



SOLAR ENERGY ZONING IN THE GREAT LAKES STATES

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The [energy zoning database](#) aims to understand how rural communities in the Great Lakes region are preparing for solar photovoltaic (PV) development within their local land use regulations. The database covers six Great Lakes states: Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, and is part of a larger [research project](#) with funding from the U.S. Department of Energy Solar Energy Technologies Office.

While the database captures local regulations for both wind and solar energy at both the small and large scale, this factsheet focuses on “principal-use” solar, where solar energy generation is the primary use on that site. Other common, synonymous terms include *large-scale solar, solar farms, utility-scale solar, and commercial solar*.

In some states (e.g., Minnesota, Ohio, and Wisconsin), the largest principal-use solar projects are permitted through state processes. But even in these states, there are still smaller principal-use solar facilities that may be subject to local land use regulations. For the sake of comparison across states, the database captures zoning regulations for the largest projects over which local government units have permitting authority.

To compile the database, a team of student researchers manually read each local zoning ordinance to capture the regulations that tend to be most consequential to principal-use solar deployment. While the database catalogs these regulations, it does not make an overall determination of whether an ordinance as a whole is restrictive to solar development. A detailed explanation of the data collection and analysis process is available through the database’s extensive [data documentation](#).

Key Findings on Solar Zoning in Rural Communities Across the Six Studied States

- The majority (70%) of zoning ordinances in the Great Lakes region are silent on principal-use solar energy systems. While silence does not constitute a conscious ban, it does lead to uncertainty and potential risks, both for solar developers looking to site projects and for community members.
- Among ordinances that are not silent on principal-use solar:
 - There are very few explicit bans (18 total ordinances), and also relatively few local jurisdictions that do not allow solar in agricultural districts, the land most commonly sought by solar developers.
 - Local governments rarely use the full range of possible regulations for solar, often just referring to standards within the underlying zoning district. When there are solar-specific standards, though, setbacks from non-participating property lines are the most common regulation that is applied. Non-participating property line setbacks in the database range from 5 to 500 feet, with 50 feet as the most common setback and 77 feet as the average setback.
 - This report also includes statistics for a number of other zoning provisions consequential to solar deployment including: setbacks from roads, participating property line, participating residence, and non-participating residence; lot size minimums and maximums; lot area coverage; regulations on maximum project size and minimum distance between projects; and qualitative standards related to land characteristics.



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Data Collection: Zoning Jurisdictions and Zoning Ordinances

Zoning arrangements and permitting regimes for solar energy vary widely across the Great Lakes region. In addition to having varying policies for the land use permitting of the largest solar projects, there is also variation in which level of local government has zoning authority for projects under “local” purview. In Illinois and Indiana, renewable energy systems are regulated exclusively at the county level, indicated by a “county” jurisdiction type. In Michigan, Minnesota, Ohio, and Wisconsin, zoning jurisdiction may be held by the township or the county. This is captured in the database as a “township” jurisdiction type, reflecting the smaller of the two units.

The database includes the verified zoning authority status of more than 90% of zoning jurisdictions in each state. Zoning authority for each locality was classified by searching public records and websites, contacting local municipalities, utilizing county-level master plans, and collecting input from experts in the field. Classifications are as follows: county-level, township/village/city-level, unzoned (where there is no zoning for any type of development – energy or otherwise), no data, or other. “Other” represents a variety of arrangements across states. Examples include joint zoning jurisdictions (e.g., Michigan), cases in which no zoning exists but there is a renewable energy ordinance in place (e.g., Illinois), or situations where both the county and the township are authorized to zone for renewables and the stricter ordinance applies (e.g., Minnesota).

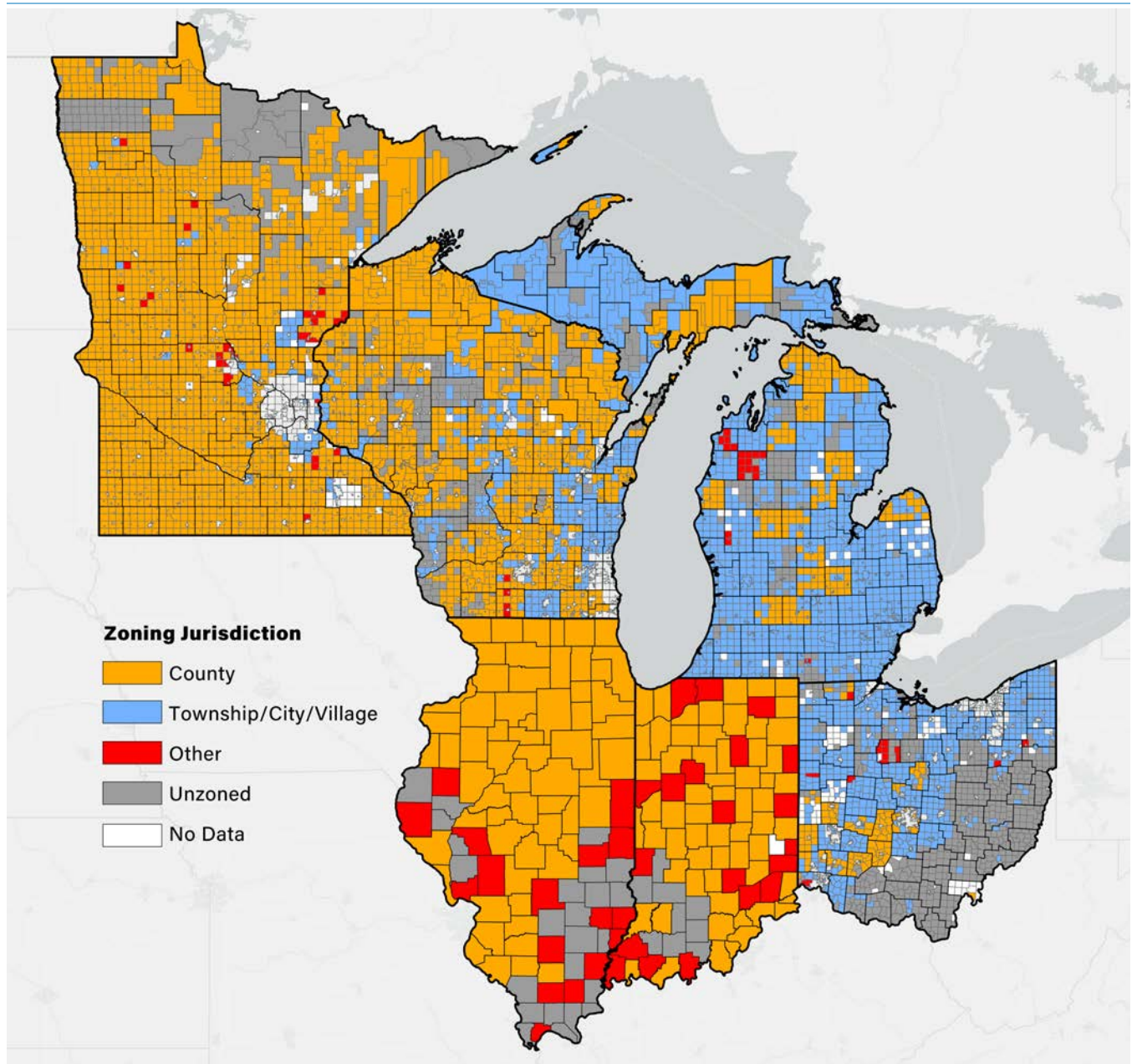
In total, of the 5,862 rural jurisdictions across the six states, the database found 2,165 individual zoning ordinances as of 04/19/2024. In several cases, a county zoning ordinance covers multiple townships, accounting for most of the difference between the number of jurisdictions and the number of ordinances. Zoning ordinances were captured whether or not they mention principal-use solar.

Table 1 summarizes the prevalence of different types of zoning authority for all rural jurisdictions in the six Great Lakes states studied, as well as the number of individual zoning ordinances collected. **Map 1** shows the spatial extent and distribution of studied jurisdiction types, the different types of zoning authority, and the unzoned jurisdictions in the region.

Table 1: Summary of Jurisdictions, Zoning Authority Types, and Individual Ordinances Studied

State	Total # of rural jurisdictions studied	Jurisdictions zoned by county		Jurisdictions zoned by township/city/village		Jurisdiction with "other" zoning jurisdiction		Unzoned jurisdictions		No Data		Individual zoning ordinances collected
		#	%	#	%	#	%	#	%	#	%	
Illinois	102 counties	61	59.8%	0	0%	17	16.7%	24	23.5%	0	0%	78
Indiana	92 counties	62	67.4%	0	0%	20	21.7%	9	9.8%	1	1.1%	82
Michigan	1,240 townships	210	16.9%	853	68.8%	19	1.5%	130	10.5%	28	2.3%	997
Minnesota	1,861 townships	1,636	87.9%	67	3.6%	28	1.5%	104	5.6%	26	1.4%	160
Ohio	1,321 townships	101	7.6%	624	47.2%	15	1.1%	515	39.0%	66	5.0%	566
Wisconsin	1,246 townships	771	61.9%	259	20.8%	4	0.3%	205	16.5%	7	0.6%	282
Region	5,862	2,841	48.5%	1,803	30.8%	103	1.8%	987	16.8%	128	2.2%	2,165

Map 1: Zoning Jurisdictions in the Great Lakes Region



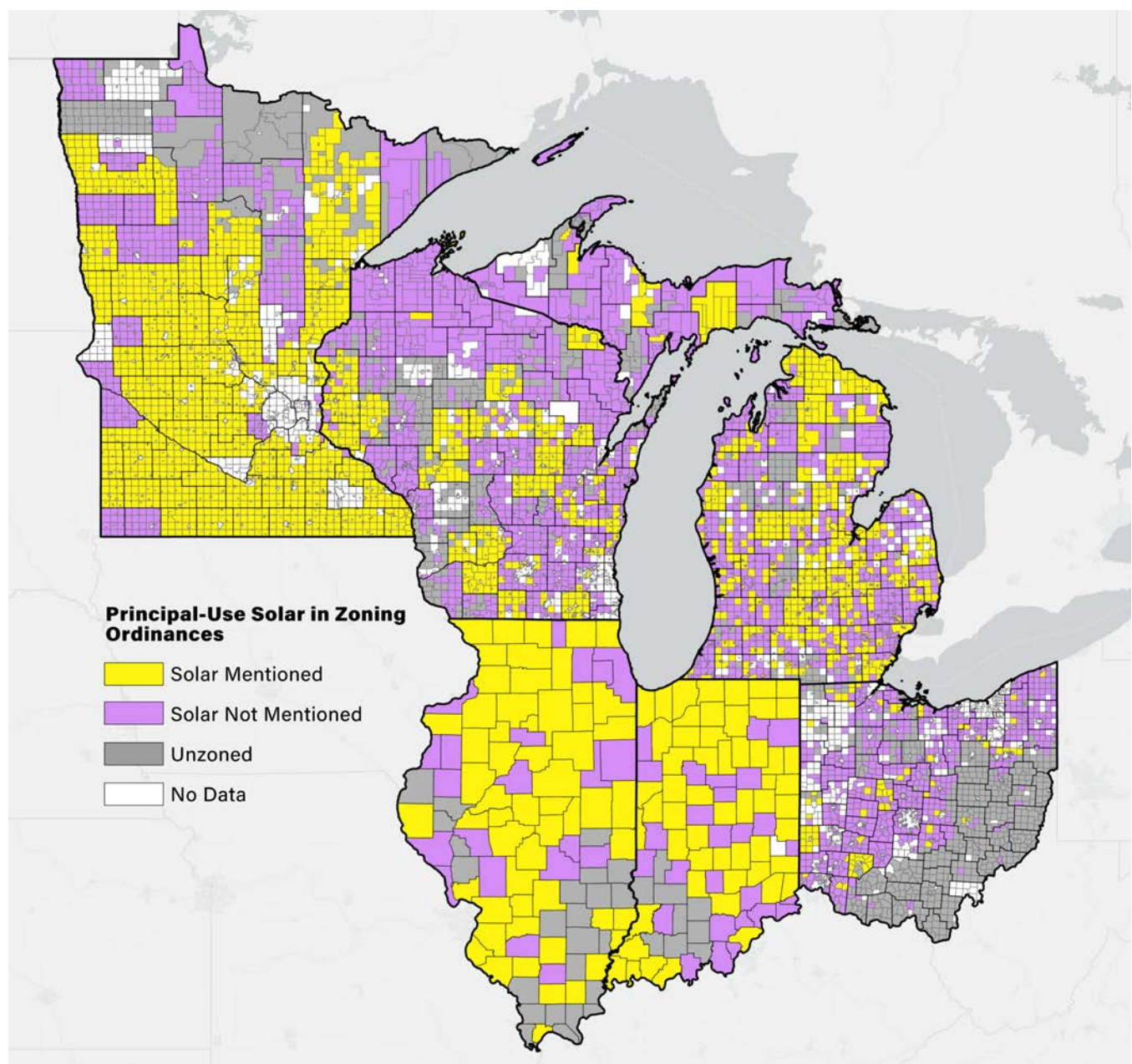
Analysis: Zoning Ordinances That Regulate Principal-Use Solar

The 2,165 zoning ordinances collected were searched for common keywords associated with principal-use solar energy systems and analyzed for the regulations that apply to that land use. Only 633 of the ordinances regulate principal-use solar. The remaining 1,532 ordinances are silent on this land use.

In each of these states, zoning is set up “permissively,” which means that a land use is typically not allowed unless it is expressly permitted in the zoning. So while silence on the topic of principal-use solar in zoning ordinances is not a conscious ban on solar in a community, it does lead to uncertainty around regulation and permitting for both community members and solar developers. This ambiguity often causes delays and presents a risk to solar developers looking to site projects in communities that seek them.

Map 2 illustrates where principal-use solar is and is not mentioned in the zoning ordinances.

Map 2: Zoning Jurisdictions Regulating Principal-Use Solar

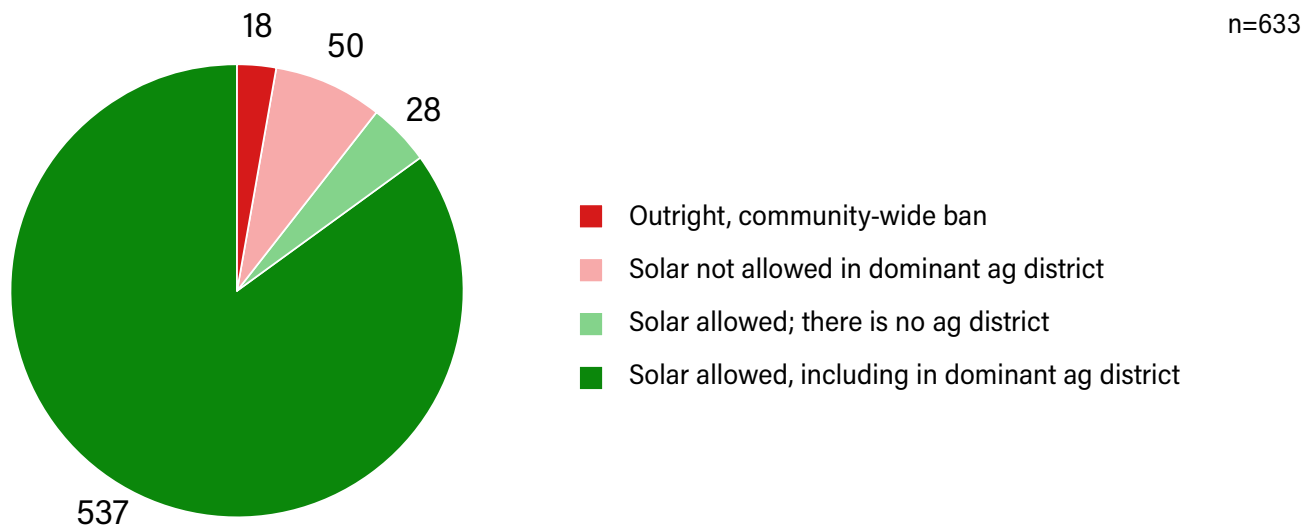


Principal-Use Solar in the Dominant Agricultural District

Of the 633 ordinances that regulate principal-use solar, 18 explicitly ban principal-use solar in the jurisdiction. Of the remaining ordinances, 50 do not allow principal-use solar in the dominant agricultural or farming district. Since agriculture is the dominant land use in many Midwestern rural jurisdictions and affords the most land available for solar development, this may amount to a virtual ban on large-scale solar farms.

Figure 1 illustrates the share of the 633 solar ordinances that either constitute outright bans or do not permit solar in the dominant agricultural district (see red colors), contrasting them with the 565 ordinances that either do allow principal-use solar in the dominant agricultural district or allow solar and do not have any agriculture or farming-specific districts (see green colors).

Figure 1: Zoning Ordinances That Permit or Prohibit Principal-Use Solar in Agricultural Districts

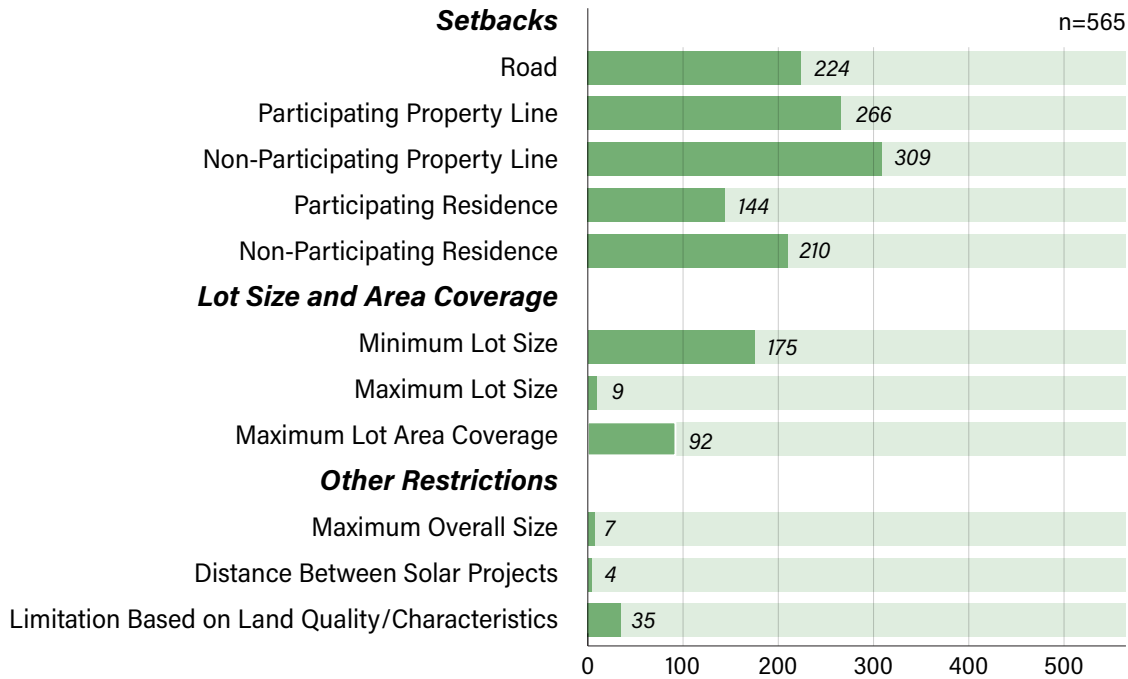


Common Regulations in Principal-Use Solar Ordinances

For the 565 ordinances where principal-use solar is allowed in the dominant agricultural district (where there is one), the database captures some of the regulations that are most consequential to solar development. These include setbacks, lot size and area requirements, and qualitative regulations that directly impact development, such as maximum development size caps, required spacing between projects, and restrictions based on land characteristics.

Figure 2 summarizes how commonly these appear within the local zoning ordinances, demonstrating that very rarely do ordinances include each of these solar-specific regulations. Note that only regulations that are exclusively applicable to principal-use solar energy systems have been included. For example, where a zoning jurisdiction applies setback restrictions of the underlying zoning districts to solar projects, too, these are not included because they apply to all land uses, not just solar development.

Figure 2: Prevalence of Solar-Specific Zoning Regulations in the 565 Principal-Use Solar Ordinances



Setbacks

The most common regulation applied to principal-use solar facilities is a setback. Typically, ordinances regulate only a couple types of setbacks, not all five that are included in the database (i.e., road, participating property line, non-participating property line, participating residence, non-participating residence).

Non-participating property line setback regulations are the most common type, found in 309 ordinances (more than half). Residence setbacks are less common, though 210 ordinances (more than a third of all solar ordinances) do include solar-specific setbacks for non-participating residences.

Table 2 details the most commonly stipulated setback distances, as well as the averages and ranges (minimum and maximum value) for each type of setback within the database.

Table 2: Analysis of Setbacks: Common Setback Distances in Solar Ordinances

Type of Setback	Most common (in feet)	Average (in feet)	Range (in feet)
Road (n=224)	100	112	10 - 2,640
Participating Property Line (n=266)	50	52	0 - 500
Non-Participating Property Line (n=309)	50	77	5 - 500
Participating Residence (n=144)	0	123	0 - 1,320
Non-Participating Residence (n=210)	200	268	40 - 2,500

Table 2 demonstrates that setbacks from residences tend to be larger than from property lines, which is consistent with the intent to afford existing residences more buffer than vacant parcels. It also demonstrates that zoning authorities tend to apply larger setbacks to non-participating properties than to participating properties, which similarly is consistent with the intent to provide non-participants, who do not have a contractual relationship with the solar developer, more protections than participants who may be able to negotiate setbacks for themselves within their solar lease.

However, the database finds that it is quite common for zoning ordinances to mention a property line setback but not to distinguish whether it applies to participating or non-participating property lines. To be conservative, the database applies that setback to both. This is why, for example, 50 feet is the most common setback for both participating and non-participating property lines in Table 2. Waiving the setbacks for property lines shared by two or more participating lots is generally regarded as [best practice](#) to avoid large, unproductive gaps in a contiguous project and minimize the project's required acreage.

Lot Size and Lot Area Coverage

Minimum lot size standards are relatively common in solar ordinances, appearing in 175 of the pertinent ordinances. The standard can range from zero to 500 acres, but most ordinances set the standard at five acres. Only nine ordinances restrict maximum lot size.

Of the 92 ordinances that mention lot area coverage specific to principal-use solar energy systems, the majority (51) explicitly exempt principal-use solar energy systems from lot area coverage restrictions. The remaining 41 ordinances that stipulate substantive restrictions limit lot area coverage to anywhere from 5% to 80%. However, whether this poses a significant barrier to solar development largely hinges on how lot area coverage is defined. Some include only concrete foundations in lot area coverage, while others include the entire area within the solar project's fence. Many, though, omit a methodology to calculate lot area coverage, leading to uncertainties.

Other Common Regulations in Principal-Use Solar Ordinances

In addition to setbacks, lot size, and area coverage requirements, ordinances may include other restrictions. Regulations on maximum project size and minimum distance between projects can all significantly affect solar development but are relatively rare within the database, appearing in just seven and four ordinances, respectively.

The database also captures qualitative standards related to land characteristics, which are present in 35 ordinances. These standards vary in which land characteristics they are designed to protect. For example, 15 jurisdictions prohibit or discourage development on land classified as prime farmland or enrolled in land preservation programs. In 14 jurisdictions, there are prohibitions on principal-use solar projects in certain proximity to highways, wildlife preserves, water bodies, or neighboring village boundaries. Likewise, two jurisdictions only allow solar development near existing or planned electrical substations.

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The views expressed herein do not necessarily represent the views of the Michigan Department of Environment, Great Lakes, and Energy, or the U.S. Department of Energy, or the United States Government.

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