Our Mission . . .

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

1. Development trends, policy drivers
2. Understanding solar energy resources
3. Solar land uses and technologies
4. Statutes affecting local options
5. Local planning and policy best practices
6. Local zoning best practices
7. Other tools in the local toolbox
8. Questions and Concerns
If you remember one thing . . .

Solar energy development is local development

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

Photo credit: U.S. DOE SunShot
If you remember two things . . .

Local governments are critical partners in the solar market transformation.

✓ Solar development is local
✓ Communities determine how local development occurs
✓ Communities choose to be pro-growth (or not)

Photo credit: U.S. DOE SunShot
Local Government Solar Toolkits

Planning, Zoning, Permitting

http://www.growsolar.org/toolbox/toolkits/
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**
Solar Market Development Trends
The wholesale price of solar photovoltaic (PV) panels ($/watt) has dropped by 99% since 1977.

1977 - $76.67/watt

2014 - $0.67/watt

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

More significantly, since 2007, the price has declined by 83% . . .
Since 2008 . . .

> 54% reduction in the installed cost of rooftop solar
> 800% increase in rooftop installed capacity
On average, Purchased Power Agreement (PPA) prices have fallen by nearly 75% since 2009.
Market Conditions
Principal Solar Development

Predictions are for this trend to continue . . .

Average PV PPA Prices and Natural Gas Fuel Cost Projections Over Time

- Overall range of AEO 2015 gas price projections (converted to $/MWh terms)
- AEO 2015 reference case gas price projection (converted to $/MWh terms)
- Average price over time among sample of PV PPAs signed in 2014 (9 contracts, 449 MW)
- Average price over time among sample of PV PPAs signed in 2015 (12 contracts, 885 MW)
Community Solar

Annual U.S. Community Solar Installation Forecast, 2010-2020E

- 59% compound annual growth rate between 2014 and 2020
Solar Resources
Solar Resources . . .

Considering your community’s solar reserves.
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.
Solar Resources . . .

Considering your community’s solar reserves.
What are Energy “Reserves”?

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

(SEC definition of proved reserves)
What are Energy “Reserves”?

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

Gross reserves
✓ 1,217 GWh of electricity,
✓ Approximately 940 MW of generating capacity.

Rooftop reserves
✓ 216 GWh of electricity (43% of electric use)
✓ approximately 170 MW of generating capacity.

Annual electricity consumed – 498 GWh
(Regional Indicators Initiative)
Eden Prairie

Gross reserves
- 4,248 GWh of electricity
- Approximately 3,270 MW of generating capacity.

Rooftop reserves
- 397 GWh of electricity (51% of electric use)
- Approximately 310 MW of generating capacity.

Annual electricity consumed – 781 GWh (Regional Indicators Initiative)
Maplewood

Gross reserves
- 2,328 GWh of electricity
- Approximately 1,790 MW of generating capacity.

Rooftop reserves
- 219 GWh of electricity (68% of electric use)
- Approximately 170 MW of generating capacity.

Annual electricity consumed – 324 GWh (Regional Indicators Initiative)
White Bear Lake

Gross reserves
- 942 GWh of electricity,
- Approximately 720 MW of generating capacity.

Rooftop reserves
- 120 GWh of electricity (68% of electric use)
- Approximately 90 MW of generating capacity.

Annual electricity consumed – 194 GWh
(Regional Indicators Initiative)
City of Urbana

Rooftop reserves

- 238 GWh of electricity
- Approximately 213 MW of generating capacity.
- Estimated 88% data coverage

Source: Project Sunroof data explorer (October 2016).
Village of Schaumburg

Rooftop reserves
✔ 238 GWh of electricity
✔ approximately 206 MW of generating capacity.
✔ Estimated 67% data coverage

Source: Project Sunroof data explorer (October 2016).
City of Rockford

Rooftop reserves

- 1,200 GWh of electricity
- Approximately 1,000 MW of generating capacity.
- Estimated 67% data coverage

Source: Project Sunroof data explorer (October 2016).
City of Oak Park

Rooftop reserves
✓ 128 GWh of electricity
✓ approximately 112 MW of generating capacity.
✓ Estimated 97% data coverage

Source: Project Sunroof data explorer (October 2016).
Illinois Coverage

Rooftop reserves
✓ 30,400 GWh of electricity
✓ Approximately 26,100 MW of generating capacity.
✓ Estimated 52% data coverage for buildings

Source: Project Sunroof data explorer (October 2016).
Solar Technologies and Land Uses
Using Solar Reserves

Solar development is not one thing . . .
Using Solar Reserves

1. **Roof-mounted systems.** Capturing the rooftop solar resource on buildings as small as a garage and as big as a convention center.

2. **Ground-mounted accessory systems.** Free-standing systems on a pole or rack in the yard.

3. **Solar gardens.** Ground or roof-mounted systems, ranging from 1 to 30 acres in coverage, providing energy to remote homes and businesses.

4. **Solar farms.** Ground-mounted systems that are the principal use and cover 5 – 1,000 acres.
Solar Technologies

✓ Solar Thermal

Photo credit: NREL Phot Xchange
Solar Technologies

✓ Solar Air/Transpired Air


Solar Technologies

✓ Solar Photovoltaic (PV)

Photo credit: CR Planning

Photo credit: NREL Photo Xchange

Photo credit: Innovative Power Systems

Photo credit: CR Planning
Solar PV Technologies, Land Uses

✓ Rooftop Solar PV systems

Photo credit: CR Planning
Solar PV Technologies, Land Uses

✓ **Building Integrated PV**

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

Photo Credit: Powerfully Green
Solar PV Technologies, Land Uses

✓ Commercial Rooftop Solar PV systems

Photo credit: Eric Hansen/SolarFlow
Solar PV Technologies, Land Uses

✓ Ground mount accessory structures

Photo credit: CR Planning
Solar PV Technologies, Land Uses

✓ Large Scale commercial rooftop

Photo credit: Meet Minneapolis
✓ Pole-mounted (tracking) solar farm

Solar PV Technologies, Land Uses

✓ Ground-mount/racked systems

Photo credit: CR Planning

Photo credit: Prairie Restorations
Solar PV Technologies, Land Uses

✓ Utility-Scale Solar Farm

Photo credit: 8minuteenergy, PV Magazine, Nov 2014
Solar PV Technologies, Land Uses

✓ Utility-Scale Solar Farm

Photo credit: KARE 11 News

Photo credit: Evan Frost, MPR News
Statutory Context
Illinois’ Future Energy Jobs Bill:

✓ 25% renewable energy standard
✓ Solar carve-outs for distributed solar, community solar, solar farms, and brownfield-focused development
✓ Funding to support market transformation – estimated 1,320 MW of solar by 2020
Enabling statutes for addressing solar resources

✓ Comprehensive Planning (65 ILCS 5/11-12-5)
✓ Zoning authority (65 ILCS 5 Article 11, Div. 13-10)
✓ Planning Commission Authority (65 ILCS 5 Article 11 Div.12-5)
✓ Homeowner Associations (765 ILCS 165/)
✓ Property Assessed Clean Energy (65 ILCS 5 Art.1 Div.1-11)
Illinois State Law 65 ILCS 5/11-12-5 Sec. 11-12-5 gives every plan commission and planning department authority to:

Prepare and recommend to the corporate authorities a comprehensive plan for the present and future development or redevelopment of the municipality.
Solar Statutes

affecting local governments

65 ILCS 5 Article 11 Div.12-5 (Plan Commissions)

Grants authority to municipalities to establish planning commissions and departments. The power given to these planning bodies includes:

(5) To prepare and recommend to the corporate authorities schemes for regulating or forbidding structures or activities which may hinder access to solar energy necessary for the proper functioning of solar energy systems, as defined in Section 1.2 of The Comprehensive Solar Energy Act of 1977, or to recommend changes in such schemes.
Solar Statutes

affecting local governments

65 ILCS 5 Article 11, Div. 13-10 (Zoning Authority, Solar Access)

Grants authority to municipalities to protect solar resources through zoning:

(10) […] to regulate or forbid any structure or activity which may hinder access to solar energy necessary for the proper functioning of a solar energy system, as defined in Section 1.2 of the Comprehensive Solar Energy Act of 1977.
Solar Statutes
affecting local governments

765 ILCS 165/ (Homeowners’ Energy Policy Statement Act)

Prohibits homeowners’ associations and similar entities from preventing homeowners from using or installing solar energy systems.

No deed restrictions, covenants, or similar binding agreements running with the land shall prohibit or have the effect of prohibiting a solar energy system from being installed on a building erected on a lot or parcel covered by the deed restrictions [...]

Grow Solar
Illinois offers a special assessment of solar energy systems for property tax purposes. When a claim is filed, the assessment must ascertain two values: the value of the improvements as if equipped with a conventional heating or cooling system and the value of the improvements as equipped with the solar energy system. The alternate valuation is the lesser of these two values.

- Both active and passive solar energy systems are eligible.
- Only the solar equipment is eligible (not valid for equipment that is equally usable in a conventional energy system or components that serve non-solar energy generating purposes.)
Solar Statutes
affecting local governments

65 ILCS 5 Art.1 Div.1-11 (Property Assessed Clean Energy)

Enables municipalities to enter into voluntary agreements to finance renewable energy and energy efficiency and affix to real property (as an assessment)

☑ Does not use “PACE” label, but effectively enables PACE mechanism

☑ No current programs in Illinois
Solar as Development
Solar Land Uses

Accessory Uses

✓ When the solar installation serves or compliments the existing principal or primary land use on the parcel
✓ Typically a “net metered” installation but includes some community shared solar installations
✓ Can be a large or small installation,
✓ Can be any type of solar technology; ground or roof, electric or thermal,
Solar Land Uses

Accessory Uses

- **Characteristics?** Has some similarities with other accessory uses, but also some important differences
- **Visual impact?** Can change the appearance of the principal structure
- **Location?** To be functional, needs to be located where the solar resource is located
- **Conflicts and nuisances?** Design and aesthetics, shade trees, other 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 is 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 Local Government Best Practices
Solar Development is Development

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
Five Principles for Solar Ready Communities...

1. **Comprehensive Plans** that describe solar resources and encourage development

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

3. **Permitting Processes** that are predictable, transparent, and documented

4. **Public Sector Investment** in the community’s solar resources

5. **Local Programs** to limit market barriers and enable private sector solar development
Solar Ready Communities

A. Comprehensive Plans that:

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

C. Permitting practices that:

✔ Reduce time spent on acquiring permits and conducting inspections

✔ Make the permit process transparent and predictable to both staff and applicants

✔ Ensure the permit process reflects industry best practices

✔ Establish a permit fee that appropriately covers local government review and inspection costs
**Solar Ready Communities**

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

*Photo credit: Bruce Schnaak Photography, City of Saint Paul, City of Minneapolis*
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.
Solar Ready Communities

Comprehensive Plans that

✓ address solar resources
✓ acknowledge solar development benefits and opportunities in the community.
✓ Guide decision making for when resources are in conflict
Solar Ready Communities

Solar Development Economic Benefits

✓ Job creation
✓ New markets for local contractors
✓ Diversity of income to land owners
✓ Import substitution

Source: 2015 Solar Jobs Census, Solar Foundation
Solar Ready Communities

Solar Development Economic Benefits

- Job creation
- New markets for local contractors
- Diversity of income to land owners
- Import substitution

### ILLINOIS

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<td>3,483</td>
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Cumulative Installed Capacity thru Q3 2015 (MW)

57.0

Source: 2015 Solar Jobs Census, Solar Foundation
Solar Development Conflicts

✓ acknowledge perceived nuisances or potential conflicts between solar development and other resources;

- Agricultural practices
- Urban forests
- Historic resources
- Airports
- Natural areas
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.
Do your basic zoning tools - uses, setbacks, heights, coverage – create barriers for home and business owners to capture solar resources?

- **Uses** - Are accessory solar land uses allowed?
- **Dimensional standards** - What exceptions does your ordinance allow for height and setback standards?
- **Coverage** - Is a ground-mount solar energy system the same as a shed or garage?

Does your ordinance define an “as-of-right” installation for accessory uses?
Basic Solar Energy Zoning – Principal Uses

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

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

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

- **Coverage** – How should solar collector surfaces be counted in coverage or impervious surface ratios?

- **Conditional use or Interim use?**

Are solar principal uses treated equivalently as other industrial or natural resource based uses?
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** – agricultural protection, municipal utility, historic preservation, etc.
Advanced Solar Zoning

Homeowner solar rights – Limitations on HOA restrictions regarding solar installations

Consistent with 765 ILCS 165/1, no homeowners’ agreement, covenant, common interest community, or other contract between multiple property owners within a subdivision of Model Community shall prohibit or restrict homeowners from installing solar energy systems. No energy policy statement enacted by a common interest community shall be more restrictive than Model Community’s solar energy standards.

Homeowner Installation Rights Protected
No deed restrictions, covenants, or similar binding agreements running with the land shall prohibit or have the effect of prohibiting a solar energy system from being installed on a building erected on a lot or parcel covered by the deed restrictions [. . . ]

Source: Illinois Statutes, 765 ILCS 165/20
Risks to Agricultural Practices

Agricultural protection is designed to address several development-related risks

- Loss of prime agricultural soils
- Loss of local productive capacity
- Fragmentation of land
- Secondary development impacts
- Nuisances impacting agricultural practices

Source: Scott County Prime Farmland Mapping Project, 2009
Agricultural Protection - Solar farms must comply with site assessment or soil identification standards that are intended to protect agricultural soils.

If the community has ordinances that protect agricultural soils, practices, or land uses, this provision applies those same standards to solar development. Communities should understand, however, that solar farms do not pose the same level or type of risk to agricultural practices as does housing or commercial development.
Standards for:

✓ Wind farms (greater than 500 KW)
✓ Pipelines
✓ Electric lines
Ground Cover/Pollinator Standards

Ground around and under solar arrays and in project site buffer areas shall be planted and maintained in perennial vegetated ground cover, and meet the following standards:

a) Top soils shall not be removed during development, unless part of a remediation effort.
b) Soils shall be planted and maintained in perennial vegetation to prevent erosion, manage run off and build soil. Seeds should include a mix of grasses and wildflowers, ideally native to the region of the project site that will result in a short stature prairie with a diversity of forbs or flowering plants that bloom throughout the growing season. Blooming shrubs may be used in buffer areas as appropriate for visual screening.
c) Seed mixes and maintenance practices should be consistent with recommendations made by qualified natural resource professionals such as those from the Department of Natural Resources, County Soil and Water Conservation Service, or Natural Resource Conservation Service.
d) Plant material must not have been treated with systemic insecticides, particularly neonicontinoids.
Vegetation requirements and management. The following provisions shall be met related to the clearing of existing vegetation and establishment of vegetated ground cover. Additional requirements may apply as required by the Board.

(2) The project site design shall include the installation and establishment of ground cover meeting the beneficial habitat standards consistent with Minnesota Statutes, section 216B.1642, or successor statutes and guidance as set by the Minnesota Board of Water and Soil Resources.

(a) Beneficial habitat standards shall be maintained on the site for the duration of operation, until the site is decommissioned.

(b) The applicant shall submit a financial guarantee in the form of a letter of credit, cash deposit or bond in favor of the County equal to one hundred twenty-five (125) percent of the costs to meet the beneficial habitat standard. The financial guarantee shall remain in effect until vegetation is sufficiently established in accordance with the requirements set forth in Section 6.51.2H(1) of this Ordinance.
Nuisances and Conflicts

Solar land uses can have conflicts with other land uses . . .

✓ Character - visual or aesthetic conflicts
✓ Opportunity costs – what else might happen on the site?
✓ Agricultural or natural resource protection
✓ Glare – nuisance (homeowners) or safety (airports, highways)
✓ Safety – Electric generation, fire risk

Some conflicts are real, others are perceived but actually pose little risk.
Does your development regulation use incentives? Do you have economic development tools?

- **Density bonus** for solar development
- **Protect solar resources** when subdividing
- **Identify** preferred areas for solar farms
- **Financial incentives and programs** Planned Unit Development conditions
- “**Solar ready**” construction
- **Development RFPs, land assembly, information clearinghouse**
Permitting Processes with predictable and clear submittal requirements, review timeframes, and permit fees.
Solar Ready Communities

Permitting best practice goals

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

Structural engineering study on Minnesota residential rooftop solar installations.
Standardizing Permitting

Structural engineering study on Minnesota residential rooftop solar installations.
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.
Thank You!

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