

**MUNICIPAL OFFICIALS’
GUIDE TO GRID-SCALE
SOLAR DEVELOPMENT
IN PENNSYLVANIA**

Section 8:
Ordinance
Considerations for
Grid-Scale Solar
Development



PennState



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Goals of This Publication

Our primary goal with this guide is to explain the emerging solar energy development trends occurring in the Commonwealth and what might be expected in the next few years. The guide is intended to inform municipal and county officials about grid-scale solar development so they can potentially add clear, regionally consistent language addressing the specific issues around solar energy development to their zoning ordinances and other regulations.

A resources list at the end of this publication provides sources of further information. A glossary defines unfamiliar terms. A notes section provides sources for statistics and additional information. Over time as new information becomes available to further inform this discussion, it will be added to this guide, including information about new legislation affecting solar development and the evolution of new solar technologies.

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ORDINANCE CONSIDERATIONS FOR GRID-SCALE SOLAR DEVELOPMENT

The Importance of Having a Solar Ordinance

Recent research at Penn State Dickinson Law reviewing Pennsylvania’s more than 2,500 municipal zoning ordinances showed that only 5% of local zoning codes in the state currently provide specific guidance for grid-scale solar (GSS) projects, also known as principal use solar, where the energy generated is used off-site.

The study sought to determine what guidance is provided for the development of solar energy projects—in particular, authorization of such facilities as a “right” or “conditional use.” A conditional use is an exception to the zoning code that allows use of a property in a way that doesn’t conform to the zoning code. It is

controlled by the municipal governing body rather than the zoning board. Grid-scale solar development (GSSD) is generally subject to approval as a conditional use in Pennsylvania zoning codes where it is addressed.

The Penn State team started this project in response to requests to Penn State Extension by local government officials seeking guidance on solar ordinances. The team also wanted to identify common practices within Pennsylvania and the U.S., with the goal of preparing a library of information for municipal officials.

Eighty-seven percent of zoning codes in the Commonwealth provide no guidance on the development of solar energy facilities, whether on a home’s roof or covering hundreds of acres. The remaining 13% primarily address



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accessory use solar for the generation of electricity used on-site (typically homes).

Principal use solar is often implicitly or explicitly prohibited in zoning ordinances. Many times, an ordinance fails to mention solar at all or mentions it without specifying where or under what circumstances it is permitted.

In summary, most municipalities in Pennsylvania don't have GSS requirements clearly laid out. This means extra work and extra costs for both developers and municipalities. Municipalities don't have the time or the staffing to come up with new site requirements on a case-by-case basis. Laying out clear expectations for GSSD in a zoning ordinance lets developers know the standards they must meet.

The Problems Raised by Having Only Limited Guidance

The lack of guidance on GSS projects in most municipal zoning codes is important because Pennsylvania has experienced a ten-fold increase in GSS capacity over the past decade, with an even faster pace of project development expected during the next decade.

When a municipality does not specifically address GSSD requirements in an ordinance, the uncertainty around permitting normally increases the cost of solar projects. This is due to the need to work through the regulatory process and the potential for new ordinance development addressing solar, including possible public outreach meetings. It increases the time to develop projects while addressing community, landowner, and developer concerns.

These "soft" costs (including permitting and inspection, financing, installation labor, land acquisition, etc.) have begun to play a greater role in solar project development because fixed costs, such as hardware and engineering, have trended downward over the past ten years. Developers can save money by wisely choosing the jurisdictions they deal with. U.S. Department of Energy researchers have found that the total price of installation is higher by \$0.64–0.93 per watt for jurisdictions having the most onerous zoning restrictions versus those having most favorable regulations. This price differential adds up when a solar company is considering a 5-megawatt or larger solar facility. As a result, the ability of local governments to enact clear guidance for GSS



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projects has a direct and growing impact on a project's overall costs.

Most companies would rather try to develop in a jurisdiction where there's a known ordinance, because they know what they're dealing with, whether it's most favorable or not. Even better than a municipal-based approach may be a county-wide or region-wide approach. Inconsistent and unpredictable land use regulations from one municipality to the next may generate a less comprehensive outcome for this type of energy development on a region-wide basis.

Like other energy projects, the electricity produced from GSS is sold into a regulated market with strict standards and limited margins. Storage capacity for electricity is currently limited. Oil and gas margins are greater, and producers can store the products and sell when the price is high. The electricity market is not highly liquid, meaning that there are relatively few buyers and sellers and it is not easy to convert the product into cash without affecting its market price. Therefore, the industry has less tolerance for risk and unknowns. It also faces the challenge of being a new energy system that many are unfamiliar with.

Local Regulation

In Pennsylvania, zoning is done locally by townships under the authority of the Municipalities Planning Code. Responsibility for siting GSSD generally lies at the township level, although a number of counties administer zoning that affects local municipalities. The county conservation district has to approve the site's erosion and sedimentation and stormwater management plans.

Local planning for GSSD should ideally include an up-to-date comprehensive plan and zoning code consistent with that plan, as well as a solar energy ordinance. Communities can be proactive before GSS proposals arise. Leaders should think about different renewable energy sources and how and whether or where they fit with the community's long-term goals. If a community doesn't plan ahead for where they want GSSD and how they want to regulate it, they may end up with it where they didn't want it. Most of new GSSD is expected to occur in rural areas. Developers will favor places that see this as an economic opportunity to grow their property tax

revenues. Research from the U.S. Department of Energy’s National Renewable Energy Lab shows that “communities that address solar in their codes have more installed solar per capita.”

Establishing specific guidance at the local level clarifies the planning process for officials, residents, and investors by:

- Clarifying regulatory costs through predictable permitting procedures and fees
- Building awareness among residents about the implications of GSSD and reflecting their localized concerns in policy
- Creating a consistent and manageable framework for officials to apply to projects despite variations across location, scale, technologies, and purpose

Some sample solar ordinances from Pennsylvania are listed in the last section of this publication. Community concerns and local issues should be heard and addressed in a local ordinance. Because every community is different, solar ordinances should always be customized to the local situation.

The Scope of Solar Ordinances

Where GSSD is placed within a jurisdiction is an important local consideration. An effective zoning ordinance outlines GSS to be the principal use of land in certain districts. Some municipalities may say it should be placed

only in industrial zones, and in others, it may be permitted in ag districts or other more rural designations.

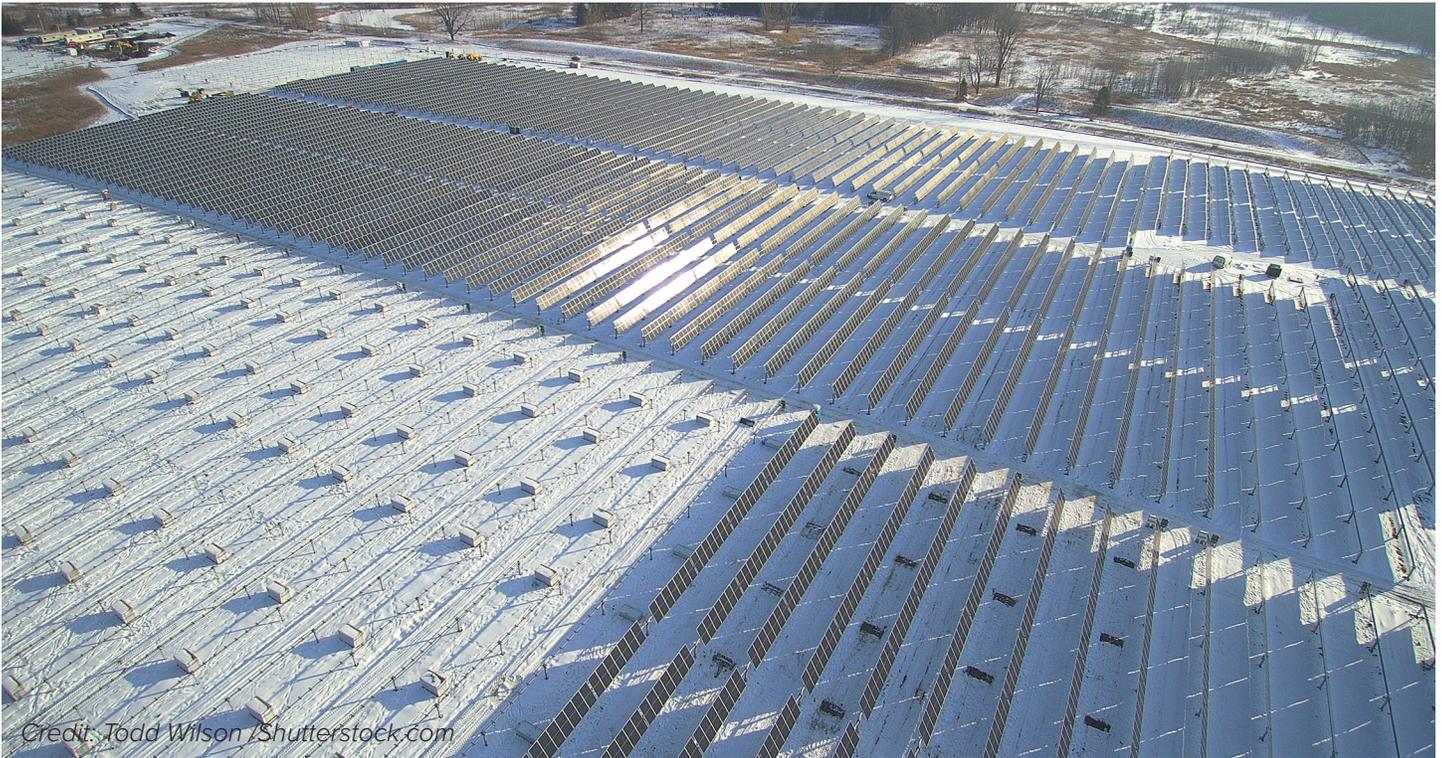
Some municipalities are taking a less prescriptive approach to GSSD. In those cases, the municipality gives a framework of what must be adhered to in terms of development outcomes for projects, letting the solar developer propose possible ways to fit their project into the community in a less disruptive way. In this approach, it is generally considered best practice to specify only the desired outcome and let developers choose how they prefer to achieve those outcomes.

For example, an ordinance might specify that the panels not be seen from the frontage road and let the developer decide how to achieve this. Conversely, if a screening requirement is very specific, such as saying that the developer must plant a certain species of tree along the road frontage at certain spacing, the municipality may get frequent variance applications to modify this requirement. Each variance application requires a hearing of the zoning board, which increases the work and cost for the municipality.

If a certain outcome should be avoided, that also should be specified up front in the ordinance. Examples might include a noise level at the perimeter fence or a glare level not to exceed.



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When a municipality is ready to develop a solar ordinance, they should gather the needed expertise with their solicitor and/or with a consultant familiar with the technology and solar development trends. The municipality should always seek to develop an ordinance compatible with existing land use plans and regulations.

Content of Solar Ordinances

Many municipalities want to adopt an ordinance that reasonably protects the health, safety, and welfare of the community, but may allow for accessory or principal solar development. In deciding what to include in a solar ordinance, municipal officials should consider the unique issues GSSD creates on the landscape and tailor the ordinance to address those concerns.

A solar ordinance starts with clear definitions of terms. If a term in an ordinance is ambiguous, the Pennsylvania Municipalities Planning Code says that the applicant can decide how the term is defined.

A solar ordinance defines the districts where GSSD is allowed, and for each of those districts, whether GSSD is:

- A permitted use, meaning that anyone who chooses to do this has the right to.
- A special exception use, which would require approval from the zoning board.
- A conditional use, which would require approval from elected officials of the jurisdiction, such as the board of supervisors, county commissioners, or borough council. These groups can attach conditions to the approval.

Many municipal ordinances currently have no provision related to solar. If a use is not specifically permitted in the ordinance, it's considered a conditional use or special exception use.

A solar ordinance should also define sensitive areas where GSSD is not allowed, and the required setback from constructed drainage corridors and wetlands, as well as the maximum percent slope of land where GSSD may be placed (15% is common).

A solar ordinance should address:

- Accessory and principal use systems— Accessory systems generate electricity primarily used on-site; principal use systems, including GSSD, generate electricity for use off-site.

- Site layout—A site plan map and details about the type of roads on the site and the number of access points should be required.
- Setback of the site fence from the road and other property lines—Many ordinances use the typical setback requirement for the zoning district where the facility will be, and may require a larger setback in residential districts.
- Height limits on the panels—To limit the visibility of the panels from neighboring properties, a maximum of 20 feet is often used.
- Maximum lot coverage regulations—This is a potential limitation on the percentage of a property that may be covered with GSS panels. Some municipalities have attempted to concentrate solar away from other conflicting uses, such as residences.
- Fencing along roads and residential areas—Perimeter fencing 7–8 feet high, with a locked gate, is common, with safety and warning signs as recommended by the industry. Some ordinances specify the size of the holes in the fence to allow wildlife passage.
- Screening—A solar ordinance should indicate that vegetative screening is required along all road and residential property lines, including replacement of plants that die. A mixture of trees, shrubs, grasses, and flowering plants provides the most effective screening. Coniferous trees provide year-round screening. Some ordinances specify the type of plant materials or say that native plants must be used.
- Buffer—A buffer of 20 feet between panels and the perimeter fence is common for emergency vehicle access.
- Stormwater management and impervious area—The Pennsylvania Department of Environmental Protection (DEP) has posted a list of frequently asked questions (FAQ) about stormwater management related to GSSD. If the developer plants the land in meadow conditions once the panels are installed, DEP considers this no impact as related to stormwater, if the site is maintained with at least 90% perennial vegetative cover. However, this guidance conflicts with impervious surface requirements in some zoning ordinances and may be challenged by a developer. As appropriate land becomes less available, developer challenges to ordinances may become more frequent.
- Traffic impacts—The permit application should address the effects of the GSSD on traffic on any bordering road, during both construction and operation of the facility, and detail any mitigation practices needed.
- Battery storage—Batteries should be housed within a secure, locked container near the middle of a GSS facility, or away from residences, because of equipment noise, commonly from cooling fans.
- Glare/reflection mitigation—A solar ordinance should require use of an antiglare coating on the panels. A glare study (see Section 3) could be required to assess impacts to neighboring residences and roads, but may only be necessary for facilities near airports, as required by Federal Aviation Administration rules.
- Solar access—Panels should be located so that shading from neighboring properties is not a problem, or developers can negotiate solar easements with neighboring property owners to ensure direct sunlight on the panel array and record those easements with the county recorder of deeds.
- Decommissioning—A solar ordinance should require a decommissioning plan (see Section 6) that defines the conditions upon which decommissioning must be started (often 1 year of non-use of the facility) and who is responsible for decommissioning. It should require removal of all power production equipment, roads, fencing, etc., and include a timeframe for completion (often 1 year). It should require restoration

of the property to the condition it was in when GSS was developed, or other grading and landscaping requirements. A solar ordinance should specify how often the decommissioning plan must be updated and requirements for financial security (bond, letter of credit, cash, etc.) for decommissioning. The amount of financial security should be periodically assessed (often every 5 years) and increased as needed. Determination of the necessary amount may be done by a third party. If the developer or holder of the lease (the lessee) fails to maintain the required bond as specified in the decommissioning plan, the municipality can withdraw the facility's permit. Whenever there's a change of lessee or land ownership, there must be a new commitment to the municipality that verifies who the parties are, the maintenance of a decommissioning plan, and proof of ongoing financial security.

- Other—Emergency response planning and safety, permit duration, facility abandonment, and enforcement should all be addressed in a solar ordinance.

More information about these requirements can be found in Sections 3 and 4 of this publication series.

Other Topics that May Be Addressed in a Solar Ordinance

- Utility line placement—Some municipalities require lines to be underground.
- Site lighting—Artificial lighting is generally not permitted, except on limited equipment, due to a desire for dark sky environments in rural areas.
- Tree cutting—Some ordinances limit maximum tree

removal for GSSD.

- Property operation and maintenance provisions—Most municipal ordinances require periodic grass mowing for properties within a township. A solar ordinance should address how this relates to GSSD. An outcomes-oriented regulation can be useful here—for example, stating that an operator must maintain a certain standard for pollinator habitat or a certain amount of ground cover. It is also wise to include a built-in remedy for failure to maintain the lease acreage. The use of grazing animals for vegetation maintenance can be an effective approach as well.
- Protection of productive soils—Some municipalities specify that only a certain percentage of class I or II soils on a parcel may be occupied by panels. These are the soils that the U.S. Department of Agriculture has found to be most productive for agriculture.
- Agrivoltaics—Some municipalities require that new GSSD projects include provisions for the combination of farming—whether grazing, pollinators, or vegetable growing (see Section 5)—and GSSD.



Credit: Christopher PB/Shutterstock.com

- Noise and vibration—A municipality should make sure that they have current limits on noise and vibration. An ordinance may address sound at the fence line. A noise study may be required.
- Repowering—A solar ordinance should specify whether repowering—the process of upgrading or updating the power-generating equipment on a site—requires a new or updated zoning project review.

Future-Proofing a Solar Ordinance

Municipalities should attempt to “future-proof” their solar ordinances. Given the recent rapid changes in solar technologies and project designs, it’s wise to include general, forward-looking language that allows the municipality to be a leader rather than a follower in GSSD permitting. Including future-proofing language will help municipalities to write a solar ordinance today that’s still relevant in 10 years.



Credit: Magic K, Pexels, CC

For example, one Pennsylvania city zoning ordinance states that a solar collection system is “a panel or other solar energy device, the primary purpose of which is to provide for the collection, inversion, **storage**, and distribution of solar energy for electricity generation, **space heating**, space cooling or water heating.” The bolded words (emphasis added) reflect potential forward-looking trends in the GSS industry. The city has allowed for these innovations in its ordinance.

Another example is that a new ordinance under consideration today should spell out the locality’s requirements around battery storage at GSS sites. More GSS sites are being built with batteries, which allow the storage of energy, because solar energy production does not always match energy demand. Even if a permit application doesn’t include plans for battery storage, the operator may want to add it later, so it’s helpful if the municipality’s requirements for this are already spelled out in the ordinance.

Another hot topic is community-owned solar, in which local residents pay a monthly fee to receive electricity from a shared solar facility. Community solar is not yet legal in Pennsylvania, but the state legislature may change that. Uses of solar power are changing, as is the typical size of projects, and ordinances should address how foreseeable changes will be handled.

Ordinances Are Evolving

Despite developers’ preference that all solar ordinances be the same, some municipalities are pushing on the standard terms to make GSSD more environmentally sustainable and to counter concerns about the loss of farmland.

For example, the solar ordinance in Montour County, Pennsylvania, limits development of class I and II soils for GSS to 75% of those soils on a parcel of land. However, if the site plan includes agrivoltaics—the collocation of GSS panels and a farming use—100% of a site can be developed for GSS. The ordinance requires no-till, shade-tolerant crops, and the



Credit: Werner Slocum, NREL, 65601

use of an erosion and sedimentation plan or best management practices for stormwater management. Vegetation may be cut or grazed no less than 4 inches tall. The use of chemical fertilizers and herbicides is limited to meeting the agronomic needs of the crops.

Montour County's solar ordinance was enacted in conjunction with a solar overlay district that follows the proximity to high tension powerlines. A potential project is judged to lie within the overlay district even if only some of the proposed area for development is within the overlay district.

Another example, from farther afield, Stearns County in Minnesota requires that all new ground-mounted GSSD be certified as pollinator habitat. Doing so helps to ensure that projects meet the county's stormwater standards.

Examples of Recent Solar Ordinances in Pennsylvania

Below are some recently updated zoning ordinances or guidance that can serve as

examples for communities looking to codify their approach to zoning GSSD sites.

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Conclusion

The potential pace of GSSD in the next decade has been compared to building the entire coal economy in 10 years. But GSSD may not fit with every community's development plans. Communities would do well to consider whether GSSD fits with their plans *before* a developer shows up. If a community wants to benefit from the expected economic infusion from GSSD, community leaders should define their terms before a project is proposed. Developers want predictability and stability as defined by an up-to-date solar ordinance. Having requirements spelled out will reduce the time and cost needed for municipalities to assess GSSD proposals. Investment may flow to communities that signal that they're ready for this expanding energy infrastructure. Requirements can be strict, but it's most important that they're clear.

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