attached sample model ordinances were adapted from those prepared by the Pennsylvania State Association of Township Supervisors and are intended for use as general templates for municipalities to review and adapt to their own particular needs. Please keep in mind that these sample model ordinances are merely models and should be used only as a guide in developing or amending your own ordinances as they pertain to large-scale solar facilities. No assurances are made regarding the enforceability of any ordinance. Each municipality should confer with its own solicitor regarding such matters.

General Regulations Affecting Large-Scale Solar Facilities

The Pennsylvania Municipalities Planning Code (MPC) provides two essential tools for use by municipalities to regulate land use within their borders: zoning ordinances (Model 1), and subdivision & land development ordinances (SALDO) (Model 2). In addition, municipalities may enact ordinances under their inherent "police" powers to protect public health, safety, and welfare (Model 3). All of these ordinances may be used, in one form or another, in guiding the development of large-scale solar facilities in Pennsylvania's municipalities.

Zoning for large-scale solar is optional on the part of municipalities but is the sole means by which a municipality may establish specific areas of the municipality in which large-scale solar facilities may be permitted, conditionally permitted, or prohibited. Subdivision and land development ordinances, while not appropriate for identifying the areas of the municipality in which such uses will or will not be permitted, do provide the municipality with a significant amount of control over such issues as set-backs, roads, layout of facilities, etc.

THE FOLLOWING MODEL ORDINANCES HAVE BEEN PREPARED TO COVER THE ALTERNATIVE SCENARIOS LISTED ABOVE. THEY ARE INTENDED TO SERVE AS MODELS AND SHOULD BE INDIVIDUALIZED TO MEET EACH MUNICIPALITY'S SPECIFIC NEEDS.

ZONING ORDINANCE AMENDMENT FOR LARGE-SCALE SOLAR FACILITIES

The following sample amendment (or variation thereof) may be used where an existing zoning ordinance is to be amended to include provisions for the siting of Large-Scale Solar Electric Energy Facilities. Such an amendment must be adopted in accordance with Sections 609 and 610 of the MPC.

(Municipality) Ordinance No. _____.

AN ORDINANCE AMENDING ORDINANCE NO. _____
OF *(MUNICIPALITY)* KNOWN AS THE *(MUNICIPALITY)* ZONING ORDINANCE, PROVIDING
FOR THE REGULATION OF LARGE-SCALE SOLAR ELECTRIC ENERGY FACILITIES.

(Municipality) hereby amends Ordinance No. _____ known as the *(Municipality)* Zoning Ordinance, by adding the following:

Section 1. Purpose

A Large-Scale Solar Electric Energy facility shall be considered a _____{permitted use, conditional use, or special exception} in the following zones _____. [select the appropriate zone].

(If a conditional use or special exception is selected,
standard language and desired conditions should be added here.)
EXAMPLE ZONING TABLE

Use Type	Residential	Mixed Use	Business	Industrial	Agricultural, Rural, Landfill	Shoreland	Floodplain	Special (Conservation, Historic Districts)
Large-Scale Solar Facility	Cond. Use	Cond. Use	Permitted	Permitted	Permitted Permitted	X	X	Cond. Use

Section 2. Definitions:

☐ Section_____of Ordinance No. _____ is hereby amended to add the following definitions:

"Solar Electric Energy System" means the components and subsystems that, in combination, convert solar energy into electric energy suitable for use. The term includes but is not limited to photovoltaic and concentrated solar power systems.

"Solar Electric Energy Facility" means an electric generating facility, whose main purpose is to generate and supply electricity and consists of one or more Solar Electric Systems and other accessory structures and buildings, including substations, electrical infrastructure, transmission lines and other appurtenant structures and facilities. Such facilities shall not include Solar Electric Energy Systems meant for residential or commercial use.

Section 3. Effective Date:

☐ This act shall take effect in _____.

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE FOR LARGE-SCALE SOLAR FACILITIES

The following sample amendment to a Subdivision and Land Development Ordinance (SALDO) provides a comprehensive set of standards for the erection, operation, and decommissioning of Large-Scale Solar Electric Energy Facilities, permitting the municipality to meet its goal of encouraging alternative/renewable energy while minimizing negative impacts by the development of such energy generating facilities. The Subdivision and Land Development Ordinance amendment must be adopted in accordance with sections 504 and 506 of the Municipalities Planning Code.

(Municipality) Ordinance No. _____.

AN ORDINANCE AMENDING ORDINANCE NO. _____
OF *(MUNICIPALITY)* KNOWN AS THE SUBDIVISION AND LAND DEVELOPMENT ORDINANCEOF *(MUNICIPALITY)*
TO PROVIDE FOR THE REGULATION OF LARGE-SCALE SOLAR ELECTRIC ENERGY FACILITIES.

Section 1. Title:
This Chapter shall be known as the Large-Scale Solar Electric Facility Ordinance for *(Municipality)*.

Section 2. Purpose:
The purpose of the Ordinance is to provide for the construction, installation, operation, and decommissioning of Large-Scale Solar Electric Facilities in *(Municipality)*, subject to reasonable conditions that will protect the public health, safety, and welfare.

Section 3. Definitions:

A. "Applicant" is the Landowner or Developer, as those terms are defined in the Municipalities Planning Code and including their heirs, successors, and assigns, who has filed an application for development of a Solar Electric Energy Facility under this Ordinance.

B. "Facility Owner" means the person or entity having an equity interest in the Solar Electric Energy Facility, including their heirs, successors, and assigns.

C. "Operator" means the entity responsible for the day-to-day operation and maintenance of the Solar Electric Energy Facility.

D. "Solar Electric System" means the components and subsystems that, in combination, convert solar energy into electric energy suitable for use. The term includes but is not limited to photovoltaic and concentrated solar power systems.

E. "Solar Electric Energy Facility" means a Large-Scale Solar Electric Facility, whose main purpose is to generate and supply electricity and consists of one or more Solar Electric Systems and other accessory structures and buildings, including substations, electrical infrastructure, transmission lines, and other appurtenant structures and facilities. These facilities shall not include Solar Electric Energy Systems meant for residential use.

MODEL 2: Subdivision and Land Development

Section 4. Applicability:

A. This Ordinance applies to any Solar Electric Facility of _____ acres or more proposed to be constructed after the effective date of this Ordinance.

B. A Solar Electric Energy Facility constructed prior to the effective date of this Ordinance shall not be required to meet the requirements of this Ordinance; provided that any physical modification or alteration to an existing Solar Electric Energy Facility that materially alters the size, type or components of the Solar Electric System shall require a permit under this Ordinance. Routine operation and maintenance or like-kind replacements do not require a permit.

Section 5. Land Development Requirements:

No land development plan providing for the construction or installation of a Solar Electric Energy Facility or addition of a Solar Electric System to an existing Solar Electric Energy Facility shall be approved unless such plan has complied with the requirements of this Chapter.

Section 6. Additional Land Development Plan Requirements:

A. Applications filed pursuant to this Ordinance shall comply with the Subdivision and Land Development Ordinance of *(Municipality)* and shall contain the following:

1. A narrative describing the proposed Solar Electric Energy Facility, including an overview of the proje the project location; the approximate generating capacity of the Solar Electric Energy Facility, the approximate number, representative types and height or range of heights of the panels or other Solar Electric System equipment to be constructed, including their generating capacity, dimensions, and respective manufacturers, and a description of all ancillary facilities. The manufacturer specifications for the key components of the system shall be submitted as part of the narrative.

2. An affidavit or similar evidence of agreement between the Landowner of the real property on which the Solar Electric Energy Facility is to be located and the Facility Owner, demonstrating that the Facility Owner has permission of the Landowner to apply for necessary permits or approvals for construction and operation of the Solar Electric Facility ("Participating Landowner Agreement").

3. Identification of the properties or portions thereof on which the proposed Solar Electric Energy Facility will be located, and the properties adjacent to where the Solar Electric Energy Facility will be located.

4. A site plan showing the planned location of each Solar Electric Facility property lines, setback lines, access roads and turnout locations, substation(s), electrical cabling from the Solar Electric System to the substation(s), ancillary equipment, buildings, and structures, including associated distribution and/or transmission lines, and layout of all structures within the geographical boundaries of any applicable setback.

5. Documents related to decommissioning, including a schedule for decommissioning.

6. Other relevant studies, reports, certifications, and approvals as may be provided by the Applicant or required by the *(Municipality)* to ensure compliance with this Ordinance.

B. Within thirty (30) business days after receipt of a land development application the *(Municipality)* will

determine whether the application is complete and advise the Applicant accordingly.

Section 7. Design and Construction:

A. Design Safety Certification: The design of the Solar Electric Energy System shall conform to applicable industry standards, including those of the American National Standards Institute. The Applicant shall submit certificates of design compliance obtained by the equipment manufacturers from Underwriters Laboratories (UL), IEEE, Solar Rating and Certification Corporation (SRCC), ETL, Florida Solar Energy Center (FSEC) or other similar certifying organizations.

B. Uniform Construction Code: The Solar Electric Energy Facility and the Solar Electric System shall be constructed to and comply with the Pennsylvania Uniform Construction Code, Act 45 of 1999, as amended, and any regulations adopted by the Pennsylvania Department of Labor and Industry as they relate to the UCC, except where an applicable industry standard has been approved by the Department of Labor and Industry under its regulatory authority.

C. Visual Appearance:
   1. Solar Electric Energy Facilities shall not be artificially lighted, except to the extent required by safety or by any applicable federal, state, or local authority.

   2. Solar Electric Energy Facilities shall not display advertising, except for reasonable identification of the panel, inverter, or other equipment manufacturer, and the Facility Owner.

   3. On-site transmission and power lines shall, to the maximum extent practicable, be placed underground.

D. Warnings: Clearly visible warning signs shall be placed on the fence, barrier, or Solar Electric Energy Facility perimeter to inform individuals of potential voltage hazards.

E. Connection Approval: The Owner of a Solar Electric Energy Facility shall provide the *(Municipality)* written confirmation that the public utility company to which the Solar Electric Energy Facility will be connected has been informed of the customer's intent to install a grid connected system and approved of such connection.

F. Glare: All Solar Electric Energy Facilities shall be placed such that concentrated solar radiation or glare does not project onto nearby structures or roadways. A Glare Study will be required only if a showing is made that glare will be an issue at the site.

G. Safety and Security: All Solar Electric Energy Facilities shall be completely enclosed by fence with a locking gate as required by the Electrical Code.

H. Acknowledgement: Prior to the issuance of a zoning permit or approval, Solar Electric Energy Facilities 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.

I. Impervious Coverage: The area beneath a ground-mounted Solar Electric Energy Facility 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 applicable Zoning District.

J. Access:

1. At a minimum, a 25' wide access road must be provided from a state or township roadway into the Solar Electric Energy Facility.

2. Access to the Solar Electric Energy Facility shall comply with the municipal access requirements in the Subdivision and Land Development Ordinance.

K. SALDO Compliance: The Solar Electric Energy Facility shall comply with the *(Municipality)*'s subdivision and land development (SALDO) requirements. The installation of the Solar Electric Energy Facility shall be in compliance with all applicable permit requirements, codes, and regulations.

Section 8. Height:

A. All Solar Electric Energy Systems shall comply with the building height restrictions for principal structures of the underlying zoning district.

OR

B. All Solar Electric Energy Facilities shall not exceed (XX) feet in height (some models propose 15' or 20').

Section 9. Setbacks:

A. Property lines: All Solar Electric Energy Systems shall be set back from the nearest property line a distance of not less than the maximum set back requirements for that zoning classification where the System is located. The setback distance shall be measured from the closest edge of the Solar Electric Energy System to the property line.

B. A Solar Electric Energy Facility shall be sited in such a way that it presents no threat to traffic or to public health and safety.

Section 10. Maintenance:

A. The Solar Electric Energy Facility's 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 Solar Electric Energy Facility's owner and/or operator shall make reasonable efforts to respond to the public's inquiries and complaints.

B. A Solar Electric Energy Facility's Owner and/or Operator shall repair, maintain, and replace the Solar Electric Energy Facility and related solar equipment during the term of the permit in a manner consistent with industry standards as needed to keep the Solar Electric Energy Facility in good repair and operating condition.

C. A Solar Electric Energy Facility's Owner and/or Operator shall, at the request of the *(Municipality)*, provide information concerning the amount of energy generated by the Solar Electric Energy Facility or System in the last twelve (12) months.

Section 11. Decommissioning:

A. The Facility Owner and Operator shall, at their expense, complete decommissioning of the Solar Electric Energy Facility or individual Solar Electric Systems within twelve (12) months after the end of the useful life of such Facility or System. A Solar Electric Energy Facility or System will be presumed to be at the end of its useful life if no electricity is generated for a continuous period of twelve (12) months.

B. Decommissioning shall include removal of all Solar Electric Energy Systems, buildings, cabling, electrical components, roads, foundations, and any other associated facilities.

C. Disturbed earth shall be graded and re-seeded, unless the landowner requests in writing that the access roads or other land surface areas not be restored.

Section 12. Remedies:

A. It shall be unlawful for any person, firm or corporation to violate or fail to comply with or take any action that is contrary to the terms of this Ordinance or a permit issued under this ordinance or cause another to violate or fail to comply, or take any action which is contrary to the terms of this Ordinance or a permit issued under this Ordinance.

B. If, after thirty (30) days from the date of the notice of violation, the *(Municipality)* determines, in its discretion, that the parties have not resolved the alleged violation, the *(Municipality)* may institute civil enforcement proceedings or any other remedy at law or inequity to ensure compliance as provided in Section _____ of Ordinance No. _____ of *(Municipality)* known as the *(Municipality)* Subdivision and Land Development Ordinance.

Section 13. Effective Date:

This ordinance shall take effect in _____.

MODEL 3: Police Powers

FREE STANDING ORDINANCE

The following sample ordinance provides a comprehensive set of standards for the erection, operation, and decommissioning of Solar Electric Energy Facilities, permitting the municipality to meet its goal of encouraging alternative/renewable energy while minimizing negative impacts by the development of such energy generating facilities. This model is enacted under the "police" power authority of the municipality.

AN ORDINANCE REGULATING THE CONSTRUCTION,
OPERATION AND DECOMMISSIONING OF LARGE-SCALE
SOLAR ELECTRIC ENERGY FACILITIES

Section 1. Title:
This Chapter shall be known as the Large-Scale Solar Electric Facility Ordinance for *(Municipality)*.

Section 2. Purpose:
The purpose of the Ordinance is to provide for the construction, installation, operation, and decommissioning of Large-Scale Solar Electric Energy Facilities in *(Municipality)*, subject to reasonable conditions that will protect the public health, safety, and welfare.

Section 3. Definitions:

A. "Applicant" is the Landowner or Developer and includes their heirs, successors, and assigns, who has filed an application for development of a Solar Electric Energy Facility under this Ordinance.

B. "Facility Owner" means the person or entity having an equity interest in the Solar Electric Energy Facility, including their heirs, successors, and assigns.

C. "Operator" means the entity responsible for the day-to-day operation and maintenance of the Solar Electric Energy Facility.

D. "Solar Electric System" means the components and subsystems that, in combination, convert solar energy into electric energy suitable for use. The term includes but is not limited to photovoltaic and concentrated solar power systems.

E. "Solar Electric Energy Facility" means a Large-Scale Solar Electric Energy Facility, whose main purpose is to generate and supply electricity and consists of one or more Solar Electric Systems and other accessory structures and buildings, including substations, electrical infrastructure, transmission lines and other appurtenant structures and facilities. These facilities shall not include Solar Electric Energy Systems meant for residential or commercial use.

Section 4. Applicability:

A. This Ordinance applies to any Solar Electric Energy Facility of _____ acres or more proposed to be constructed after the effective date of the Ordinance.

B. A Solar Electric Energy Facility constructed prior to the effective date of this Ordinance shall not be required to meet the requirements of this Ordinance; provided that any physical modification or alteration to an existing Solar Electric Energy Facility that materially alters the size, type or components of the Solar Electric System shall require a permit under this Ordinance. Routine operation and maintenance or like-kind replacements do not require a permit.

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Section 5. Permit Requirements:

A. No Solar Electric Energy Facility, or addition of a Solar Electric System to an existing Solar Electric Energy Facility, shall be constructed or located within *(Municipality)* unless a permit has been issued to the Facility Owner or Operator approving construction of the Solar Electric Energy Facility under this Ordinance.

B. The permit application or amended permit application shall be accompanied with a fee in the amount of $ _____.

C. Any physical modification to an existing and permitted Solar Electric Energy Facility that materially alters the size, type, and number of Solar Electric Systems or other equipment shall require a permit modification under this Ordinance. Like-kind replacements shall not require a permit modification.

Section 6. Permit Application:

A. The permit application shall demonstrate that the proposed Solar Electric Energy Facility will comply with this Ordinance.

B. Among other things, the application shall contain the following:

1. A narrative describing the proposed Solar Electric Energy Facility, including an overview of the project; the project location; the approximate generating capacity of the Solar Electric Energy Facility, the approximate number, representative types and height or range of heights of the panels or other Solar Electric Energy System equipment to be constructed, including their generating capacity, dimensions and respective manufacturers, and a description of all ancillary facilities. The manufacturer specifications for the key components of the system shall be submitted as part of the narrative.

2. An affidavit or similar evidence of agreement between the Landowner of the real property on which the Solar Electric Energy Facility is to be located and the Facility Owner, demonstrating that the Facility Owner has permission of the Landowner to apply for necessary permits or approvals for construction and operation of the Solar Electric Energy Facility ("Participating Landowner Agreement").

3. Identification of the properties or portions thereof on which the proposed Solar Electric Energy Facility will be located, and the properties adjacent to where the Solar Electric Energy Facility will be located.

4. A site plan showing the planned location of each Solar Electric Energy Facility property lines, setback lines, access roads and turnout locations, substation(s), electrical cabling from the Solar Electric System to the substation(s), ancillary equipment, buildings, and structures, including associated distribution and/or transmission lines, and layout of all structures within the geographical boundaries of any applicable setback.

5. Documents related to decommissioning, including a schedule for decommissioning.

6. Other relevant studies, reports, certifications, and approvals as may be provided by the Applicant or required by the *(Municipality)* to ensure compliance with this Ordinance.

C. Within thirty (30) days after receipt of a permit application, the *(Municipality)* will determine whether the

application is complete and advise the Applicant accordingly.

D. Within sixty (60) days of a completeness determination, the *(Municipality)* will schedule a public hearing. The Applicant shall participate in the hearing and be afforded an opportunity to present the project to the public and municipal officials, and answer questions about the project. The public shall be afforded an opportunity to ask questions and provide comment on the proposed project.

E. Within one hundred and twenty (120) days of a completeness determination, or within forty-five (45) days after the close of any hearing, whichever is later, the *(Municipality)* will make a decision whether to issue or deny the permit application.

F. Throughout the permit process, the Applicant shall promptly notify *(Municipality)* of any changes to the information contained in the permit application.

G. Changes to the pending application that do not materially alter the initial site plan may be adopted without a renewed public hearing.

Section 7. Design and Construction:

A. Design Safety Certification: The design of the Solar Electric Energy System shall conform to applicable industry standards, including those of the American National Standards Institute. The Applicant shall submit certificates of design compliance obtained by the equipment manufacturers from Underwriters Laboratories (UL), IEEE, Solar Rating and Certification Corporation (SRCC), ETL, Florida Solar Energy Center (FSEC) or other similar certifying organizations.

B. Uniform Construction Code: The Solar Electric Energy Facility and the Solar Electric System shall be constructed to and comply with the Pennsylvania Uniform Construction Code, Act 45 of 1999, as amended, and any regulations adopted by the Pennsylvania Department of Labor and Industry as they relate to the UCC, except where an applicable industry standard has been approved by the Department of Labor and Industry under its regulatory authority.

C. Visual Appearance:

1. Solar Electric Energy Facilities shall not be artificially lighted, except to the extent required by safety or by any applicable federal, state, or local authority.

2. Solar Electric Energy Facilities shall not display advertising, except for reasonable identification of the panel, inverter or other equipment manufacturer, and the Facility Owner.

3. On-site transmission and power lines shall, to the maximum extent practicable, be placed underground.

D. Warnings: Clearly visible warning signs shall be placed on the fence, barrier, or Solar Electric Energy Facility perimeter to inform individuals of potential voltage hazards.

E. Connection Approval: The Owner of a Solar Electric Energy Facility shall provide the *(Municipality)* written

confirmation that the public utility company to which the Solar Electric Energy Facility will be connected has been informed of the customer's intent to install a grid connected system and approved of such connection.

F. Glare: All Solar Electric Energy Facilities shall be placed such that concentrated solar radiation or glare does not project onto nearby structures or roadways. A Glare Study will be required only if a showing is made that glare will be an issue at the site.

G. Safety and Security: All Solar Electric Energy Facilities shall be completely enclosed by fence with a locking gate as required by the Electrical Code.

H. Acknowledgement: Prior to the issuance of a zoning permit or approval, Solar Electric Energy Facilities 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.

I. Impervious Coverage: The area beneath a ground-mounted Solar Electric Energy Facility 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 applicable Zoning District.

J. Access:

1. At a minimum, a 25' wide access road must be provided from a state or township roadway into the Solar Electric Energy Facility.

2. Access to the Solar Electric Energy Facility shall comply with the municipal access requirements in the Subdivision and Land Development Ordinance.

K. SALDO Compliance: The Solar Electric Energy Facility shall comply with the (Municipality)'s subdivision and land development (SALDO) requirements. The installation of the Solar Electric Energy Facility shall be in compliance with all applicable permit requirements, codes, and regulations.

Section 8. Height:

A. All Solar Electric Energy Systems shall comply with the building height restrictions for principal structures of the underlying zoning district.

OR

B. All Solar Electric Energy Facilities shall not exceed (XX) feet in height (some models propose 15' or 20').

Section 9. Setbacks:

A. Property lines: All Solar Electric Energy Systems shall be located _____ feet from all property lines where the System is located. These distances shall be measured from the closest edge of the Solar Electric Energy System to the property line.

B. A Solar Electric Energy Facility shall be sited in such a way that it presents no threat to traffic or to public health and safety.

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Section 10. Maintenance:

A. The Solar Electric Energy Facility's 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 Solar Electric Energy Facility's owner and/or operator shall make reasonable efforts to respond to the public's inquiries and complaints.

B. A Solar Electric Energy Facility's Owner and/or Operator shall repair, maintain, and replace the Solar Electric Energy Facility and related solar equipment during the term of the permit in a manner consistent with industry standards as needed to keep the Solar Electric Energy Facility in good repair and operating condition.

C. A Solar Electric Energy Facility's Owner and/or Operator shall, at the request of the (Municipality), provide information concerning the amount of energy generated by the Solar Electric Energy Facility or System in the last twelve (12) months.

Section 11. Decommissioning:

A. The Facility Owner and Operator shall, at their expense, complete decommissioning of the Solar Electric Energy Facility or individual Solar Electric System within twelve (12) months after the end of the useful life of such Facility or System. A Solar Electric Energy Facility or System will be presumed to be at the end of its useful life if no electricity is generated for a continuous period of twelve (12) months.

B. Decommissioning shall include removal of all Solar Electric Energy Systems, buildings, cabling, electrical components, roads, foundations, and any other associated facilities.

C. Disturbed earth shall be graded and re-seeded, unless the landowner requests in writing that the access roads or other land surface areas not be restored.

Section 12. Remedies:

A. It shall be unlawful for any person, firm or corporation to violate or fail to comply with or take any action that is contrary to the terms of this Ordinance or a permit issued under this ordinance or cause another to violate or fail to comply, or take any action which is contrary to the terms of this Ordinance or a permit issued under this Ordinance.

B. IIf, after thirty (30) days from the date of the notice of violation, the *(Municipality)* determines, in its discretion, that the parties have not resolved the alleged violation, the *(Municipality)* may institute civil enforcement proceedings or any other remedy at law or inequity to ensure compliance as provided in Section _____ of Ordinance No. ____ of *(Municipality)* known as the *(Municipality)* Subdivision and Land Development Ordinance.

Section 13. Effective Date:

This ordinance shall take effect in _____.

Footnotes

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17. See Pa. Dept. of Environmental Protection, Chapter 102 Permitting for Solar Panel Farms FAQ, dated April 20, 2021. Found at https://files.dep.state.pa.us/Water/BPNPSM/StormwaterManagement/ConstructionStormwater/Solar_Panel_Farms_FAQ.pdf (last visited April 3, 2022).

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26. See Pa. Department of Conservation & Natural Resources Website, Forest Buffers Along Waterways. Found at: https://www.dcnr.pa.gov/Conservation/Water/RiparianBuffers/Pages/default.aspx (last visited April 10, 2022). See also Pa. Department of Conservation & Natural Resources, Streamside Buffers. Found at: http://elibrary.dcnr.pa.gov/GetDocument?docId=3779742&DocName=Streamside%20Buffers%20General.pdf (last visited April 10, 2022).

27. 25 Pa. Code § 102.14(a), "Riparian buffer requirements."

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