MAKING “SOLAR READY” COMMUNITIES

MIDWEST RENEWABLE ENERGY ASSOCIATION
2015 ENERGY FAIR

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Non-partisan, non-profit organization:

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.

GREAT PLAINS INSTITUTE
Sustainable Communities

1. Grow Solar Partnership
2. GreenStep Cities
3. Metro Clean Energy Resource Team (CERT)
4. Sustainability Planning and Technical Assistance
Why Does Local Government Matter?
The wholesale price of solar photovoltaic (PV) panels ($/watt) has dropped by 99% since 1977.

1977 - $76.67/watt

2014 - $0.67/watt

Source: Bloomberg New Energy Finance
The wholesale price of solar photovoltaic (PV) panels ($/watt) has dropped by 99% since 1977.

More significantly, since 2007, the price has declined by 83% . . .

2007 - $4.00/watt

2014 - $0.67/watt
DOE (SunShot) estimates that installed costs need to be well below $2/watt (rooftop) to sustain the market. However, the “soft cost” component for rooftop systems in particular remains difficult to address.
Evolution of Solar Energy ...

Commercial PV Systems ≤10 kW

- Total Installed Price (Median)
- Global Module Price Index
- Implied Non-Module Costs

Source: Tracking the Sun VII Briefing, LBN Labs
Local governments are a critical partner in the task of creating a self-sustaining solar energy market.

Photo credit: Meet Minneapolis
If you remember two things . . .

Solar energy development is local development

✓ Local government development oversight determines how, and whether, local solar resources are used

Photo credit: U.S. DOE SunShot

Photo credit: CR Planning
Role of Local Government ...
Five Principles for Solar Ready Communities...

1. **Comprehensive Plans** that acknowledge and address solar resources and 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 Development is Development

**Solar energy development is local development**

- Is investment adding value to homes and businesses
- Creates economic opportunity
- Uses local resources
- Poses potential conflicts

*Photo credit: U.S. DOE SunShot*
Typical Local Government Roles in Development Activities

- **Regulator** – policy, zoning, permitting
- **Educator** – providing information to help people make informed decisions
- **Financier or Assembler** – EDA type role, providing financing tools, development preparation, assembly of resources for private sector investment
- **Developer** - HRA or public housing authority type role, owning and managing development for private sector use
- **Consumer** – developing solar for public sector use
Grow Solar Toolkit

Planning, Zoning, Permitting

Local Government Solar Toolkit
PLANNING, ZONING, AND PERMITTING

Minnesota

Local Government Solar Toolkit
PLANNING, ZONING, AND PERMITTING

Wisconsin

Local Government Solar Toolkit
PLANNING, ZONING, AND PERMITTING

Illinois
Local Solar Policy
Solar Ready Communities

Comprehensive Plans that

- address solar resources
- acknowledge solar development benefits and opportunities in the community.

- Property value
- Job creation
- Import substitution
Comprehensive Plans that acknowledge perceived nuisances or potential conflicts between solar development and other resources:

- Agricultural practices
- Urban forests
- Historic resources
- Airports
- Natural areas
Thinking about your Solar “Reserve”
Rochester’s Solar “Reserve”
Rochester’s Solar “Reserve”

- Gross solar reserve – Over 7,000 MW of capacity, enough to generate almost 100 times the amount of electricity used in Rochester every year...
Rooftop Solar Reserves

Source: GPI 2015
Rooftop Solar Reserves

Source: GPI 2015
Rooftop Solar Reserves

- Rooftop solar reserve – 470 MW of capacity, enough to generate approximately 50% of the amount of electricity used in Rochester every year...
Grow Solar Toolkit

- Existing conditions,
- Desired conditions,
- Strategies for getting there
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
Regulation of Solar Development
Solar Ready Communities

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

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

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

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

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.
Permitting Best Practices
Solar Permit Checklist – Minneapolis/St. Paul

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.saintpaulgov.com/STPANDA5/eNtrprise/StPaul/MList/a_FlickProperty.jsp?id=ReadAboutStPaul.

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.

Grow Solar Toolkit

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

### Mounting System Information:

7. 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 yes, provide details of structural attachment certified by a design professional. Manufacturer’s engineering specifications are sufficient to meet this requirement.

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

- Mounting System Manufacturer ________________________________
- Product Name and Model # ________________________________
- Total Weight of PV Modules and Racks ________________________________
- Total Number of Attachment Points ________________________________
- Attachment Points must be equitably distributed across the array
- Weight per Attachment Point ________________________________
- 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) ________________________________
- Distributed Weight of PV Module on Roof (lbs) ________________________________

### Recipe

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

1. Is the roof being supported by a footed-rivet in good condition, without visible sag or deflection, no cracking or splitting of support, nor any potential structural defect? Yes No

2. Is the roof a safety system? Yes No

3. Is there a metal surface to the roof such that the collector surface is parallel to the roof? Yes No

4. Is the roofing material lightweight? Yes (composition, lightweight metal, etc.) No

5. Does the roof have a single layer roof covering? Yes No

6. If 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 licensed/certified structural engineer verifying integrity may be needed. Contact the building official to determine substantial requirements.

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

### Resources and Reference Material

- Chicago Solar Express, [http://www.chicagosolar.org](http://www.chicagosolar.org)
- Solar Access Center, [http://www.solaraccess.org](http://www.solaraccess.org)
- Sandra National Laboratories, Empirically Derived Strength of Residential Roof Structures, [http://www.solaraccess.org](http://www.solaraccess.org)
- SolarStruct Tool, [http://www.solarstruct.org](http://www.solarstruct.org)
- Solar Land Use and Zoning, [http://www.solaraccess.org](http://www.solaraccess.org/)
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.
Do your basic zoning tools - uses, setbacks, heights, coverage – create barriers for home and business owners to capture solar resources?

- **Uses** - Are accessory solar land uses allowed?

- **Dimensional standards** - What exceptions does your ordinance allow for height and setback standards?

- **Coverage** - Is a ground-mount solar energy system the same as a shed or garage?

- **Does your ordinance define an “as-of-right” installation for accessory uses?**
Do your basic zoning tools set clear standards for solar farm or garden development?

✓ **Uses** - Are principal solar land uses allowed? Are clear land use priorities set in districts, overlays?

✓ **Submittal requirements** – What information do you need from solar farm developers?

✓ **Coverage** – How does your ordinance consider solar collector surfaces in coverage or impervious surface ratios?

✓ **Are solar principal uses treated equivalently as other industrial or natural resource based uses?**
Does your zoning use advanced regulatory concepts that can affect 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 long-term 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 your 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

The community has an long-term interest in sustainable infrastructure – housing, transportation, energy systems
Grow Solar Toolkit

- Solar accessory uses, by type
- Solar principal uses
- Regulatory incentives
THANK YOU!

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