PlanIt

Comprehensive Planning for Solar Energy Systems

Cameran J. Bailey – Solar Advisor
December 12, 2017
Solar Advisor to the Met Council & SolSmart
Solar Advisor to the Met Council & SolSmart

2040 Comprehensive Plan
Minimum Solar Requirements

1. Solar Resource Map
2. Solar Calculations
3. Solar Development Policies
4. Solar Development Strategies

Solar Advisor to the Met Council & SolSmart

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2040 Comprehensive Plan Minimum Solar Requirements

1. Solar Resource Map
2. Solar Calculations
3. Solar Development Policies
4. Solar Development Strategies

Foundational Categories
• Permitting Process
• Planning, Zoning & Development

Special Focus Categories
• Inspection
• Construction Codes
• Solar Rights
• Utility Engagement
• Community Engagement
• Market Development & Finance
PlanIt

Comprehensive Planning for Solar Energy Systems

Eric Wojchik – Senior Planner
December 12, 2017
Contents

Solar Energy System Requirements

- Solar Resource Protection
- Solar Resource Development
- How to Comply with the Requirements
- Go Further with Solar

Integration of Resilience into the Plan
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.
The Requirement of Planning for Solar Energy Systems

Comprehensive Planning for Solar

Solar Resource Protection

Solar Resource Development
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.

https://solarapp.gisdata.mn.gov/solarapp/
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.
How to Comply with the Requirements
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:

**Existing Conditions**
- Resource Protection
  - Map & Calculation

**Desired Conditions**
- Resource Development
  - Policy & Implementation Strategy
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.

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.
Going Further with Solar
Integration of Resilience

- Land Use
- Transportation
- Water Resources
- Parks & Trails
- Housing
- Economic Competitiveness
- Implementation
2040 Comprehensive Plan

Community Vision

Desired Conditions

Existing Conditions

Policies & Strategies

Implement & Evaluate

PlanIt
Comprehensive Planning Process

**Existing Conditions**
- Compile Community Baseline Data
- Consider Barriers to Engagement
- Assess Staff & Financial Resources
- Synthesize Information

**Desired Conditions**
- Community SWOT* Analysis
- Engagement – Public & Political
- Identify Short & Long-term Priorities
- Focus Prioritization

**Policies & Strategies**
- Vision & Goals
- Policies
- Implementation Strategies
- Evaluation

*Strengths, weaknesses, opportunities, & threats
Policies & Strategies

Vision & Goals

Plan Elements

Integration

Policies

Implementation Strategies

Evaluation
Policies & Strategies

Implementation Strategies

Encouragement  Incentives  Regulation  Lead by Example

From Minnesota’s Local Government Project for Energy Planning (LoGoPEP)
# Planning for Solar

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<th>Existing Conditions</th>
<th>Compile Data</th>
<th>Consider Engagement</th>
<th>Staff &amp; Financial Resources</th>
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<td>Developers, Politicians, &amp; Public</td>
<td>Existing Outdated Ordinance. No Staff Expertise</td>
<td>Matrix Depicting Existing Conditions</td>
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<th>SWOT Analysis</th>
<th>Engagement</th>
<th>Short &amp; Long Priorities</th>
<th>Focus Priorities</th>
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<td>Public Buildings &amp; Incentives in Commercial Mixed-use Developments</td>
<td>Council Work Session/Public Energy Workshop</td>
<td>Reduce Grid Reliance &amp; Create PR Campaign</td>
<td>Planning Mechanisms &amp; Set Measureable Benchmarks</td>
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<thead>
<tr>
<th>Vision &amp; Goals</th>
<th>Policies</th>
<th>Strategies</th>
<th>Evaluation</th>
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<tr>
<td>Become Solar-Ready Through Incentivizing Solar Development</td>
<td>Increase Provision of Solar Energy Systems in Public &amp; Commercial Sites by 50% by 2040</td>
<td>Create Ordinance based on Grow Solar Local Gov Toolkit</td>
<td>Create Standards; Track MWh &amp; Cost Savings</td>
</tr>
<tr>
<td>Educate the Public on the Cost &amp; Benefit of Solar</td>
<td>Provide Technical Assistance Support for the Public</td>
<td>Become SolSmart Certified by 2019</td>
<td>Monitor Program by Annually Reporting to Council</td>
</tr>
<tr>
<td>Become an Energy Convener for Stakeholders</td>
<td>Engage to Advance Solar Tech in the Community</td>
<td>Convene Annual Energy Planning Event</td>
<td>Coordinate Feedback on Policies &amp; Events</td>
</tr>
</tbody>
</table>
Solar Ready Communities

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
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
Resources


Comprehensive Planning for Solar Energy Systems
http://www.metrocouncil.org/Handbook/PlanIt.aspx

Resilience Plan Element

Community Pages
http://lphonline.metc.state.mn.us/commportal
Questions?

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Solar Mapping Exercise

Hopkins

Lake Elmo

Oakdale
Solar Mapping Exercise

Solar Goal
- (1) Goal by Community Type
- (1) Goal by Plan Element

Intended Outcomes of Exercise
Solar Mapping Exercise

Intended Outcomes of Exercise

Solar Goal

- (1) Goal by Community Type
- (1) Goal by Plan Element

Solar Policy

- (1) For Accessory Solar Development
- (1) For Solar Farm/Garden Development
Solar Mapping Exercise

**Intended Outcomes of Exercise**

**Solar Goal**
- (1) Goal by Community Type
- (1) Goal by Plan Element

**Solar Policy**
- (1) For Accessory Solar Development
- (1) For Solar Farm/Garden Development

**Solar Strategy**
- (1) Supporting Accessory Solar Development
- (1) Supporting Solar Farm/Garden Development
## Solar Mapping Exercise

### Intended Outcomes of Exercise

<table>
<thead>
<tr>
<th>Goal (a)</th>
<th>Question(s)/Concern(s):</th>
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<tr>
<td>Goal (b)</td>
<td>Question(s)/Concern(s):</td>
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<tr>
<td>Policy (a)</td>
<td>Question(s)/Concern(s):</td>
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<tr>
<td>Policy (a)</td>
<td>Question(s)/Concern(s):</td>
</tr>
<tr>
<td>Strategy (a)</td>
<td>Question(s)/Concern(s):</td>
</tr>
<tr>
<td>Strategy (b)</td>
<td>Question(s)/Concern(s):</td>
</tr>
</tbody>
</table>
Solar Mapping Exercise
Round 1 – Solar Goal

Solar Goals by Community Type
1. Urban Goal – Balance between the benefits of urban forests and the benefits of enabling solar development.
2. Urban Goal – Create local community solar garden opportunities for residents and businesses who have limited on-site solar resources or do not own land or buildings.
3. Urban Goal – Redevelopment projects will evaluate on-site solar resources and incorporate solar development into designs.
4. Suburban Goal – Encourage residential solar development that maintains community character.
5. Suburban Goal – Increase energy resilience of critical facilities such as police, fire, and emergency and hazard response centers.
6. Suburban Goal – Fairly balance the development rights of land owners with solar resource with the community character rights of adjacent landowners.
7. Suburban Goal – Protect access to solar resources in new developments and subdivisions, enabling individual land owners to choose to self-generate energy.
8. Agricultural Goal – Encourage solar garden or farm development on marginal farmland rather than prime agricultural soils.
9. Rural Goal – Enable solar garden development that enhances the community’s and landowners’ ability to limit non-rural housing or commercial development.

Solar Goals by Plan Element
1. Economic Goal – Increase use of local energy resources to capture job creation opportunities and diversify local economic base.
2. Housing Goal – By 2030, all new housing has solar generation or is built to “solar-ready” standards.
3. Land Use Goal – Encourage solar garden development on closed landfills and brownfields.
4. Resilience Goal – Encourage investment in electric grid infrastructure and solar development that makes electric service more reliable and resilient to weather-related disruptions.
Solar Policies - Distributed (Accessory) Solar Development
1. City encourages development of distributed solar energy systems that are in keeping with the community's character and use community solar resources.
2. City supports the development of zero net energy buildings and use of local renewable and energy efficiency resources.
3. City sets a local renewable energy standard to meet 10% of community-wide electric energy use with on-site renewable energy.

Solar Policies - Solar Farm/Garden (Principal) Solar Development
1. 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.
2. City will develop solar resources on its closed landfill sites and buffer lands around industrial uses.
3. County supports the 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 Mapping Exercise
Round 1 – Solar Strategies

Solar Strategies - Solar Farm/Garden (Principal) Solar Development
1. Adopt solar zoning and permitting best practices for accessory use solar development.
2. Become certified as a “solar-ready” community under the Department of Energy’s SolSmart program.
3. Participate in a community solar garden project for a set amount (i.e., 30%) of public facilities’ electric energy use.
4. Sponsor a community solar garden on a public building or land, for the benefit of city residents and non-profit institutions.
5. Enable and promote PACE financing for local energy efficiency and solar energy projects on private buildings.
<table>
<thead>
<tr>
<th>Goal (a)</th>
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</table>
In this section, record strategies or resources noted by Brian Ross that may address some of the questions or concerns you just identified in Round 1.

Notes:
MAKING COMMUNITIES “SOLAR READY”

METROPOLITAN COUNCIL PLANIT WORKSHOP
SOLAR PLANNING, DECEMBER 12, 2017

Brian Ross, AICP, LEED GA
Senior Program Director
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, co-benefits, and development opportunities and conflicts in the community.
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.

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 of 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.

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.
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 solar resources to demonstrate viability, community commitment, technological elements.
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.
Local Government Solar Toolkit
Local Government Solar Toolkits
Planning, Zoning, Permitting

http://www.betterenergy.org/publications/minnesota-solar-toolkit
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 Toolkit

✓ Existing conditions,
✓ Desired conditions,
✓ Strategies for getting there
Solar Ready Communities

Solar Development Conflicts and Opportunities

Acknowledge perceived nuisances or potential conflicts between solar development and other resources, and synergies among different resources;

- Agricultural practices
- Urban forests
- Historic resources
- Airports
- Natural areas
Planning Best Practice

GreenStep Cities

Comprehensive Plan Best Practice, Action #5:
Adopt climate mitigation and/or energy independence goals and objectives in the comprehensive plan or in a separate policy document, and link these goals to direct implementation recommendations.
Solar Ready Communities

Development Regulations that:

✓ explicitly address solar development in its varied forms (small and large, accessory and principal),

✓ create as-of-right installation opportunities for accessory uses and consistent CUP standards for principal uses

✓ set clear and predictable standards for balancing solar resources with other resources.

Model Solar Ordinance – Minnesota

Introduction
Minnesota has good solar energy potential—as good as Houston, Texas, and many parts of Florida. As solar energy system components have become more efficient and less costly an increasing number of solar energy systems have been installed in Minnesota. Market opportunities for solar development have dramatically increased in Minnesota over the last five years, such that most communities now must address solar installations as land use and development issues. Solar energy components continue to improve in efficiency and decline in price; solar energy has reached retail cost parity for many customers, and is now approaching cost competitive status at the wholesale level.

But solar energy is much more than a supplement (or alternative) to utility power. Solar energy has become a symbol of energy sufficiency and environmental sustainability. The growth in solar installations is attributable as much to the non-economic benefits as to solar being an economic substitute for electric utility power. Households and businesses wanting to reduce their carbon footprint see solar energy as a strong complement to energy efficiency. Volatility in natural gas prices and retail electric rate increases make free solar fuel an attractive price hedge.

Solar Energy Issues
Local governments in Minnesota are seeing increasing interest by property owners in solar energy installations, and are having to address solar land uses in their development regulation. Given the continuing cost reductions, and growing value of clean energy, solar development will increasingly be a local development opportunity, from the rooftop to the large scale solar farm. Three primary issues tie solar energy to development regulations:

1. Land use conflicts and nuisance considerations. Solar energy systems have few nuisances, but some types of solar development can compete for land with other development options, and visual impacts and perceived safety concerns by neighbors sometimes create opposition to solar installations. Good design and attention to aesthetics can answer most nuisance or visual concerns for rooftop or accessory use systems. But large scale development (solar farms or gardens) are becoming more common and raise the issue about whether and where such land uses are appropriate, just like other types of development.

2. Protecting access to solar resources. Development regulations can inadvertently limit a property owner’s ability to access their solar resource. Solar access can also be limited by buildings or vegetation on adjacent lots. Communities should consider how to protect and develop solar resources in zoning and subdivision processes.

3. Encouraging appropriate solar development. Local governments can encourage solar development for economic development, energy independence, or to meet sustainability or climate protection goals. Communities can meet both remove regulatory barriers to solar energy and incorporate low or no-cost incentives in development regulations or economic development programs to spur appropriate solar investment.
Agricultural Protection

If the community has ordinances that protect agricultural soils, 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.
Ground Cover/Natural Resource Standards

The following provisions shall be met related to the clearing of existing vegetation and establishment of vegetated ground cover:

- The project site design shall include the installation and establishment of ground cover meeting the beneficial habitat standard consistent with Minnesota Statutes, section 216B.1642, or successor statutes and guidance as set by the Minnesota Board of Water and Soil Resources.
- Beneficial habitat standards shall be maintained on the site for the duration of operation, until the site is decommissioned.
- The applicant shall submit a financial guarantee in the form of a letter of credit, cash deposit or bond in favor of the Community 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.
Grow Solar Toolkit

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

Standardized Permitting Template

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 (racking or trees), spacing, span dimension, and approximate roof slope. The drawings need not be to scale, but it should represent relative location of components, PV arrays on dwellings with a 3’ perimeter space at ridge and clips may not need separate fire service review.
2. Specification sheets and installation manuals for all manufactured components including, but not limited to, PV modules, inverters, combiner boxes, disconnects, and mounting systems.
3. If the modules use electric pivot points - Electrical diagram showing PV array configuration, wiring system, ground protection, inverters, 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 sag or deflection, no cracking or splitting of support, or other potential structural defects?
   [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]
4. Is the roof type lightweight?
   [Yes] (Composition, lightweight masonry, metal, etc.) [No]
5. Does the roof have a single layer roof covering?
   [Yes] [No]
6. 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 signed by a Minnesota licensed/certified structural engineer certifying integrity may be required. Contact the building official to determine submit requirements.
7. Identify methods and types of weatherproofing for roof penetrations (e.g., flashing, caulk).

Mounting System Information:

7. Is the mounting structure an engineered product designed to mount PV modules with a maximum weight of 150 lbs per module?
   [Yes] [No]
8. If “No” provide details of structural attachment certified by a design professional. Manufacturer’s engineering specifications are sufficient to meet this requirement.

For roof systems, additional information may be needed to ascertain the roof’s design loads.

Step 2: Electrical Review of PV System

1. PV modules, inverters, and circuit boxes are identified for use in PV systems.
2. The PV array is composed of 4 series strings or less per inverter.
3. The total inverter capacity has a continuous AC power output of 15,640 watts or less.
4. The AC interception point is on the load side of the service disconnecting means (REC 2011 705-115). NEC 2008 680-CHS.

A standard electrical diagram should be used to accurately represent the PV system. Acceptable diagrams, in interactive PDF format, are available at www.solarbeta.com/pertaining.

Resources and Reference Material:

- Minnesota Department of Labor and Industry Solar PV Resources: www.dfl.state.mn.us/industrial/energy/permitting
- Solar America Ready for Code and Standards (SolarARC): Simplified Permit Process, with sample drawings for all installation types: http://www.solararc.org
- Grow Solar Inspection Training: www.greenenergy.org/technical-assistance/training/program/developments

The information, data, or work appearing herein was funded in part by the Office of Energy Efficiency and Renewable Energy (EERE), U.S. Department of Energy, under Award Number DE-EE0001044.
Standardizing Permitting

Structural engineering studies on residential rooftop solar installations.

✓ Minneapolis Saint Paul Solar Cities Structural Study
✓ Minnesota Standardized Load Tables for residential solar installations
✓ Sandia National Lab study on roof strength for solar installations.
✓ Solar America Board of Codes and Standards
## Resources

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<th>Energy Use Profile</th>
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<th>Energy Planning and Action</th>
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<td><strong>Regional Indicators Initiative:</strong></td>
<td><strong>Metropolitan Council Community Pages</strong>&lt;br&gt;Measured energy and emissions data for Minnesota cities&lt;br&gt;<a href="http://www.regionalindicatorsmn.com">http://www.regionalindicatorsmn.com</a></td>
<td><strong>LoGoPEP Energy Planning Tools</strong>&lt;br&gt;<a href="http://www.regionalindicatorsmn.com/energy-planning">http://www.regionalindicatorsmn.com/energy-planning</a>&lt;br&gt;- A brief guide on how to incorporate energy and/or climate resilience in a city’s request for proposals</td>
</tr>
<tr>
<td><strong>Xcel Community Energy Reports:</strong></td>
<td><strong>Solar Suitability App:</strong>&lt;br&gt;Map of solar potential in Minnesota&lt;br&gt;<a href="https://solarapp.gisdata.mn.gov/solarapp/">https://solarapp.gisdata.mn.gov/solarapp/</a></td>
<td>- An energy planning guide and workbook</td>
</tr>
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<td><strong>DOE State and Local Energy Profiles:</strong></td>
<td><strong>Minnesota Wind Speed Maps:</strong>&lt;br&gt;Maps of Minnesota wind resource&lt;br&gt;<a href="https://mn.gov/commerce/industries/energy/technical-assistance/maps.jsp">https://mn.gov/commerce/industries/energy/technical-assistance/maps.jsp</a></td>
<td>- An example analysis of energy existing conditions</td>
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<tr>
<td></td>
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<td>- A solar energy calculator to assist in setting solar energy development goals</td>
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<tr>
<td></td>
<td></td>
<td>- A wedge diagram tool for energy and greenhouse gas reduction planning with an associated menu of feasible city actions</td>
</tr>
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<td></td>
<td></td>
<td><strong>GreenStep Cities</strong>&lt;br&gt;Best practices to help cities achieve their sustainability and quality-of-life goals&lt;br&gt;<a href="https://greenstep.pca.state.mn.us/">https://greenstep.pca.state.mn.us/</a></td>
</tr>
</tbody>
</table>
REGIONAL INDICATORS INITIATIVE
Measuring City-Wide Performance

Tracking the performance of Minnesota cities through key indicators is essential to assessing progress and promoting efficiency. Use this website to learn about the Initiative, explore the data, understand the results, and get involved.

ENERGY
BRITISH THERMAL UNITS

WATER
GALLONS

TRAVEL
VEHICLE MILES

WASTE
POUNDS

GHG EMISSIONS
CARBON DIOXIDE EQUIVALENTS
Local Government Project for Energy Planning

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<th>SOLAR ENERGY CALCULATOR</th>
<th>June 2017</th>
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<tr>
<td>City Name:</td>
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</tr>
<tr>
<td>Date:</td>
<td></td>
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<td></td>
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<tr>
<td><strong>Electricity Use</strong></td>
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<tr>
<td>MMBtu/year</td>
<td>tCO2e/year</td>
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<tr>
<td>Total Electricity Use</td>
<td>1,700,575</td>
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<tr>
<td>Statewide Electricity Goals</td>
<td></td>
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<tr>
<td>MMBtu/year</td>
<td>MWh/year</td>
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<tr>
<td>State Solar Goal of 1.5% by 2020</td>
<td>25,509</td>
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<tr>
<td>State Solar Goal of 10% by 2030</td>
<td>170,058</td>
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<tr>
<td>25% Renewables by 2025 RES</td>
<td>425,144</td>
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<tr>
<td><strong>Solar Generation Potential</strong></td>
<td></td>
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<tr>
<td>MW</td>
<td>MWh/year</td>
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<tr>
<td>Total Generation Potential</td>
<td>1,530</td>
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<tr>
<td>Total Rooftop Generation Potential</td>
<td>220</td>
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<tr>
<td>Top 10 Buildings Generation Potential</td>
<td>22</td>
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<tr>
<td>Public Buildings Generation Potential</td>
<td>-</td>
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<td><strong>Local Government Goals</strong></td>
<td></td>
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<tr>
<td>Renewable Electricity Share</td>
<td>25%</td>
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<tr>
<td>Renewable Electricity Generation</td>
<td>124,603 MWh/year</td>
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<tr>
<td>Renewable Electricity Capacity (Solar)</td>
<td>95.8 MW</td>
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<tr>
<td>Greenhouse Gas Reduction</td>
<td>59,074 tonnes CO2e</td>
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**Results**

43% of the total rooftop solar resource is utilized, providing enough local renewable electricity to serve the equivalent of 16,405 households and resulting in a 25% reduction in greenhouse gas emissions from electricity use.

**Instructions**

1. Use Regional Indicators Initiative data to enter electricity consumption and greenhouse gas emissions data under "Electricity Use."
2. Use the Solar Resource Calculation provided by the Metropolitan Council on your Community Page, the Minnesota Solar Suitability App or Google Project Sunroof to determine your solar resource and enter this into the "Solar Resources" section. Cities may need to conduct further GIS analysis to determine the solar resource of the top 10 buildings and public buildings.
3. Review Minnesota's clean electricity goals in the "Statewide Electricity Goals" section in comparison to your city's solar resource.
4. Set a citywide renewable electricity goal in the "Local Government Goals" section based on your city's solar resource and the statewide goals.
Cities-LEAP, State and Local Energy Data

Commercial Building Energy Benchmarking for Northfield, Minnesota

The following chart shows commercial properties from CoStar Realty Information, Inc. (www.costar.com) by building area and property type. Cities can use this data to estimate the potential scope and impact of building energy benchmarking policies or programs.
THANK YOU!

Brian Ross, AICP, LEED GA
Senior Program Director
bross@gpisd.net, 612-767-7296
Solar Mapping Exercise
Round 3 – Resources Integration

| Notes: |
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Questions?

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