DEVELOPING SOLAR READY COMMUNITIES

SOLAR POWERING IOWA
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GREAT PLAINS INSTITUTE
Better Energy. Better World.

Our Mission . . .

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

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

If you remember one thing . . .

1. **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 . . .

2. 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

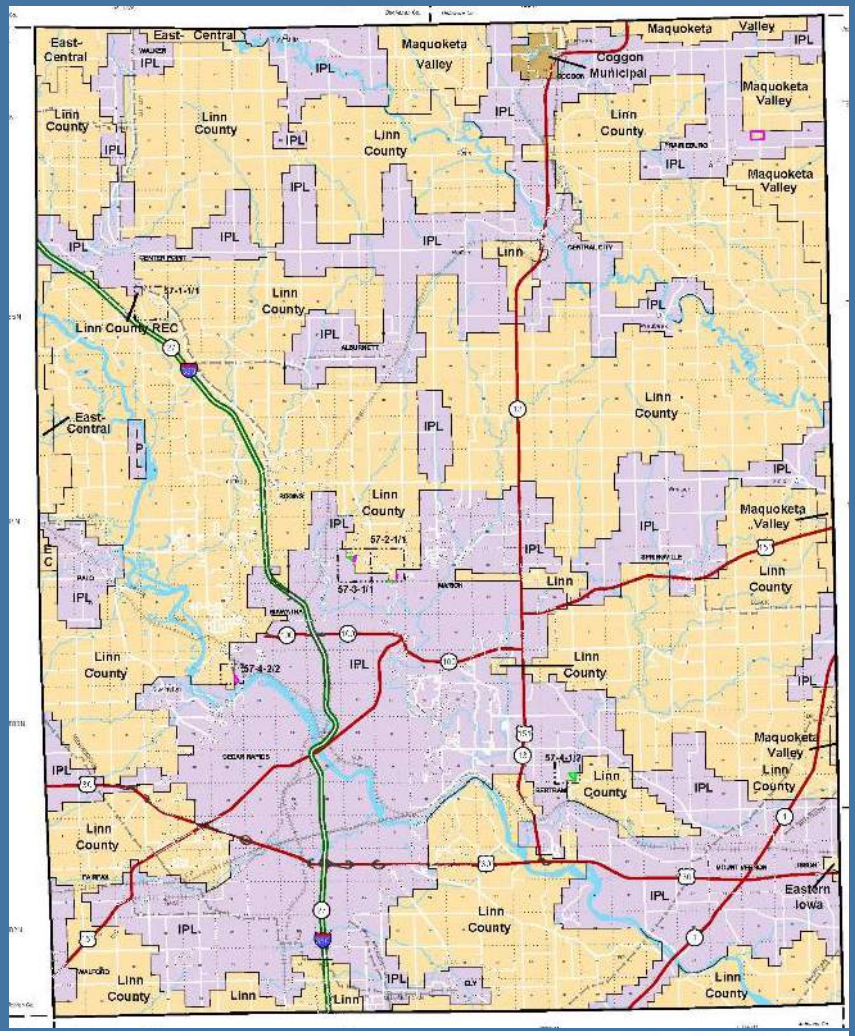
Iowa Solar Ready Communities

Project Objectives

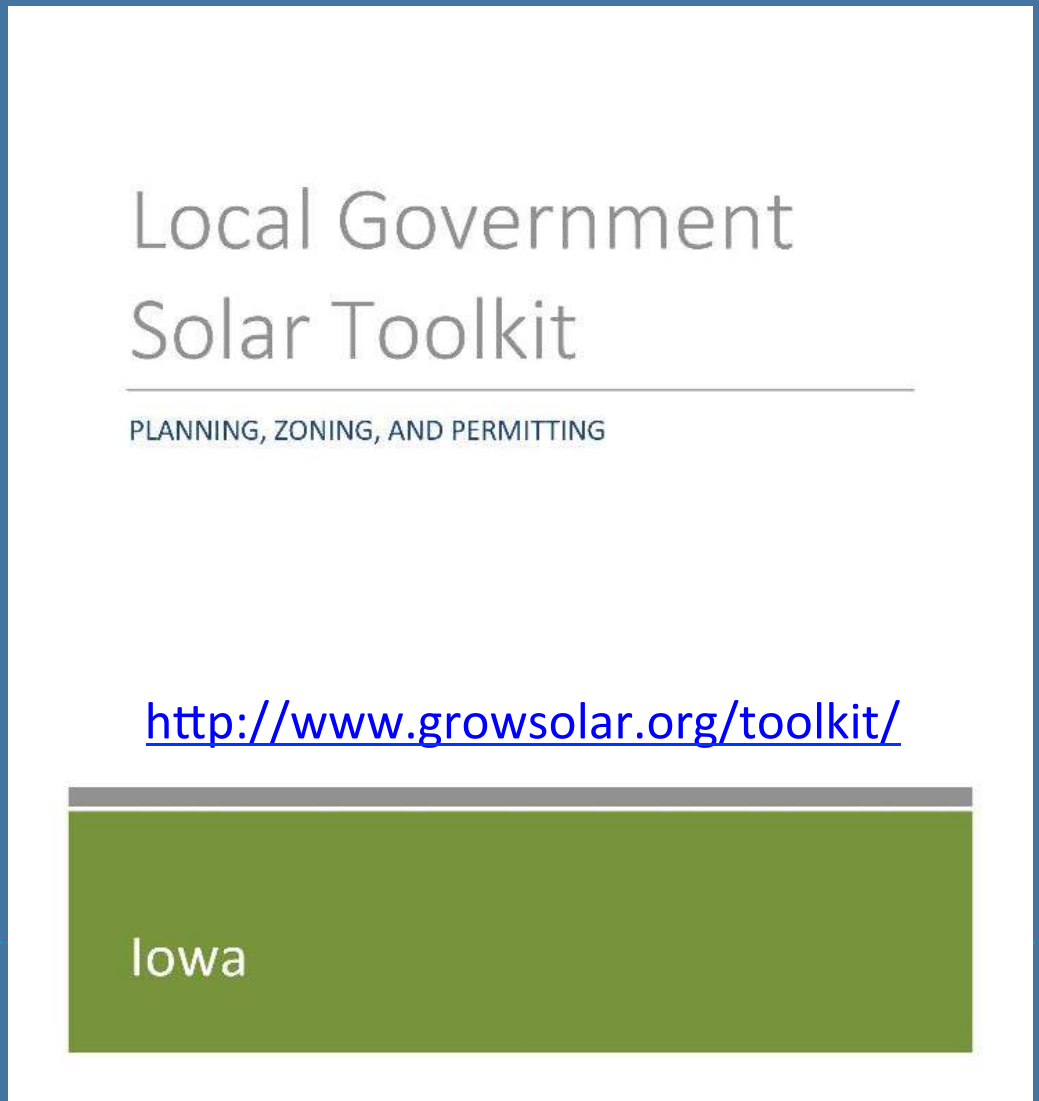
- ✓ Engage stakeholders and create collaborative effort to promote solar energy
- ✓ Increase knowledge of solar PV benefits and barriers
- ✓ Promote standardization of regulation and permitting
- ✓ Provide communities with solar planning and zoning resources
- ✓ Identify and evaluate policy options to further reduce "soft costs" of solar development

Five Pilot Communities

- ✓ Linn County
- ✓ City of Cedar Rapids
- ✓ City of Dubuque
- ✓ City of Des Moines
- ✓ Floyd County

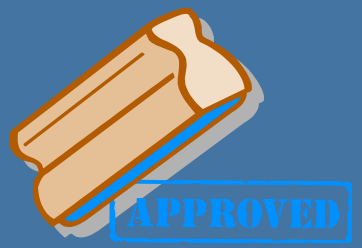


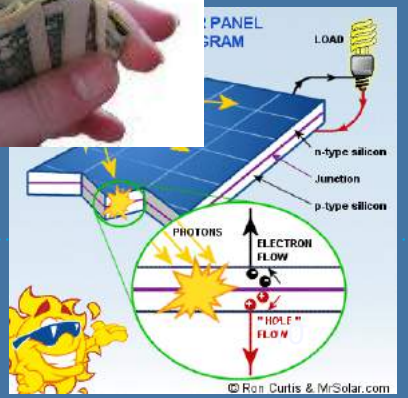
Everything You Wanted to Know about Solar Ready Best Practices . . .



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 Resources

Solar Resources . . .

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

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

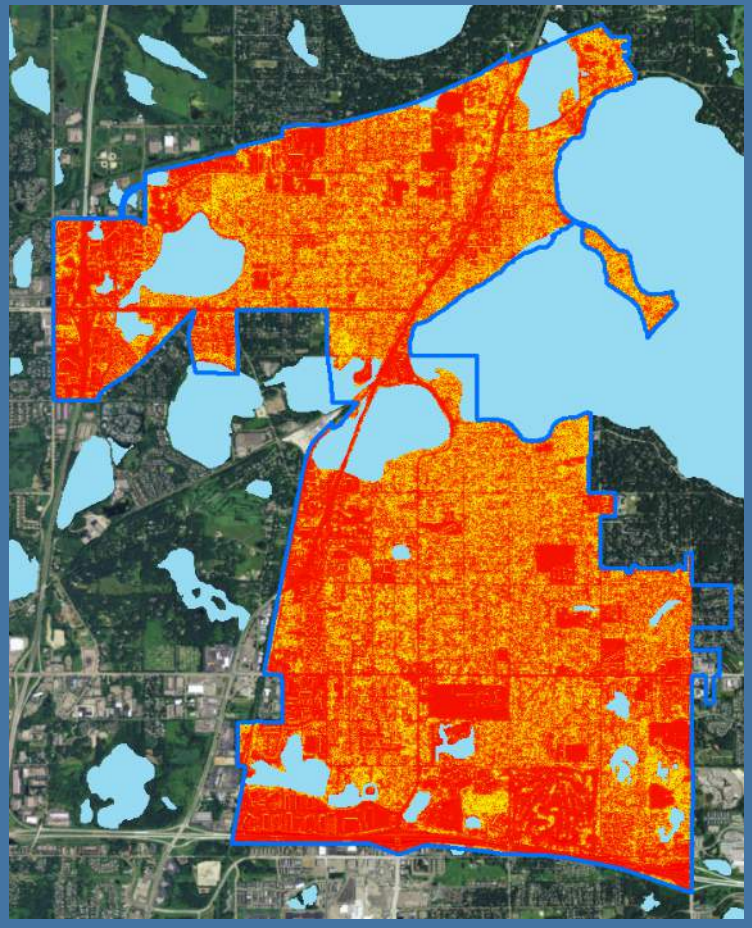
An adequate solar resource location is unshaded for several hours every day (around solar noon), both now and well into the future.

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.

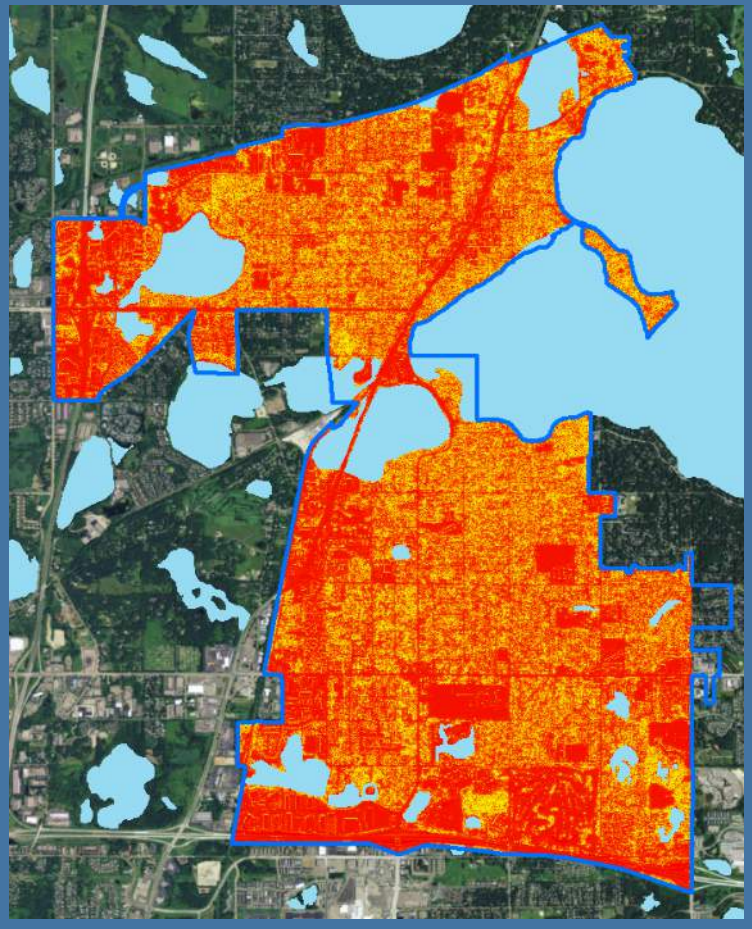
  (SEC definition of proved reserves)

Solar Reserves



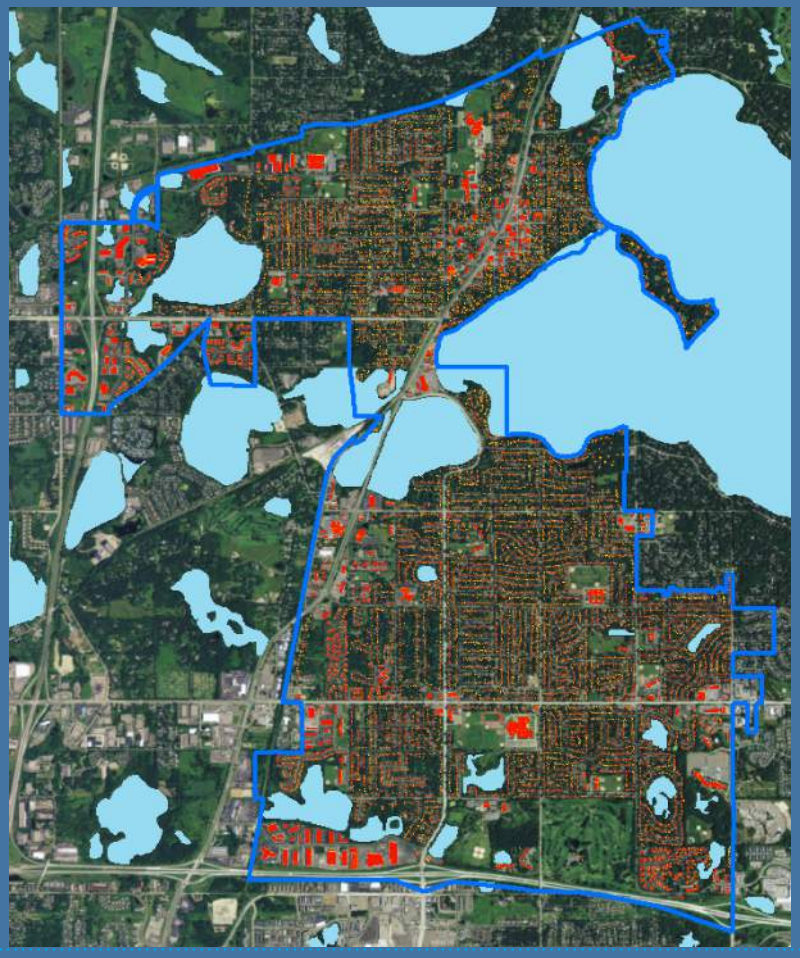
Gross “reserves” sum up the total annual watt hours of sunlight hitting the land surface, and converts that total into a hypothetical electric production using current technologies.

Solar Reserves



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 is generally does not have

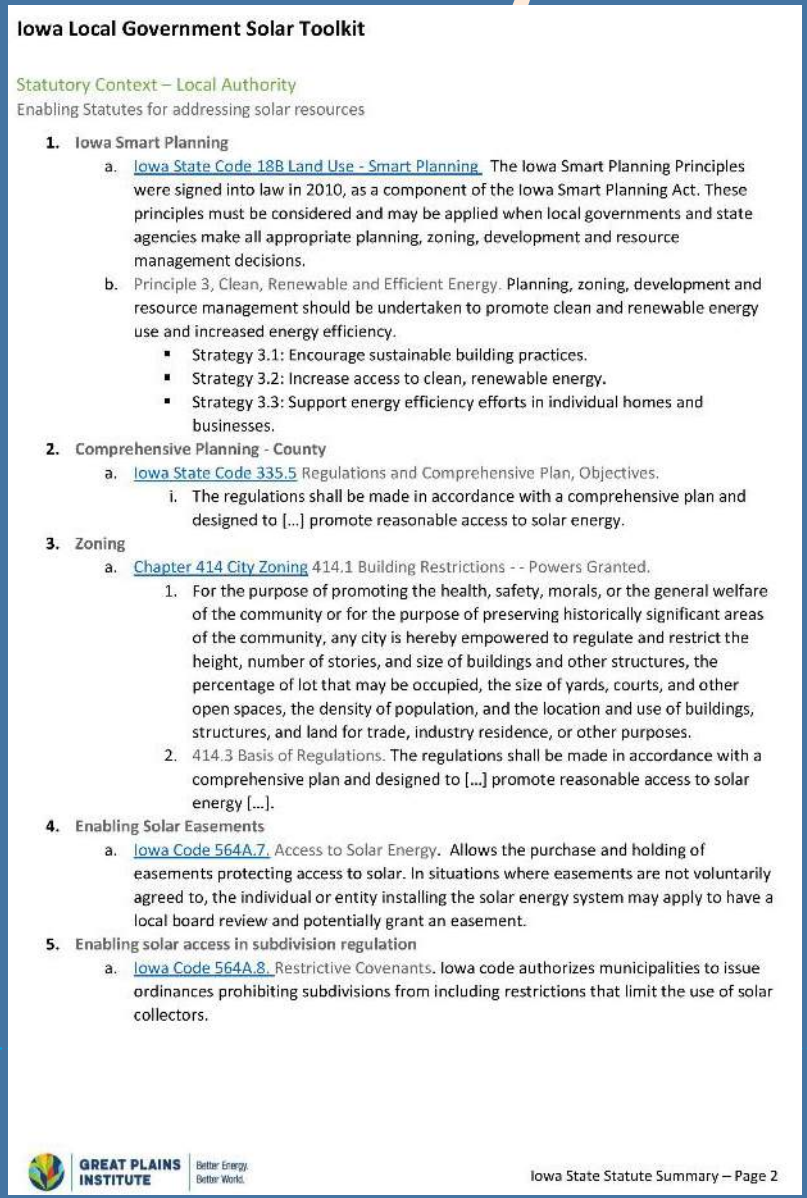
Rooftop Solar Reserve

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.

Iowa Solar Toolkit: Best Practices and Resources

Statutory Context – State Policy

- ✓ Policies to promote solar development
- ✓ Incentives in Statute
- ✓ Encouraging local solar policy development
- ✓ Enabling powers for local protection of solar resources and rights to solar installation



Iowa Local Government Solar Toolkit

Statutory Context – Local Authority

Enabling Statutes for addressing solar resources

1. Iowa Smart Planning
   a. Iowa State Code 18B Land Use - Smart Planning. The Iowa Smart Planning Principles were signed into law in 2010, as a component of the Iowa Smart Planning Act. These principles must be considered and may be applied when local governments and state agencies make all appropriate planning, zoning, development and resource management decisions.
   b. Principle 3, Clean, Renewable and Efficient Energy. Planning, zoning, development and resource management should be undertaken to promote clean and renewable energy use and increased energy efficiency.
      - Strategy 3.1: Encourage sustainable building practices.
      - Strategy 3.2: Increase access to clean, renewable energy.
      - Strategy 3.3: Support energy efficiency efforts in individual homes and businesses.
2. Comprehensive Planning - County
   a. Iowa State Code 335.5 Regulations and Comprehensive Plan, Objectives.
      i. The regulations shall be made in accordance with a comprehensive plan and designed to [...] promote reasonable access to solar energy.
3. Zoning
   a. Chapter 414 City Zoning 414.1 Building Restrictions - - Powers Granted.
      1. For the purpose of promoting the health, safety, morals, or the general welfare of the community or for the purpose of preserving historically significant areas of the community, any city is hereby empowered to regulate and restrict the height, number of stories, and size of buildings and other structures, the percentage of lot that may be occupied, the size of yards, courts, and other open spaces, the density of population, and the location and use of buildings, structures, and land for trade, industry residence, or other purposes.
      2. 414.3 Basis of Regulations. The regulations shall be made in accordance with a comprehensive plan and designed to [...] promote reasonable access to solar energy [...].
4. Enabling Solar Easements
   a. Iowa Code 564A.7. Access to Solar Energy. Allows the purchase and holding of easements protecting access to solar. In situations where easements are not voluntarily agreed to, the individual or entity installing the solar energy system may apply to have a local board review and potentially grant an easement.
5. Enabling solar access in subdivision regulation
   a. Iowa Code 564A.8. Restrictive Covenants. Iowa code authorizes municipalities to issue ordinances prohibiting subdivisions from including restrictions that limit the use of solar collectors.

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Iowa State Statute Summary – Page 2

Solar Ready Communities

A. Comprehensive Plans that:

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

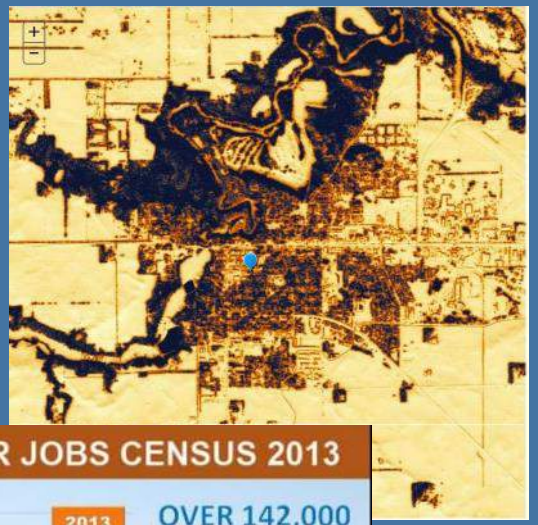


Photo credit: Fresh Energy/Giving Tree

Smart Planning Statute

3. **Clean, renewable, and efficient energy**. Planning, zoning, development, and resource management should be undertaken to promote clean and renewable energy use and increased energy efficiency.

Best Practice:
Acknowledge the value of solar resources and recognize and enable the varied forms of solar development in plans, policies, and regulations.

Smart Planning Statute

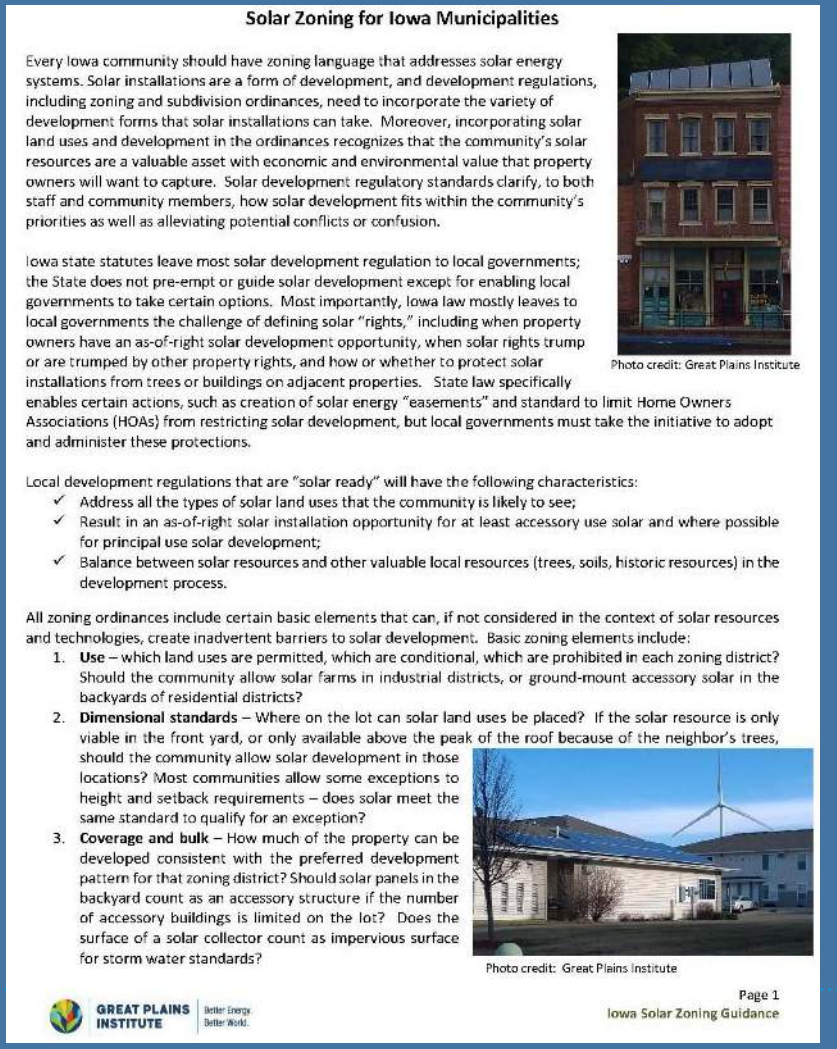
2. **Efficiency, transparency, and consistency**. Planning, zoning, development, and resource management should be undertaken to provide efficient, transparent, and consistent outcomes. Individuals, communities, regions, and governmental entities should share in the responsibility to promote the equitable distribution of development benefits and costs.

Best Practice: Regulations and permitting processes should be transparent, predictable, and consistent with surrounding jurisdictions.

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.



Solar Zoning for Iowa Municipalities

Every Iowa 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 regulatory standards clarify, to both staff and community members, how solar development fits within the community's priorities as well as alleviating potential conflicts or confusion.

Photo credit: Great Plains Institute

Iowa 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, Iowa law mostly 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. State law specifically enables certain actions, such as creation of solar energy "easements" and standard to limit Home Owners Associations (HOAs) from restricting solar development, but local governments must take the initiative to adopt and administer these protections.

Local 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** – Where on the lot can solar land uses 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 number of accessory buildings is limited on the lot? Does the surface of a solar collector count as impervious surface for storm water standards?

Photo credit: Great Plains Institute

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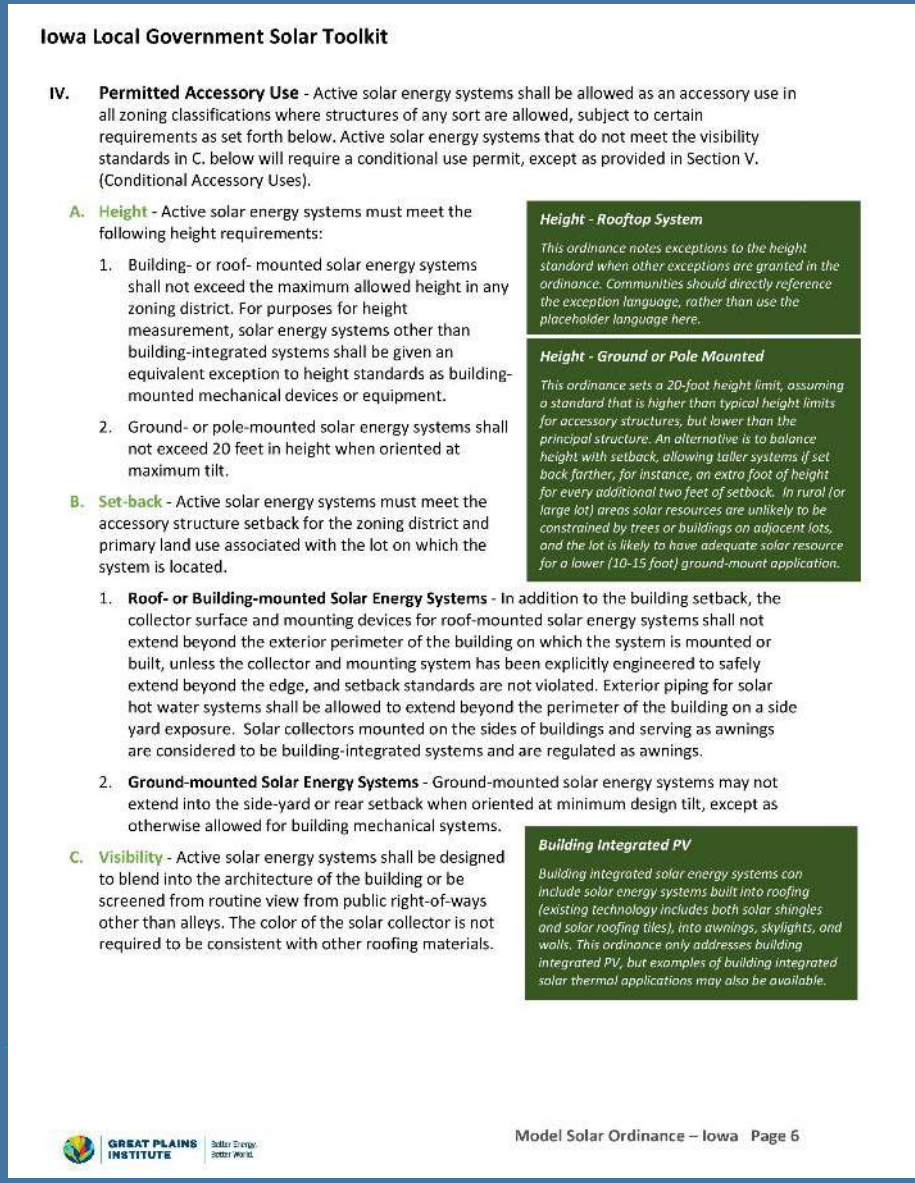
Page 1
Iowa Solar Zoning Guidance

Planning Best Practices

Model Ordinance:

1. Language addressing solar as accessory uses
2. Language addressing solar as a principle use (solar farms, solar gardens)



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.

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.

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.

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.

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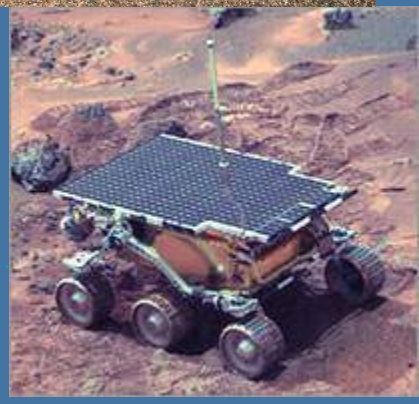
Model Solar Ordinance – Iowa Page 6

Basic Solar Energy Zoning – Accessory Uses

Do your basic zoning tools 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?

Solar Land Uses

Principal Uses

- ✓ When solar land uses are the primary use on the lot or parcel
- ✓ Defines the land use on the parcel for the next 25 – 30 years
- ✓ Technology limited to ground-mount solar electric systems (solar farms and gardens)

Photo credit: 8minuteenergy

Solar as Principal Use

Solar farms and gardens . . .

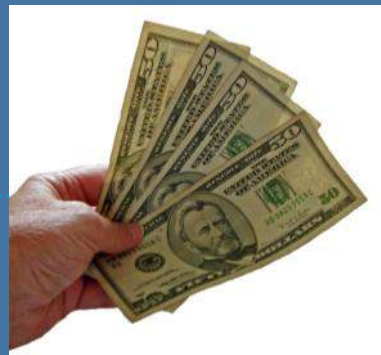
- ✓ **Permitted?** – If not listed, then it's not permitted . . .
- ✓ **Which districts?** Do you want solar farms competing for land in industrial or commercial districts? Agricultural districts?
- ✓ **Conflicts and nuisances?** Agricultural protection (soils, fragmentation), airports, natural resource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

Photo credit: 8minuteenergy

Solar Ready Communities

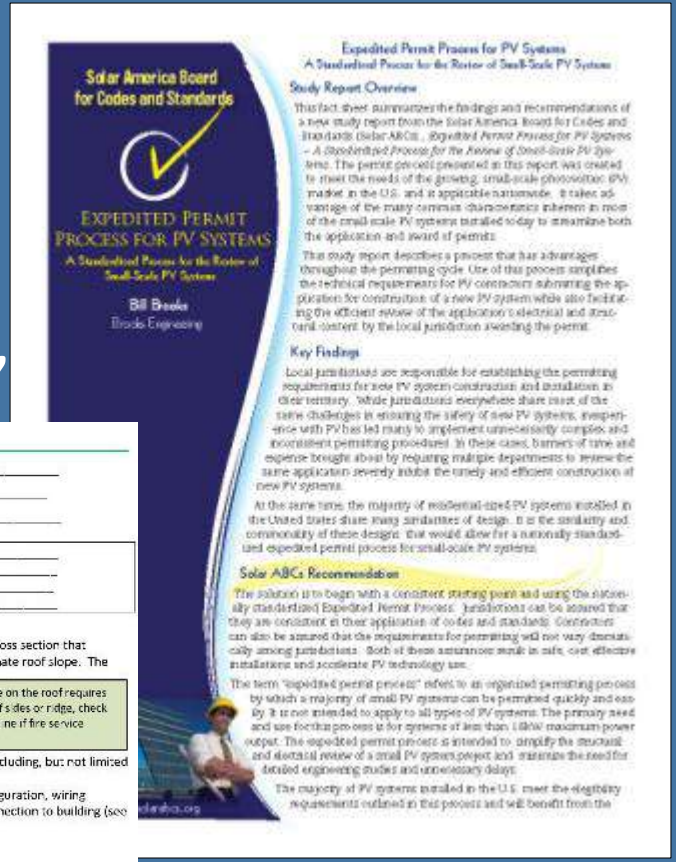
C. Permitting practices that:

- ✓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

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 this 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, inexperience 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 safe, 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 15kW maximum power output. The expedited permit process is intended to simplify the structural and electrical review of a small PV system project and minimize 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

solarabcs.org

Iowa 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:

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. 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.
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 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
2. Is the roof a rafter system? ☐Yes ☐No
3. Is the equipment to be flush-mounted to the roof such that the collector surface is parallel to the roof? ☐Yes ☐No

   For truss systems, additional information may be needed to ascertain the truss' design loads. The SolarStructool (http://www.powerolar.org/wp-content/uploads/2012/05/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.
4. Is the roofing type lightweight? ☐Yes (composition, lightweight masonry, metal, etc...) ☐No
5. Does the roof have a single layer roof covering? ☐Yes ☐No

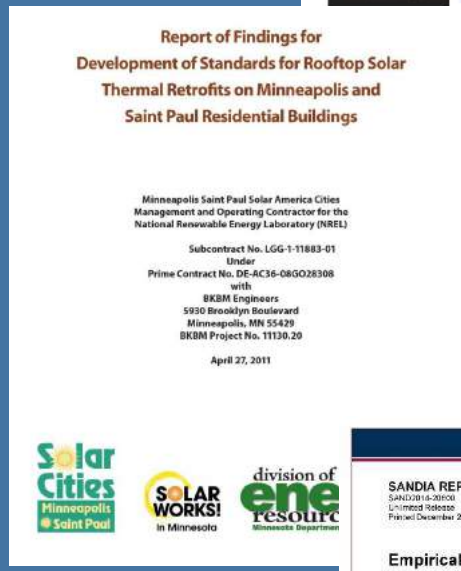
If "No" to any of questions 1-4 above, additional documentation may be required. Documentation may need to demonstrate the structural integrity of the roof and all necessary structural modifications needed to maintain integrity. A statement stamped by an Iowa licensed/certified structural engineer certifying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

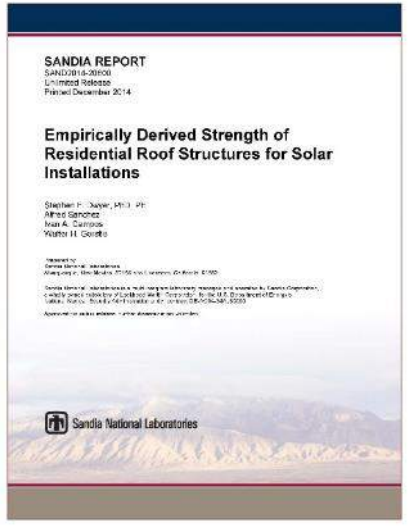
6. Identify method and types of weatherproofing for roof penetrations (e.g. flashing, caulk).

Standardizing Permitting

Structural engineering studies on residential rooftop solar installations.

- ✓ http://mn.gov/commerce/energy/images/SolorRoofsReport.pdf
- ✓ http://mn.gov/commerce/energy/images/FINAL-Standardized-Load-Table-Report.pdf
- ✓ http://prod.sandia.gov/techlib/access-control.cgi/2014/1420600.pdf





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.

Thank You!

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