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Webinar Series for Comprehensive Plan Updates

Comprehensive Planning for Solar Energy Systems

Presented by Eric Wojchik and Brian Ross
November 10, 2016

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Metropolitan Land Planning Act

Statute 472,859, Subd. 2.

- ✓**Land use plan**. (b) A land use plan shall contain a protection element, as appropriate, for historic sites, the matters listed in the water management plan required by section 103B.235, **and an element for protection and development of access to direct sunlight for solar energy systems.**

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The Requirement of Planning for Solar Energy Systems

Solar Resource Protection

Solar Resource Development

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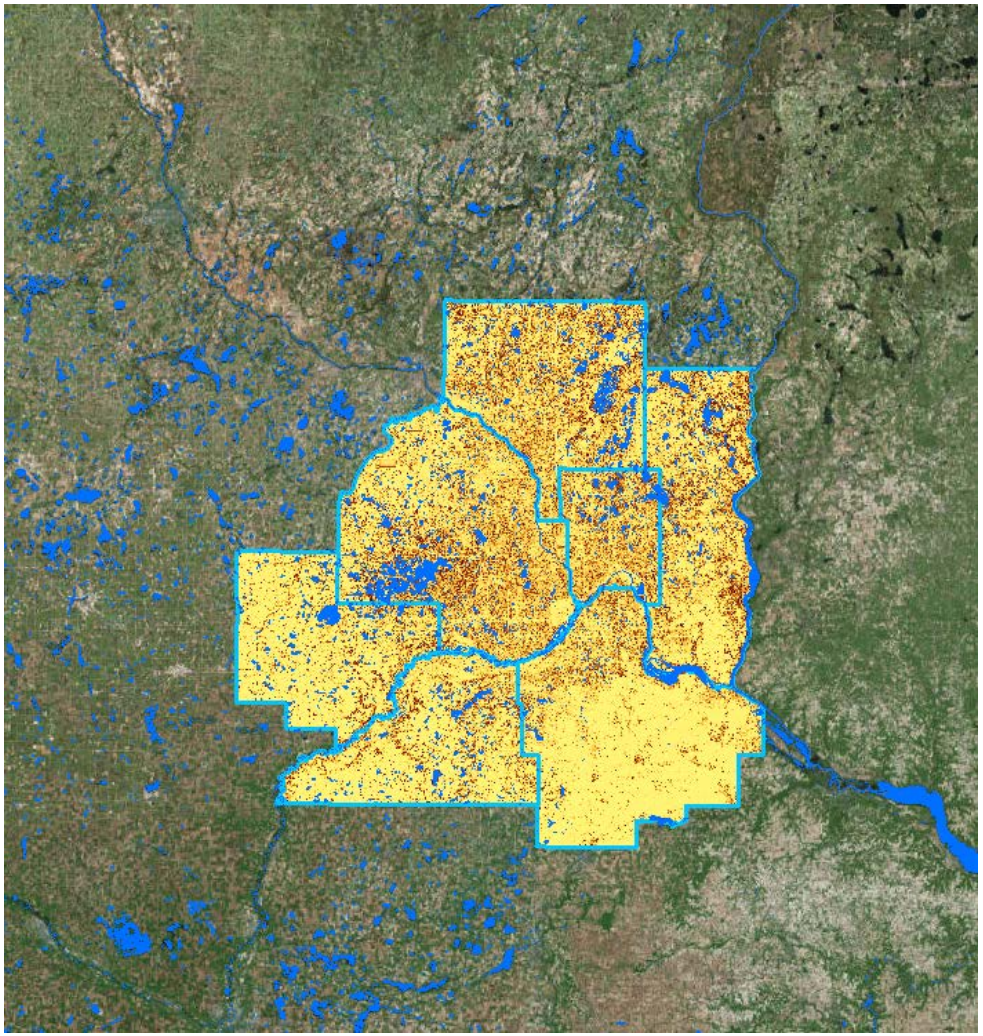
Solar Resource Protection Map

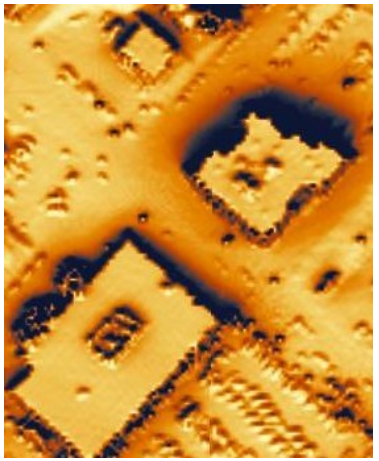


https://solarapp.gisdata.mn.gov/solarapp/

Solar Resource Protection Map

How does the solar map allow for the protection of access to direct sunlight for solar energy systems?

Answer: The map averages the hourly solar resource for 365 days a year. The map includes the shading affect which therefore accurately demonstrates the solar resources available at the community scale and, often times, at the site scale.



Solar Resource Protection Map

Does the solar map take account of recent development?

Answer: One limitation of the map is that it represents a snapshot in time. Development beyond the year 2011 will not be depicted, but for the purposes of calculating a community's overall solar resource, the map provides sufficient information.

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)

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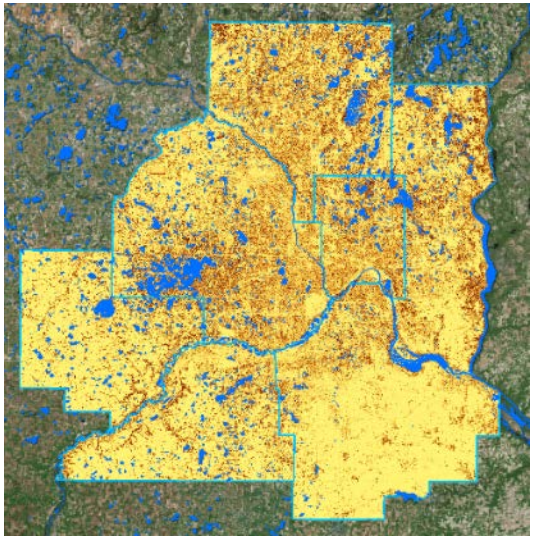
What are Solar “Reserves”?

- ✓**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.



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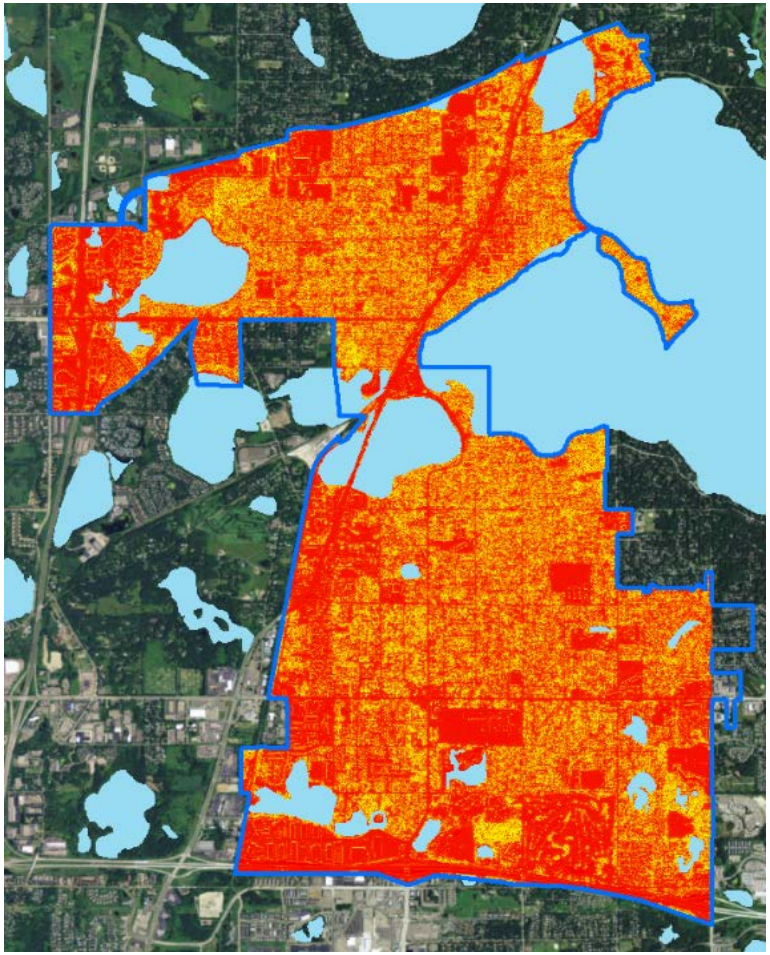
Example – Local Solar Reserves



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.

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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.

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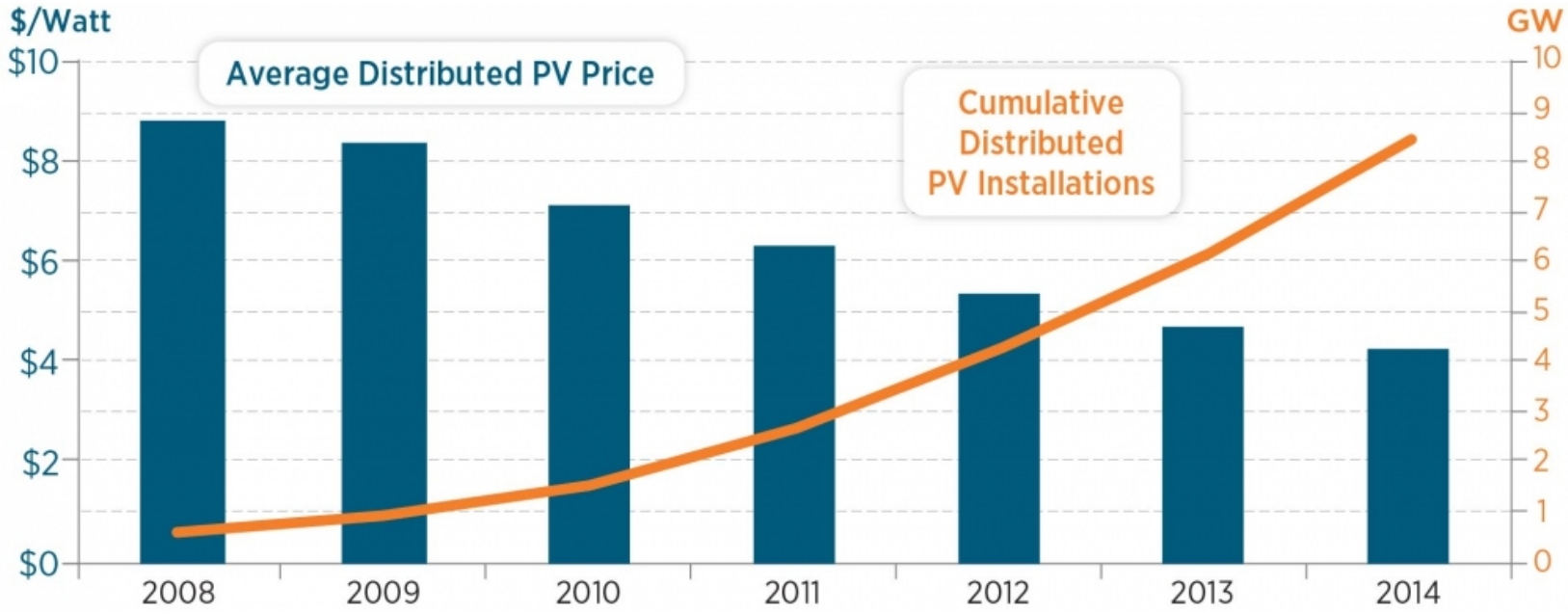
Market Conditions

Accessory Solar Development

Since 2008 (previous Comprehensive Plan cycle)....

> 54% reduction in the installed cost of rooftop solar

> 800% increase in rooftop installed capacity



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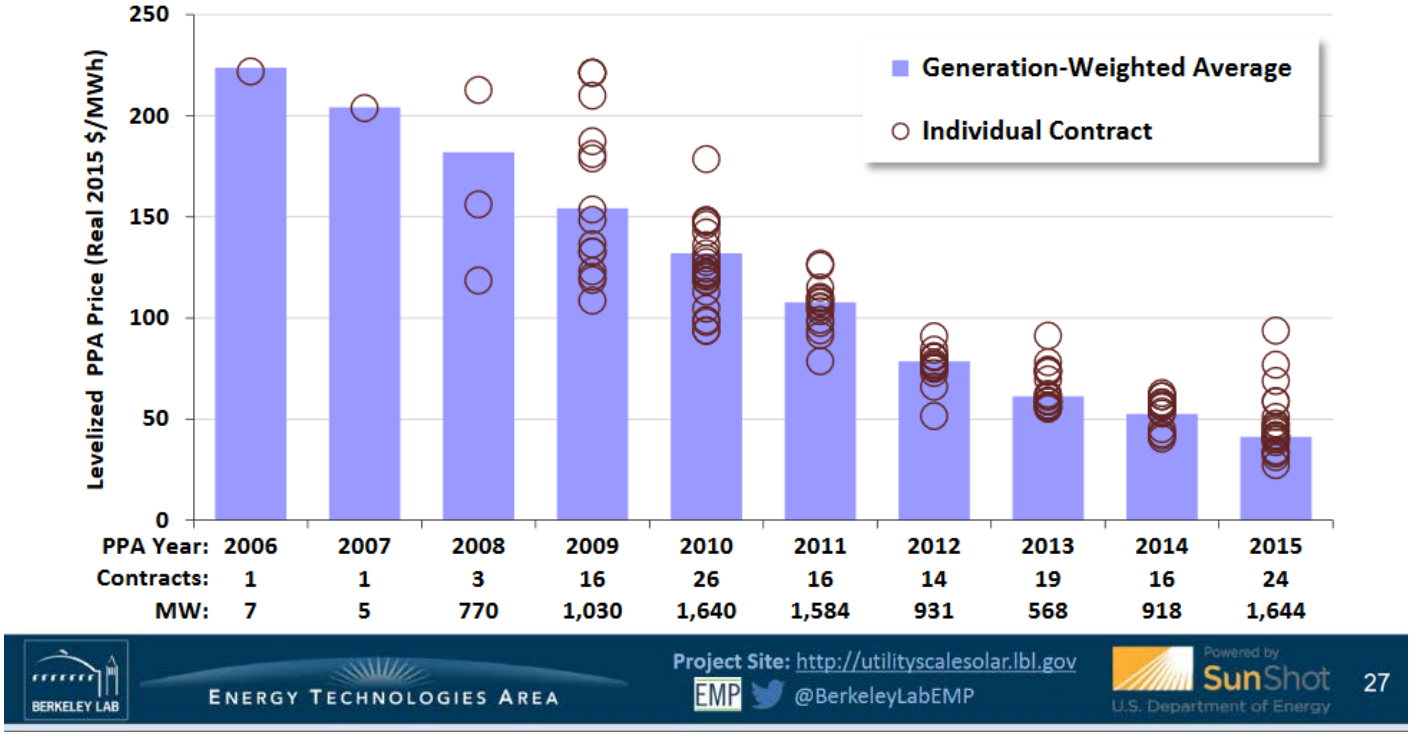
Market Conditions
Principal Solar Development

On average, Purchased Power Agreement (PPA) prices have fallen by nearly 75% since 2009



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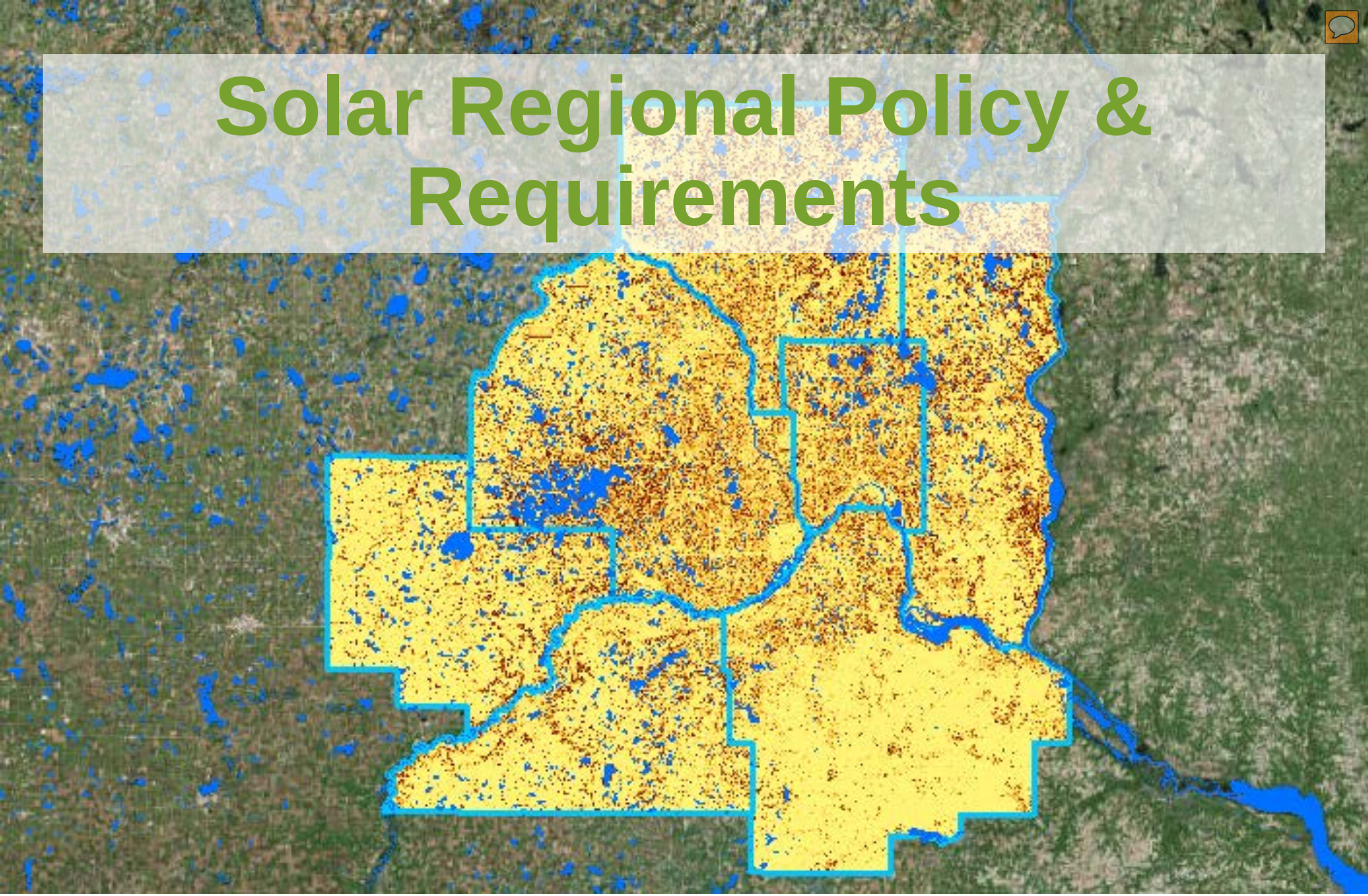
Solar Regional Policy & Requirements



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Thrive MSP 2040

Land Use Policy – Building in Resilience Council Role

- **Encourage** the preparation of adaptation, mitigation, and resiliency responses to climate change as part of the comprehensive plan update.

- **Provide** technical assistance and toolkit resources to communities in integrating climate change mitigation and adaptation strategies as part of local comprehensive plans

Thrive MSP 2040

Land Use Policy – Building in Resilience Community Role

- **Ensure** that local comprehensive plans and ordinances protect and enable the development of solar resources, as required by the Metropolitan Land Planning Act, and consider the use of other alternative energy sources as part of the planning process.

- **Consider** the development or use of community solar gardens (CSGs) by public and private entities to enable fuller and more economic use of the community's solar resource, including participating as subscribers, assisting in marketing community solar garden opportunities for economic development, and providing sites for gardens to be developed.

Community Vision

Desired Conditions

Existing Conditions

Strategies & Evaluation

Implement & Evaluate

2040 Comprehensive Plan

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Plan Elements

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Integration of Resilience

Resilience

Solar Resource Protection & Development

- Land Use
- Transportation
- Water Resources
- Parks & Trails
- Housing
- Economic Competitiveness
- Implementation

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Solar Resource Protection Requirement

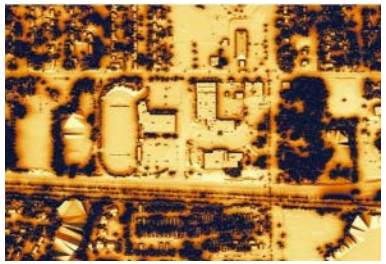
Communities with Land Use Authority - Existing Conditions

- The Council will provide the following resources to communities to provide an 'element for protection and development of access to direct sunlight for solar energy systems' within the Comprehensive Plan:

Calculation of Gross Solar MWh

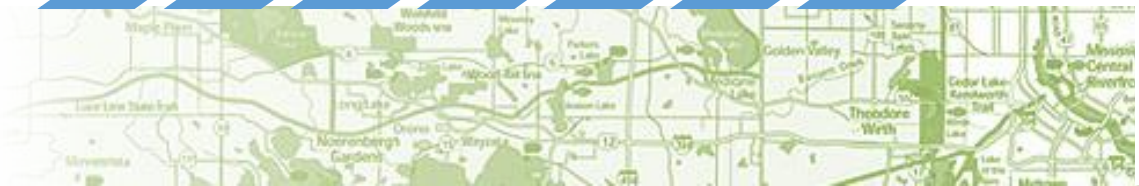
LOCAL PLANNING HANDBOOK

Calculation of Rooftop Solar in MWh



MN Solar Suitability Analysis App

A Community Map of Gross Solar Resources



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Solar Resource Development Requirement

Communities with Land Use Authority - Desired Conditions

- The Council will provide the following resources to communities to provide an 'element for protection and development of access to direct sunlight for solar energy systems' within the Comprehensive Plan:

LOCAL PLANNING HANDBOOK

Policy

Implementation Strategy

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Minimum Solar Requirements

Communities with Land Use Authority - Solar Resource Protection & Development

- The Council will provide the following resources to communities to provide an 'element for protection and development of access to direct sunlight for solar energy systems' within the Comprehensive Plan:

LOCAL PLANNING HANDBOOK

Existing Conditions

Resource Protection

Map & Calculation

Desired Conditions

Resource Development

Policy & Implementation Strategy

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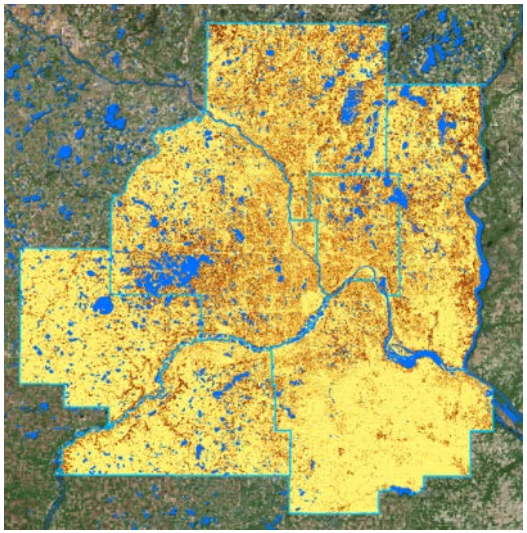
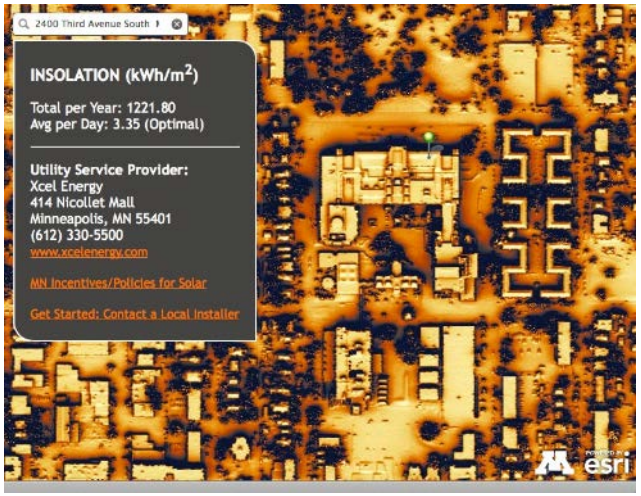
The Solar Requirement

What is the difference between the solar element requirement in the 2030 and 2040 Comprehensive Plan Updates?

Answer: The requirement is the same, but the need and ability to satisfy the statutory requirement has changed given new market realities and the fact that new data exists that will be made available to all metropolitan communities.





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The Solar Requirement

Does the Metropolitan Council require a minimum amount of solar resource development for metropolitan communities?

Answer: No, there is no minimum MWh requirement for solar resource development detailed within statue.

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The Solar Requirement

What happens if a community does not include the solar calculations/community solar map along with a solar policy and implementation strategy in the 2040 Comprehensive Plan Update?

Existing Conditions – Solar Resource Protection
It is expected that communities will include the gross solar and rooftop solar calculations, along with the community solar map within the Comprehensive Plan Update in order to satisfy the resource protection requirement.

Desired Conditions – Solar Resource Development
In order to satisfy the resource development requirement, communities will need to include a policy and implementation strategy for the development and direct access to sunlight for solar energy systems.

Summary
For communities with land use authority, if the above information is not included in the Comprehensive Plan Update, the Plan will be considered **incomplete**.

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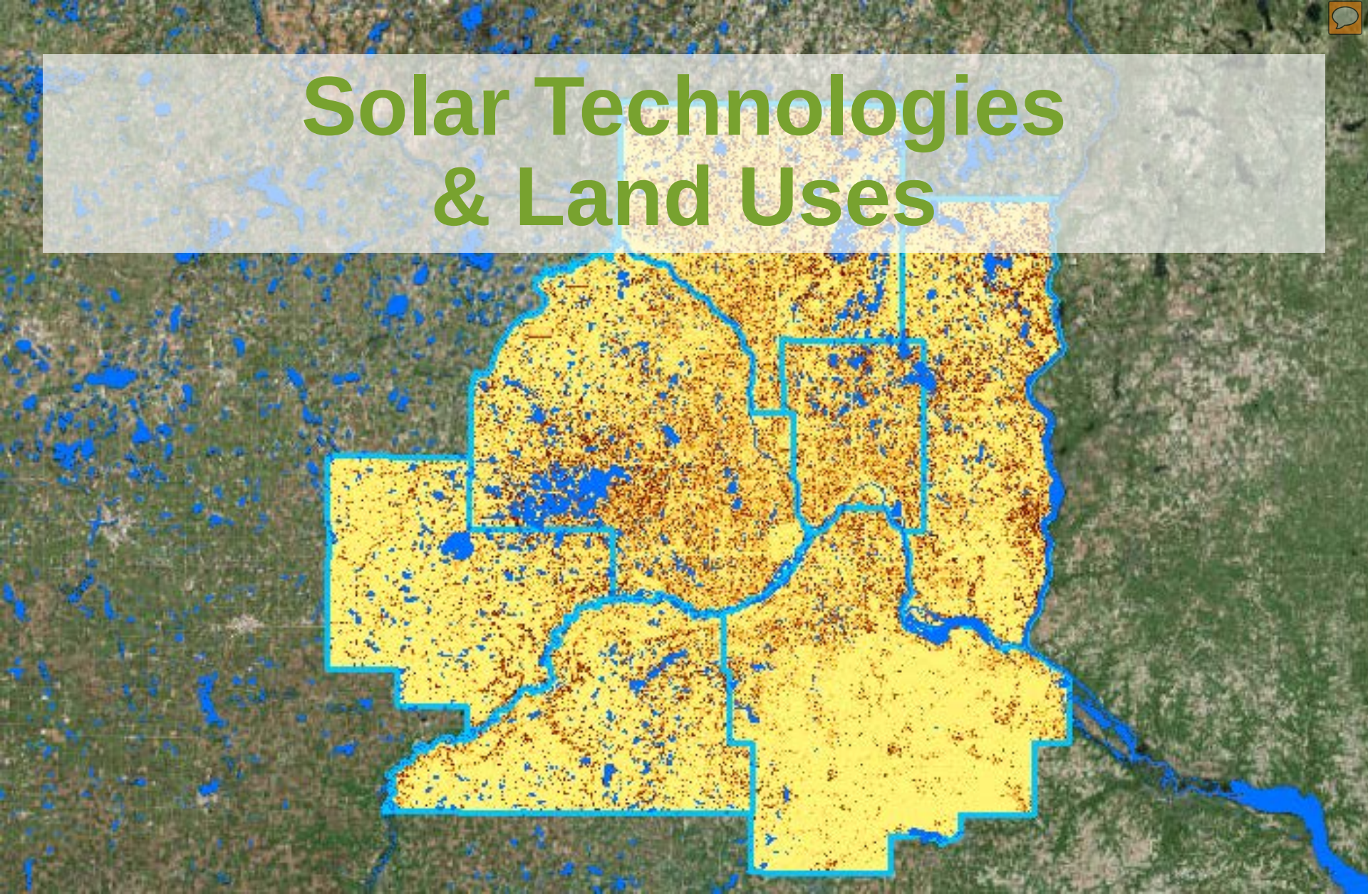
Solar Technologies & Land Uses



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Solar Technologies

✓Solar Thermal

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Solar Technologies

✓Solar Air/Transpired Air

Photo credit: Solar Wall, http://solarwall.com/en/products/uses-and-applications/agriculture.php

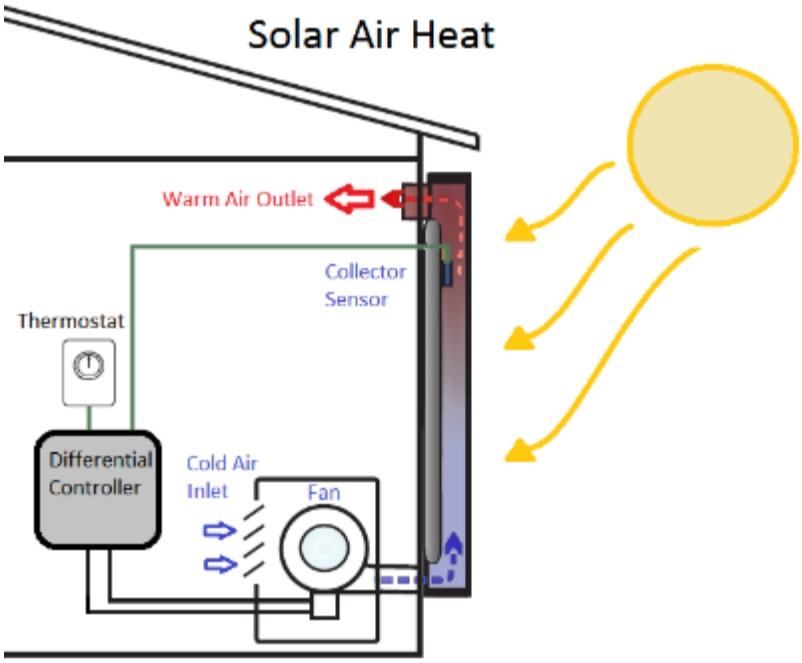

Photo credit: RREAL, http://www.rreal.org/wp-content/uploads/2010/03/Air-heat-Diagram-21.png

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Solar Technologies

✓ Solar Photovoltaic (PV)


Photo credit: NREL Photo Xchange


Photo credit: Innovative Power Systems


Photo credit: CR Planning

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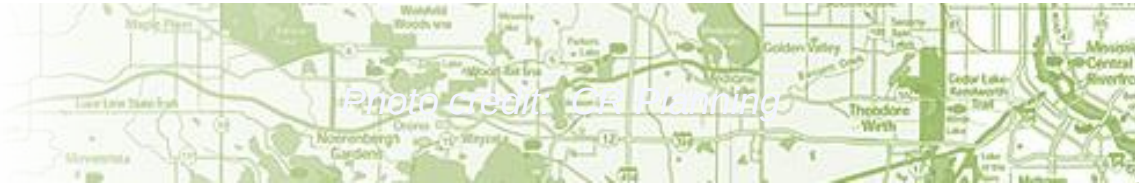
Solar PV Technologies, Land Uses

✓Rooftop Solar PV systems



Solar PV Technologies, Land Uses

✓Building Integrated PV

Photo Credit: Powerfully Green

Source: Tesla Solar Roof website
https://www.tesla.com/solar

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Solar PV Technologies, Land Uses

✓Commercial Rooftop Solar PV systems

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Solar PV Technologies, Land Uses

✓Ground mount accessory structures

Photo credit: CR Planning

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Solar PV Technologies, Land Uses

✓ Large Scale commercial rooftop

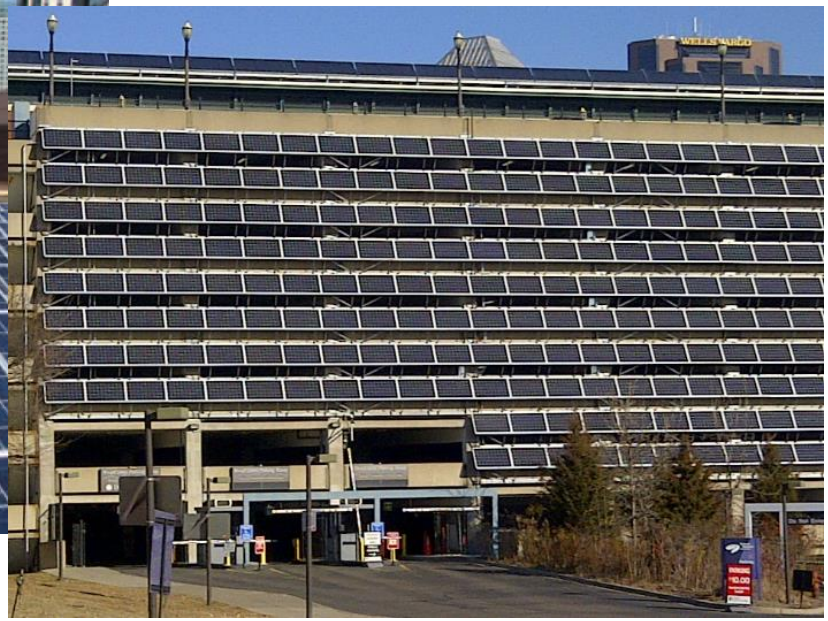

Photo credit: Meet Minneapolis

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Solar PV Technologies, Land Uses

✓Pole-mounted (tracking) solar farm

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Solar PV Technologies, Land Uses

✓Ground-mount/racked systems

Photo credit: Prairie Restorations

Solar PV Technologies, Land Uses

✓Utility-Scale Solar Farm

Photo credit: 8minuteenergy, PV Magazine, Nov 2014

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Solar PV Technologies, Land Uses

✓Utility-Scale Solar Farm

Photo credit: Evan Frost, MPR News

Photo credit: KARE 11 News

Solar Land Uses

What land use categories include solar development? Is solar development its own land use category?

Answer: Generally, solar land uses do not need to be a separate land use category, but neither do solar land uses easily fit into a single traditional category.

a. **Solar accessory uses** are appropriate wherever there are principal uses that use energy. Solar accessory uses should be explicitly identified as a permitted use in zoning as part of Plan implementation.
b. **Solar principal uses** can fall into several different land use categories, depending on both the scale of the development and the type of community. The most typical categories are agricultural and industrial.

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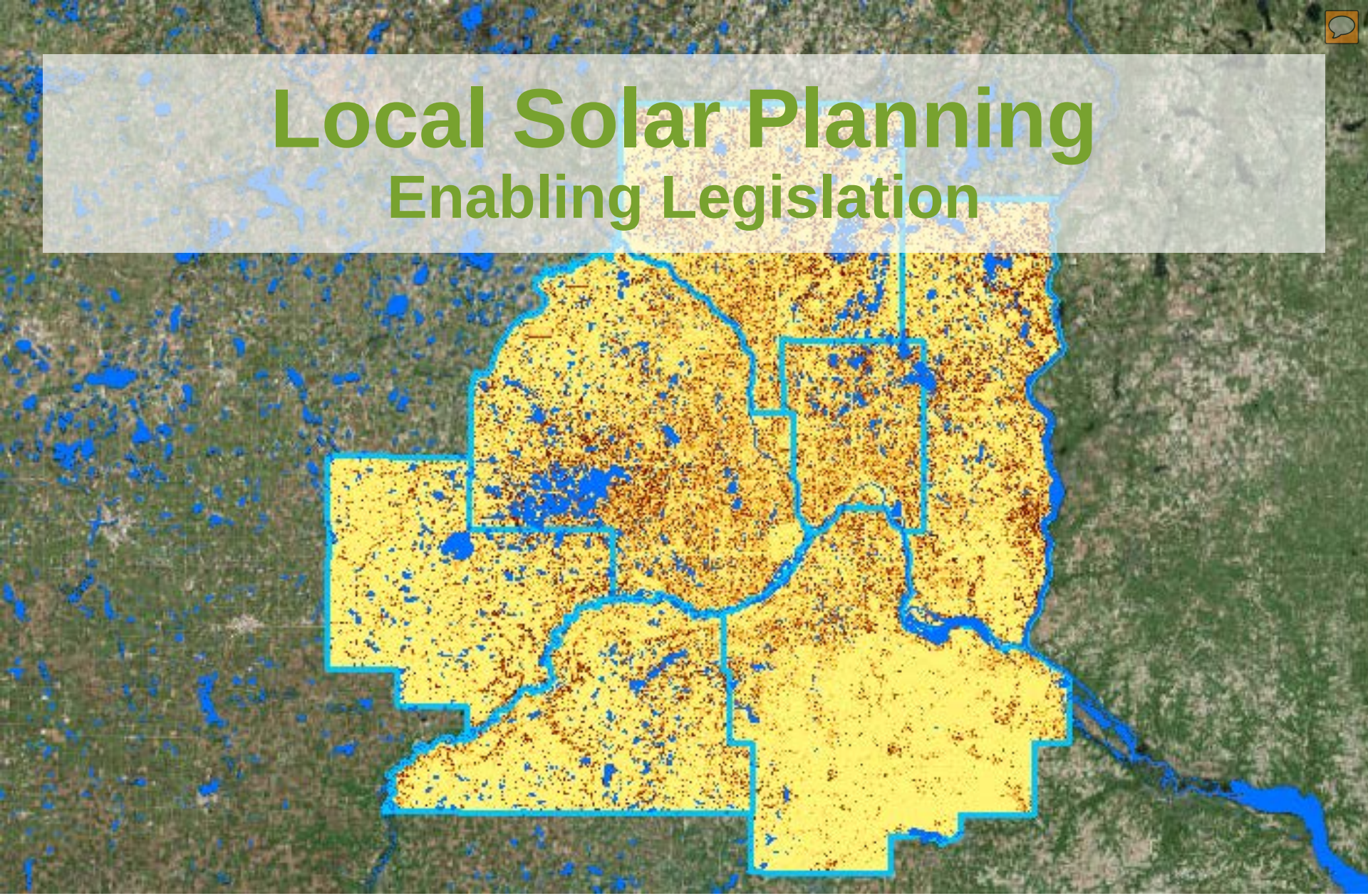
Local Solar Planning

Enabling Legislation



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Statutory Context

Local Authority

Enabling statutes for addressing solar resources

- ✓ Metropolitan Land Planning Act, solar planning requirement (473.859 Subd.2.b)
- ✓ Zoning authority (cities, 462.357; counties, 394.25, Subd. 2.)
- ✓ Enabling solar access in subdivisions (462.358 Subd. 2.a)
- ✓ Allowance for solar variance (462.357 Subd. 6; 394.25, Subd. 7.)




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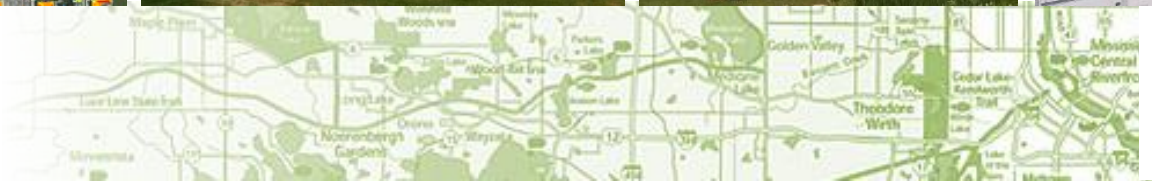

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Statutory Context
Local Authority

Enabling Statutes Addressing Solar Resources

- ✓Enabling solar easements (500.30 Subd. 3.)
- ✓Power Plant Siting (216E.01-.05)
- ✓Solar Property Tax exemption and Production Tax (272.02, subd. 24)




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Solar Statutes
affecting local governments

394.25, Subd. 2. Districts Set by Zoning Ordinances.

Official controls may be applied to . . . protection and encouragement of access to direct sunlight for solar energy systems as defined in section 216C.06, subdivision 17 . . .

462.357 Subd. 1. Authority for Zoning

. . . a municipality may by ordinance regulate . . . access to direct sunlight for solar energy systems as defined in section 216C.06,

Solar Statutes
affecting local governments

394.25, Subd. 7. Variances; Practical Difficulties

- ✓The board of adjustment shall have the exclusive power to order the issuance of variances . . . Variances shall only be permitted when they are in harmony with the general purposes and intent of the official control and when the variances are consistent with the comprehensive plan. . . **Practical difficulties include, but are not limited to, inadequate access to direct sunlight for solar energy systems**. . . .

- ✓Identical language in 462.357 Subd. 6 for cities

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Solar Statutes
affecting local governments

500.30 Subd. 3. Solar and Wind Easements

Minnesota Statutes allow the purchase and holding of easements protecting access to solar and wind energy.

Required Contents - Any deed, will, or other instrument that creates a solar or wind easement shall include, but the contents are not limited to:

a) A description of the real property subject to the easement and a description of the real property benefiting from the solar or wind easement; and

b) For solar easements, a description of the vertical and horizontal angles, expressed in degrees and measured from the site of the solar energy system, at which the solar easement extends over the real property subject to the easement. . .

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Solar Statutes
affecting local governments

216E.01-05. Power Plant Siting Act

Subd. 1. Local Review

(a) Notwithstanding the requirements of sections 216E.03 and 216E.04, an applicant who seeks a site or route permit for one of the projects identified in this section shall have the option of applying to those local units of government that have jurisdiction over the site or route for approval to build the project. . . .

Subd. 2. Applicable Projects

Applicants may seek approval from local units of government to construct the following projects:

(1) large electric power generating plants with a capacity of less than 80 megawatts . . .

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Solar Statutes
affecting local governments

216E.01-05. Power Plant Siting Act

216E.021 Solar Energy Size Determination.

The alternating current nameplate capacity of one solar energy generating system must be combined with the alternating current nameplate capacity of any other solar energy generating system that:

(1) is constructed within the same 12-month period as the solar energy generating system; and

(2) exhibits characteristics of being a single development, including but not limited to ownership structure, an umbrella sales arrangement, shared interconnection, revenue sharing arrangements, and common debt or equity financing.

Solar Statutes
affecting local governments

272.02 Subd. 24.

Property Taxes, Solar Energy Generating Systems

Personal property consisting of solar energy generating systems, as defined in the newly-enacted Solar Energy Production Tax, is exempt.

Principal uses (solar farms or gardens) - the land on which the system is located shall be classified as class 3a property.

Accessory uses - the solar energy system is disregarded for purposes of classification.

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Solar Statutes
affecting local governments

272.0295. Solar Energy Production Tax

The new production tax only applies to solar energy generating systems with a capacity exceeding one megawatt alternating current and establishes a tax rate of $1.20 per megawatt hour.

The production tax is paid to the county in which the system is located, with 80 percent of the revenue distributed to the county and the remaining 20 percent to cities and townships.

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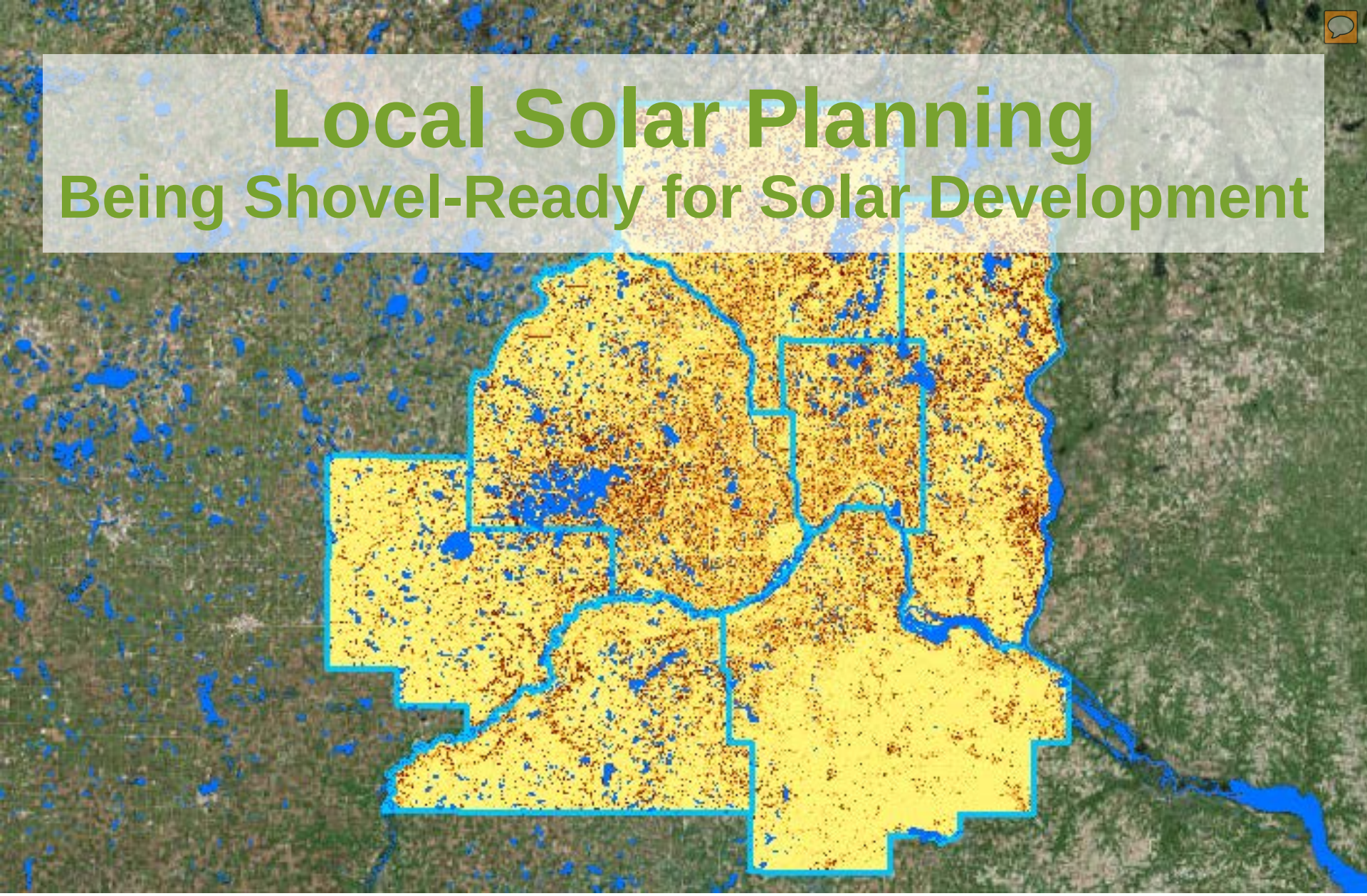
Local Solar Planning

Being Shovel-Ready for Solar Development



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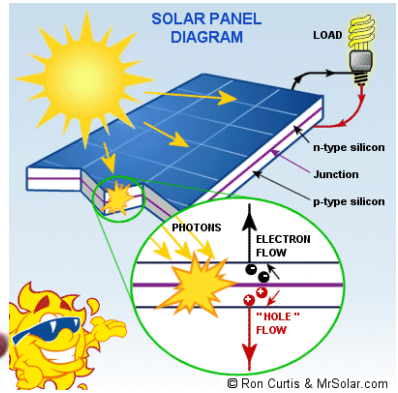
Five Principles for Solar Ready Communities…

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



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Solar Ready Communities

A. Comprehensive Plans that:

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

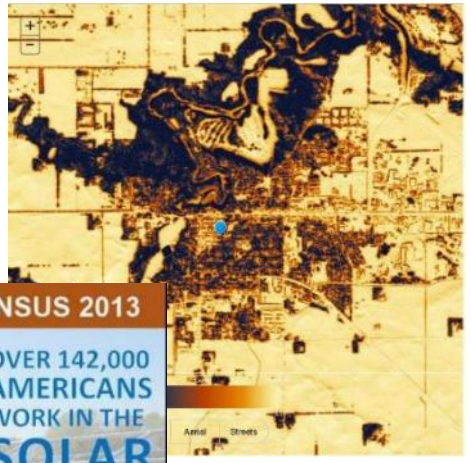

Photo credits: Fresh Energy/Giving Tree

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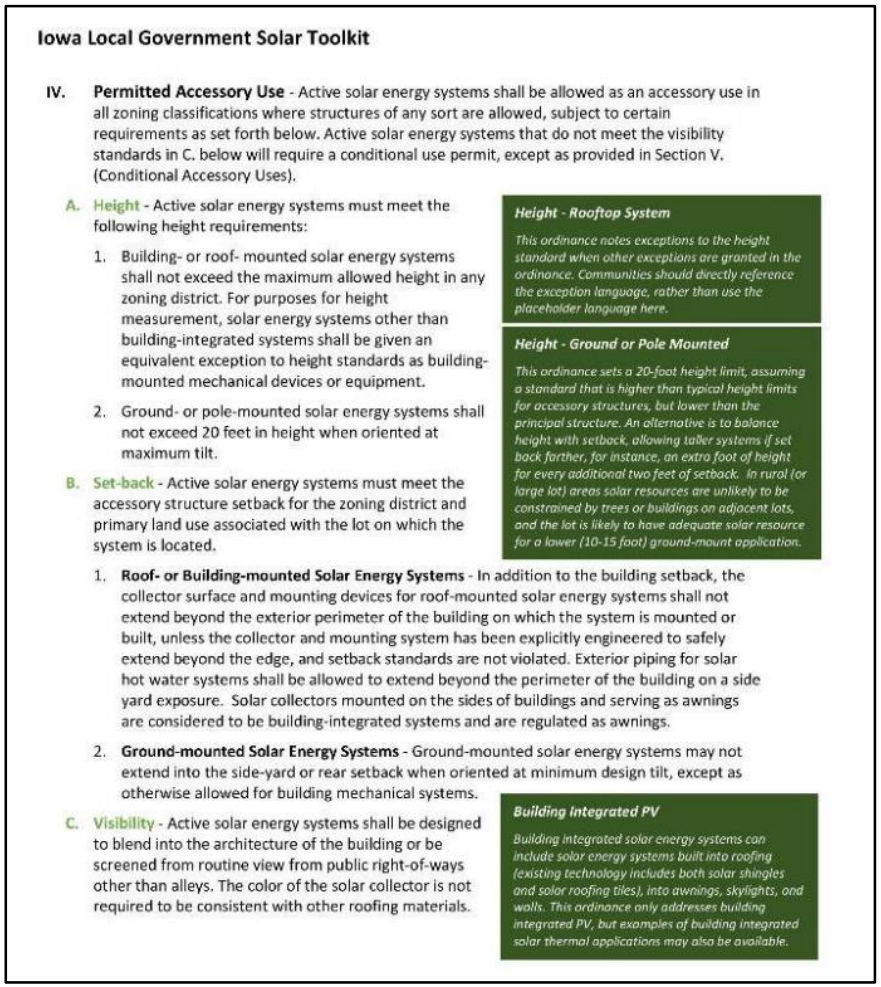
Solar Ready Communities

B. Development Regulations that:

- ✓explicitly address the different forms/uses of solar development,
- ✓creates as-of-right installation opportunities,
- ✓set clear and predictable standards for balancing solar resources with other resources
- ✓Ensures capture of desired 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.

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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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

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Solar Ready Communities

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

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

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Solar Ready Communities

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

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Solar Planning

Where do you want to go? Desired Conditions

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Desired Conditions
(distributed solar development)

- City encourages development of distributed solar energy systems that are in keeping with the community's character and use community solar resources.
- City supports the development of zero net energy buildings and use of local renewable and energy efficiency resources.
- City sets a local renewable energy standard to meet 10% of community-wide electric energy use with on-site renewable energy.

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Desired Conditions
(solar farm and garden development)

- City encourages development of community solar gardens on lands outside the MUSA that retain community character and capture co-benefits such as creation of pollinator habitat.
- City will develop solar resources on its closed landfill sites and buffer lands around industrial uses.
- County supports use of local solar resources, but discourages utility scale solar development that diminishes preferred agricultural use of prime soils or conflicts with rural residential priorities.

Solar Desired Conditions

Will the goals and policies reflecting our desired conditions be different for different types of communities?

Answer: Yes. An “urban center” community should consider different issues regarding how solar development occurs than a “suburban edge” community, which will differ from an “agricultural” community. Examples that address these community differences include:

Desired Conditions
For different types of communities

- **Urban Goal** – Balance between the benefits of urban forests and the benefits of enabling solar development.
- **Urban Goal** – Create community solar garden opportunities for residents and businesses.
- **Suburban Goal** – Encourage residential solar development that maintains community character.
- **Suburban Goal** – Increase energy resilience of critical facilities such as police, fire, and emergency and hazard response centers.
- **Agricultural Goal** – Encourage solar garden or farm development on marginal farmland rather than prime agricultural soils.

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Solar Desired Conditions

We don't have a "solar" chapter of our Plan. Where do we include goals or "desired conditions" for solar development?

Answer: Solar development goals can be incorporated into the Land Use, Housing, and Economic Competitiveness elements of the Plan:

- **Economic Goal** – Increase use of local energy resources to capture job creation opportunities and diversify local economic base.
- **Housing** – By 2030, all new housing has solar generation or is built to "solar-ready" standards.
- **Land Use** – Encourage solar garden development on closed landfills and brownfields.

Strategies

- Adopt solar zoning and permitting best practices for accessory use solar development.
- Become certified as a “solar-ready” community under the Department of Energy’s SolSmart program.
- Participate in a community solar garden project for a set amount (i.e., 30%) of public facilities’ electric energy use.
- Sponsor a community solar garden on a public building or land, for the benefit of city residents and non-profit institutions.
- Enable and promote PACE financing for local energy efficiency and solar energy projects on private buildings.

Local Planning Handbook

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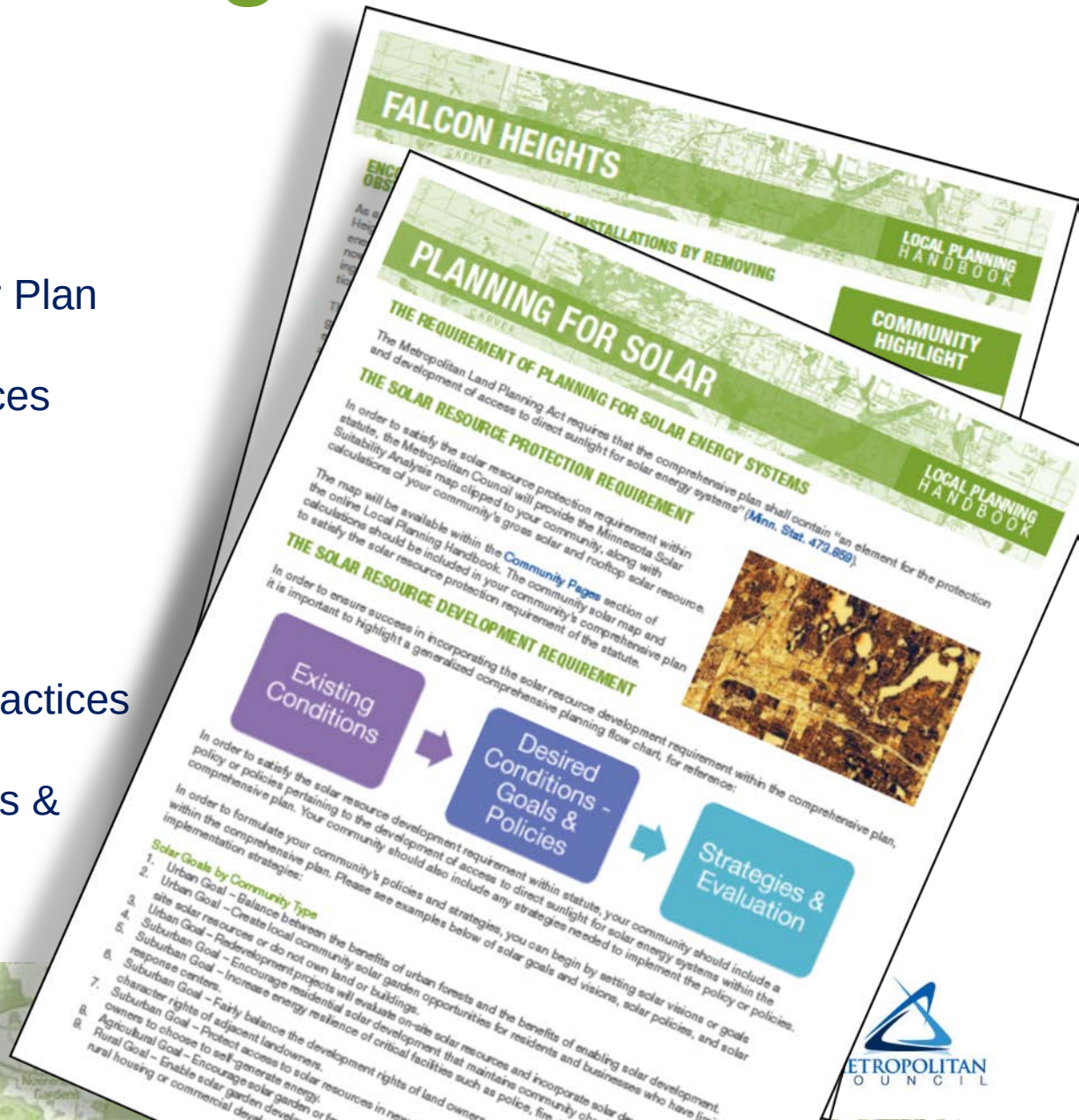
Local Planning Handbook

- Planning Highlights
- Model Ordinances
- Get More Out of Your Plan
- Inter-agency Resources
- Technical Assistance
- APA Resources
- Best Management Practices
- Financial Mechanisms & Support



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Local Government Solar Toolkits

Planning, Zoning, Permitting

http://www.growsolar.org/toolbox/toolkits/

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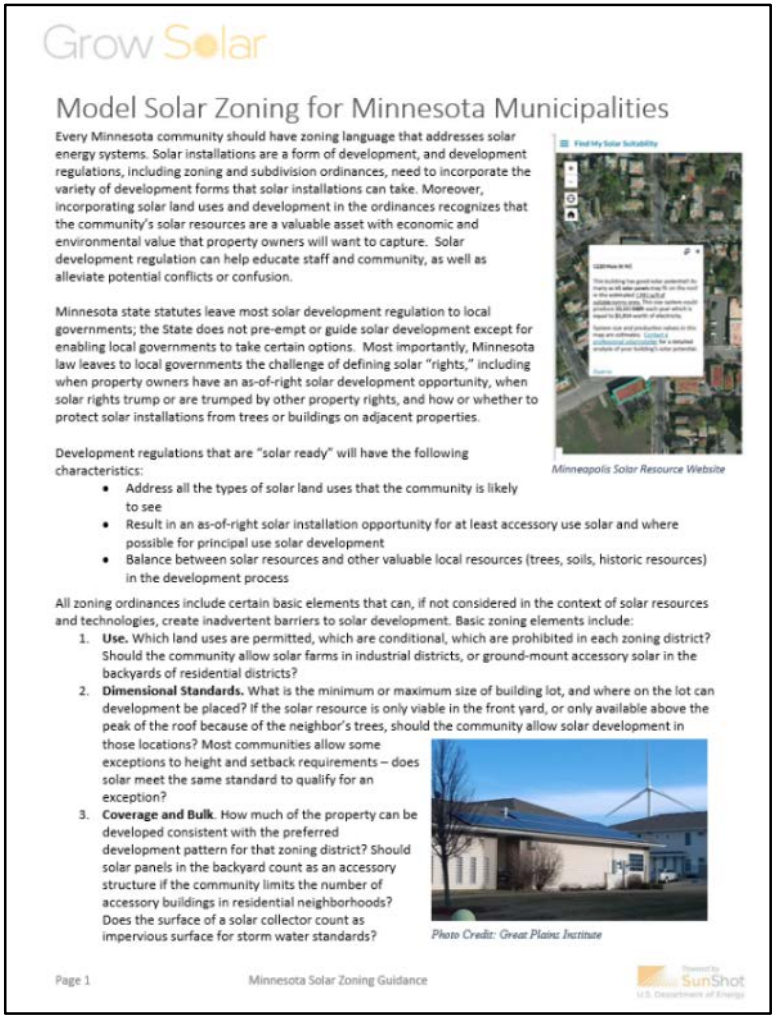
Grow Solar Toolkit

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**



Grow Solar

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.

Minneapolis Solar Resource Website

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?

Photo Credit: Great Plains Institute

Page 1 Minnesota Solar Zoning Guidance

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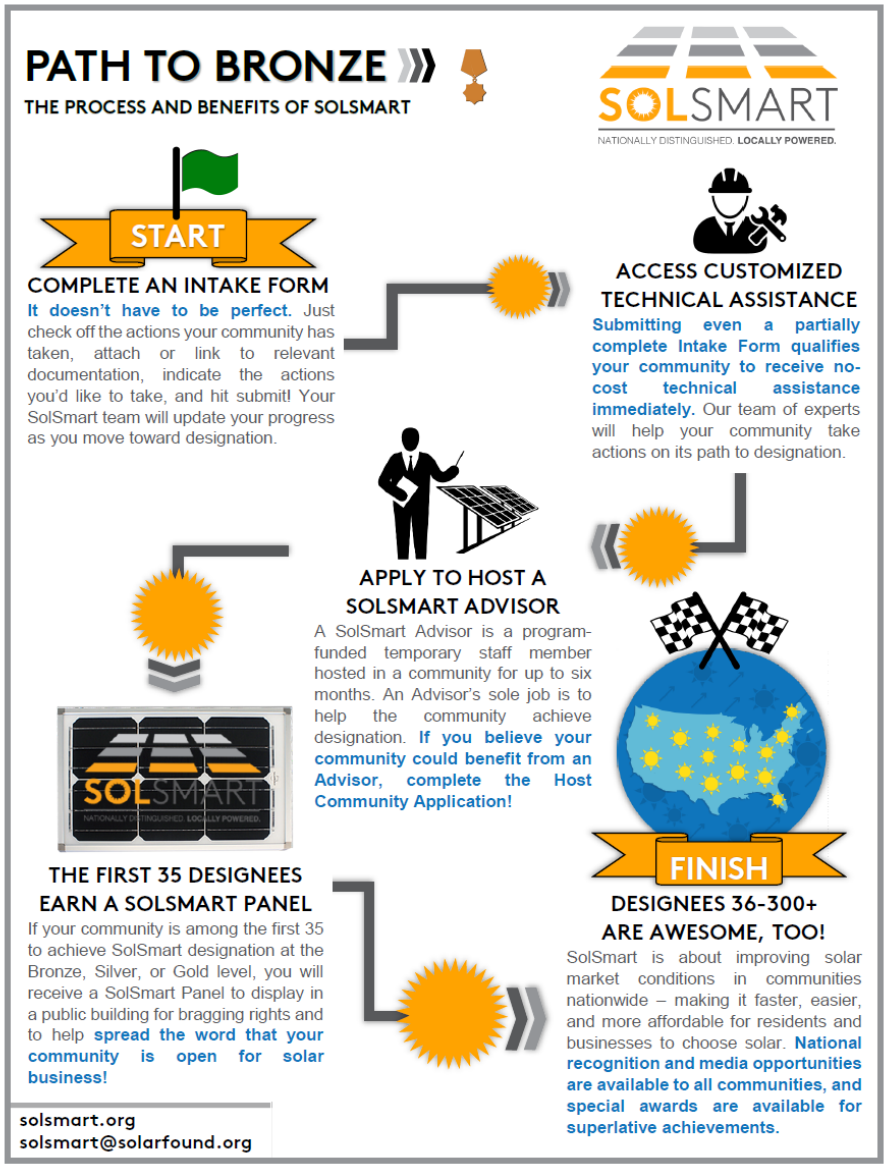
SolSmart

Certifying Solar Ready Communities

- National Department of Energy (DOE) Certification program for “solar ready” cities and counties.
- Technical assistance available from the National Renewable Energy Lab (NREL) upon entering the program.
- Opportunity to work with a full time solar “advisor” staff person to tailor best practices to your community.



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Resources

LOCAL PLANNING HANDBOOK

http://metrocouncil.org/Handbook.aspx

PlanIt

http://www.metrocouncil.org/Handbook/PlanIt.aspx

Resilience Plan Element

https://metrocouncil.org/Handbook/Plan-Elements/Resilience.aspx

Community Pages

http://lphonline.metc.state.mn.us/commportal

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Questions?

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Upcoming Events

Economic Data Webinar – What's out there and How It Can Enhance the Comp Plan
Presented by Todd Graham
Thursday, December 1, 2016
12:00 – 1:00 PM

Registration Now Open!

PlanIt Comprehensive Planning Conference
at the Earle Brown Heritage Center, Brooklyn Center
Tuesday, December 13, 2016

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