

# MAKING COMMUNITIES “SOLAR READY”

THE GROW SOLAR PARTNERSHIP  
MIDWEST RENEWABLE ENERGY FAIR 2016



**Brian Ross, AICP, LEED GA**  
Senior Program Director



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# Our Mission . . .

Transforming the way we produce, distribute and consume energy to be both economically and environmentally sustainable.



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# Achieving our Mission by:

1. Developing better energy policy via consensus decision-making.
2. Working with communities to identify and implement local and regional sustainability priorities.
3. Providing local, state, and federal policy-makers with reliable analysis & decision tools.



# Sustainable Communities

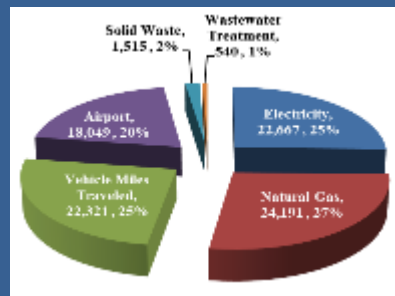
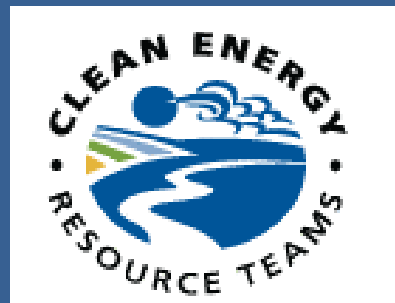
*Transforming the world through community action*

1. Grow Solar Partnership

2. GreenStep Cities

3. Metro Clean Energy Resource Team (CERT)

4. Sustainability Planning and Technical Assistance



# Conclusions

- 1. Solar energy development is local development.** Local government policies and regulations determine how, and whether, local solar resources are used



*Photo credit: U.S. DOE SunShot*



*Photo credit: CR Planning*

# Conclusions

1. Local governments are a key partner to creating and sustaining a clean energy future.



*Photo credit: Meet Minneapolis*

# What are Energy “Reserves”?

- ✓ **Proved oil and gas reserves** - those quantities of oil and gas, which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be economically producible—from a given date forward, from known reservoirs, and under existing economic conditions, operating methods, and government regulations.

(SEC definition of proved reserves)



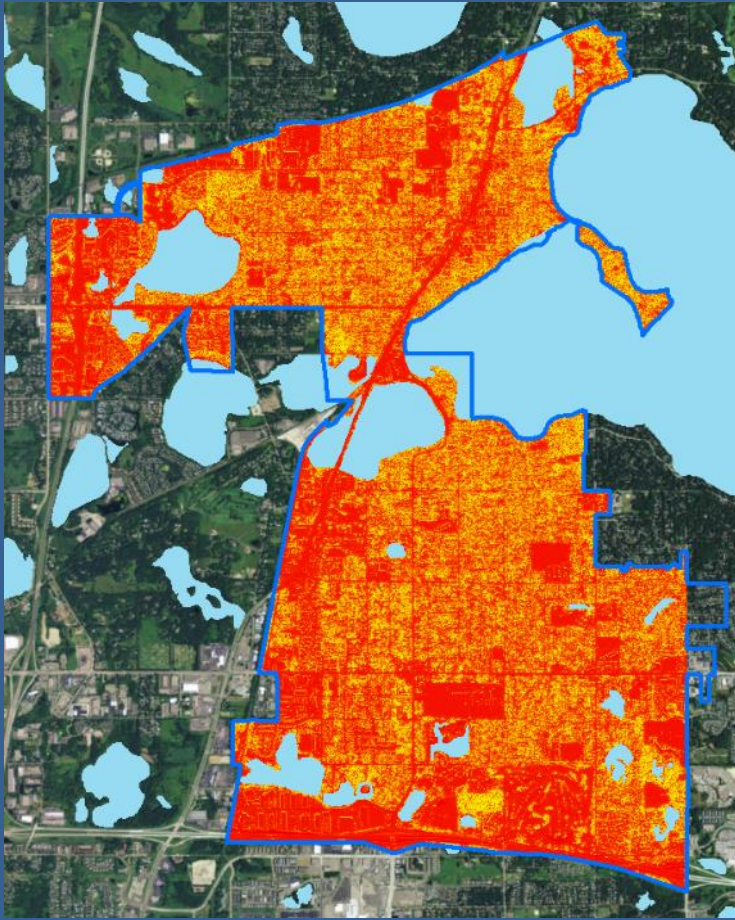
# What are Energy “Reserves”?

- ✓ **Proved solar reserves** - those quantities of solar energy, which, by analysis of atmospheric and land cover data, can be estimated with reasonable certainty to be economically producible—from a given date forward, from known access to direct sunlight, and under existing economic conditions, operating methods, and government regulations.





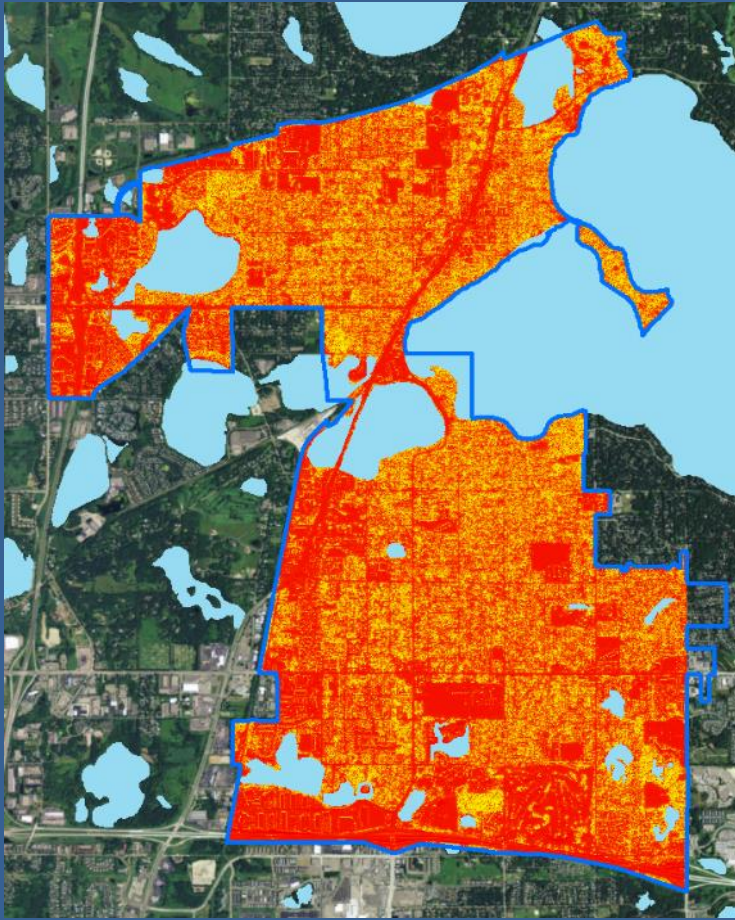
# City of White Bear Lake



Gross “reserves” sum up the total watt hours of sunlight hitting the land surface, and converts that total into a hypothetical electric production using current technologies.



# City of White Bear Lake

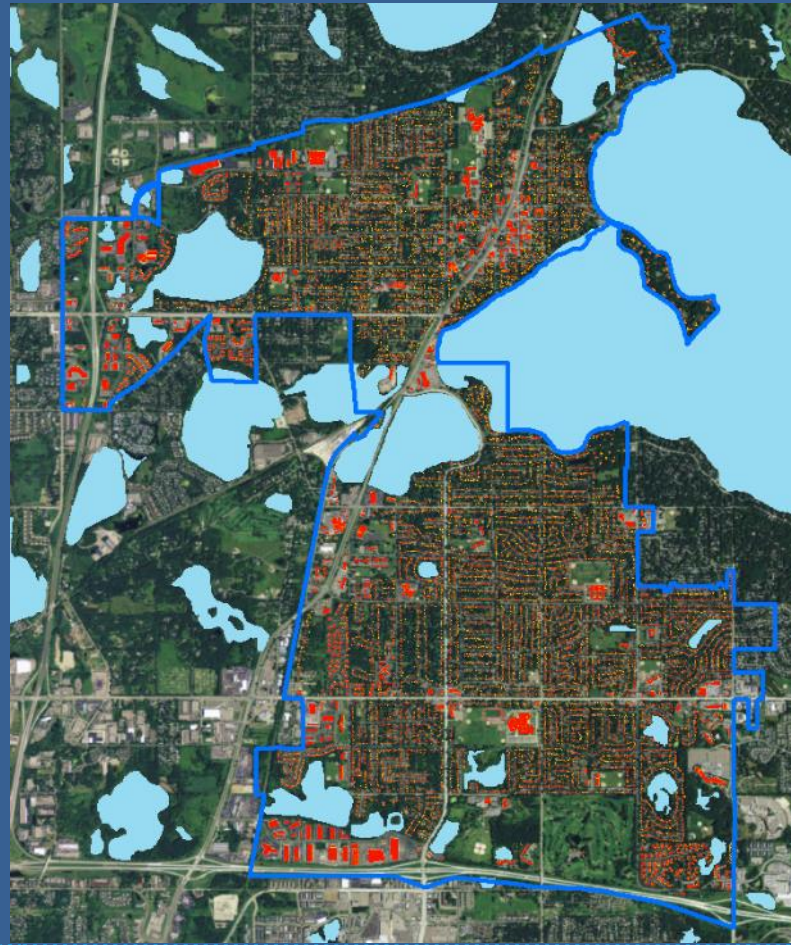


Gross “reserves” total over 1,182 GWh of electricity, equaling about 910 MW of generating capacity. This is about six times the amount of electricity used in White Bear Lake annually.



# Rooftop Solar Reserve

The rooftop “reserves” look at the solar resource that falls on building roofs, a location that generally does not have land use conflicts.



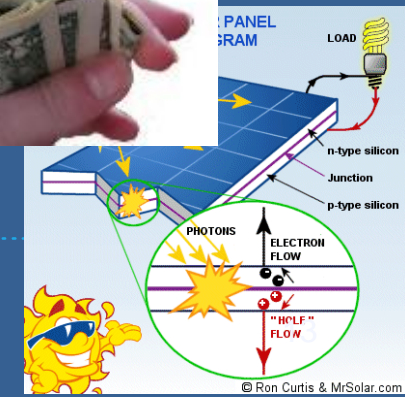
# Rooftop Solar Reserve

White Bear Lake's rooftop "reserves" total over 147 GWh of electricity, equaling about 113 MW of generating capacity. This is about 76% of the amount of electricity used in White Bear Lake annually.



# Five Principles for Solar Ready Communities...

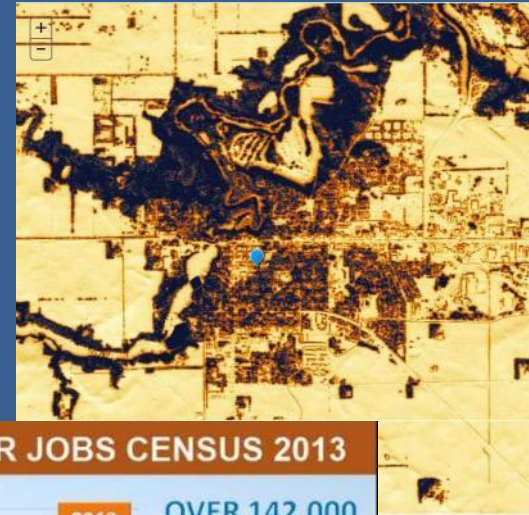
- 1. Comprehensive Plans** that describe solar resources and encourage development
- 2. Development Regulations** that explicitly address solar development in its varied forms
- 3. Permitting Processes** that are predictable, transparent, and documented
- 4. Public Sector Investment** in the community's solar resources
- 5. Local Programs** to limit market barriers and enable private sector solar development



# Solar Ready Communities

## A. Comprehensive Plans that:

- ✓ Identify and define solar resources,
- ✓ acknowledge solar development benefits, co-benefits, and development opportunities and conflicts in the community.



# Solar Ready Communities

## B. Development Regulations that:

- ✓ explicitly address solar development in its varied forms,
- ✓ creates as-of-right installation opportunities, and
- ✓ set clear and predictable standards for balancing solar resources with other resources and capturing co-benefits.

### Iowa Local Government Solar Toolkit

**IV. Permitted Accessory Use** - Active solar energy systems shall be allowed as an accessory use in all zoning classifications where structures of any sort are allowed, subject to certain requirements as set forth below. Active solar energy systems that do not meet the visibility standards in C. below will require a conditional use permit, except as provided in Section V. (Conditional Accessory Uses).

**A. Height** - Active solar energy systems must meet the following height requirements:

1. Building- or roof- mounted solar energy systems shall not exceed the maximum allowed height in any zoning district. 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.
2. Ground- or pole-mounted solar energy systems shall not exceed 20 feet in height when oriented at maximum tilt.

**B. Set-back** - Active solar energy systems must meet the accessory structure setback for the zoning district and primary land use associated with the lot on which the system is located.

1. **Roof- or Building-mounted Solar Energy Systems** - In addition to the building setback, the collector surface and mounting devices for roof-mounted solar energy systems shall not extend beyond the exterior perimeter of the building on which the system is mounted or built, unless the collector and mounting system has been explicitly engineered to safely extend beyond the edge, and setback standards are not violated. Exterior piping for solar hot water systems shall be allowed to extend beyond the perimeter of the building on a side yard exposure. Solar collectors mounted on the sides of buildings and serving as awnings are considered to be building-integrated systems and are regulated as awnings.
2. **Ground-mounted Solar Energy Systems** - 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.

**C. Visibility** - Active solar energy systems shall be designed to blend into the architecture of the building or be screened from routine view from public right-of-ways other than alleys. The color of the solar collector is not required to be consistent with other roofing materials.

#### Height - Rooftop System

*This ordinance notes exceptions to the height standard when other exceptions are granted in the ordinance. Communities should directly reference the exception language, rather than use the placeholder language here.*

#### Height - Ground or Pole Mounted

*This ordinance sets a 20-foot height limit, assuming a standard that is higher than typical height limits for accessory structures, but lower than the principal structure. An alternative is to balance height with setback, allowing taller systems if set back farther, for instance, an extra foot of height for every additional two feet of setback. In rural (or large lot) areas solar resources are unlikely to be constrained by trees or buildings on adjacent lots, and the lot is likely to have adequate solar resource for a lower (10-15 foot) ground-mount application.*

#### Building Integrated PV

*Building integrated solar energy systems can include solar energy systems built into roofing (existing technology includes both solar shingles and solar roofing tiles), into awnings, skylights, and walls. This ordinance only addresses building integrated PV, but examples of building integrated solar thermal applications may also be available.*

# Solar Ready Communities

## C. Permitting practices that:

- ✓ Reduce time spent on acquiring permits and conducting inspections
- ✓ Make the permit process transparent and predictable to both staff and applicants
- ✓ Ensure the permit process reflects industry best practices
- ✓ Establish a permit fee that appropriately covers local government review and inspection costs





# Solar Ready Communities

**D. Public Sector Investment** in the community's solar resources to demonstrate viability, community commitment, technological elements.



Photo credit: Bruce Schnaak Photography, City of Saint Paul, City of Minneapolis

# Solar Ready Communities

**E. Local Programs** to remove or limit market barriers (lack of information, financing, workforce) that prevent capture of the economic, environmental, and social value of the community's solar resources.



# Grow Solar Partnership

Grow  Solar  
A Midwest Partnership to Move Markets

SEARCH



[Toolkit](#) [Technical Assistance](#) [Solar Power Hour](#) [Education](#) [Conferences](#) [News & Events](#)



Regional Sustainable  
Development Partnerships

UNIVERSITY OF MINNESOTA  
**EXTENSION**



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# Local Government Solar Toolkits

## Planning, Zoning, Permitting

IOWA

Local Government  
Solar Toolkit

PLANNING, ZONING, AND PERMITTING

Grow Solar

Local Government  
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PLANNING, ZONING, AND PERMITTING

Iowa

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Illinois

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PLANNING, ZONING, AND PERMITTING

Minnesota

Wisconsin

# Grow Solar Toolkit

1. **Summary of Statutes** that guide or enable local government actions regarding solar development
2. **Comprehensive Plan guidance** and local policy best practices
3. **Land use regulation guidance** and best practices to enable solar development
4. **Model zoning ordinance**
5. **Permitting guidance** and best practices to reduce soft costs
6. **Model solar building permit**

## Model Solar Zoning for Minnesota Municipalities

Every Minnesota community should have zoning language that addresses solar energy systems. Solar installations are a form of development, and development regulations, including zoning and subdivision ordinances, need to incorporate the variety of development forms that solar installations can take. Moreover, incorporating solar land uses and development in the ordinances recognizes that the community's solar resources are a valuable asset with economic and environmental value that property owners will want to capture. Solar development regulation can help educate staff and community, as well as alleviate potential conflicts or confusion.

Minnesota state statutes leave most solar development regulation to local governments; the State does not pre-empt or guide solar development except for enabling local governments to take certain options. Most importantly, Minnesota law leaves to local governments the challenge of defining solar "rights," including when property owners have an as-of-right solar development opportunity, when solar rights trump or are trumped by other property rights, and how or whether to protect solar installations from trees or buildings on adjacent properties.

Development regulations that are "solar ready" will have the following characteristics:

- Address all the types of solar land uses that the community is likely to see
- Result in an as-of-right solar installation opportunity for at least accessory use solar and where possible for principal use solar development
- Balance between solar resources and other valuable local resources (trees, soils, historic resources) in the development process

All zoning ordinances include certain basic elements that can, if not considered in the context of solar resources and technologies, create inadvertent barriers to solar development. Basic zoning elements include:

1. **Use.** Which land uses are permitted, which are conditional, which are prohibited in each zoning district? Should the community allow solar farms in industrial districts, or ground-mount accessory solar in the backyards of residential districts?
2. **Dimensional Standards.** What is the minimum or maximum size of building lot, and where on the lot can development be placed? If the solar resource is only viable in the front yard, or only available above the peak of the roof because of the neighbor's trees, should the community allow solar development in those locations? Most communities allow some exceptions to height and setback requirements – does solar meet the same standard to qualify for an exception?
3. **Coverage and Bulk.** How much of the property can be developed consistent with the preferred development pattern for that zoning district? Should solar panels in the backyard count as an accessory structure if the community limits the number of accessory buildings in residential neighborhoods? Does the surface of a solar collector count as impervious surface for storm water standards?



Minneapolis Solar Resource Website

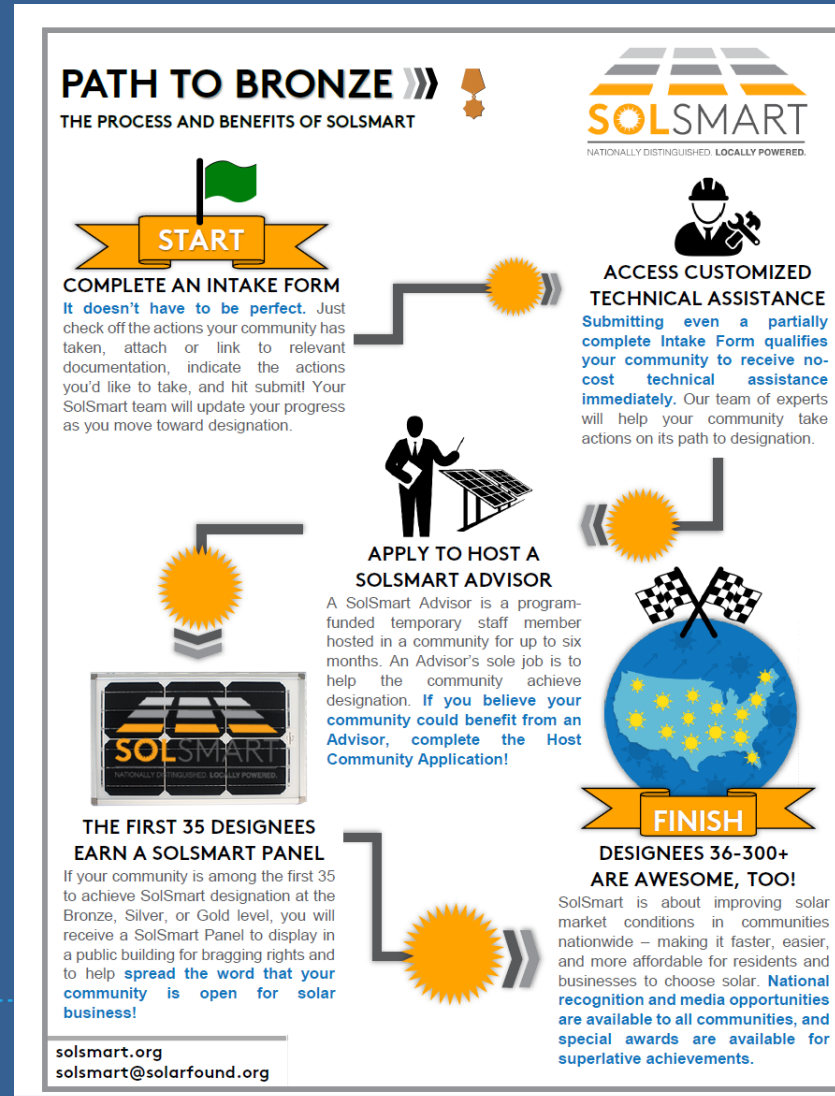


Photo Credit: Great Plains Institute

# SolSmart

## Certifying Solar Ready Communities


- ✓ National Department of Energy (DOE) Certification program for “solar ready” cities and counties.
- ✓ Technical assistance available from the Solar Foundation for entering the program.
- ✓ Opportunity to apply for a full time solar “advisor” staff person for your community or organization for up to six months.



# SolSmart

## Certifying Solar Ready Communities

- ✓ Three levels of certification: Gold, Silver and Bronze
- ✓ Looking to certify 300 communities across the nation over the next 3 years
- ✓ Best practices follow the Grow Solar program and the Local Government Solar Toolkit.
- ✓ Search for “SolSmart” . . .



### PATH TO BRONZE

SAMPLE PATHWAYS TO SOLSMART DESIGNATION

#### STEP 1 » COMMIT AND CUT CRITICAL RED TAPE VIA PREREQUISITES

PR-1	Provide a statement of your community's solar goals, including commitments to earn designation and to track key solar metrics.
P-1	Create and put your community's solar permitting checklist online.
PZD-1	Review zoning requirements and remove PV prohibition if applicable. Commit to reducing other barriers during next review.

#### STEP 2 » EARN 20 POINTS IN PERMITTING

P-4	Require no more than one application form for a residential rooftop PV project. <b>5 PTS</b>	OR	P-6	Review permitting process for efficiency improvements and reduce processing time to 10 days or fewer. <b>10 PTS</b>
P-5	Review solar permit fees for residential and commercial solar. <b>5 PTS</b>		P-8	Train permitting staff on best practices for permitting solar PV and/or solar and storage systems. <b>10 PTS</b>
P-9	Train fire and safety staff on solar PV. <b>10 PTS</b>			

#### STEP 3 » EARN 20 POINTS IN PLANNING, ZONING, AND DEVELOPMENT REGULATIONS

PZD-4	Provide clear guidance for solar in historic and special-use districts. <b>10 PTS</b>	OR	PZD-2	Allow solar by-right and as an accessory use in all major zones, and implement any zoning ordinance adjustments identified through the zoning review to improve solar-friendliness. <b>20 PTS, SILVER+GOLD PREREQUISITE</b>
PZD-6	Include considerations for active and passive solar in development regulations (e.g. providing guidance for orientation of structures in subdivision regulations). <b>10 PTS</b>			




#### STEP 4 » EARN 20 TOTAL POINTS IN SPECIAL FOCUS CATEGORIES

CE-2	Create a solar landing page on local government website with goals and local resources for solar development. <b>10 PTS</b>	OR	SR-2	Provide consumer protection resources on solar. <b>5 PTS</b>
U-2	Discuss community or shared solar programs with the local utility. <b>10 PTS</b>		I-4	Make inspection requirements for PV available online. <b>10 PTS</b>
			MDF-1	Provide resources on active solar installers and/or local incentives for solar. <b>5 PTS</b>

FOR MORE INFORMATION, EMAIL [SOLSMART@SOLARFOUND.ORG](mailto:SOLSMART@SOLARFOUND.ORG) OR CALL 202-469-3743.

THE SAMPLE PATHWAYS SHOWN HERE ARE FOR DEMONSTRATION PURPOSES AND ARE NOT PRESCRIBED PATHS TO DESIGNATION. THERE ARE OVER 70 ACTIONS IN 8 CATEGORIES AND THOUSANDS OF PATHWAYS TO SOLSMART DESIGNATION.

**BLAZE YOUR OWN PATH TO BRONZE AT SOLSMART.ORG!**



An aerial photograph of a large-scale solar farm. The image shows numerous rows of solar panels, each with a grid of thin silver lines. The panels are tilted at an angle, and the perspective is from a high angle, looking down and across the rows. The sky is a clear, pale blue. In the background, some green trees are visible on the left side. A semi-transparent blue horizontal bar is overlaid across the middle of the image, containing the text.

# Local Planning for Solar Resources



# Grow Solar Toolkit

- ✓ Existing conditions,
- ✓ Desired conditions,
- ✓ Strategies for getting there

## Grow Solar Local Government Solar Toolkit

PLANNING, ZONING, AND PERMITTING

Wisconsin

### Grow Solar Solar in Comprehensive Planning

#### Purpose

Comprehensive plans are the foundational policy document reflecting a community's priorities and values regarding development and local resources. Solar energy resources are an increasingly valuable local resource—solar development can bring environmental and economic benefits to a community through clean energy production, creation of local jobs and revenue, and improved property value. Communities are acknowledging this valuable resource and incorporating support and guidance for energy development into comprehensive plans, sending a strong message of commitment for sustained growth in the solar energy sector.

Communities are not, however, always familiar with the characteristics of solar resources and solar land uses. This document outlines considerations that communities should make and identifies elements that allow for clear priorities around solar energy objectives. Identifying how solar development can benefit the community will help decision-makers determine how solar resources and investments are integrated into the community in a way that balances and protects competing development or resources.



*Geotown Solar Resource Map, Rochester, MN*

#### Considerations

When addressing solar development in a comprehensive plan, it is important to acknowledge what makes solar work for a community as well as the inherent conflicts that may arise. Any comprehensive plan that includes a solar component should:

1. Address the solar resource and the different land use forms that solar development can take
2. Acknowledge the multiple benefits of solar development
3. Guide decision-makers on optimizing opportunities when solar development might conflict with other resources or land use forms

Each of these components can help a community identify how they wish to include solar as a resource and to be able to reasonably justify why and where solar development is supported.

Additionally, in Wisconsin, [Statute 66.1001 Comprehensive Planning](#), outlines the elements that must be included in a comprehensive plan. Elements where solar goals and policies may be added include: *..... and Opportunities; Utilities and community facilities; Agricultural, natural, cultural resources; economic development; and land use.*

### Grow Solar

#### Solar Resource

The local landscape (e.g., topography, on-site obstructions, obstructions on adjacent land, potential future obstructions) defines whether or not a given site has a good solar resource. An adequate solar resource is a site that is unshaded for at least 6 hours a day, both now and into the future. Communities can map their solar resource using LIDAR data that is frequently available in urban areas, and in some states even in rural areas. Such a map can allow the community to measure the size of their "solar reserves" identify areas with good and poor resources for prioritizing development in a manner consistent with other land uses, and even distinguish between opportunities for rooftop and ground-mount solar development opportunities.

In addition to measuring and recognizing the solar resource, communities should recognize that a variety of methods exist to capture the energy and provide economic value. There are several different types of solar installations a community will want to consider: rooftop, accessory ground-mount, and principal ground-mount. A community can use the comprehensive plan to determine which of these technologies to support and/or promote.

#### Solar Benefits

Communities can realize a number of benefits through solar development, including environmental, energy production, and economic development. Environmental benefits include helping meet local air quality or climate protection goals. Communities with renewable energy or energy independence goals can better achieve these through explicit support of solar energy development. Economically, solar development creates construction jobs for a variety of trades, financially benefits those who install systems on their properties with lower energy bills, and increases the property value of buildings within the local housing market.

#### Land Use Conflicts

Like any development, solar may come into conflict with other land uses, and solar resources are often co-located with other important local resources. Recognizing these issues in the comprehensive plan can help to mitigate future problems.



*Rooftop Solar, MRZA*



*Ground Mount System, CERTS*



*Solar Farm, CERTS*

# Planning Best Practice

## Chapter 4: Plan Making

*David Morley, AICP, and Erin Musiol, AICP*

- ✓ Common Features of Local Plans
- ✓ Solar in the Comprehensive Plan
- ✓ Solar in Subarea Plans
- ✓ Solar in Functional Plans
- ✓ Summary

## Planning for Solar Energy



David Morley, AICP, Editor



American Planning Association  
Planning Advisory Service  
Report Number 575

*Making Great Communities Happen*



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An aerial photograph of a large-scale solar farm. The image shows numerous rows of solar panels, each mounted on a metal tracking system that allows them to follow the sun's path. The panels are arranged in a grid-like pattern across a vast, flat landscape. The sky is clear and blue, and the overall scene conveys a sense of clean, renewable energy production.

# **Solar Permitting Processes and Best Practices**

# Solar Ready Communities

Permitting Processes with predictable and clear submittal requirements, review timeframes, and permit fees.

**Solar America Board for Codes and Standards**

**EXPEDITED PERMIT PROCESS FOR PV SYSTEMS**  
A Standardized Process for the Review of Small-Scale PV Systems

Bill Brooks  
Brooks Engineering

**Expedited Permit Process for PV Systems**  
A Standardized Process for the Review of Small-Scale PV Systems

**Study Report Overview**

This fact sheet summarizes the findings and recommendations of a new study report from the Solar America Board for Codes and Standards (Solar ABCs), *Expedited Permit Process for PV Systems – A Standardized Process for the Review of Small-Scale PV Systems*. The permit process presented in this report was created to meet the needs of the growing, small-scale photovoltaic (PV) market in the U.S. and is applicable nationwide. It takes advantage of the many common characteristics inherent in most of the small-scale PV systems installed today to streamline both the application and award of permits.

This study report describes a process that has advantages throughout the permitting cycle. One of the process simplifies the technical requirements for PV contractors submitting the application for construction of a new PV system while also facilitating the efficient review of the application's electrical and structural content by the local jurisdiction awarding the permit.

**Key Findings**

Local jurisdictions are responsible for establishing the permitting requirements for new PV system construction and installation in their territory. While jurisdictions everywhere share most of the same challenges in ensuring the safety of new PV systems, experience with PV has led many to implement unnecessarily complex and inconsistent permitting procedures. In these cases, barriers of time and expense brought about by requiring multiple departments to review the same application severely inhibit the timely and efficient construction of new PV systems.

At the same time, the majority of residential-sized PV systems installed in the United States share many similarities of design. It is the similarity and commonality of these designs that would allow for a nationally standardized, expedited permit process for small-scale PV systems.

**Solar ABCs Recommendation**

The solution is to begin with a consistent starting point and using the nationally standardized Expedited Permit Process. Jurisdictions can be assured that they are consistent in their application of codes and standards. Contractors can also be assured that the requirements for permitting will not vary drastically among jurisdictions. Both of these assurances result in safer, cost-effective installations and accelerate PV technology use.

The term "expedited permit process" refers to an organized permitting process by which a majority of small PV systems can be permitted quickly and easily. It is not intended to apply to all types of PV systems. The primary need and use for this process is for systems of less than 10kW maximum power output. The expedited permit process is intended to simplify the structural and electrical review of a small PV system project and streamline the need for detailed engineering studies and unnecessary delays.

The majority of PV systems installed in the U.S. meet the eligibility requirements outlined in this process and will benefit from the

**CITY OF PORTLAND OREGON - BUREAU OF DEVELOPMENT SERVICES**

**LAND DIVISION**

**INFORMATIONAL GUIDE**

Solar Access Regulations, Ch 33.639

The solar access regulations encourage variation in the width of lots to maximize solar access for single dwelling detached development and minimize shade on adjacent properties.

**Do the solar access requirements apply to my site?**

The approval criteria of the solar access chapter apply to lots for single dwelling detached development created as part of a land division proposal in all zones.

**What are the solar access criteria?**

The solar access approval criteria focus on the width of individual lots. All of the following approval criteria must be met:

A. On streets that are within 30 degrees of a true east-west axis (see Figure 639-1). The narrowest lots should be:

1. Interior lots on the south side of the street (see Figure 639-2); and
2. Corner lots on the north side of the street (see Figure 639-3).

B. On streets that are within 30 degrees of a true north-south axis, the widest lots should be interior lots on the east or west side of the street (see Figure 639-4).

**Frequently asked questions**

Q What if I can't meet the solar access approval criteria?  
A Where it is not practicable to meet both the approval criteria of the solar access chapter and approval criteria of other chapters in the 2009, the regulations of the other chapters supersede the approval criteria of the solar access chapter.

Q What if I'm creating lots in a Commercial zone and will sell them to builders, so I don't know if they will be developed with detached or attached houses?  
A The Solar Access regulations will only apply to lots we know will be developed with detached housing.

Q Does this apply to land divisions that have a common green instead of a regular street?  
A Yes. A common green is defined as a street.

**Fig. 639-1. Axis within 30° of North-South and East-West**

**Fig. 639-2. Interior lots on South side of street**

**Fig. 639-3. Corner lots on North side of street**

**Fig. 639-4. Interior lots on East and West side of street**

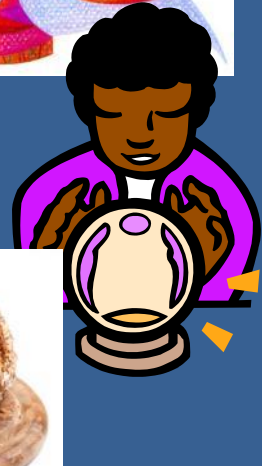
**SOLAR ACCESS REGULATIONS**  
1800 SW FOURTH AVENUE, PORTLAND, OREGON 97201 • 503-823-7526 • www.bds.ci.portland.or.us



# Solar Ready Communities

## Permitting best practice goals

- A. Reduce time spent on acquiring permits and conducting inspections
- B. Make the permit process transparent and predictable to both staff and applicants
- C. Ensure the permit process reflects industry best practices
- D. Establish a permit fee that appropriately covers local government review and inspection costs



# Permitting Best Practices

## Solar Permit Checklist – Minneapolis/St. Paul



### Permit Applicant Checklist for Residential Solar Energy Installations

Before approval and issuance of permit(s) for Solar Thermal/Photovoltaic installations, applicant shall submit the following minimum information. Required drawings shall be scaled and dimensioned, readable, and legible. Additional information may be requested for a building permit. Other permits are also required.

Building integrated solar installations, where the solar collector replaces or substitutes for a component of a building or structure such as roof, shingle, or awning, do not require completion of this checklist separately from the building permit application for the building, structure, or building modification.

1. Fully completed application for a building permit, including the following information:
  - a. Project address;
  - b. Owner's name, address, phone number;
  - c. Name, address and phone number of the person preparing the plans;
  - d. Description of proposed work, including both solar equipment installation and all associated construction;
2. Contractor's license \_\_\_\_\_
3. Name of company conducting the installation \_\_\_\_\_
4. For **electric** (photovoltaic) systems:
  - a. What is the system KW rating (DC)? \_\_\_\_\_
  - b. Is this an inter-tie or stand alone system? (Circle one)
  - c. Does the system include battery backup or an uninterrupted power supply (UPS)?  
yes \_\_\_ no \_\_\_  
If yes, give the number, size and location of the batteries.  
\_\_\_\_\_
5. For **thermal** systems:
  - a. What is the total size of the solar collectors (sq. ft.) ? \_\_\_\_\_
6. If rooftop mounted, identify the following:
  - a. Roof type-  Flat roof (nominal pitch)  Sloped (identify pitch) \_\_\_\_\_
  - b. The type of existing roofing (shingles, tile, metal, ballasted, membrane, etc).  
\_\_\_\_\_
  - c. The number of roofing layers that will be under the panels \_\_\_\_\_ (no more than 2 layers of roof shingles are allowed).
  - d. Identify the condition of the roofing material and appropriate age.  
\_\_\_\_\_  
\_\_\_\_\_

1. Identifies when the checklist is applicable
2. Collects basic information about the installation
3. Identifies required drawings and technical information to acquire a permit
4. Identifies when structural engineering review is necessary
5. Identifies criteria for other permit or process requirements

# Permitting Best Practices

## Solar Permit Checklist – Minneapolis/St. Paul

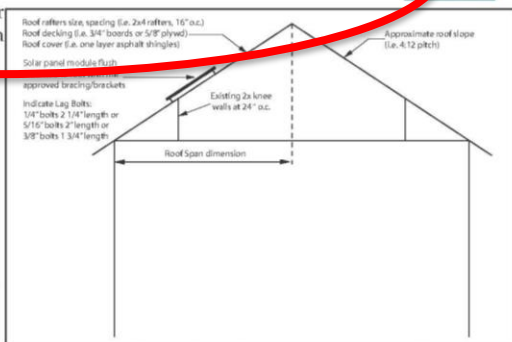
### Permit Applicant Checklist for Residential Solar Energy Installations



#### Required Drawings and Plans

7. Provide construction drawings that include a building section detail and complete notation of method of fastening equipment to the roof of the subject property, including the following details:

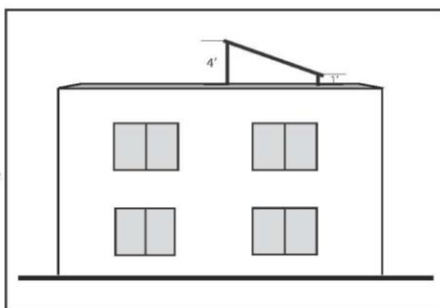
- Cross section that identifies rafter size, spacing and span dimension and approximate roof slope.
- Identify style, diameter, length of embedment of bolts (i.e., 5/16" lags with minimum 3" embedment into framing, blocking, or bracing).



Example of a framing cross-section illustration

- Is system to be mounted according to panel and rack manufacturers' instructions?  
yes \_\_\_ no \_\_\_

If no, please explain. Attach explanation if more space is needed.



Example of an elevation

8. Provide an elevation of the structure indicating the appearance of the proposed solar installation (see example to the right). Note the finished height of the system above the roof or, if ground-mounted, above the ground.

9. Provide a site plan indicating the buildings and features of the property (see example on following page). The site plan shall show property line locations, approximate location of all structures, the location(s) of the panel installations, setback from property lines, the main service location, and, if applicable, the solar easement across adjoining properties. For roof-mounted systems identify the setback dimension from the peak and from all edges of the roof.

#### Rooftop Solar Installations

10. Is the equipment to be *flush-mounted* to the roof (mounted such that the collector surface is parallel to the roof)?  
yes \_\_\_ no \_\_\_ (If no, go to question 12)

# Permitting Best Practices

## Solar Permit Checklist – Minneapolis/St. Paul

**Permit Applicant Checklist for Residential Solar Energy Installations**

11. The minimum structural threshold for installing a *flush-mounted* PV system is a roof structure with at least 2 x 4 rafters no more than 24" on-center spacing.

a. Does the roof structure use 2x4 or larger rafters, spaced no wider than 24 inches on center?  
yes \_\_\_ no \_\_\_

b. If a *solar thermal* installation, is the collector/racking system fastened to each rafter passing under the collector?  
yes \_\_\_ no \_\_\_

12. *Non-flush-mounted installations* have different potential structural considerations. If the answer to question 10 (is the system flush-mounted?) is no, please provide the following additional information.

a. Is the finished pitch of the collector at or less than a 12/12 pitch?  
yes \_\_\_ no \_\_\_

b. Is the collector or racking fastened to the roof within one foot of the roof peak?  
yes \_\_\_ no \_\_\_

c. Is the collector/racking system fastened to each rafter passing under the collector?  
yes \_\_\_ no \_\_\_

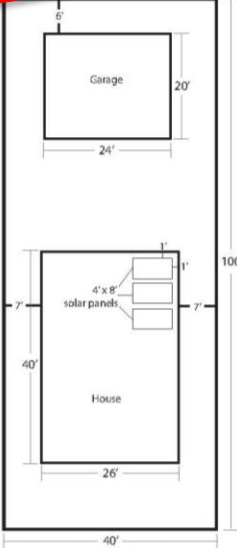
d. Is the horizontal span (roof span dimension) of the rafter less than 7.75 feet for 2x4 rafters or 11.5 feet for 2x6 rafters?  
yes \_\_\_ no \_\_\_

13. Roof decking and structural supports should all be in good condition without visible roof sag/deflection. Is the roof structure in good condition, having no visible sag, cracking or splintering of rafters, or other potential structural defect? If roof structure is accessible, please provide a photo showing the condition of the roof. If roof structure is not accessible, provide an exterior photo, side view, of the roof.  
yes \_\_\_ no \_\_\_

14. If the answer is no to question 11, 12 a. - d., or 13 please provide a study or statement regarding the proposed solar installation and all proposed structural modifications stamped by a Minnesota licensed/certified structural engineer. Approval can come in the following forms:

a. Construction plans denoting the roof structure and any modifications to the structure if required, as well as the method of installation of solar collector on the subject property.

b. Letter from engineer accomplishing the same as above if the engineer feels that letter format will provide the necessary information.



Example of a site plan.





# Permitting Best Practices

## Solar Permit Checklist – Minneapolis/St. Paul



### Permit Applicant Checklist for Residential Solar Energy Installations

#### Ground Solar Installations

13. For **ground-mounted** solar energy systems, the installation must meet property line setback standards for accessory structures, as identified in the Saint Paul Zoning Code (Section 65.921, 65.501). Verification of the property line and appropriate setback is required, either through identification of property pins or completing a survey. Identify the method used to verify property lines and setbacks.

Located property pins  Completed survey (attach)  Other (attach explanation)

#### Electrical Information

15. Specify the locations of all equipment and disconnects (on a separate page, if necessary) (e.g., AC disconnect located on exterior face of \_\_\_ wall of house, inverter and DC disconnect located in the interior within \_\_\_\_\_ room).

16. Provide a single line drawing of the electrical installation which includes the following information: PV panel layout, PV power source short circuit current rating, conductor size, type, locations and lengths of runs, wiring methods, grounding points, inverter location, disconnect locations, battery locations (if applicable), point of connection to the existing electrical system. Note the existing service size and number of meters. An example of a single line drawing is attached to this checklist.

17. Provide manufacturer's specification sheets on all components including but not limited to inverters and panels, which include the make, model, listing, size, weight, etc.

#### Heritage Preservation

18. Legislative Code § 73.06 provides that exterior work, including installation of solar energy systems, within city designated heritage preservation sites and districts is subject to review and approval by the Heritage Preservation Commission (HPC) prior to the issuance of city permits. For a city map showing individual sites and district boundaries go to <http://www.stpaul.gov/index.aspx?NID=4080>. You may also search by a specific address by using "property look-up" at: [https://www.stpaulonestop.com/AM/AND5/eNtraprise/StPaul/m3list/a\\_PickProperty.jsp?nc=ReadOnIystpaul](https://www.stpaulonestop.com/AM/AND5/eNtraprise/StPaul/m3list/a_PickProperty.jsp?nc=ReadOnIystpaul).

Is the installation address within a heritage preservation district, or on a landmark property or building?

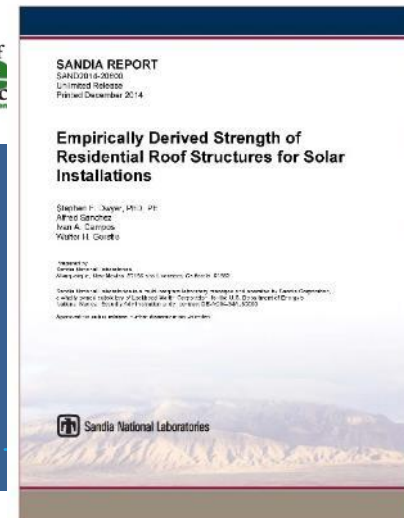
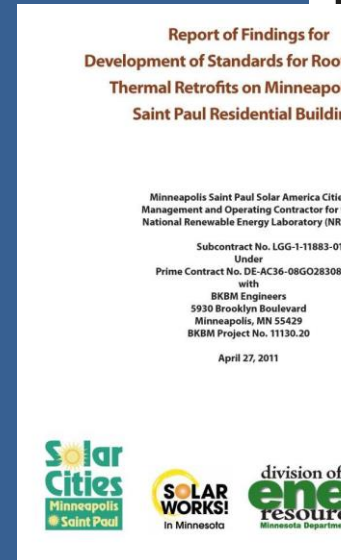
yes \_\_\_ no \_\_\_

Solar installations on properties with heritage preservation considerations will require additional review, either administrative review by staff or review by the Heritage Preservation Commission.

# Standardizing Permitting

Structural engineering studies on residential rooftop solar installations.

- ✓ Minneapolis Saint Paul Solar Cities Structural Study
- ✓ Minnesota Standardized Load Tables for residential solar installations
- ✓ Sandia National Lab study on roof strength for solar installations.
- ✓ Solar America Board of Codes and Standards



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Better Energy.  
Better World.

# Grow Solar Toolkit

- ✓ Submittal requirements
- ✓ Structural guidance
- ✓ Standard electrical diagram
- ✓ Permit fees

## Illinois Standardized Permitting Template

JOB SITE ADDRESS \_\_\_\_\_  
 NAME OF BUILDING OWNER \_\_\_\_\_  
 JOB VALUATION \_\_\_\_\_

Installation Contractor	Name _____
	Address _____
	City _____ State _____ Zip _____
	State License No. _____ Phone _____

### Required Information for Permit:

- Site plan showing location of major components on the property and a framing cross section that identifies type of support (rafter or truss), spacing, span dimension, and approximate roof slope. The drawings need not be exactly to scale, but it should represent relative location of components. PV arrays on dwellings with a 3' perimeter space at ridge and sides may not need separate fire service review.
 

If location of the solar resource on the roof requires installation within three feet of sides or ridge, check with building official to determine if fire service review is needed.
- Specification sheets and installation manuals for all manufactured components including, but not limited to, PV modules, inverter(s), combiner box, disconnects, and mounting system.
- If city manages electric permit process - Electrical diagram showing PV array configuration, wiring system, overcurrent protection, inverter, disconnects, required signs, and AC connection to building (see accompanying standard electrical diagram).

### Step 1: Structural Review of PV Installation Mounting System

- Is the roof supporting the installation a pitched roof in good condition, without visible sag or deflection, no cracking or splintering of support, or other potential structural defect?  Yes  No
- Is the roof a rafter system?  Yes  No
 

For truss systems, additional information may be needed to ascertain the truss' design loads. The SolarStruc tool (<http://www.growsolar.org/wp-content/uploads/2012/06/Solarstruc-2.2.xls>) allows contractors to calculate truss capacity for solar installations. Please contact the building official for standards on when structural analysis will be needed.
- Is the equipment to be flush-mounted to the roof such that the collector surface is parallel to the roof?  Yes  No
- Is the roofing type lightweight?  Yes (composition, lightweight masonry, metal, etc.)  No
- Does the roof have a single layer roof covering?  Yes  No

If "No" to any of questions 1-4 above, additional documentation may be required. Documentation may need to demonstrate the structural integrity of the roof and all necessary structural modifications needed to maintain integrity. A statement stamped by a Illinois licensed/certified structural engineer certifying integrity may be needed. Contact the building official to determine submittal requirements.

- Identify method and types of weatherproofing for roof penetrations (e.g. flashing, caulk).

### Mounting System Information:

- Is the mounting structure an engineered product designed to mount PV modules with no more than an 18" gap beneath the module frames?  Yes  No

If No, provide details of structural attachment certified by a design professional. Manufacturer's engineering specifications are sufficient to meet this requirement.

- For manufactured mounting systems, fill information on the mounting system below:

- Mounting System Manufacturer \_\_\_\_\_
- Product Name and Model # \_\_\_\_\_
- Total Weight of PV Modules and Rails \_\_\_\_\_ lbs
- Total Number of Attachment Points \_\_\_\_\_
 

Attaching the rail to each rafter or truss that passes under the array, or to blocking installed between each support, may serve to mitigate for any structural uncertainties on older roofs or wind loading concerns. This approach is used by other Midwestern cities based upon engineering studies conducted with their building stock. Contact the building official to determine requirements.
- Weight per Attachment Point \_\_\_\_\_ lbs
- Maximum Spacing between Attachment Points on a Rail \_\_\_\_\_ inches (see product manual for maximum spacing allowed based on maximum design wind speed).
- Total Surface Area of PV Modules (square feet) \_\_\_\_\_ ft<sup>2</sup>

If distributed weight of the PV system is greater than 5 lbs/ft<sup>2</sup>, a study or statement demonstrating the structural integrity of the installation, or a statement stamped by an Illinois licensed/certified structural engineer, may be required. Contact the building official to determine requirements.
- Distributed Weight of PV Module on Roof (c=) \_\_\_\_\_ lbs/ft<sup>2</sup>

### Step 2: Electrical Review of PV System

Please document the following information to be issued an electric permit. If the installation does not meet the following thresholds, additional information may be needed, as requested by the permit official.

- PV modules, utility-interactive inverters, and combiner boxes are identified for use in PV systems.
- The PV array is composed of 4 series strings or less per inverter.
- The total interconnect capacity has a continuous AC power output 13,440 watts or less
- The AC interconnection point is on the load side of service disconnecting means (NEC 2011 705.12(D), NEC 2008 690.64(B)).
- A standard electrical diagram should be used to accurately represent the PV system. Acceptable diagrams, in interactive PDF format, are available at [www.solarabc.org/permitting](http://www.solarabc.org/permitting).

Fill out the standard electrical diagram completely. A guide to the electrical diagram is provided at [www.solarabc.org/permitting](http://www.solarabc.org/permitting) to help the applicant understand each blank to fill in. If the electrical system is more complex than the standard electrical diagram can effectively communicate, provide an alternative diagram with appropriate detail.

### Step 3: Permit fee for residential installations

\_\_\_\_\_ Fees ..... \$100  
 \_\_\_\_\_ Additional inspection ..... \$ 50.00  
 (Per inspection, when needed)

TOTAL FEE = \$ \_\_\_\_\_

RECEIPT NO. \_\_\_\_\_

DATE \_\_\_\_\_

I HEREBY CERTIFY that I have completed and examined this application and certify that the information contained therein is correct. If a permit is issued, I agree all work will be done in conformance with all applicable ordinances and codes of this City and laws of the State of Illinois.

\_\_\_\_\_  
 CONTRACTOR OR AUTHORIZED AGENT/HOMEOWNER

Recommended fee for residential or small commercial solar installations is a fixed fee between \$50 - 200, consistent with cost for services (permit processing, inspection) incurred by the government unit. Alternatively, the fee can be valuation based, but for a building permit should exclude the value of the solar collectors and electronics.

### Resources and Reference Material

- Chicago Solar Express, [http://www.cityofchicago.org/city/en/pages/energy/solar\\_in\\_chicago.html](http://www.cityofchicago.org/city/en/pages/energy/solar_in_chicago.html)
- Milwaukee Solar Permit, [http://city.milwaukee.gov/MilwaukeeShines/Solar-Professionals/Permitting.html#VUD8\\_JN93s](http://city.milwaukee.gov/MilwaukeeShines/Solar-Professionals/Permitting.html#VUD8_JN93s)
- Saint Paul Solar Permit Checklist, <http://www.stpaol.gov/DocumentCenter/View/76171>
- National Renewable Energy Lab: Permitting Best Practices <http://www.nrel.gov/docs/fv13osti/57104.pdf>
- Interstate Renewable Energy Council: Solar Permitting Best Practices: <http://www.irecusa.org/solar-permitting-best-practices/>
- Solar America Board for Code and Standards (Solar ABCs): Expedited Permit Process, with sample line drawings for all installation types: <http://www.solarabc.org/>
- Sandia National Laboratories, Empirically Derived Strength of Residential Roof Structures for Solar Installations, <http://prod.sandia.gov/techlib/access-control.cgi/2014/1420600.pdf>
- SolarStruc Tool, <http://www.growsolar.org/wp-content/uploads/2012/06/Solarstruc-2.2.xls>
- Minneapolis Saint Paul Solar Cities Program, Standards for Rooftop Solar Thermal Retrofits,
- Minnesota Division of Energy Resources/Department of Labor and Industry, Standardized Load Tables Characterizing Residential Solar Thermal and Solar Electric Installations for Residential Structures, <http://mn.gov/commerce/energy/images/FINAL-Standardized-Load-Table-Report.pdf>
- Grow Solar Inspection trainings, <http://www.growsolar.org/technical-assistance/training-program-development/>

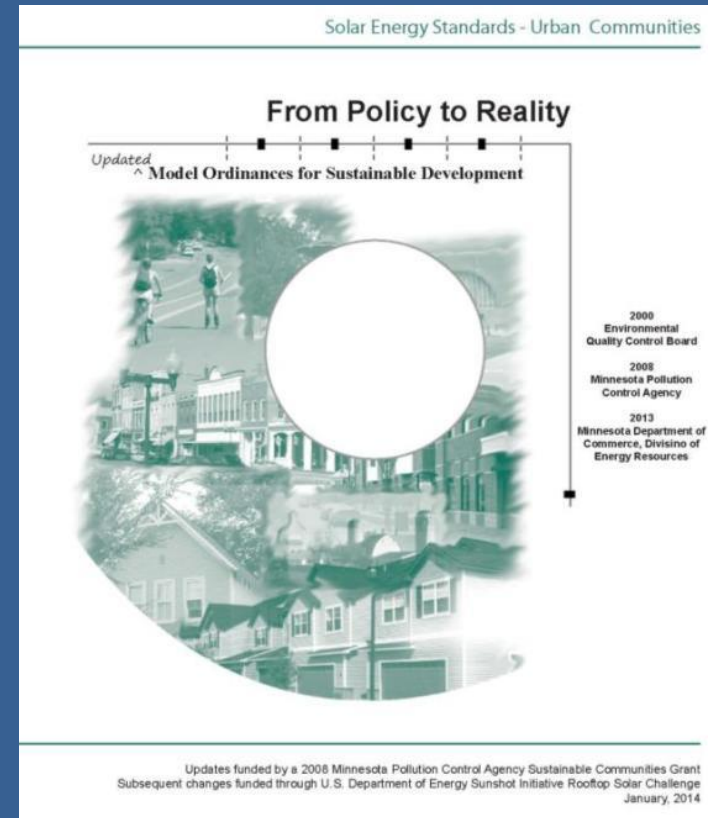
An aerial photograph of a large-scale solar farm. The image shows numerous rows of solar panels, each equipped with a tracking system that allows them to follow the sun's path. The panels are arranged in a grid-like pattern, and the tracking mechanisms are visible as metal structures. The background shows a clear sky and some distant trees.

# Regulation of Solar Development

# Solar Ready Communities

## Development Regulations that:

- ✓ explicitly address solar development in its varied forms,
- ✓ create as-of-right installation opportunities, and
- ✓ set clear and predictable standards for balancing solar resources with other resources.



# Basic Solar Energy Zoning – Accessory Uses

Do your basic zoning tools - uses, setbacks, heights, coverage – create barriers for home and business owners to capture solar resources?

**Define an “as-of-right” installation**

fo



# Basic Solar Energy Zoning – Principal Uses

Do your basic zoning tools set clear standards for solar farm or garden development?



# Advanced Solar Zoning

Using advanced regulatory concepts to encourage solar development

- ✓ **Design standards** - Are community aesthetic or character standards part of local regulations?
- ✓ **Solar easements or cross-property protection** - Does local regulation protect the solar resource when someone makes a long-term investment in solar infrastructure?
- ✓ **Home Owners Associations**— Does the community have an interest in ensuring solar development rights in common interest communities?
- ✓ **Integrating with other processes** – agricultural protection, municipal utility, historic preservation, etc.

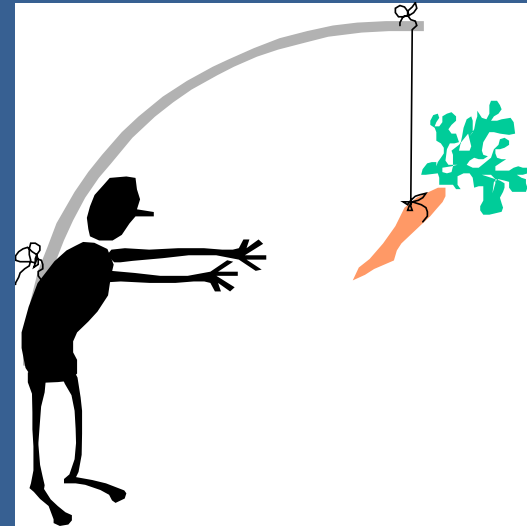




# Incentives and Requirements

Does development regulation use incentives?

- ✓ **Density bonus** for solar development
- ✓ **Protect solar resources** when subdividing
- ✓ **Identify** preferred areas for solar farms
- ✓ **Financial incentives** in fee structure
- ✓ **Planned Unit Development** conditions
- ✓ **“Solar ready”** construction



# Grow Solar Toolkit

- ✓ Solar accessory uses, by type
- ✓ Solar principal uses
- ✓ Regulatory incentives

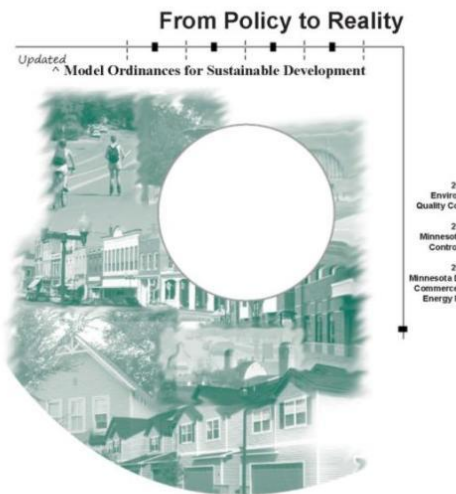
Grow Solar

Local Government  
Solar Toolkit

PLANNING, ZONING, AND PERMITTING

Minnesota

Solar Energy Standards - Urban Comm



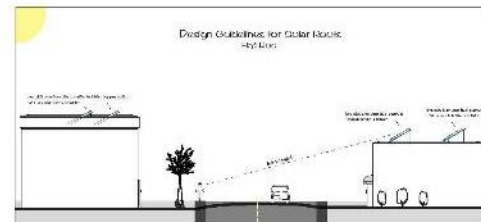
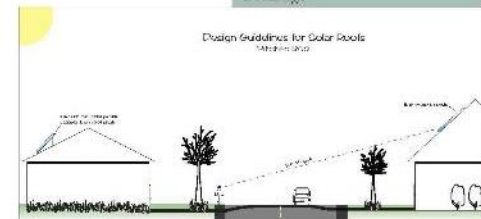
Updates funded by a 2008 Minnesota Pollution Control Agency Sustainable Communities Grant  
Subsequent changes funded through U.S. Department of Energy Sunshot Initiative Rooftop Solar Challenge  
January, 2014

## Solar Energy Standards

- land use or performance standards for the district in which the building is located.
2. **Solar Energy Systems with Mounting Devices** - Solar energy systems using roof mounting devices or ground mount solar energy systems shall not be restricted if the system is not visible from the closest edge of any public right-of-way other than an alley. Roof mount systems that are visible from the nearest edge of the street frontage right-of-way shall not have a highest finished pitch steeper than the roof pitch on which the system is mounted, and shall be no higher than twelve (12) inches above the roof.
  3. **Coverage** - Roof or building mounted solar energy systems, excluding building-integrated systems, shall allow for adequate roof access to the south-facing or flat roof upon which the panels are mounted. The surface area of pole or ground mount systems shall not exceed half the building footprint of the principal structure.
  4. **Historic Buildings** - Solar energy systems on buildings within designated historic districts or on locally designated historic buildings (exclusive of State or National historic designation) will require an administrative variance, as provided in this ordinance.

### Coverage

Roof coverage limitations are generally not necessary, as long as the roof is likely to be shaded or otherwise not suitable for solar energy. Coverage is an issue of concern in order to ensure ready roof access in the event of a fire. Coverage limits may be a percentage limitation, such as 50% of the total walls facing roof, or a required setback from one or more edges.



- D. **Approved Solar Components** - Electric solar energy system components must have a UL listing and solar hot water systems must have an SRCC rating.
- E. **Plan Approval Required** - All solar energy systems shall require administrative plan approval by Model Community zoning official.
  1. **Plan Applications** - Plan applications for solar energy systems shall be accompanied by to-scale horizontal and vertical (elevation) drawings. The drawings must show the location of the system on the building or on the property for a ground-mount system, including the property lines.
    - a. **Pitched Roof Mounted Solar Energy Systems** - For all roof-mounted systems other than a flat roof the elevation must show the highest finished slope of the

# THANK YOU!



**Brian Ross, AICP, LEED GA**

Senior Program Director

[bross@gpisd.net](mailto:bross@gpisd.net), 612-767-7296



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