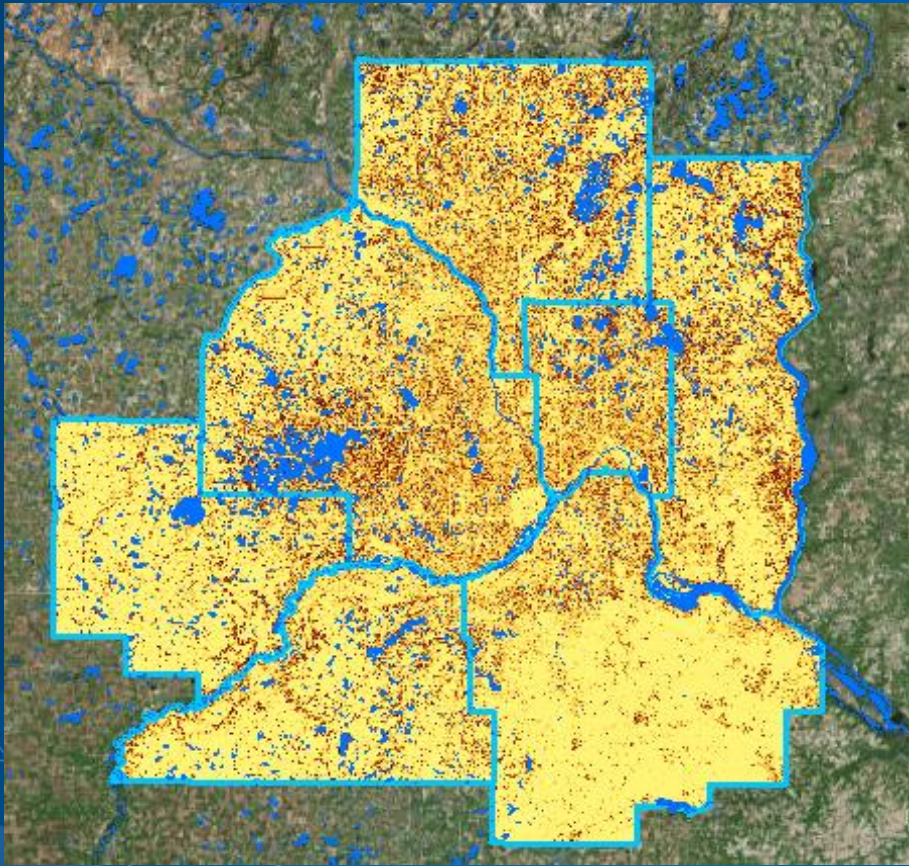


Metropolitan Council Land Use Advisory Committee (LUAC)

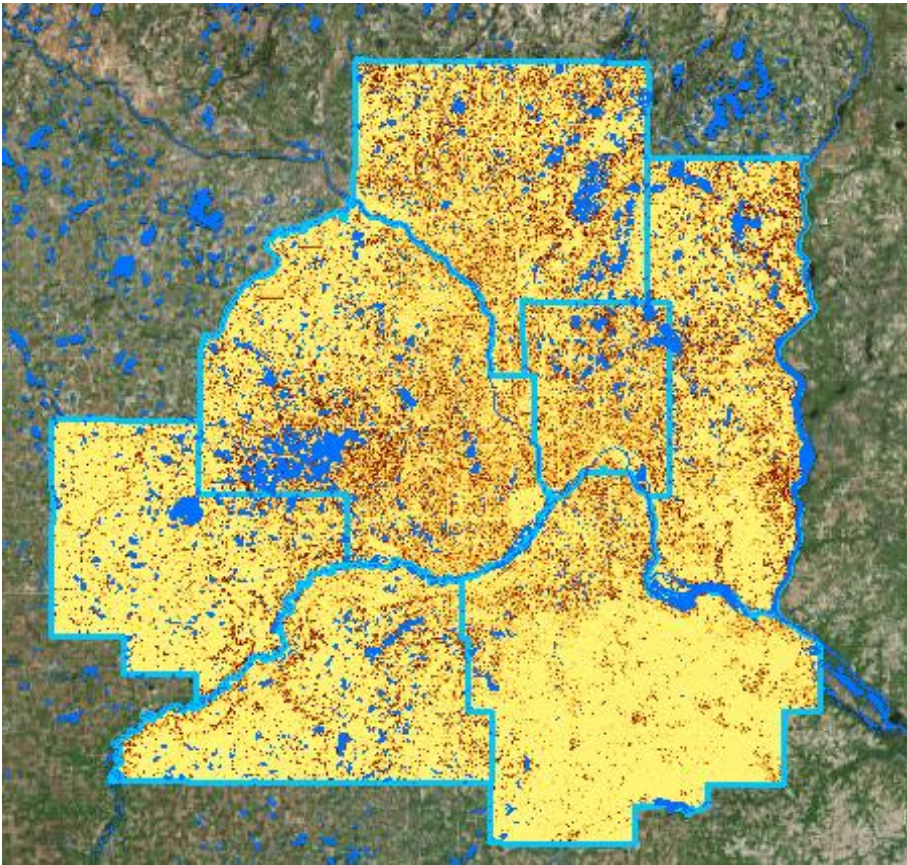


Solar Energy Planning in the Twin Cities Metro

Cameran J. Bailey
Solar Planning Advisor

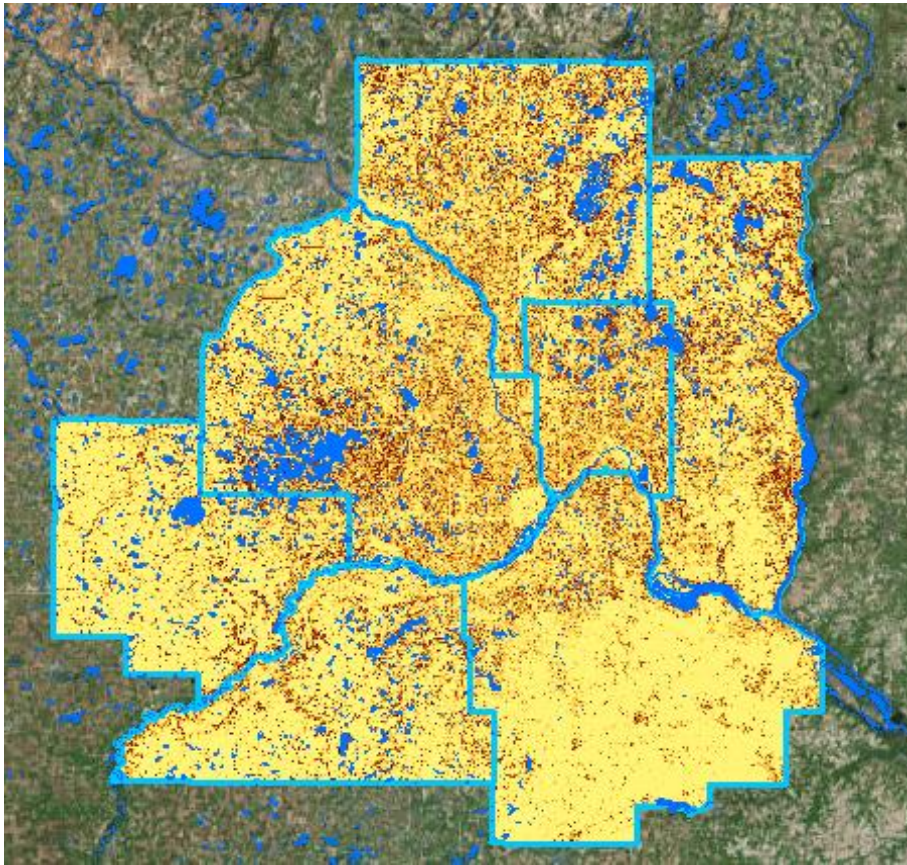
November 15, 2018

The Metropolitan Council provides solar planning assistance to Metro Region Communities per Minn. Stat. 473.859. Subd. 2. (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 Council identified four minimum requirements that must be included in the Comprehensive Plan to be compliant with State Statute



Solar Resource Protection

1. Include your community's Minnesota Solar Suitability Analysis Map.
2. Include calculations of your community's gross solar and rooftop solar resource.

Solar Resource Development

3. Include a policy or policies relating to the development of access to direct sunlight for solar energy systems.
4. Include a strategy or strategies needed to implement the policy or policies.

The Council developed supplemental solar planning documents for Metro Region Communities to fulfill their statutory requirements

SOLAR RESOURCE PROTECTION LOCAL PLANNING HANDBOOK

SOLAR RESOURCE PROTECTION REQUIREMENT

The Metropolitan Land Planning Act requires that the Comprehensive Plan shall contain "an element for the protection and development of access to direct sunlight for solar energy systems."

To satisfy the solar resource protection requirement within statute, the Council has provided the Minnesota Solar Suitability Analysis map clipped to your community, along with calculations of your community's gross solar and rooftop solar resource. To adequately plan for solar energy systems, communities should assess their existing, or baseline, conditions. The solar map and calculations provide baseline conditions for solar protection which will assist communities in creating appropriate solar policies and implementation strategies through the identification of key sites or land uses suitable for solar development, while correspondingly limiting solar development for other land uses or locations.

The sample map and calculations below are for the City of Afton, in Washington County. The solar map and calculations will differ based on the existing natural and built environment.

SOLAR MAP

In recent years, the declining prices and growing demand for solar panels have not been matched with publicly-available information for site suitability analysis to determine ideal solar panel placement. To better plan for solar development, communities need baseline solar resource information. The baseline provides necessary information for adopting appropriate solar policies and implementation strategies.

The Minnesota Solar Suitability Analysis Map, developed by the University of Minnesota and maintained by the Department of Commerce, provides solar insolation (total annual sun energy, measured in watts) data at a high resolution (1 meter). These data can be used to estimate total potential energy production of solar installations. Solar insolation varies, but the most important factor affecting small-scale photovoltaic solar installations is intermittent shading due to nearby structures and trees. More information on the methodology for creating the Solar Suitability Analysis Map can be found on the project website.

The Metropolitan Council has clipped the MN Solar Suitability Analysis Map to your community so that the map, along with the solar resource calculations, can meet the statutory requirement for the protection of the solar resource.

Continue to next page →

CALCULATION LOCAL PLANNING HANDBOOK

As that the Comprehensive Plan shall contain "an element for the direct sunlight for solar energy systems." The following needs to be updated for it to be considered complete:

is solar resource, along with your community's Solar Suitability of Community Page.

development of access to direct sunlight for solar energy systems, policy or policies.

of the Local Planning Handbook to learn more about the and development for the 2040 Comprehensive Plan Update.

Resource Calculations

rooftop potential are expressed in megawatt hours per year in the solar map for your community. These values represent intended to demonstrate the amount of solar likely to develop alons estimate the total potential resource before removing areas related to solar energy efficiency.

The gross solar generation potential and the gross solar rooftop generation potential for your community are estimates of how much electricity could be generated using existing technology and assumptions on the efficiency of conversion. The conversion efficiency of 10% is based on benchmarking analyses for converting the Solar Suitability Map data to actual production, and solar industry standards used for site-level solar assessment.

Please contact your Sector Rep if you have any questions. Your community totals are shown in the table below:

Community	Gross Potential (Mwh/yr)	Rooftop Potential (Mwh/yr)	Gross Generation Potential (Mwh/yr) ¹	Rooftop Generation Potential (Mwh/yr) ²
St. Paul	66,151,161	10,968,464	6,615,116	1,096,846

¹ There are a few communities where generation potential calculations could not be produced. These are areas within some maps where data was unusable. These areas were masked and excluded from gross rooftop potential and generating potential calculations.

² In general, a conservative assumption for panel generation is to use 10% efficiency for conversion of total insolation into electric generation. These solar resource calculations provide an approximation of each community's solar resource. This baseline information can provide the opportunity for a more extensive, community-specific analyses of solar development potential for both solar gardens and rooftop or accessory use installations. For most communities, the rooftop generation potential is equivalent to between 30% and 60% of the community's total electric energy consumption. The rooftop generation potential does not consider ownership, financial barriers, or building-specific structural limitations.

June 2017

SOLAR RESOURCE DEVELOPMENT LOCAL PLANNING HANDBOOK

SOLAR RESOURCE DEVELOPMENT REQUIREMENT

The Metropolitan Land Planning Act requires that the Comprehensive Plan shall contain "an element for the protection and development of access to direct sunlight for solar energy systems."

To ensure success in incorporating the solar resource development requirement within the comprehensive plan, it is important to highlight a generalized comprehensive planning flow chart, for reference:

To satisfy the solar resource development requirement within statute, your community should include a policy or policies relating to the development of access to direct sunlight for solar energy systems within the comprehensive plan. Your community should also include any strategies needed to implement the policy or policies.

In order to formulate your community's policies and strategies, you can begin by setting solar visions or goals within the comprehensive plan. Please see examples below of solar goals and visions, solar policies, and solar implementation strategies:

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.
3. Urban Goal – Reduce energy consumption in buildings.
4. Suburban Goal – Encourage solar development in residential areas.
5. Suburban Goal – Encourage solar development in commercial and industrial areas.
6. Suburban Goal – Encourage solar development in rural areas.
7. Suburban Goal – Encourage solar development in agricultural areas.
8. Agricultural Goal – Encourage solar development in agricultural areas.
9. Rural Goal – Encourage solar development in rural areas.
10. Rural Goal – Encourage solar development in rural housing or other uses.

Solar Goals by Plan Element

1. Economic Goal – Encourage solar development in economic base.
2. Housing Goal – Encourage solar development in housing.
3. Land Use Goal – Encourage solar development in land use.
4. Resilience Goal – Encourage solar development in resilience.

APPLYING ROOFTOP GENERATION POTENTIAL TO YOUR COMMUNITY

The table below serves as a point of reference for how three communities of three different designations within the Twin Cities metropolitan area may view their Rooftop Generation Potential (Mwh/yr). For the Lake Elmo community, their Rooftop Generation Potential could potentially meet 95% of their community's electricity needs over the course of a year. The community of Hopkins is nearly 12 times as dense as Lake Elmo; however, they may still benefit from 55% of their electricity needs being met by their Rooftop Generation Potential. The benchmarking of the electricity use in these communities will allow them to more accurately understand, analyze, and plan around the benefits of their individual Rooftop Generation Potential.

Community (Designation) ¹	Rooftop Generation Potential (Mwh/yr)	Electricity Consumption (Mwh/yr) ²	Potential Electricity Consumption met by Rooftop Generation (%)
Oakdale (Suburban)	155,503	204,845	76%
Lake Elmo (Rural Residential & Emerging Suburban Edge)	51,949	54,935	95%
Hopkins (Urban Center)	111,590	203,524	55%

¹ Community Designation by the Metropolitan Council per "Thrive MSP 2040."
² Total electricity use across the Residential and Commercial/Industrial sectors within each community in the year 2011 as reported in "Final Minnesota Pollution Control Agency Report on: Regional Indicators Initiative Measuring City-Wide Performance, An Inventory of Energy, Potable Water, Travel, Waste, Greenhouse Gas Emissions and Costs for Twenty Minnesota Cities from 2008-2011."

The Council developed two solar planning resource webpages for metro region communities

SOLAR ENERGY PLANNING & IMPLEMENTATION RESOURCES

The **Metropolitan Land Planning Act** requires that the Comprehensive Plan shall contain "an element for the protection and development of access to direct sunlight for solar energy systems." Given the availability of new data, our ability to measure solar as a natural resource has greatly improved. Subsequently, communities have four (4) Minimum Requirements to fulfill in their 2040 Comprehensive Plan Updates.

- **Solar Resource Protection:** Include your community's Minnesota Solar Suitability Analysis Map. This is available on your [Community Page](#).
- **Solar Resource Protection:** Include calculations of your community's gross solar and rooftop solar resource. This is available on your [Community Page](#).
- **Solar Resource Development:** Include a policy or policies relating to the development of access to direct sunlight for solar energy systems.
- **Solar Resource Development:** Include a strategy or strategies needed to implement the policy or policies.

The purpose of this webpage is to provide the most up-to-date catalogue of resources to support communities in their Solar Energy Planning and Implementation efforts. These resources include useful guides, organizations, and tools from across the State of Minnesota, the Upper Midwest Region, and the Country. This page was developed through Local Planning Assistance's collaboration with the [Great Plains Institute](#), [Minnesota GreenStep Cities](#), the [McKnight Foundation](#), and the [SolSmart Program](#), which provides no-cost technical assistance from a team of national experts who work with local governments to evaluate programs and practices that impact solar markets, and identify high-prospect opportunities for improvement.

❖ PLANNING, ZONING, & DEVELOPMENT REGULATIONS

❖ PERMITTING

❖ INSPECTIONS & CONSTRUCTION CODES

❖ SOLAR RIGHTS (CONSUMER PROTECTION, POLICIES, & REGULATIONS)

❖ UTILITY ENGAGEMENT

❖ COMMUNITY ENGAGEMENT

❖ DEVELOPMENT & FINANCE

❖ TRAINING & EDUCATION

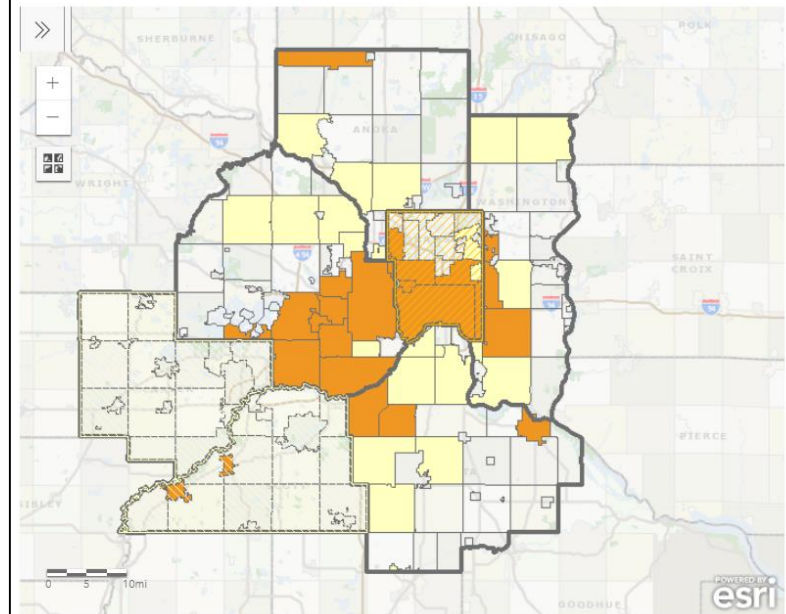
Solar Resources

Find resources by community or by resource type (ordinances, plans, etc.)

Select a community... or Select a resource type...

Solar Communities Map

The highlighted communities have Solar Sustainability & Energy plans, ordinances or web resources.



"SolSmart Designated Communities" are communities that are incorporating national solar energy best practices into their planning and permitting processes. To become solar-ready communities. There are currently 24 Metro Communities, representing 1.5 million residents, actively enrolled in SolSmart.

The Council developed supplemental solar planning documents for metro region communities based on requests for further guidance

Local Government Solar Landing Page – Resources Template

Installing Solar PV in your Community

- Solar PV Permit Checklist (*upload document and embed your community's link*): [GPI Guide For Reference](#)
- [Solar PV MN Electrical Inspection Checklist](#)

Finance

- Database of State, County, and Local [Incentives for Renewables & Efficiency](#)
- Community Energy Resource Teams: [Community Solar Garden Resources](#)
- Center for Energy and Environment: [Financing Resources](#)
- MN Commercial Property-Assessed Clean Energy: [PACE Program](#)
- MN Department of Commerce: [Solar Industry](#)

Solar Mapping and Production Value Projections

- [MN Solar Suitability](#): Ground and Roof Analysis App
- [Google Project Sunroof](#): Rooftop Solar Suitability App for individual buildings, cities, and counties
- National Renewable Energy Lab's [PV Watts Calculator](#): Ground and Roof Analysis App
- [Midwest Renewable Energy Association's Solar Project Builder](#): Analyze potential benefits of finance options

Find an Installer & Consumer Rights

- [Clean Energy Project Builder](#): Find Companies, Explore Installations, See Solar Gardens, Get Resources.
- MN Department of Commerce: [Solar Industry Resources](#)
- Solar Energy Industry Association (SEIA) [Consumer Protection](#) (both Spanish and English).
- Interstate Renewable Energy Council (IREC): [Consumer Solar Checklist](#)
- MnSEIA (MN Solar Energy Industries Association): [Find a Local Installer](#)
- Consumer Reports, [How to Install a Solar System and Not Get Burned](#)
- [Solar United Neighbors - Minnesota](#): Consumer Education and Group Purchase Assistance

Education, Utilities, and Additional Resources

- The Solar Foundation: [Solar Jobs Map](#)
- Solar Outreach Partnership: [Myths & Misconceptions, Financing, Planning, Implementing, Training](#)
- SunShot Spotlight: [Solar and Real Estate](#)
- Xcel Energy: [Residential Programs & Rebates](#); [Business Programs & Rebates](#)
- Connexus Energy: [Programs & Rebates](#)
- Minnesota Valley Electric Cooperative: [Residential Members Resources](#); [Business Members Resources](#)
- Wright-Hennepin Cooperative Electric Association: [Energy Savings & Rebates](#)
- Dakota Electric Association: [Programs & Rebates](#)

Twin Cities Metro Communities with Solar/Sustainability Landing Pages

[St. Francis](#) [Maplewood](#) [Roseville](#) [Minneapolis](#) [Golden Valley](#) [Oakdale](#)

[Burnsville](#) [Blaine](#) [Eden Prairie](#) [Edina](#) [Woodbury](#) [Jordan](#)

390 Robert Street North | Saint Paul, MN 55101-1805
P. 651.602.1000 | TTY. 651.291.0904 | [metro council.org](#)

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Installing Solar PV on Properties on the National Register of Historic Places

Solar can be installed on a property listed on the National Register of Historic Places. The National Register provides opportunities for preservation incentives, such as grants, tax credits, and preservation easements. The national Historic Preservation Act of 1966 created the National Register and established a regulatory framework for federal actions involving historic properties.

The National Renewable Energy Laboratory notes that, "A private owner or a state or local government acting without federal involvement has no restrictions placed upon it by Section 106 [of the National Historic Protection Act]. The regulation only applies to federal undertakings involving a property or properties listed in or eligible for listing in the National Register."

(<https://www.nrel.gov/docs/fy11osti/51297.pdf>, pg. 5)

Most of the preservation exists at the local level through historic preservation ordinances, which are administered by local government staff and historic preservation commissions which may be either advisory or regulatory. Generally, to install solar on a historic property or within a historic district, a property owner would have to obtain a certificate of appropriateness from the requisite body. The certificate of appropriateness would convey that the installation of solar would not diminish the historic nature and character of the property.

Additional Resources:

- National Park Service, U.S. Dept. of the Interior: [Solar Panels on Historic Properties: Installing Solar Panels and Meeting the Secretary of the Interior's Standards](#)
- National Park Service, U.S. Dept. of the Interior: <https://www.nps.gov/tps/standards/applying-rehabilitation/its-bulletins/ITS52-SolarPanels.pdf> Interpreting The Secretary of the Interior's Standards for Rehabilitation: Incorporating Solar Panels in a Rehabilitation Project

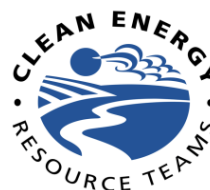


390 Robert Street North | Saint Paul, MN 55101-1805
P. 651.602.1000 | TTY. 651.291.0904 | [metro council.org](#)

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Partnering with these four organizations has provided a foundation for many other fruitful collaborations, which keep our assistance relevant



Metro & State Partners

- *Great Plains Institute*
- *MN Department of Commerce, Division of Energy Resources*
- *Clean Energy Resource Teams*
- *Fresh Energy*
- *MN GreenStep Cities*
- *Xcel Energy – Partners in Energy*
- *MN Brownfields*
- *Center for Energy & Environment*
- *University of Minnesota*
- *Solar United Neighbors*
- *Midwest Renewable Energy Association*
- *The McKnight Foundation*
- *St. Paul Port Authority*
- *MN Rural Renewable Energy Alliance*
- *MN Solar Energy Industries Association*

National Partners

- *The Solar Foundation*
- *National Renewable Energy Lab*
- *Meister Consultant's Group*
- *Electric Power Research Institute*
- *ZEF Energy*
- *National League of Cities*
- *Brooks Engineering*
- *National Association of Counties*
- *Solar Energy Industries Association*
- *International City/County Management Association*



The Council's partnership with the SolSmart Program greatly increased the quality and reach of solar planning among metro region communities

Total Communities with Solar Resources	48	Total SolSmart Communities	25	Total Metro SolSmart Resident Population	1,536,320
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Solar Planning & Technical Assistance

- Permitting Process
- Planning, Zoning & Development
- Inspections
- Construction Codes
- Solar Rights
- Utility Engagement
- Community Engagement
- Market Development & Finance



Example: Golden Valley, MN

Guiding Solar into new developments

Public Amenities Ordinance.

Points	Amenity
5	Green Roof
5	Affordable Housing
4	Public Open Space
4	Utilization of a Renewable Energy Source
4	LEED Platinum Certification
3	LEED Gold Certification
3	Community Garden



Why a Minnesota apartment project is a pioneer in solar development

WRITTEN BY

Frank Jossi
August 27, 2018

PHOTO BY

courtesy Todd
Schachtman



A Twin Cities developer who recently completed one of Minnesota's largest residential solar energy projects hopes that it serves as a model for future multi-family developments.

The 452-kilowatt (kW) array at the Liberty Apartments and Townhomes in Golden Valley consists of more than 1,400 panels atop 55 townhouses, as well as on a clubhouse and a five-story apartment building.

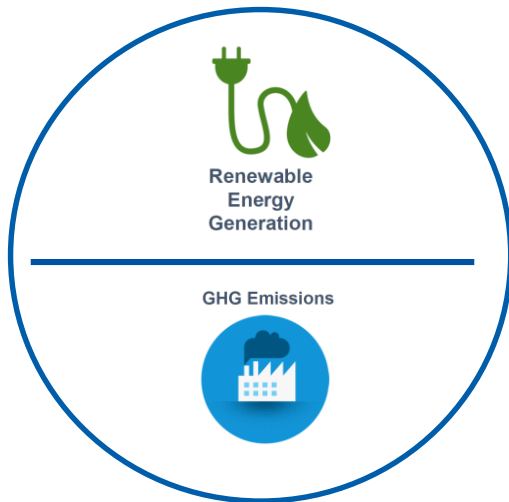


Example: Belle Plaine, MN

Best Practices in Solar Zoning & Permitting

Solar Planning Tools Adopted in last 1.5 years

- Received free review of Solar PV Permitting Process to keep residential fees below \$400
- Launched a Solar Resource Webpage
- Received a free review of their Solar Ordinance (in process of adopting proposed changes)
- Developed and published a “Solar PV Permitting Checklist” to streamline solar permitting process
- Developed Resilience & Solar Chapter in 2040 Comprehensive Plan with goal to align with state’s renewable energy and greenhouse gas emissions goals
- Made Solar Panels eligible for “Facade and Energy Efficient Improvement Matching Grant” program



Example: Edina, MN

Equitable Solar Energy Savings

Andrew Wig Nov 8, 2018 Updated 6 hrs ago 0

City Residents:

LMI households in Edina eligible to sign up for energy savings created by Community Solar Garden on city's Public Works Facility

Operational:

October 1 ribbon cutting ceremony




The Edina Community Solar Garden, installed on the roof of the Edina Public Works Building, is set to go online this month. (Photo courtesy IPS Solar)




Example: Minneapolis, MN

Largest Solar Incentive in Upper Midwest



City of Minneapolis
Green Business
Solar Cost Share 2018



Funds Available for Green Business Solar Projects

City is paying residents and businesses 2 – 3 times as much for their electricity as they paid for it to decrease pollution and save money.



The Council's next steps in advancing Solar Energy Planning

SOLSMART ORGANIZATIONAL ADVISOR UPPER MIDWEST JOINT PROPOSAL

JUNE 4, 2018

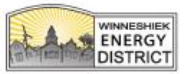


Rolf Nordstrom
President and CEO

Trevor Drake
Program Manager

Great Plains Institute
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Minneapolis, MN 55407
612-767-7291
tdrake@gpisd.net

In partnership with:



MN SOLAR PATHWAYS
illuminating pathways to 10% solar

Collaborating to find least-risk, best-value strategies for Minnesota to achieve its solar energy goals

Extreme Heat Map Tool

Localized Flood Map Screening Tool

Extreme Heat Story Map

Localized Flooding Story Map



The Council's next steps in advancing Solar Energy Planning

MN Brightfields Initiative

MN Brightfields Initiative | Renewable Energy Development at Minnesota Closed Landfills
Letter of State-Wide, Regional, and National Support
May 1, 2018

To Whom It May Concern:

My name is Cameron Bailey and I serve as the Solar Policy & Planning Advisor to the Metropolitan Council and the SolSmart Program in the Twin Cities Metro. I have aggregated a state-wide, regional, and national team of public and non-profit solar and energy professionals to support an initiative termed the "MN Brightfields Initiative". In this initiative, we are offering cost-free professional, technical, financial, and regulatory expertise and analysis to assist local governments across Minnesota develop renewable energy projects on closed landfills. The desired outcomes of this initiative are to:

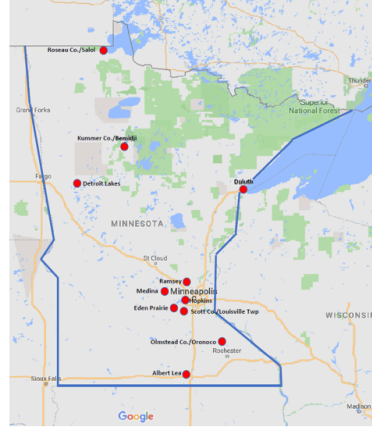
- Bring redevelopment potential to land that is otherwise undevelopable
- Bring value-adding economic redevelopment to the local governments (townships, cities, counties) and their communities, which stand to benefit from such developments
- Make Minnesota a national leader in solar construction on landfills, showcasing how these projects can save money, create jobs, and partially mitigate environmental impacts from landfills
- Bring these savings and benefits to ALL of Minnesota. By demonstrating success in your community, other counties, utilities, and municipalities can replicate the process
- Guide national and state policies and incentives to support renewable energy redevelopment projects on landfills, brownfields, superfund sites, other contaminated lands with the MPCA
- Many brownfield sites have limited funding for remediation, do not have the capacity to assess and maneuver the MPCA's processes, and these projects can motivate action and bring resources to sites that may otherwise be neglected
- Developing projects on brownfield sites can result in regular site maintenance that is paid for by the project, rather than maintenance costs being a burden on local taxpayers

As of October 2017, there are over 150 solar and wind projects on landfill sites across the country, providing benefits to their communities. Installations provide clean energy and often electricity cost savings to [owners], [residents], and businesses. Depending upon the arrangement, projects can generate lease payments for the owners, taxes to the municipality and environmental benefits over traditional sources of electricity. These projects are [located] in 28 states with the relevant regulatory authority (usually the state's environmental department) overseeing the compatibility of the renewable energy installation with the landfill and the continued protectiveness of the landfill cap and closure.

As of today, we have 11 sites across the state (Fig. 1) where the applicable local government has told us they are interested in our team assessing the technical, financial, and regulatory feasibility of renewable energy development on their closed landfills:

- | | |
|------------------------------|--------------------------------------|
| 1. Becker County, 1973-1998 | 7. City of Hopkins, 1964-1980 |
| 2. Roseau County, 1979-1994 | 8. City of Albert Lea, 1965-1993 |
| 3. Scott County 1971-1990 | 9. City of Medina, 1960-1993 |
| 4. Wadena County | 10. City of Eden Prairie, 77-1986 |
| 5. City of Duluth, 1965-2001 | 11. Onnoco Township |
| 6. City of Ramsey, 1972-1993 | 12. City of Fridley (superfund site) |

Fig. 1 - MN Communities Interested in the pursuit of Brightfields in their Community



All we ask for in return from MN Brightfield Initiative Communities is a commitment to the feasibility assessment process, as well as a real desire to see an execution of a renewable energy redevelopment project on their closed landfill site should the assessment yield results that are favorable for development.

Our team of professionals can bring the following resources to bear:

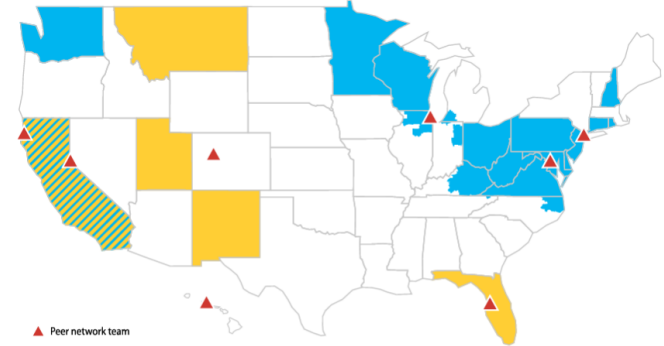
- Solar photovoltaic feasibility study for the site including and economic and technical considerations
- Subject Matter Experts to present the results to local decision makers
- Support to work with the MPCA on a proposal for development
- A list of solar developers to engage with on developing the project
- Support for developing a RFP that can be used to engage industry on site development

Solar Energy Innovation Network

The Solar Energy Innovation Network assembles diverse teams of stakeholders to research cutting-edge solutions for a more reliable and resilient grid.

Participating Teams

For the first round of the Solar Energy Innovation Network, nine teams were selected and grouped into two cohorts based on shared challenges and goals.



Options Analysis
Improving reliability and affordability of solar energy through options analysis and systems design

Grid Flex
Improving grid flexibility and resiliency through advanced siting and operations of solar + DER

The program's first two cohorts bring together teams from across the country to address shared challenges and drive problem solving and innovation for tomorrow's electric grid.



Climate Change & the UHI Effect in the TC Metro: Solar PV Canopies, Vegetative Coverage, and Stormwater Treatment Integration

Cameron J. Bailey – Senior Planner & Solar Advisor
September 20, 2018



Questions?

Cameran J. Bailey, Solar Planning Advisor,

Local Planning Assistance

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651-602-1212



**METROPOLITAN
COUNCIL**