Planning and Zoning Best Practices for Solar Energy

SolSmart Program
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Agenda

Solar and communities

Planning best practices
  • Solar resources and markets
  • Solar as a land use

Zoning best practices
  • Distributed or accessory use solar
  • Large-scale and primary use solar
Our Mission - Accelerate the transition to net-zero carbon emissions for the benefit of people, the economy, and the environment.
If you remember one thing . . .

Every community is a host community in the clean energy future.

- Renewable energy is an economically valuable local resource in every community in United States
- Energy resource development should align with the community comprehensive or master plan
- Ordinances should enable reasonable development that also captures benefits and minimizes risks to the host community.
Principles for Solar Ready Communities

1. **Comprehensive Plans** that describe solar resources and encourage development

2. **Development Regulations** that explicitly address solar development in its varied forms

3. **Permitting Processes** that are predictable, transparent, and documented

4. **Public Sector Investment** in the community’s solar resources

5. **Local Programs** to limit market barriers and enable private sector solar development
Principles for Solar-Ready Planning

- Identify and define solar resources,
- Acknowledge solar development benefits and desired co-benefits,
- Identify solar development opportunities and conflicts in the community,
- Set solar development targets or goals.
Every Community, a Host Community

Lafayette, CO (SolSmart Gold)

• Rooftop reserves are approximately 99.2 MW of generating capacity
• Potential of 133 GWh of electricity
• Equivalent to 68% of community annual electric use

Annual electricity consumed – 194.7 GWh (2015 GHG Emissions Report)

Source: Project Sunroof data explorer (August 2019).
The Metropolitan Land Planning Act requires that all local comprehensive plans contain “an element for the protection and development of access to direct sunlight for solar energy systems.” With new data, our ability to measure solar as a natural resource has greatly improved.
Solar Energy Resources and Local Benefits

Minneapolis/Saint Paul Metropolitan Council (SolSmart Gold)

Four (4) minimum requirements for 2040 comprehensive plan updates.

1. Include your community’s Minnesota Solar Suitability Analysis Map.
2. Include calculations of your community’s gross solar and rooftop solar resource.
3. Include a policy or policies relating to the development of access to direct sunlight for solar energy systems.
4. Include a strategy or strategies needed to implement the policy or policies.
Identify Development Opportunities, Conflicts

Large-Scale Solar Development Guidance

“The following questions may help process leaders and facilitators begin to draw out the most significant issues for stakeholders in their community (Bacher, Nolon, and Zezula 2015):

• How might large-scale solar development benefit you, your organization, or the community?
• What are your biggest concerns about large-scale solar development?
• What are some strategies for overcoming these concerns?
• What other land uses may wish to locate on sites that could host large-scale solar facilities?
• How do the potential land-use impacts of those other uses compare to large-scale solar development?”

Principles for Solar-Ready Zoning

- Explicitly recognize and address the different forms/uses of solar development,
- Create by-right installation opportunities,
- Set clear and predictable standards that balance solar resources and development with other resources and land uses,
- Enable capture of desired local co-benefits,
- Maintain consistency with regional best practices.
Accessory Use Solar
(Rooftop and Ground-mount)
# Zoning best practices for distributed-scale solar

<table>
<thead>
<tr>
<th>Define terms</th>
<th>Include storage and solar hot water heating installations in the definition of “solar,” differentiate systems by area and rooftop versus ground-mounted</th>
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<tbody>
<tr>
<td>By-right accessory use</td>
<td>Allow small rooftop and ground-mounted PV in all major zoning districts</td>
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<tr>
<td>Height</td>
<td>Allow rooftop solar an exemption from or allowance above building height restrictions</td>
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<tr>
<td>Accessory uses</td>
<td>Exempt solar from counting toward accessory uses maximum</td>
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</table>
| Aesthetic requirements| • Exempt solar from rooftop equipment screening requirements  
                        • Allow PV installations to be seen from public roadways  
                        • Limit screening or aesthetic requirements to historic districts                                                                   |
| Ground-mounted        | • Include small ground-mounted systems as accessory structures  
                        • Require conditional use permit for principal use, ground-mounted systems                                                          |
| Lot coverage          | Exempt ground-mounted solar from lot coverage restrictions that apply to buildings                                                          |
| Setbacks              | Avoid applying principal building setbacks                                                                                                |
| Roof coverage         | Address fire code setback requirements in coordination with fire officials                                                                  |
| Glare                 | Glare studies not needed unless solar is on or adjacent to airport, in which case it will be regulated by FAA, not the local jurisdiction          |
| Regulate based on impact/area | • Not capacity (kW) as efficiencies and technologies change over time  
                                      • Not where energy is used (e.g. on-site) as it has no bearing on the impact                                                          |
**Best practice**: Exempt roof-mounted solar energy systems on flat roofs, similar to other function devices and equipment, from height calculations or allow systems to exceed the maximum height by a fixed amount (5 to 10 feet).

**Model Ordinance Example**

- For purposes for height measurement, solar energy systems other than building-integrated systems shall be given an equivalent exception to height standards as building-mounted mechanical devices or equipment.
Setbacks

**Best practice**: Allow ground-mounted solar energy systems the ability to have a modest encroachment into the setback, similar to other mechanical systems.

**Model Ordinance Example**
- Ground-mounted solar energy systems may not extend into the side-yard or rear setback when oriented at minimum design tilt, except as otherwise allowed for building mechanical systems.
Lot coverage, impervious surface

**Best practice**: Exempt ground-mounted systems from lot coverage/impervious surface calculations as long as the ground beneath the system is pervious (e.g. vegetated).

**Model Ordinance Example**
1. Ground-mounted systems shall be exempt from lot coverage or impervious surface standards if the soil under the collector is maintained in vegetation and not compacted.
2. Ground-mounted systems shall not count toward accessory structure limitations.
3. Solar carports in non-residential districts are exempt from lot coverage limitations.
**Aesthetics**

**Best Practice**: Exempt solar from rooftop equipment screening requirements, limit screening or aesthetic requirements to historic districts

**Model Ordinance Example**

- Solar energy systems in residential districts shall be designed to minimize visual impacts from the public right-of-way. . . . to the extent that doing so does not affect the cost or efficacy of the system.

- Roof-mounted systems on flat roofs that are visible from the nearest edge of the front right-of-way shall not be more than five feet above the finished roof and are exempt from any rooftop equipment or mechanical system screening.
Zoning best practices for large-scale solar

| Define Terms | • Define large-scale solar as a unique land use (not an industrial land use),  
|              | • Include storage in the definition of large-scale solar  
|              | • Distinguish between small and large systems by area as needed |
| Enable Development | Most large-scale solar will be a conditional or interim use in those districts where allowed, although small or community scale development can be a permitted use |
| Land Use, not Energy Use | Performance or design standards should focus on land use impacts and benefits, not on energy use or performance |
| Recognize land use differences | • Exempt PV panels from coverage limits  
| | • Exempt PV panels from impervious surface standards if ground cover is suitably pervious (see co-benefits below) |
| Capture Co-Benefits | • Enable habitat-friendly ground cover to be installed, established, and maintained  
| | • Enable co-location of agricultural uses (sometimes in place of ground cover)  
| | • Enable water quality (surface and ground water) improvements |
| Screening requirements | • Look to existing screening requirements as a guide, consistency across land uses  
| | • Limit screening to residential districts or existing uses  
| | • Balance screening against larger setbacks, both are not necessary |
| Setbacks | • Look to existing setback distances as a guide  
| | • Balance setbacks with screening requirements (more screening, less setback)  
| | • Measure setbacks from array edge |
| Glare | Glare studies only needed if adjacent to an airport. On-airport solar will be appropriately regulated by FAA |
Siting (where does it go?)

**Community-Scale Solar**
- Define by size (not MW)
- Permitted by-right where not in conflict with protected areas or through a conditional use permit in other non-residential districts

**Large-Scale Solar**
- Everything larger than community-scale
- Permitted through a conditional use permit
- Avoid conflicts with priority natural/economic resources, encourage where co-benefits are greatest
Siting (where does it go?)

**Community-Scale Solar**
- No conflict with agricultural economic base
- Easier to site on low-impact areas and difficult-to-use parcels
- Easier to interconnect to grid (distribution scale)

**Large-Scale Solar**
- Prioritize low-density areas near transmission grid (existing or planned)
- Consider low-impact sites based on community priorities (similar to other types of development)
- Encourage development on sites with high co-benefit opportunities
Site Design (how is it built?)

- Setbacks
- Screening
- Ground cover and buffer areas
- Power and communication lines, fencing, buffers
- Agrivoltaics
Setbacks

• Property line
• Roadways
• Specific land uses, such as non-participating dwelling units
• Other features such as natural areas, commercial uses, recreation areas.
Setbacks

Model Ordinance Example Language (Minnesota)

- Property line setback from a non-participating landowner’s property line must meet the established setback for buildings or structures in the district in which the system is located, except as otherwise determined in 1.a.5 below.
- Roadway setback of 50 feet from the ROW of State highways and County and State Aid Highways (CSAHs), and 40 feet for other roads, except as otherwise determined in 1.a.5 below.
- Housing unit setback of 150 feet from any existing dwelling unit of a non-participating landowner, except as otherwise determined in 1.a.5 below.
- Setback distance should be measured from the edge of the solar energy system array, excluding security fencing, screening, or berm.
- All setbacks can be reduced by 50%, except that unwaived setbacks cannot be less than 30 feet, if the array has a landscape buffer that screens the array at the setback point of measurement.

Appropriate Setbacks

- The community should consider balancing set-back requirements and screening requirements for principal use solar. Since the primary impact to neighbors of large-scale solar is visual, screening becomes less useful, as the setbacks get larger (and vice versa) . . .
- Excessive setbacks that are unique to solar land uses, or that are designed for land uses with health and safety or significant nuisance risks such as industrial uses or animal agriculture, are unjustified given the low level of risk or nuisance posed by the solar array.
Screening

- Use existing screening standards as your benchmark
- Consider the screening circumstances
- What is the relationship between screening and setbacks?
- Avoid arbitrary standards
Screening

Model Ordinance (Minnesota)

- A landscape plan shall be submitted that identifies the type and extent of proposed buffer and screening. Vegetation or another type of buffer can be proposed.
- Screening shall be consistent with Model Community’s screening ordinance or standards typically applied for other land uses requiring screening.
- Screening shall not be required along highways or roadways, except as provided in 4. below, or along property lines within the same zoning district, except where the adjoining lot has an existing residential.
- Model Community may require screening where it determines there is a clear community interest in maintaining a viewshed.

Screening

The community should consider limiting screening of community- or large-scale solar to where there is a visual impact from an existing use, such as adjacent residential districts or uses. Screening standards should be consistent for solar with other land uses that have screening requirements. Solar energy systems may not need to be screened from adjacent lots if those lots are in agricultural use, are non-residential, or have low-intensity commercial use.
Ground Cover

- Visual impacts
- Water quality (surface and groundwater)
- Soil health
- Habitat
- Carbon sequestration
Ground Cover (Illinois model solar ordinance)

1. Large-scale removal of mature trees on the site is discouraged.

2. The project design shall include the installation and establishment of ground cover meeting the pollinator-friendly standard consistent with 525 ILCS 55/1 “Pollinator-Friendly Solar Site Act”.

3. The applicant shall submit a vegetation management plan adhering to guidance set forth by the Department of Natural Resources.

4. Pollinator-friendly standards shall be maintained on the site for the duration of site operation, until the site is decommissioned.

5. The applicant shall submit a financial guarantee equal to (125) percent of the costs to meet the pollinator-friendly standard. The financial guarantee shall remain in effect until vegetation is fully established.
Agriculture

- **Interim use** - For solar facilities located primarily on prime soils, use interim use or time-limited CUP that allows the site to be returned to agriculture.

- **Soil health** - Require construction methods and maintenance practices that protect or enhance soil health on site in the permit.

- **Agrivoltaics** - Encourage or require commercial solar facilities that include co-location of agricultural uses (agrivoltaics) on the project site.

- **Co-benefits** - Encourage commercial solar facilities to be located on wellhead protection areas for the purpose of removing agricultural uses from high-risk recharge areas.

- **Mitigation** - Encourage use of agricultural conservation easements to mitigate loss of production on the project site.
Inventory of Zoning Standards

NREL developed and made available two data sets: one including nearly 2,000 U.S. wind energy zoning ordinances and another including nearly 1,000 solar energy ordinances at the state, county, township, and city levels. Both are formatted as downloadable spreadsheets and accompanied by interactive maps, illustrating the wind and solar energy zoning ordinance data by location and ordinance type.

Great Lakes Solar Zoning

**Zoning Jurisdiction** - Zoning authority for each locality was evaluated by searching public records, contacting municipalities, utilizing county level master plans and collecting input from experts in the field...

**Zoning Ordinance Collection** - For each locality with zoning jurisdiction, efforts were made to collect the official, current zoning ordinance. A copy of the zoning ordinance we collected can be accessed on the ‘Data’ or ‘Maps’ pages...

**Zoning Ordinance Analysis** - Each instance of solar or wind was analyzed for its relevance to renewable energy siting...

[https://energyzoning.org/](https://energyzoning.org/)
Colorado County Solar Zoning

- Solar Definitions
- Solar Siting Policy Documentation and Solar Deployment
- Categorization of PV Systems
- 1041 Permitting (Areas and Activities of State Interest)
- Solar on Agricultural Land
- Panel Height Restrictions
- Fencing Requirements
- Vegetation Management
- Visual Impacts
- Decommissioning Plans
- Financial Assurance for Decommissioning
Summary of Findings

- In 27 states the level of government with principal authority for renewable energy siting and permitting depends on project size.

- Published guidance is available in many states. These guides typically summarize the siting process, involved parties, and relevant policies, are often published by a state agency, but can sometimes be the product of nonprofits or working groups serving a state or region.

- Model ordinances are available in many states. Because local governments have a key role in setting siting rules in most states, some have developed model ordinances for local authorities to use as guides.

- Local authorities typically control siting standards. Solar or wind projects must meet standards to manage land use and regulate their development and construction. Our research finds that 37 states give local authorities the jurisdiction to set siting standards.
Thank you!