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Local Energy Matters: Solar Market Landscape

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This report was prepared under DE-EE0006908 as part of the Local Energy Matters: Solar Market Development in Duluth, MN project.

NOTICE

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- Paul Helstrom, Minnesota Power
- Anthony LeVanda, Portland State University
- Minnesota Power
- State of Minnesota Department of Commerce
- PV System Owners
- PV System Installers
- City of Duluth

List of Acronyms
IOU- Investor Owned Utility
MIM- Made in Minnesota
MP- Minnesota Power
PUC- Public Utilities Commission
PV- Photovoltaic

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Project Background

The *Local Energy Matters* project works to advance solar deployment in the City of Duluth, MN- a cold-climate community of 86,000. Duluth currently has minimal solar installation and relatively high solar soft costs. The project has convened a cross-sector stakeholder group to benchmark the current market, implement best practices for solar deployment and soft cost reduction, develop pilot deployment programs in residential rooftop, community solar, and commercial industrial sectors, work with the local electricity provider to determine appropriate sites for utility scale developments, and will complete a 5-Year Solar Market Transformation Plan at the conclusion of the three-year project period. This work is being conducted under a Solar Market Pathways grant from the US Department of Energy.

The technical approach to the *Local Energy Matters* project recognizes the following:

- Considerable work has been accomplished regionally and nationally to establish best practices and case studies for solar market development and soft cost reduction.
- Duluth can apply these practices and lessons learned through smart process and program design.
- Adapting best practices to a community must include a review of specific challenges and opportunities within that community and experienced by stakeholders.
- Applying capacity in the form of staffing to facilitate a stakeholder process, complete baseline analysis, and develop programmatic options can accelerate a community's solar market.
- A comprehensive community process model and the policy, financing, and program development results of that process can serve as case studies for successful replication in other communities.
- Completing defined demonstration projects can provide test cases to further refine policy, practices, and processes which can result in lower price points for scaling solar development.

To advance the solar market in Duluth a stakeholder process has been created to develop a Solar Market Transformation Plan. Development of the plan will include work on the following:

- Creation of a partnership with the local IOU electric utility to determine opportunities for solar installation within Duluth that will help the IOU to meet or exceed their 1.5% solar standard by 2020 including 10% (of 1.5%) as small-solar distributed generation.
- Integration with energy efficiency programs including utility Conservation Improvement Programs, the Duluth Energy Efficiency Program, low-income weatherization, and Duluth's entry into the Georgetown University Energy Prize competition.

- Development of educational opportunities and streamlined process for institutions that have expressed interest in building or hosting solar arrays on municipal, school, housing authority, and university buildings.
- Incorporation of grassroots effort from the interfaith community to take the pilot church energy efficiency program to the next step by creating solar opportunities.
- Engagement in revising Duluth's Comprehensive Plan and year-long City-designated land use planning processes to incorporate energy generation overlay.
- Completion a City policy review and incorporation of solar-friendly practices in the City housing and resiliency plans.
- Development a framework for solar installation in a historic neighborhood as part of an energy pilot and identification of appropriate brownfields redevelopment sites.
- Exploration of different financing options for solar installations and develop additional options as needed to accomplish 1 MW of installed capacity.

During the first year of the three-year project, the focus is on benchmarking and program development including benchmarking current installed capacity, financing, costs, policies, procedures, and processes including permitting, inspection, and interconnection. This initial benchmarking period will produce recommendations for soft cost reductions and pilot program development. The overall objective for this budget period will be completion of demonstration project designs, including marketing strategies, financing, developer RFP's and a streamlined pathway from individual project design to interconnection for residential rooftop, community solar garden and commercial/industrial installations. Also, during this period, the stakeholder group will pursue the potential for a utility-scale solar development within the City of Duluth.

Focus of Report

The focus of the landscape analysis is conducting a baseline of current conditions and establishing solar market advancement recommendations that can be addressed in subsequent periods. The report examines the local solar market in the areas of installer availability and quality, financing, development process (permitting, inspection, interconnection), hardware, code/policy, solar mapping, and cost.

The overall goal of the Local Energy Matters project is to identify barriers and find solutions to identified barriers within the solar market of Duluth, MN, with the end goal of seeing the first MW of solar installed in the city by the end of 2017. This Landscape Analysis of current solar market conditions builds upon the previous Duluth Baseline Analysis (Ecolibrium3, 2015), and is intended to further refine the understanding of the barriers to solar in this particular region. Market categories including current installed cost, workforce review, financing considerations,

and solar process and policy are discussed below with identified barriers to solar development and opportunities for soft cost reduction.

Data Sources and Issues

Local data to understand the development of the Duluth solar market came from five sources and builds upon data and analysis that was conducted to create a solar market baseline which previously explored current installed capacity and costs. Sources for the landscape analysis included:

Utility Data – Minnesota Power (MP), an investor owned utility (IOU) that includes Duluth in its service territory, provided cost data for this analysis, attached as *Appendix A*, and data on participation in its 2015 SolarSense rebate program via an interview. Additionally, MP previously provided a comprehensive solar report for that was included as an appendix in the Solar Baseline report.

Minnesota Department of Commerce – This agency administers the Made in Minnesota (MiM) Incentive Program, and provided information about this program via interview and documentation. The Department of Commerce, as well as the *Consumer Affairs Office of the Minnesota Public Utilities Commission*, also provided information on consumer complaints regarding the solar interconnection process in Minnesota Power service territory (via interview).

City of Duluth – Ecolibrium3, in partnership with the Great Plains Institute, started meeting regularly with Minnesota Power and City of Duluth permitting department representatives in March, 2015 to determine current city solar policy and practices, with the intent of finding ways to reduce soft costs attributed to solar within Duluth. One outcome of those meetings was a modified survey of current city solar practices based on the Solar Roadmap, an interactive program that organizes national best practices in solar activity. This survey is attached as *Appendix B*.

Individual interviews - City of Duluth permit data lists the owner of the property for individual installations, which allowed Ecolibrium3 to interview owners of solar systems. Approximately 33% of identified permit holders have been interviewed thus far by Ecolibrium3, and have yielded valuable insight into many aspects of solar project development in Duluth. Ecolibrium3 also made contact with local solar owners through offering free solar consultations to commercial and residential customers that express interest in solar opportunities, allowing for further data collection of solar activity and perceptions.

Organizational interviews – Ecolibrium3 interviewed installers, finance organizations, and nonprofits that have served the region in terms of solar and sought input from them in aspects

of solar market development. Their experiences are included within the insights gained in this report.

Solar Market Landscape Analysis Findings

Current Installed Cost Analysis

The previous installed cost analysis for solar in the Minnesota Power territory, found an average installed cost of $3.99/watt, through analysis of permit data, incentive applications, and interviews. One piece of data that seemed a mismatch was the utility reported costs versus expenses noted during interviews with solar customers. A further analysis examined a subset of installations from 2014 to determine cost structure based on the City of Duluth and installation size. A further breakdown of MP's interconnections in 2014, based on updated data provided by MP (Appendix A), indicates not only a different average installed cost (than previously determined) that is more reflective of cost noted in individual interviews, but also a disparity in installed costs in Duluth and outside the city.

Table 1: Average Installed Cost per Watt of Solar, MP service area, 2014

System Size	Duluth	MP service area, outside Duluth
0-5 kW	$6.25/watt	$7.06/watt
5-10 kW	$4.07/watt	$4.53/watt
10-20 kW	$5.8/watt	$3.31/watt
20-40 kW	n/a	$3.30/watt
Average Install Cost	$5.04/watt	$3.93/watt
Range of Install Cost	$3.73-$8.34/watt	$2.28-$10/watt
Total Installed Capacity	59.19kW	141.01kW

This clarifies that, on average, Duluth is a more expensive install site than Minnesota Power service locations outside Duluth by over a $1/watt. It also suggests that part of the reason for the higher cost of solar in Duluth is due to the small average size of solar installations. In general, smaller solar installs have a higher cost per watt than larger size installs, and Duluth had double the ratio of under 5kw installs (13.9%) than areas outside Duluth (7%) in 2014, and half the amount of installs over 10KW in size compared to those outside city limits. It should be noted, from the baseline data collected previously, that in Duluth a majority of residential systems are under 5kw and make up the vast majority of interconnections (Ecolibrium3, 2015). Data also suggests however, that larger solar installs are becoming more common in Duluth, which indicates that a downward pressure will be exerted on the average installed cost/watt.

Other possible reasons for a higher installed cost per watt will be explored in the following market categories.

Workforce Review

While Duluth has only one solar installer in its metro area, at least 5 other installers are active and have completed projects in the region. Of these businesses, 4 out of the 6 tend to be small operations focused primarily on installs of less than 20kW. They tend to be highly professional, 5 out of 6 employing workers in house with NABCEP certifications. They also tend to utilize high quality, US made, solar PV panels. Finally, the Made in Minnesota (MiM) Solar Incentive program gives those awarded these incentives a strong financial motivation to utilize higher cost and quality Minnesota-made PV panels, which can add cost to a solar installation.

The one metro-area installation contractor has worked in the solar space for over twenty years. During this time, as noted in an interview, customer acquisition has been a major cost factor. Of the number of inquiries into solar, it was noted that less than 1% of sales inquiries covert into an installed system. This is a company history that was especially true when the cost of solar was significantly higher but continues to color the sales approach of the local installer. To reduce time in solar assessments and/or pricing systems, initial inquiries are often first greeted with a recommendation not to install as an artificial obstacle to determine who follows up with continued interest. The installer is also most likely to create custom solutions which can add to costs.

Without a doubt the relatively small amount of highly skilled solar contractors installing high quality products would contribute to a higher cost per watt. However, based our interviews with solar owners, another contributing factor which may play a role in higher cost per watt in our region is the lack of competitive bidding in the solar process. We found very few solar owners that had bid their project out to more than one installer. Three main reasons cited for this phenomenon include loyalty to local businesses, lack of information about solar installer choice and availability, and confusion about solar value and installation process. In general, we found that roofs that used flush mounted racking tended to be less expensive per watt than those tilted off the roofline to take maximum advantage of the northern solar resource. Studies have indicated racking has determined as a major contributor to solar install costs, and incentivizing flush mounted solar installs in Duluth may be another strategy to bring cost down (Morris, Calhoun, Goodman, and Seif, 2013).

Financing

Information about local financing of solar installations came primarily from owner interviews. Interviewees utilized a wide range of financing to pay for solar projects, but most often solar owners paid for "out-of-pocket" installation expenses from their own financial resources rather than with a loan product. However, solar owners that did use financing typically utilized a home equity loan or line of credit on their mortgage, and were able to obtain them without difficulty. This is probably self-selecting to a degree, as past installers of solar have needed to

be on financially stable footing to be able to afford solar in Duluth, and thus would pose a small risk to a financial institution. However, it also indicates there is not an ingrained institutional barrier among local financial institutions in terms of solar installations.

We use the term "out-of-pocket" because what became apparent in our previous reporting is that very few solar projects have moved forward in this region without state or utility rebates, and that the lottery structure of these rebates indicate a much higher solar demand than the current rebate supply, see Table 2 below. This creates an uncertainty for installers and potential solar customers that was identified as a primary barrier. Partly because of this uncertainty (and partly due to the comparative low cost per kWh regionally), third-party financing through installer partners appears to be quite rare in Duluth comparative to the Twin Cities metro region.

Table 2: SolarSense and MiM rebate applications and awards, MP service area, 2015

PV Rebate - PV Sector	Applications	Awards	%, Applications Awarded
MIM - Residential	31	3	9.70%
MIM - Commercial	15	2	13.30%
SolarSense- Residential	26	6	23%
SolarSense-Commercial	5	5	100%

Due to this imbalanced demand and supply cycle, it was previously noted that alternative market financing was needed to address excess solar demand. While no further rebates were found to plug into this demand gap, there are other forms of financial aid available for solar at the state level through institutions that have not been utilized in Duluth, including Minnesota Property Assessed Clean Energy (MN PACE), the Minnesota Center for Energy and the Environment (MN CEE), and the Minnesota Housing Finance Agency Fix Up loan. A brief overview of the institutional loan offerings are indicated below in Table 3.

Table 3: Minnesota Solar Finance Availability in Duluth

Lending Agencies	Residential	Commercial	Nonprofit	Income limited	Rate	Term	Max Loan Amount	EE/Solar Bundling ?
MN PACE	No	Yes	Yes	No	4-7%	Up to 15 years	Varies	Yes
MN CEE Loans	Yes	Yes	Yes	No	3.9-6.99%	5-10 years	$20000-$100000	Yes
MHFA Fix Up Fund	Yes	No	No	$99,500	5.99-6.99%	10-20 years	$15000-$50000	No

Ecolibrium3 has engaged local finance institutions in two ways. The first was to work with Park State Bank as a member of the Lincoln Park Shines program. This program is a partnership between University of Minnesota-Duluth engineering classes, Ecolibrium3, and local businesses to engage business owners in renewable and sustainable design. Park State Bank was recruited specifically as a local institution that could install solar, but was also interested in understanding the process so they could explore the potential of a niche market for solar financing. Ecolibrium3 is working with Park State Bank on developing a local product. In addition, a commercial and finance joint meeting was held in partnership with Minnesota Power and the City of Duluth. This meeting included exploration of current financing tools available for project development including PACE, MN Housing Finance Agency, Minnesota Center for Energy and the Environment, and the St. Paul Port Authority Trillion BTU program.

These lenders can provide financing to a wider range of residential, commercial, and nonprofit customers in Duluth, and enable the ability to bundle solar installations with of energy efficiency (EE) projects to reduce the simple payback of a combined/EE energy retrofit. This could provide a mechanism for pent up solar demand in Duluth that is unable to access rebate incentives. However, to compete with the lure of the rebate lottery, the consumer would have to be knowledgeable of the economic value of solar and energy, including net metering law, federal incentives, customer electricity cost, and measurements of return. This type of complexity was another noted primary barrier in the Local Energy Matters: Solar Baseline Report, and public outreach to specific solar market segments in regards to financing availability and options could jump start the use of this untapped resource locally (Ecolibrium3, 2015).

One noted barrier in this opportunity is that, while the residential financing does make available low cost financing (<5%) for residential solar, the loans that allow for EE bundling with solar are more expensive than stand-alone solar loans (refer to Table 3). This is not the case for commercial and nonprofit solar loans available in the state, which allow solar/EE bundling at low rates of interest. A low interest residential loan that allows EE bundling could assist in value oriented energy retrofits that include solar.

Finally, while community solar gardens (CSG) are not currently available in the Minnesota Power service area, CSG's could be another mechanism to reduce costs for commercial, nonprofit, and residential customers. Depending on the model, CSG's could allow the purchase or lease solar in an amount in small enough increments to meet customer affordability. This could create solar options for those who cannot afford high capital investments. Research indicated general support and interest within all three sectors of the community solar garden concept.

Process and Policy

The Duluth solar policy review team previously mentioned included four separate departments, including Facilities, Economic Development, Building Inspection, and Planning. The document produced from those meetings, the Solar Roadmap survey (Attachment B), highlights current practice and pathways for improvement in three areas, market development, planning & zoning, and permitting. Interestingly, Duluth ranked first in terms of survey response from Minnesota cities that have participated in the Solar Roadmap, and roughly in the middle of national responding municipalities to the survey.

Market Development –Duluth earned high marks for allowing a state PACE program to operate in the city in 2015, for the state financial resources that are available, and the installation of solar at three city facilities. Areas of improvement include establishing a collaborative procurement program for solar, providing additional educational and workforce information for consumers and industry, and establishing a solar resource map for the city.

Solar Mapping –While the University of Minnesota created an open source solar resource map for the entire state, integrating city building footprint data into this platform would allow for much more sophisticated and accurate use reading of the Duluth solar resource on a building-by-building basis. This could then be used as a tool to empower and educate consumers as well as lower the cost of customer acquisition for installers, noted in studies as one of the largest components of solar soft costs (Morris et al., 2013).

Planning and Zoning – While Duluth scored solar points for new construction incentives for green building (including solar installation), and recognizing solar resource in its zoning code, it found opportunities for improvement through specifically highlighting energy (and specifically solar) as a local resource in long range planning, and by enabling solar easements.

Permitting – Duluth was rewarded with survey points for the accessibility of its permit information, and the relative ease and timeliness of solar permitting. Areas of suggested improvements include the clarity of solar permit requirements for different types of installations and consideration a flat fee for solar permitting. In particular, snow loading and structural roof load were areas identified as barriers in previous baseline reporting, and clarity of structural load requirements for permitting would assist the certainty of installation cost for both consumers and installers.

An additional factor for permitting is that snow load code requirements for rooftops in Duluth have increased since 2007. One potential solution is to create permit incentives for flush mounted solar installations of pitched roofs, as studies have indicated that they do not add to wind or snow loading, and actually serve to increase the structural load capacity of pitched roofs when installed according to best practices (Dwyer, Sanchez, Campos, & Gerstle, 2014;

Minneapolis Saint Paul Solar America Cities, 2011; Minnesota Department of Commerce, Division of Energy Resources, Minnesota Department of Labor and Industry, & Braun Intertec Corporation, 2013).

Interconnection

The interconnection process in Minnesota is established by state standards, and Minnesota Power also has their own standards and process for systems 40kW and under, both of which can be found in the previous baseline reporting (Ecolibrium3, Appendix A, 2015).

It was previously noted that interconnection was a significant source of consumer complaint, both in terms of time of interconnection and in terms of the imposition of additional costs. Subsequent discussions with the Minnesota Department of Commerce and the Consumers Affairs office of the Minnesota Public Utilities Commission found that there were two official consumer complaints, filed in 2014 through both these offices regarding interconnection through Minnesota Power. In both cases, the general nature of complaints were that MP overstepped state guidelines for interconnection by imposing additional requirements at the interconnection stage that were costly and unknown prior to that point. Minnesota Power cited its responsibility to public safety as the reason for imposing the required steps, and noted that the installer in question had not followed the MP established process properly, and therefore was unaware of these additional costs.

The Consumer Affairs Office decided in favor of Minnesota Power in both cases, but the cases highlight similar complaints that this study had previously noted. The MN Department of Commerce was not entirely satisfied with this outcome, as they felt that the technical aspects of interconnection were not fully considered in the decision. Accordingly, the State of Minnesota is working with PUC and Commerce staff to establish a complaint process specifically for consumers with interconnection issues.

Recommendations

The market landscape analysis explored questions raised and barriers noted in the baseline analysis, including interconnection, permitting and policy, financing options, and the various elements of the local solar installation process. The analysis also suggested actions to limit local barriers and accelerate soft cost reductions, including:

- Establish an independent third-party community solar resource, with a focus education and outreach to increase clarity of the solar process and consumer value, including contractor listings, financing options, and incentive/rebate possibilities.
- Assist the City in establishing a value-added solar map for increased education and outreach.

- Further assist the City in establishing an easily assessable solar checklist for clarity in permitting requirements that creates an incentive pathway for flush mounted solar on pitched roofs.
- Work with lenders to establish low cost loans for residential solar that allows bundling with energy efficiency projects in order to drive down combined energy project payback.
- Work with Minnesota Power and the Department of Commerce to bring clarity and certainty to the interconnection process
- Continue to consult with Minnesota Power regarding the establishment of a community solar garden option for Duluth residents.

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Local Energy Matters: Appendix A

Minnesota Power 2014 Solar Installations by Region

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Appendix A: Minnesota Power 2014 Solar Installations by Region

Duluth installs		
4.92	$30,000.00	Duluth
3.28	$21,000.00	Duluth
10	$44,361.00	Duluth
10.4	$86,736.00	Duluth
9.84	$39,096.00	Duluth
8	$29,822.48	Duluth
12.75	$47,555.99	Duluth
59.19	298571.47	
	5044.289069	

Other Areas Installed		
5	$50,000.00	Willow River
8	$33,126.18	Carlton
9.9	$34,650.00	Wrenshall
7.5	$27,249.91	Ely
8	$46,770.57	Silver Bay
13.1	$47,131.13	Upsala
15.01	$34,243.00	Little Falls
39.36	$129,888.00	Pierz
4.92	$20,000.00	Royalton
9.72	$46,248.00	Ironton
13.5	$56,549.28	Esko
7	$29,112.27	Ely
141.01	$554,968.34	
	$3,935.67	

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Local Energy Matters: Appendix B

City of Duluth Solar Roadmap Survey

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Appendix B: Solar Roadmap Survey Spreadsheets

PERMITTING PROCESS							
Topic Area	**SRM ID**	**Question**	**RESIDENTIAL**		**COMMERCIAL**		**DATA SOURCES/NOTES (optional)**
			Options	**Check Box**	**Options**	**Check Box**	
Application	P1	What submittals are required for a solar permit application (Check all that apply)	Application form (solar-specific)		Application form (solar-specific)		Does not require a building permit unless structural modifications are needed.
			Application form (generic)	X	Application form (generic)	X	
			Electrical line diagram	X	Electrical line diagram	X	
			Site plan	X	Site plan	X	
			Structural drawings	Maybe	Structural drawings	X	
			Spec sheets and install manuals	X	Spec sheets and install manuals	X	
			Other (*Specify)		Other (*Specify)		
	P2	What are the options for obtaining an application? (Check all that apply)	Online	X	Online	X	
			Email		Email		
			In person	X	In person	X	
			Mail		Mail		
	P3	What are the options for submitting an application? (Check all that apply)	Online		Online		
			Email		Email		
			In person	X	In person	X	
			Mail	X	Mail	X	
	P4	To how many departments does an installer have to submit separate applications for a typical installation? (a municipal utility does not count as a city department here)	1	X	1		
			2		2	X	
			≥ 3		≥ 3		
	Misc	What types of departmental approvals are required for a typical installation? (check all that apply)	Building/Structural	X	Building/Structural	X	
			Electrical	X	Electrical	X	

			Fire		Fire		
			Planning		Planning		
			Zoning		Zoning		
			Other (*Specify)	*	Other (*Specify)	*	
	P13	What approvals from Professional Engineers are required as part of the permit package for a typical installation? (Check all that apply)	Electrical		Electrical		
			Structural		Structural		
			Other (*Specify)		Other (*Specify)		
Information access	P5	What information is available online? (Check all that apply)	Permit process description	X			
			Permit fee information	X			
			Point of contact	X			
			Inspection process description				
	P12		Inspection checklist				
Permitting Process Time	P6	Is there a policy to issue/deny PV permits within a specified number of business days from submission of application?	Yes, ≤ 3 days		Yes, ≤ 5 days		
			4-10 days		6-15 days		
			> 10 days		> 15 days		
			No	X	No	X	
		What is the average number of business days between application submission and decision (issuance or denial) regarding permit?	≤ 3 days		≤ 5 days		
			4-5 days	X	6-10 days	X	
			6-10 days		11-15 days		
			> 10 days		> 15 days		
		Are there mechanisms in place for accelerating PV permitting processes under certain conditions?	Yes, *Specify		Yes, *Specify		
			No	X	No	X	
			*		*		
Fee	P7, P8	What is the average total for the applicable permit fee(s) for typical installations?	≤$250		Please *Specify	*	Valuation
			$251 - 500	X			
			> $500				

		Is/are the permit fee(s) structured as flat, cost recovery, valuation open ended, or valuation capped?	Flat		Flat		
			Cost Recovery		Cost Recovery		
			Valuation Open Ended	X	Valuation Open Ended	X	
			Valuation Capped		Valuation Capped		
			Valuation with Exclusions		Valuation with Exclusions		
			Other (*Specify)	*	Other (*Specify)	*	
Inspection	P9	What is the average number of business days from inspection request to actual inspection?	≤ 2 days	X	≤ 2 days	X	
			3-5 days		3-5 days		
			6 -10 days		6 -10 days		
			> 10 days		> 10 days		
	P10	What is the typical window of time given to the installer for final onsite inspection?	Specific Time	X	Specific Time	X	
			2 hrs		2 hrs		
			3-4 hrs		3-4 hrs		
			5-8 hrs		3-8 hrs		
			> 1 day		> 1 day		
	P11	How many separate inspection trips are required for a typical installation? (Check all that apply)	Single Comprehensive Inspection		Single Comprehensive Inspection		
			Electrical Rough-in	X	Electrical Rough-in	X	
			Electrical Final	X	Electrical Final	X	
			Roof Penetrations (pre-install)		Roof Penetrations (pre-install)		
			Structural / Building Final	X	Structural / Building Final	X	
			Other (*Specify)	*	Other (*Specify)	*	
Other	P14	What code cycles are currently enforced?	*Specify				
Other	Misc	Do the utility and local jurisdiction coordinate regarding inspection requirements and on-site inspection times for the permit inspection and interconnection inspection?	Yes, *Specify		Yes, *Specify		
			No	X	No	X	
			*		*		

PLANNING & ZONING							
Topic Area	**SRM ID**	**Question**	**RESIDENTIAL**		**COMMERCIAL**		**DATA SOURCES/NOTES (optional)**
			Options	**Check Box**	**Options**	**Check Box**	
Solar Rights and Access	Z1	Is there a state law that protects property owner rights to install solar systems on their property?	Yes		Yes		
			No	X	No	X	
		What type of enforcement mechanism is used to support solar rights?	Agency		Agency		
			Fixed process		Fixed process		
			Court of law		Court of law		
			N/A	X	N/A	X	
		Is there a state or local law that provides for solar easements to protect access to sunlight (solar access)?	Yes	X	Yes	X	Local governments must enable the easement registration in order for it to be effective.
			No		No		
		Is there a state or local process for a PV system to be registered in order to protect solar access?	Yes		Yes		
			No	X	No	X	
	Z7	Are HOA's precluded, by either state or local law, from prohibiting solar energy systems?	Yes		Yes		
			No	X	N/A	X	
New Construction	Z2, Z3	Are there local standards for new construction that reduce barriers to solar deployment? (Check all that apply)	Solar requirement or incentive on certain homes	X	Solar requirement or incentive on certain homes		Sustainability Point System: -Install solar panels on a minimum of 15% of homes dwelling untis constained in one-family, two-family, or townhouse dwellings. - Pre-wire a minium of 10% of residential dwelling utnis for solar panel. - Install solar panels on primary structure, or at least 50% of buidlings in a multi-building complex.
			East-west street and building orientation	X	East-west street and building orientation	X	
			Solar-ready construction guidelines		Solar-ready construction guidelines		

			Solar easements for new construction		Solar easements for new construction		
			Other (*Specify)		Other (*Specify)	50-29	
			None		None		
			*At least 20% of residential have one longer axis oriented east-west for maximum solar exposure.		*At least 20% of non-residential have one longer axis oriented east-west for maximum solar exposure.		
Long Term Planning	Z4	Does the jurisdiction have long term planning documents with renewable energy goals? (comprehensive plans, sustainability plans, energy action plans, etc)	Yes (*List)				http://www.duluthmn.gov/sustainability/
			No	X			
		Does the plan address solar benefits such as environmental, economic, greenhouse gas reduction, etc.?	Yes (*List)				
			No	X			
		Does the plan address solar energy as a local resource?	Yes (*List)				Duluth has an energy plan that addresses ghg, but has not been formally adopted by the City.
			No	X			
			*				
		Does the local plan reference state renewable energy standards or greenhouse gas reduction goals (Not applicable in IA)?	Yes (*List)				
			No	X			

			*				
		Does the plan incorporate recommendations regarding renewable energy as identified in a regional plan?	Yes (*List)				
			No	X			
		Does the plan guide decision-makers on addressing solar conflicts with other resources or development, e.g. agricultural, vegetation, historic preservation, future development, etc.?	Yes (*Specify)				
			No	X			
			*				
Zoning		Does the zoning code create a clear as of right installation opportunity for building owners?	Yes	X			
			No				
	Z5	Do zoning codes have rules specifically for accessory solar installations? (i.e. solar is identified as a specific land use type, and has specific height/setback/coverage provisions)	Yes (*Specify)	X	Yes (*Specify)	X	50-20.5 Accessory Use H
			No		No		
			*		*		
		Do zoning codes allow and have rules specifically for principal solar installations? (i.e. solar is identified as a specific land use type and has submittal requirements, design standards, or performance standards?			Yes (*Specify)	X	
					No		

	Z6	Are there historic, viewshed, or other aesthetically sensitive zones in the jurisdiction? If so, are there specific rules for solar in these zones?	Yes (*Specify)	X	Yes (*Specify)	X	
			No		No		
			There are historic, viewshed, and design zones, but they don't address solar.		There are historic, viewshed, and design zones, but they don't address solar.		

MARKET DEVELOPMENT PROGRAMS					
Topic Area	**SRM ID**	**Question**	**Options**	**Check Box**	**DATA SOURCES/NOTES (optional)**
Solar Installations	M1, M2, M3	Have local collaborative procurement programs been explored?	Residential sector		The city does have a few solar installations on city property, namely the downtown library (2.4kW), Hartley Nature Center (13.1 kW), and the Lake Superior Zoo (3 kW).
			Municipal sector		
			Other (*specify)		
			*		
	M6, M7	Has the community installed solar or considered installing solar at any of the following publicly owned locations?	Landfill		
			Water treatment facility		
			Brownfield site		
			Other (*specify)	X	
			*Duluth Main Library and the Lake Superior Zoo		
PACE	F5a	Establish a working group to evaluate the potential of a PACE financing program for clean energy upgrades in your jurisdiction based on national example by local municipalities.	Duluth just initiated PACE this year and the first solar projects are underway.	X	
Solar Loan	F6	Encourage local financial institutions to establish local loan programs for solar energy systems.	There are three options for solar loan programs in Duluth: 1. Northern Communities Credit Union; 2. MN Housing and Finance Agency (MHFA); 3. The Center for Energy and Environment	X	
Outreach	F7, M7, M8	Does the community share solar educational resources online or via other avenues? (Check any that apply)	Info on solar finance programs and incentives	X	
			General educational matls for consumers		

			Workforce development matls for industry/workforce	
			Other (*specify)	
			*	
Other	M9, M10	Does the community participate in any clean energy action or recognition programs?	Yes (*specify)	X
			No	X
			*GreenStep City and ICLEI	
Other	M11	Does the community have a solar resource map available on its website?	Yes (*specify)	
			No	
			*A solar resource map will be available soon.	