Permitting, Planning & Zoning Resources

Solar Powering Michigan

September 12, 2014

Brian Ross, AICP, LEED GA
bross@crplanning.com

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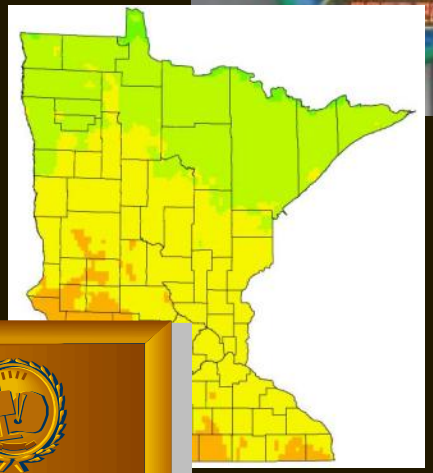
What I'm talking about . . .

1. Why local governments?

2. What are "solar resources"?

3. What are "solar-ready communities"?



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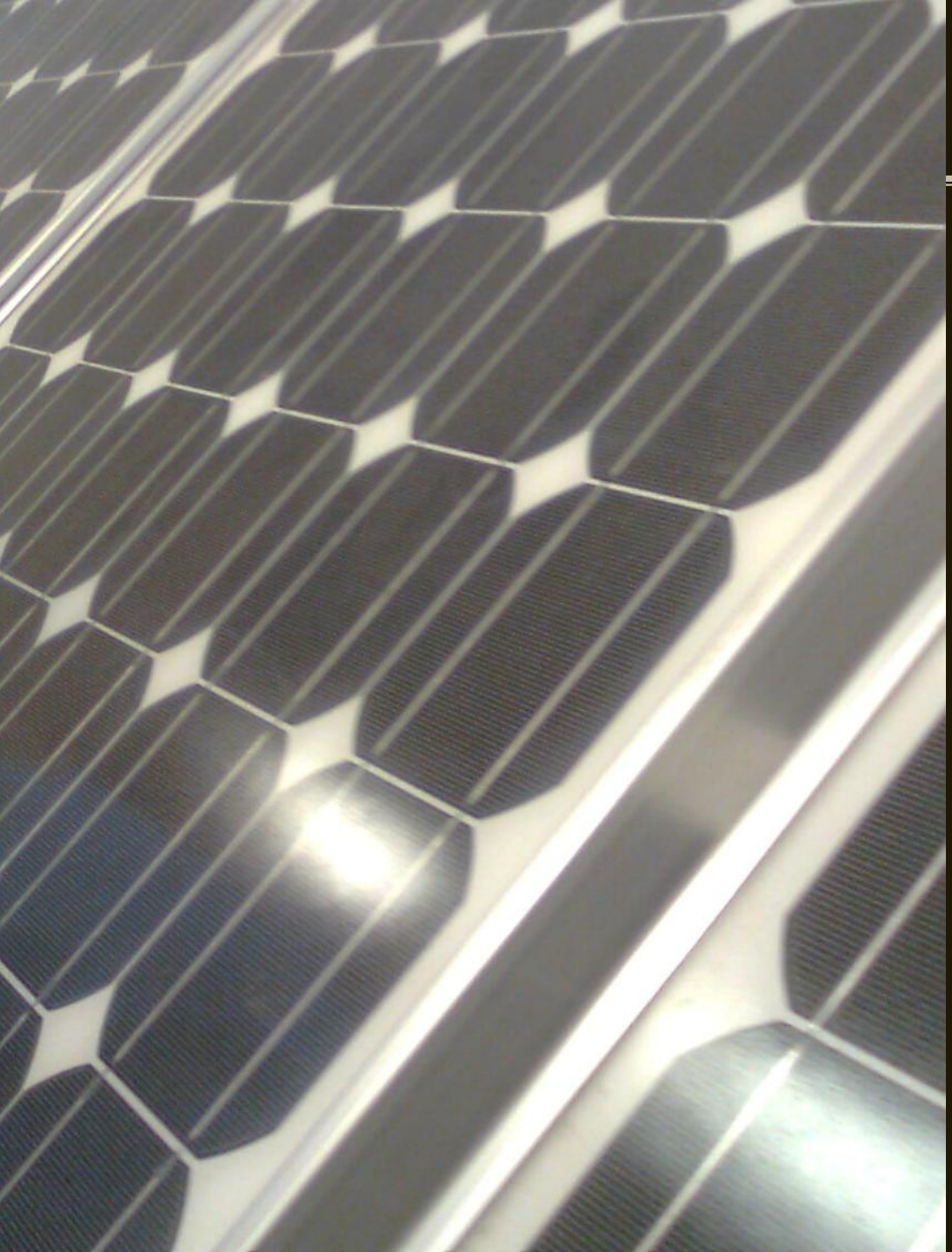

Why Local Governments?

Why Local Governments?

- **Local governments are a critical partner in the task of creating a self-sustaining solar energy market**

Photo credit: Meet Minneapolis

Why Local Governments?

Solar energy development is local development

- ✓Is investment in the community
- ✓Creates economic opportunity
- ✓Poses potential conflicts
- ✓Uses local resources

Photo credit: U.S. DOE SunShot

Photo credit: CR Planning

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Why Local Governments?

Solar energy development is local development

- ✓ Local government development oversight determines how local solar resources are used
- ✓ As with other types of development, local government can play a variety of roles to enable solar development

Photo credit: U.S. DOE SunShot

Photo credit: CR Planning

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Why Local Governments?

Typical Local Government Roles in Development Activities

- ✓ **Regulator –** policy, zoning, permitting.
- ✓ **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

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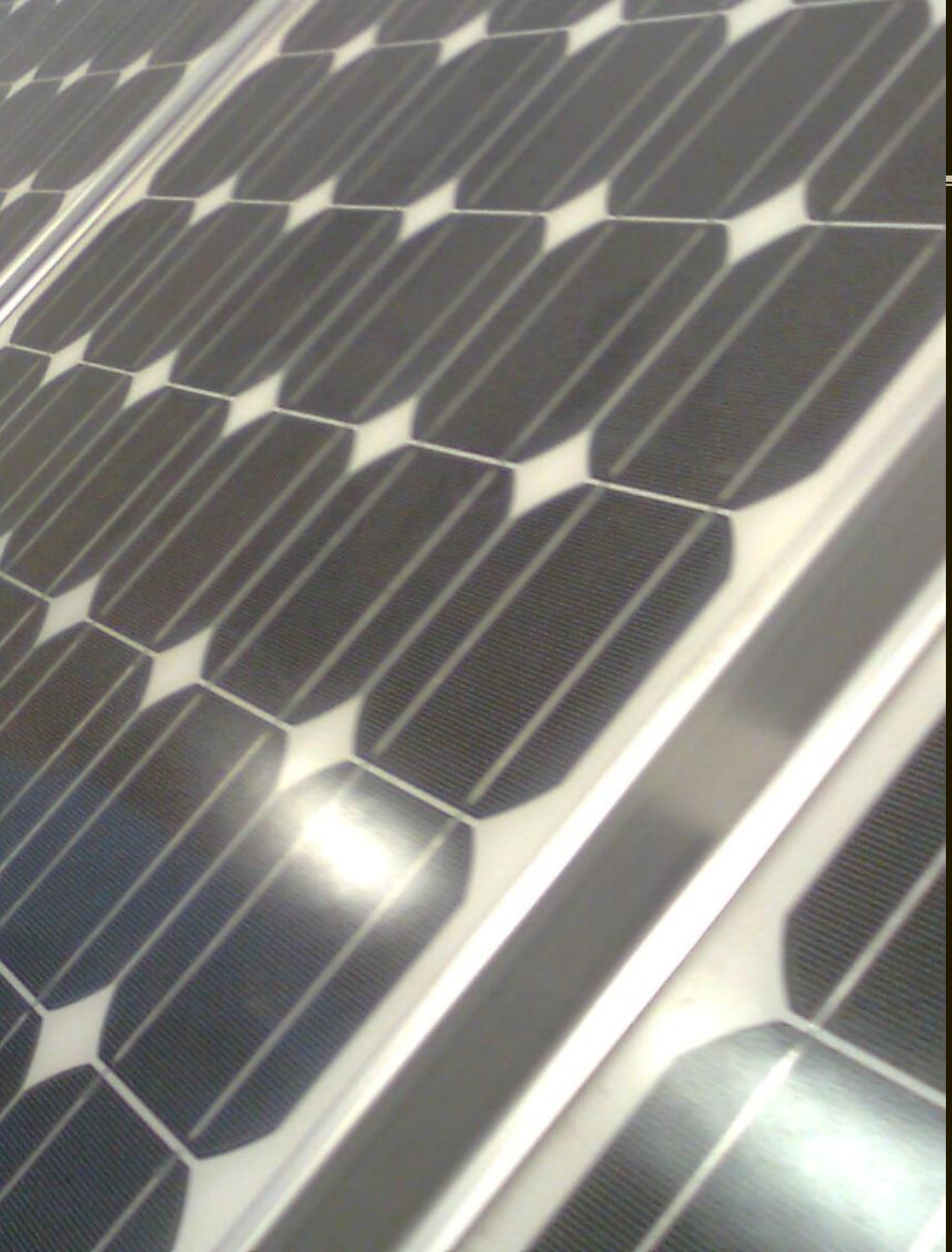
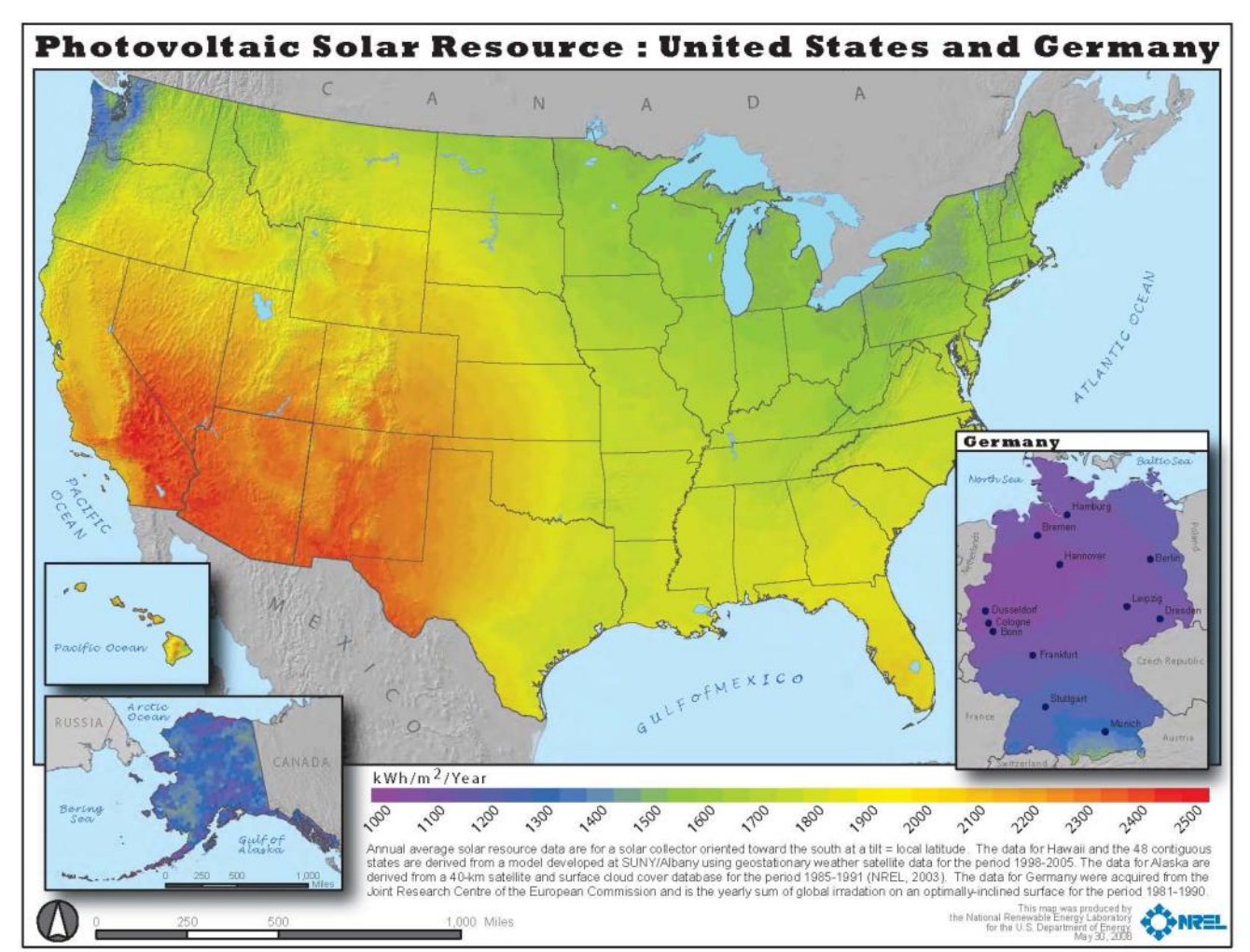


Understanding Solar Resources

Solar Resources . . .

Considering your community's solar reserves.



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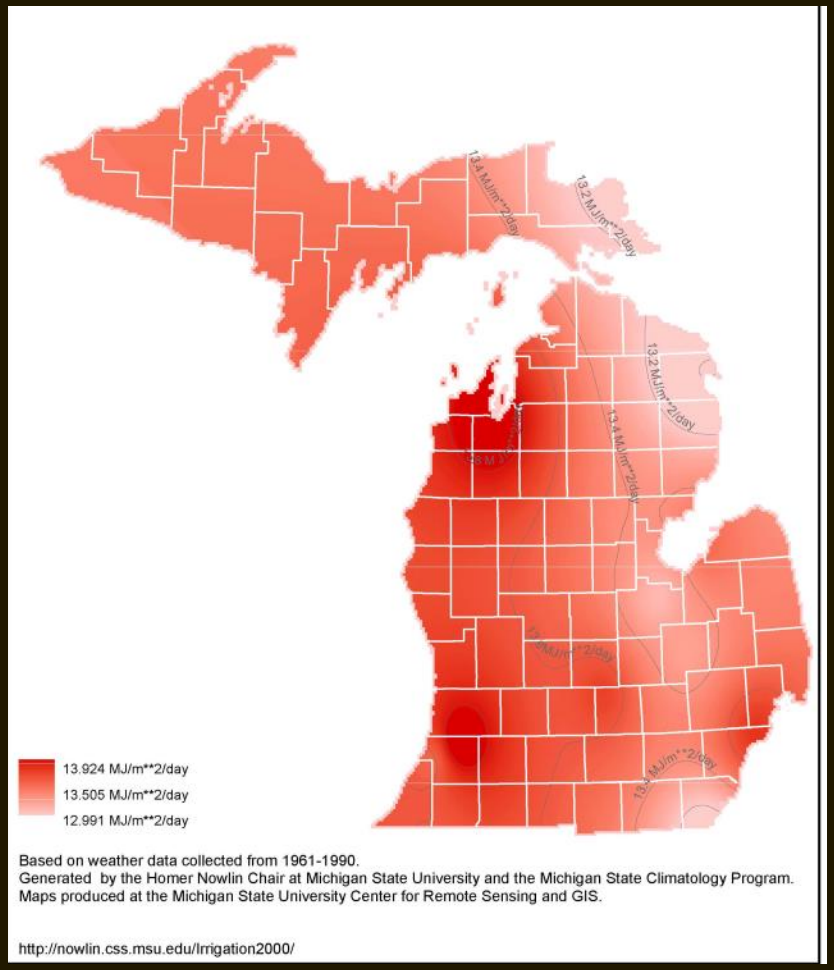

Solar Resources . . .

The local landscape defines whether a given site has a solar resource

- ✓ Topography
- ✓ On-site obstructions
- ✓ Obstructions on adjacent land
- ✓ Future obstructions

An adequate solar resource location is unshaded for several hours every day (around solar noon), both now and well into the future.

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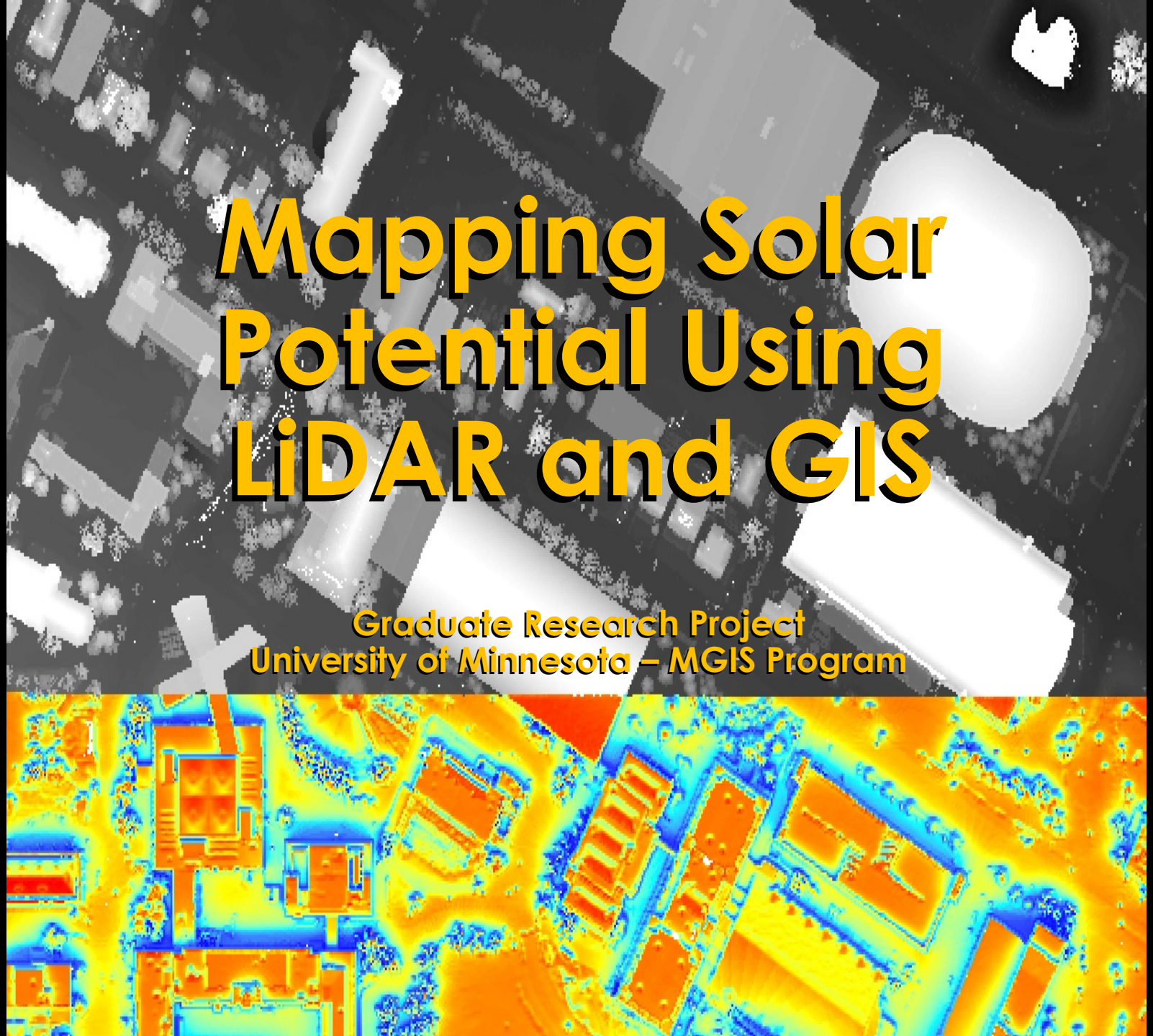
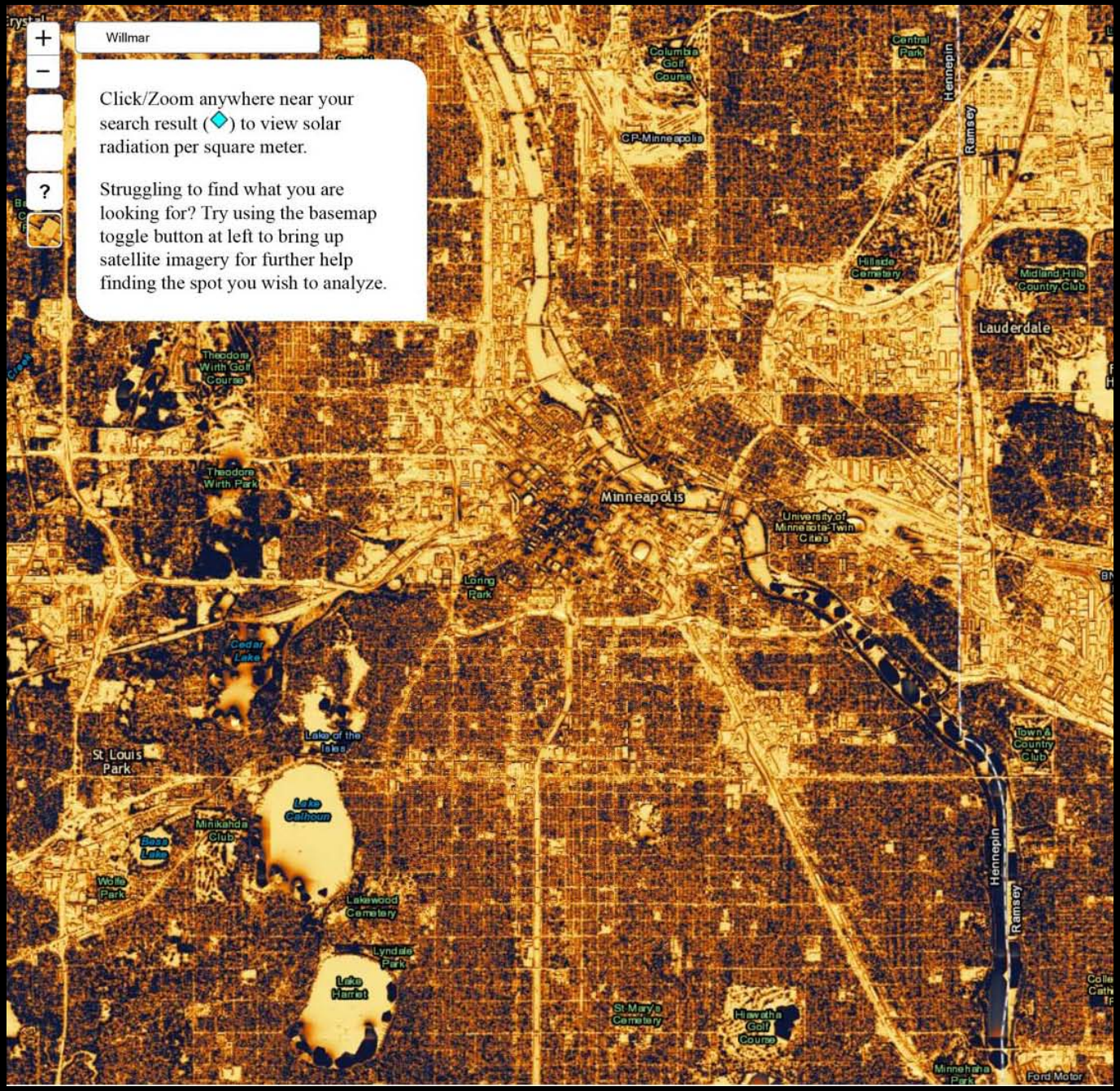


Mapping Solar Potential Using LiDAR and GIS

Graduate Research Project
University of Minnesota – MGIS Program

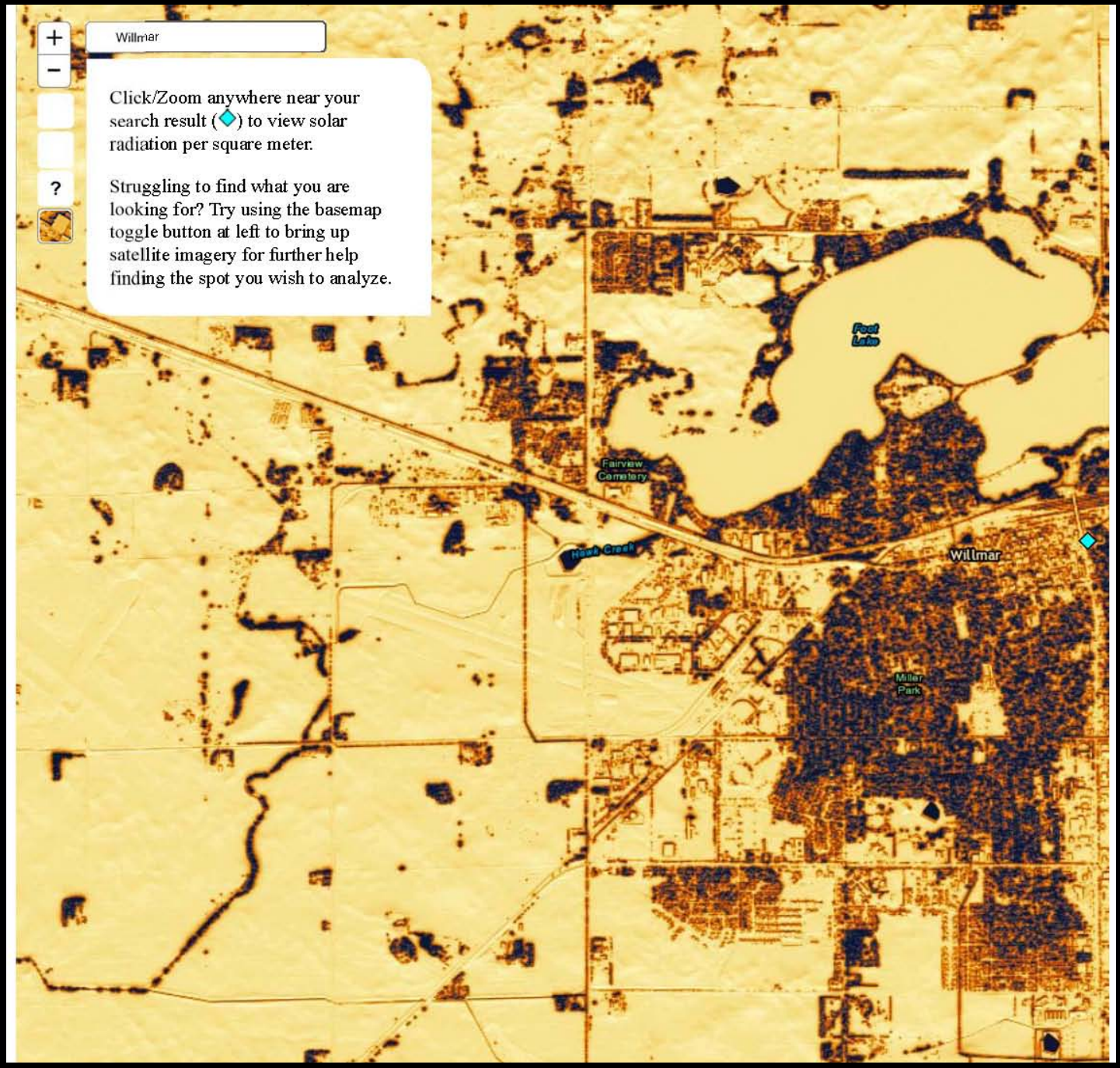
Minnesota Project Outline

- Goals
  - Map statewide solar potential
  - Free public distribution of maps, data, methodology, and findings
- Resources
  - Geographic Information Systems (GIS)
  - LiDAR data
  - MN Supercomputing Institute
  - Advice from stakeholders and experts


Willmar
Click/Zoom anywhere near your search result (◆) to view solar radiation per square meter.
Struggling to find what you are looking for? Try using the basemap toggle button at left to bring up satellite imagery for further help finding the spot you wish to analyze.
Columbia Golf Course
Central Park
Hennepin
Ramsey
CP-Minneapolis
Hillside Cemetery
Midland Hills Country Club
Lauderdale
Theodore Wirth Golf Course
Theodore Wirth Park
Minneapolis
University of Minnesota-Twin Cities
Loring Park
Cedar Lake
Lake of the Isles
St. Louis Park
Lake Calhoun
Minikahda Club
Bass Lake
Wolfe Park
Lakewood Cemetery
Lyndale Park
Lake Harriet
St. Mary's Cemetery
Hiawatha Golf Course
Minnehaha Park
Ford Motor
Town & Country Club


Rochester
Click/Zoom anywhere near your search result (◆) to view solar radiation per square meter.
Struggling to find what you are looking for? Try using the basemap toggle button at left to bring up satellite imagery for further help finding the spot you wish to analyze.
?
Cascade Lake
Cascade Creek
J R Cooke Park
Manor Park
Judd Park
Kutzky Park
Saint Mary's Hospital
Meadow Lakes Golf Club
Rochester Golf and Country Club
Apache Mall
Bamber Lake
South Fork Zumbro River
Lake George
Zumbro Park


Duluth
Click/Zoom anywhere near your search result (◆) to view solar radiation per square meter.
Struggling to find what you are looking for? Try using the basemap toggle button at left to bring up satellite imagery for further help finding the spot you wish to analyze.
Hartley Park
Chester Creek
College of St Scholastica
Chester Park
Miller Hill Mall
Enger Park Golf Course
Enger Park
Hermantown
Central Park
Kingsbury Creek
Port of Duluth-Superior
Oneota Cemetery
Proctor
MINNESOTA
WISCONSIN
St Louis Bay
Fairmont Park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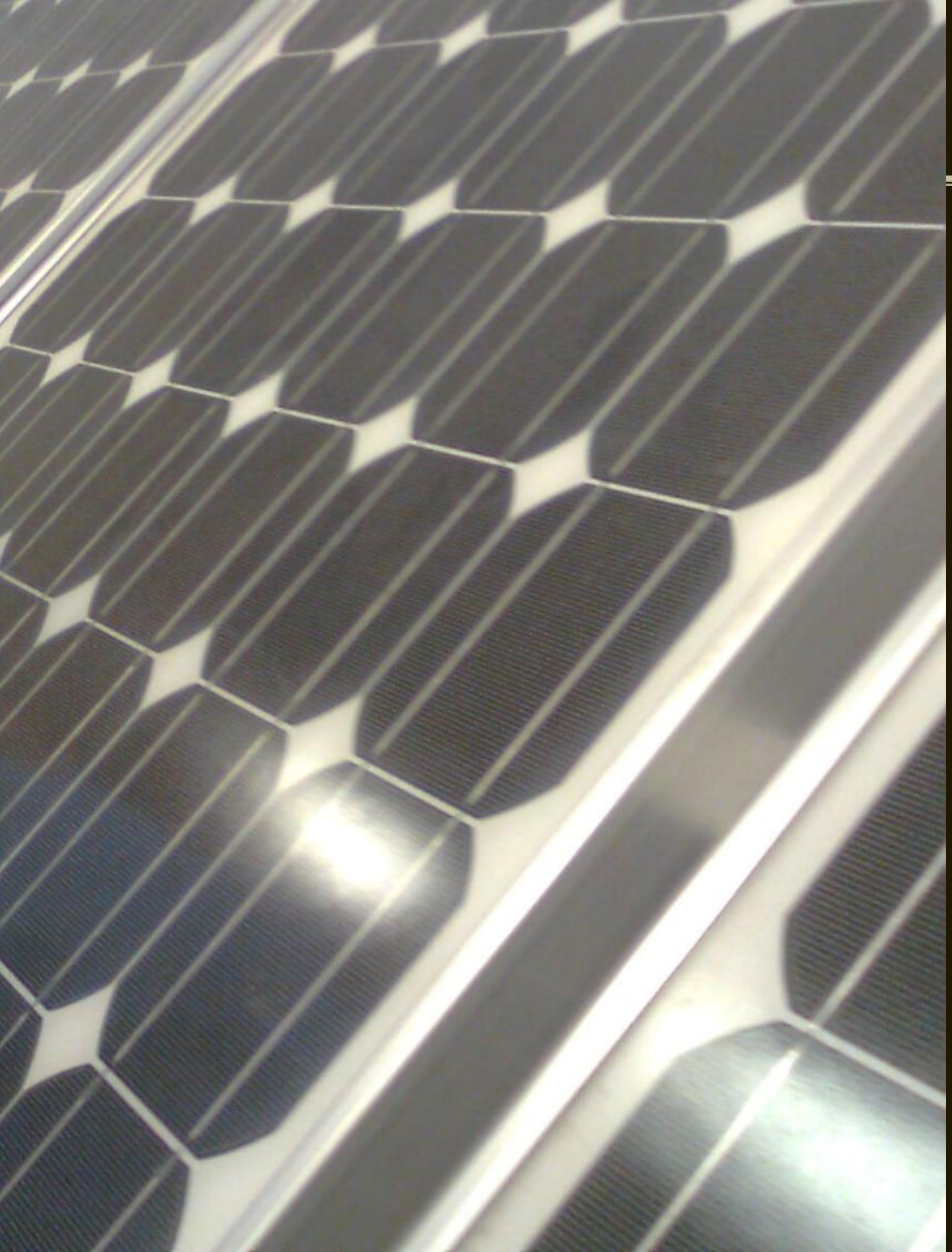
Fairview Cemetery
Willmar
Miller Park


Austin, MN
INSOLATION (kWh/m^2)
Total per Year: 1144.04
Avg per Day: 3.13 (Optimal)
Utility Service Provider:
Austin Utilities
400 4th Street NE
Austin, MN 55912
(507) 433-8886
www.austinutilities.com
MN Incentives/Policies for Solar
Get Started: Contact a Local Installer



What are "Solar Ready" Communities?

Michigan's "Ten Steps to becoming Solar Ready"

STEP 1: BEGIN THE DISCUSSION

STEP 2: ADOPT A RESOLUTION

STEP 3: ESTABLISH A GUIDING POLICY THAT SUPPORTS SOLAR

STEP 4: UPDATE CODE LANGUAGE

STEP 5: CREATE AN EASY-TO-USE PERMITTING PROCESS

STEP 6: PROVIDE EASY ACCESS TO INFORMATION

STEP 7: ESTABLISH SOLAR INSTALLATION TARGETS

STEP 8: TRAIN STAFF

STEP 9: PURSUE SOLAR BUSINESS DEVELOPMENT OPPORTUNITIES

STEP 10: GO THE EXTRA MILE

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STEP 10: GO THE EXTRA MILE

Solar Ready Communities

1. **Comprehensive Plans** that acknowledge and address solar resources and development

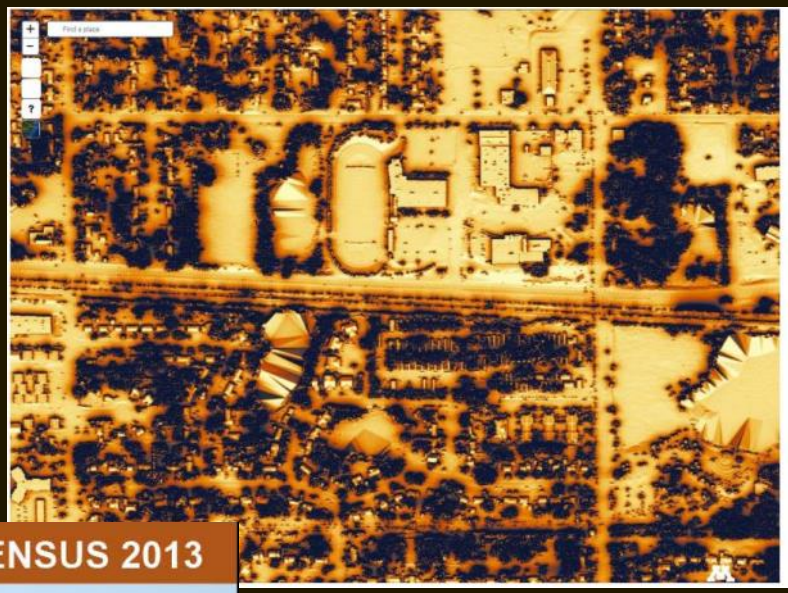
2. **Development Regulations** that explicitly address solar development in its varied forms

3. **Permitting Processes** that are predictable and clear

Solar Ready Communities

Comprehensive Plans that

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



Planning Best Practices

Policy 6.3: Encourage sustainable design practices in the planning, construction and operations of new developments, large additions and building renovations.

- 6.3.4 Encourage developments to utilize renewable energy sources, including solar, wind, geothermal, hydro, and biomass.

City of Minneapolis



Planning Best Practice

- Goal A, Objective 4; Increase the use of agricultural land for agricultural technology uses such as for the production of biodiesel fuels, ethanol production, wind and solar electricity production, and similar uses.

Morrison County, MN

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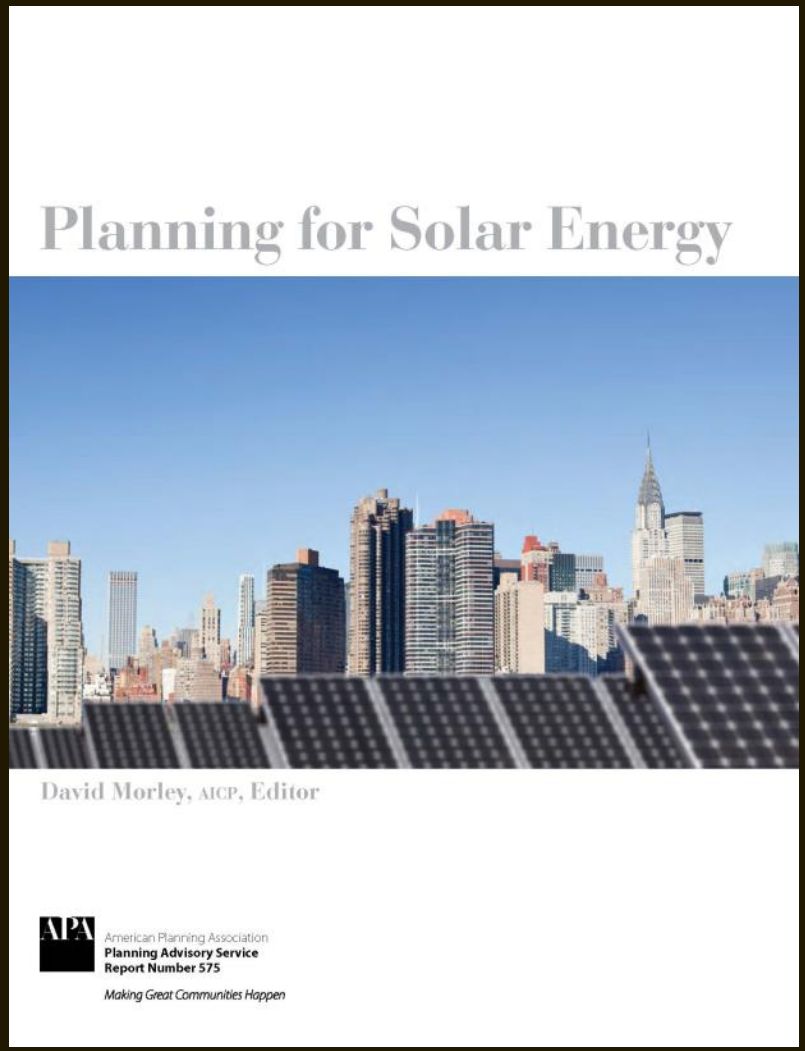
Planning Best Practice

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



Solar Ready Communities

2. 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.

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Basic Solar Energy Zoning

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?**

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Advanced Solar Zoning

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 -** municipal utility, historic preservation, etc.

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Solar as Principal Use

Solar farms, and gardens, and plants . . .

- ✓ **Generally not a listed permitted use** – If not listed, then it's not permitted . . .
- ✓ **Which districts?** Do you want solar farms competing for land in industrial or commercial districts? Agricultural districts?
- ✓ **Conflicts and nuisances?** Agricultural protection (soils, fragmentation), airports, natural resource areas, urban reserves
- ✓ **Solar farms as "interim" use** – brownfields, aggregate reserves, closed landfills

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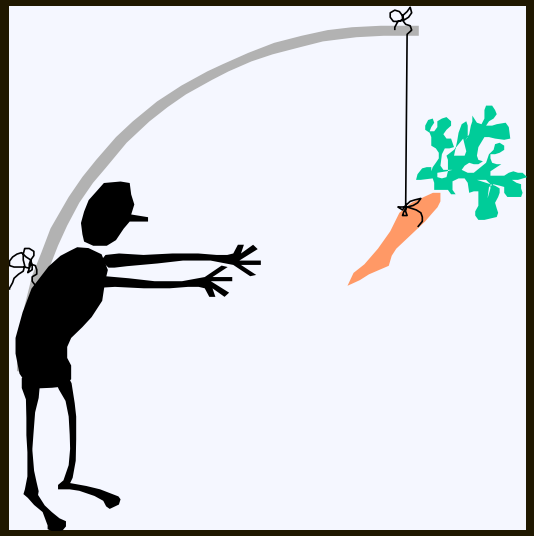
Incentives and Requirements

Does your development regulation use incentives?

- ✓ **Density bonus** for solar development
- ✓ **Protect solar resources** when subdividing
- ✓ **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

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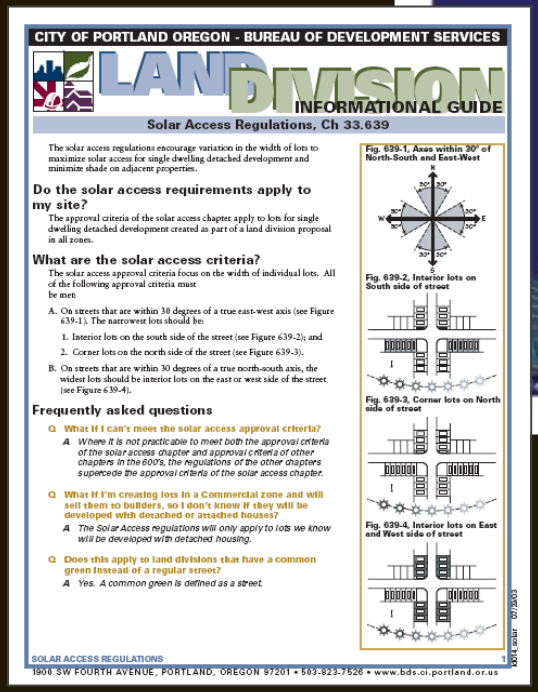
Solar Ready Communities

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



Solar Ready Communities

3. 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

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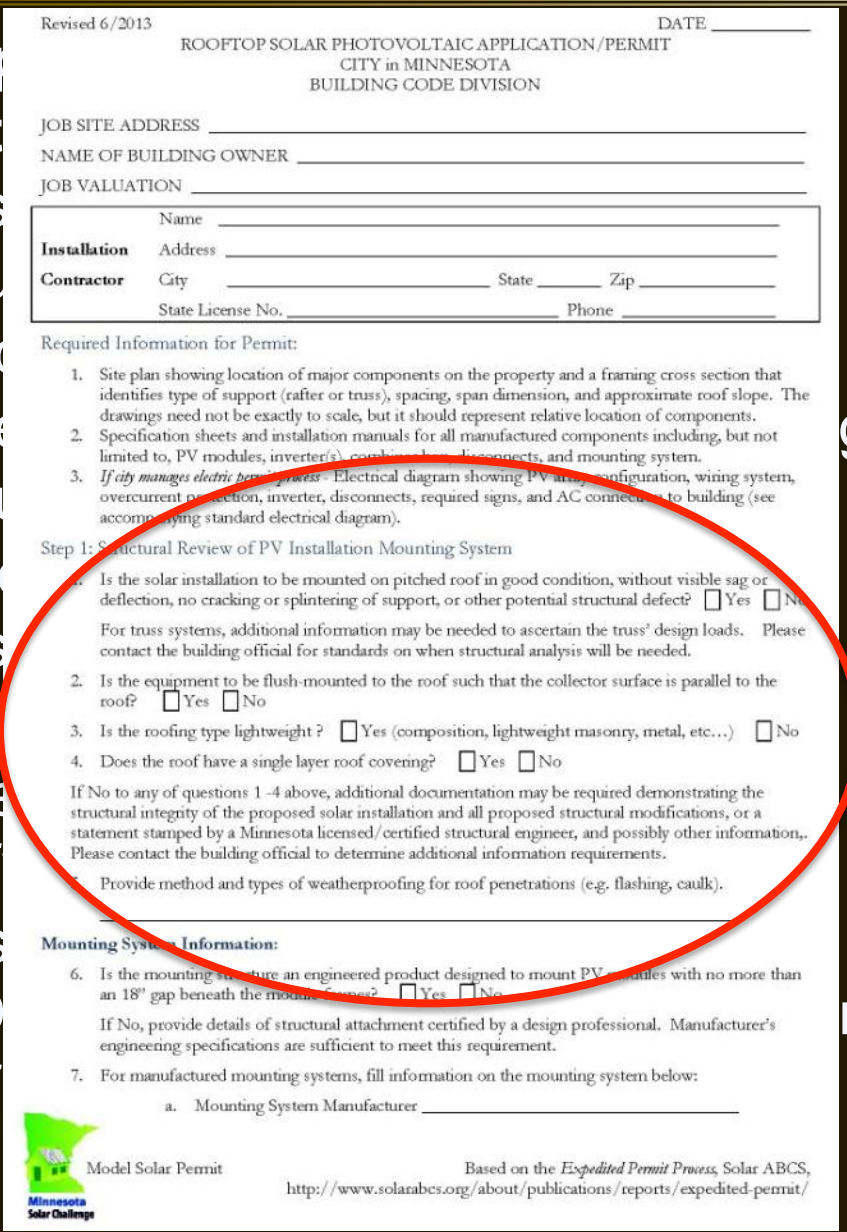
Sample Permit Application



Revised 6/2013 DATE _____

ROOFTOP SOLAR PHOTOVOLTAIC APPLICATION/PERMIT
CITY in MINNESOTA
BUILDING CODE DIVISION

JOB SITE ADDRESS _____

NAME OF BUILDING OWNER _____

JOB VALUATION _____

Installation Contractor

Name _____

Address _____

City _____ State _____ Zip _____

State License No. _____ Phone _____

Required Information for Permit:

1. 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.
2. Specification sheets and installation manuals for all manufactured components including, but not limited to, PV modules, inverter(s), combiner box, disconnects, and mounting system.
3. *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

1. Is the solar installation to be mounted on pitched roof in good condition, without visible sag or deflection, no cracking or splintering of support, or other potential structural defect? ☐ Yes ☐ No

   For truss systems, additional information may be needed to ascertain the truss' design loads. Please contact the building official for standards on when structural analysis will be needed.

2. Is the equipment to be flush-mounted to the roof such that the collector surface is parallel to the roof? ☐ Yes ☐ No
3. Is the roofing type lightweight ? ☐ Yes (composition, lightweight masonry, metal, etc…) ☐ No
4. 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 demonstrating the structural integrity of the proposed solar installation and all proposed structural modifications, or a statement stamped by a Minnesota licensed/certified structural engineer, and possibly other information,. Please contact the building official to determine additional information requirements.

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

   _____

Mounting System Information:

6. Is the mounting structure an engineered product designed to mount PV modules with no more than an 18" gap beneath the modules' 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.

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

   a. Mounting System Manufacturer _____

Minnesota Solar Challenge

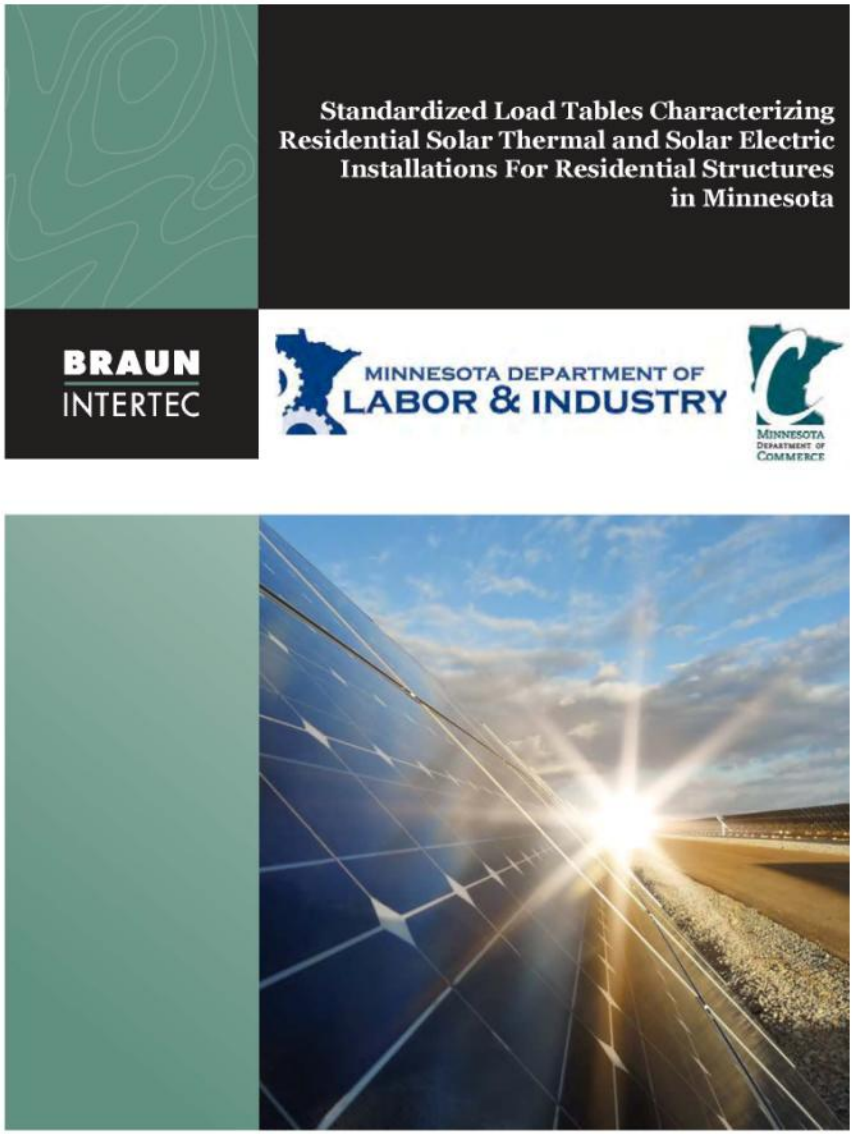
Model Solar Permit

Based on the *Expedited Permit Process*, Solar ABCS, http://www.solarabcs.org/about/publications/reports/expedited-permit/

Standardizing Permitting

Structural engineering study on Minnesota residential rooftop solar installations.

http://mn.gov/commerce/energy/images/FINAL-Standardized-Load-Table-Report.pdf



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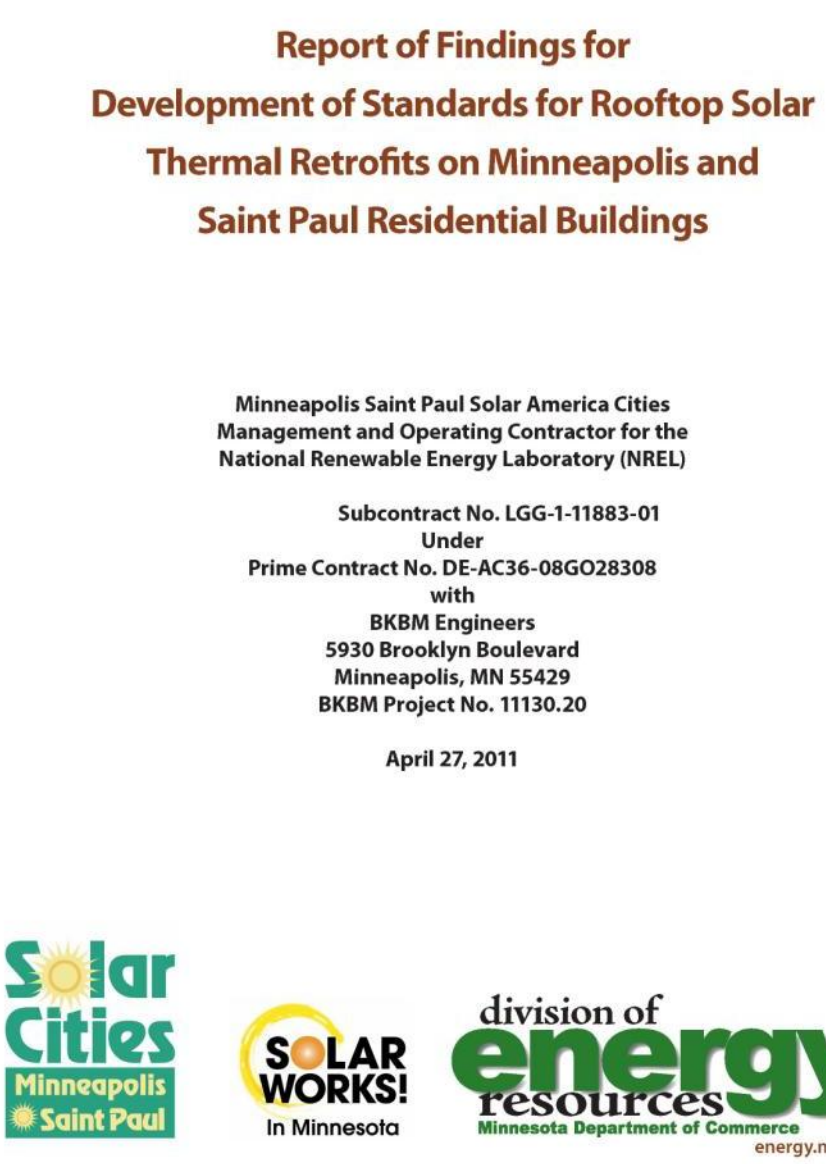
http://mn.gov/commerce/energy/images/SolorRoofsReport.pdf



Report of Findings for
Development of Standards for Rooftop Solar Thermal Retrofits on Minneapolis and Saint Paul Residential Buildings

Minneapolis Saint Paul Solar America Cities
Management and Operating Contractor for the
National Renewable Energy Laboratory (NREL)

Subcontract No. LGG-1-11883-01
Under
Prime Contract No. DE-AC36-08GO28308
with
BKBM Engineers
5930 Brooklyn Boulevard
Minneapolis, MN 55429
BKBM Project No. 11130.20

April 27, 2011

Solar Cities Minneapolis Saint Paul

SOLAR WORKS! In Minnesota

division of energy resources
Minnesota Department of Commerce
energy.mn.gov

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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.
   _____
   _____

04/26/2012 Page 1

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

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   _____
   _____

Permitting Best Practices

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   c. Does the system include battery backup or an uninterrupted power supply (UPS)?
      yes____ no____
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   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.
      _____
      _____

Building Integrated Solar

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:

   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).

   _____

   _____

   _____

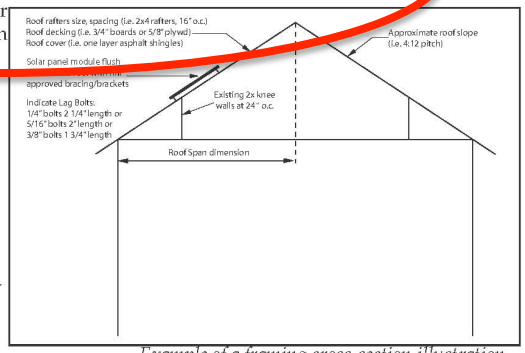
   c. Is system to be mounted according to panel and rack manufacturers' instructions?

   yes____ no____

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

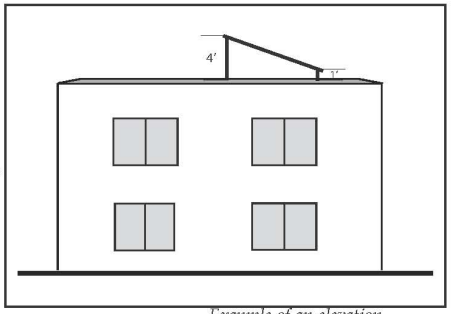
   _____

   _____



Example of a framing cross-section illustration

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.



Example of an elevation

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)?

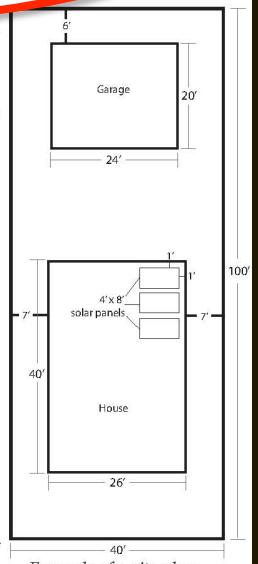
    yes____ no____ (If no, go to question 12)

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

15. 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, invertor 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.

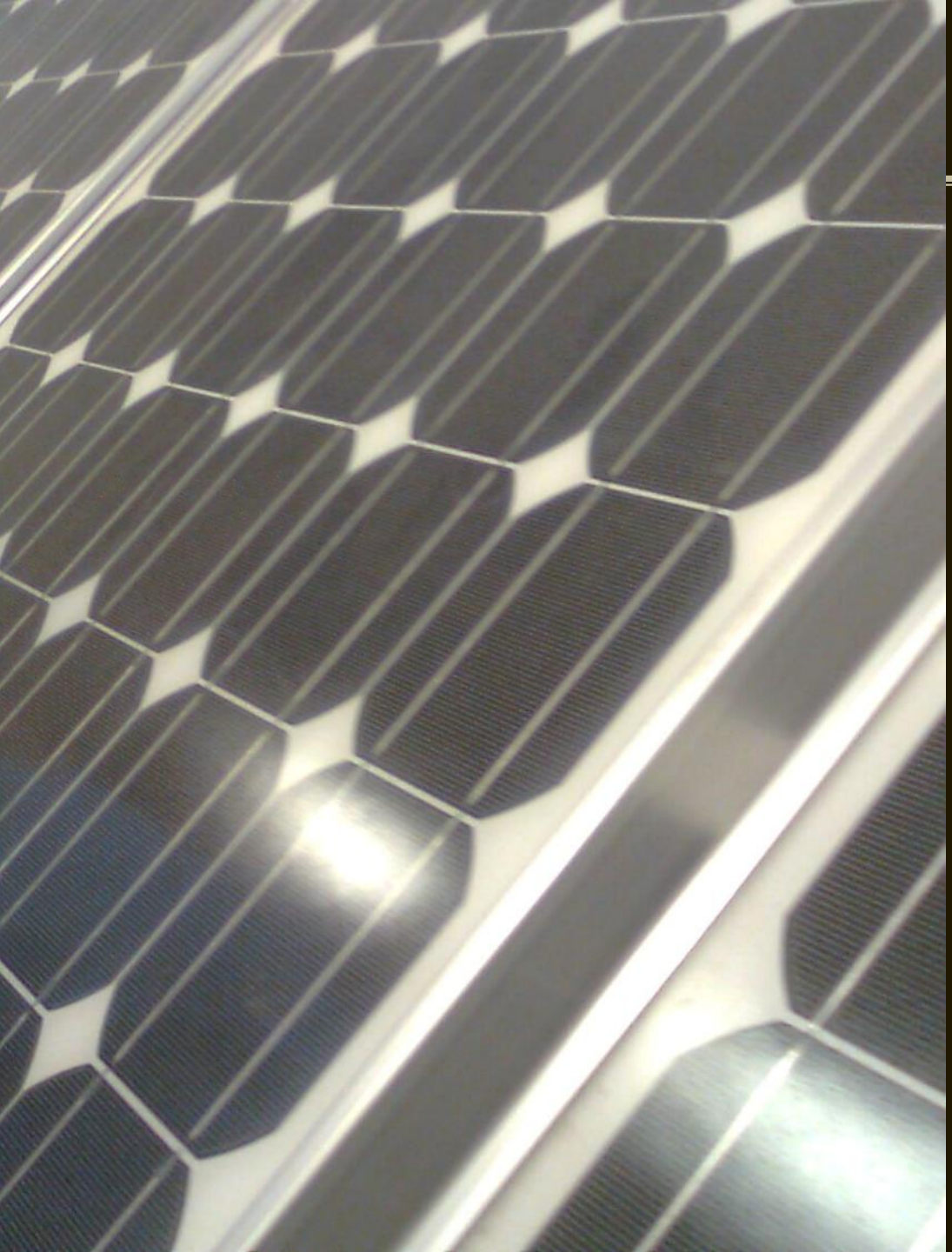
Heritage Preservation

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/AMANDA5/eNtraprise/StPaul/m3list/a_PickProperty.jsp?id=ReadOnlystpaul.

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.



Thank You!

Brian Ross
CR Planning, Inc.
bross@crplanning.com
612-588-4904