

BEMIDJI CITY COUNCIL

Work Session Agenda

Monday, October 22, 2018

**City Hall
Conference Room
5:30 P.M.**



1. CALL TO ORDER / ROLL CALL

2. 2019 OTTERTAIL POWER 40KW SOLAR ARRAY PROJECT

3. COMMUNITY VISIONING/PLANNING DISCUSSION

4. ADJOURNMENT

NOTE: Please switch all cellphones and pagers to a non-audible function during Council and Committee meetings.



City Manager's Office

TO: Honorable Mayor Albrecht and City Council
FROM: Nate Mathews, City Manager *Nate*
DATE: October 17, 2018
RE: October 22 work session agenda topics

2019 Ottertail Power 40 kW Solar Array project

The past few months I have been meeting with Roger Garton, Energy Management Representative from Ottertail Power regarding a Bemidji solar photovoltaic (PV) array project. In addition, this summer I asked Joel Anastasio from the HRDC to assist me in navigating sustainability and energy related projects that are surfacing for the City. Both Roger and Joel will also be in attendance to discuss this topic with the Council.

As a general overview, Roger and I have identified two (2) potentially feasible sites of interest for a solar PV project in Bemidji. One is near the Sanford Center on 1st Street NE, and one is west of PB Drive south of the Candlewood Inn and Suites. At this time Ottertail is proposing to construct its own solar array, however, the project site near the Sanford Center carries the potential for the City to also participate and actually own a solar array that can offset electric costs of the Sanford Center through net metering. There are grants available through OTP for a City-owned solar array through their new Publicly Owned Property Solar program which are available to us, should this be a project of interest for the City Council.

After reviewing and discussing this project, our hope is to get some feedback from you and direction on how you would like to proceed with a potential solar photovoltaic project.

Community Visioning/Planning discussion

Following up from our October 3 retreat, I would like to circle back our conversation to larger community planning/visioning, and get some direction from Council regarding what we identified as a comprehensive Bemidji Visioning and Community Engagement initiative. At the end our retreat we discussed that four groups in Bemidji (Chamber, BDA, Visit, Greater) are exploring the potential creation of a new master umbrella entity called "Bemidji Alliance" that would help these 4 groups start working better together and potentially initiate an engagement/visioning effort in the community.

I have been meeting with members of the Bemidji Alliance regarding their plans, their logistics (still preliminary) ultimate outcomes, goals, and so on. The group has been meeting for many months, and we feel it is important for them to attend this worksession to further discuss the Council's desire for a large-scale community visioning effort (see examples attached from Minnetonka, St. Louis Park, Northfield...full reports provided on Monday) and how this relates to their Bemidji Alliance entity desire and goal.



Publicly Owned Property Solar

How it works

Your publicly owned facility could qualify for a cash incentive by installing a solar photovoltaic (PV) system. Through our Publicly Owned Property Solar program, we're offering incentives of \$1,250/kilowatt (kW) of installed solar PV nameplate direct current (DC) capacity, up to 50 percent of project costs, for systems less than 40 kW of nameplate DC capacity.

otpc.com/POPSolar
800-493-3299



This program helps our company meet Minnesota's 2013 solar energy legislation, which requires us to provide 1.5 percent of retail electric energy sales with solar PV generation by 2020. In addition, customers who sign up for the program agree to assign all renewable energy credits to our company to help us meet the solar energy standard.

Eligible public entities

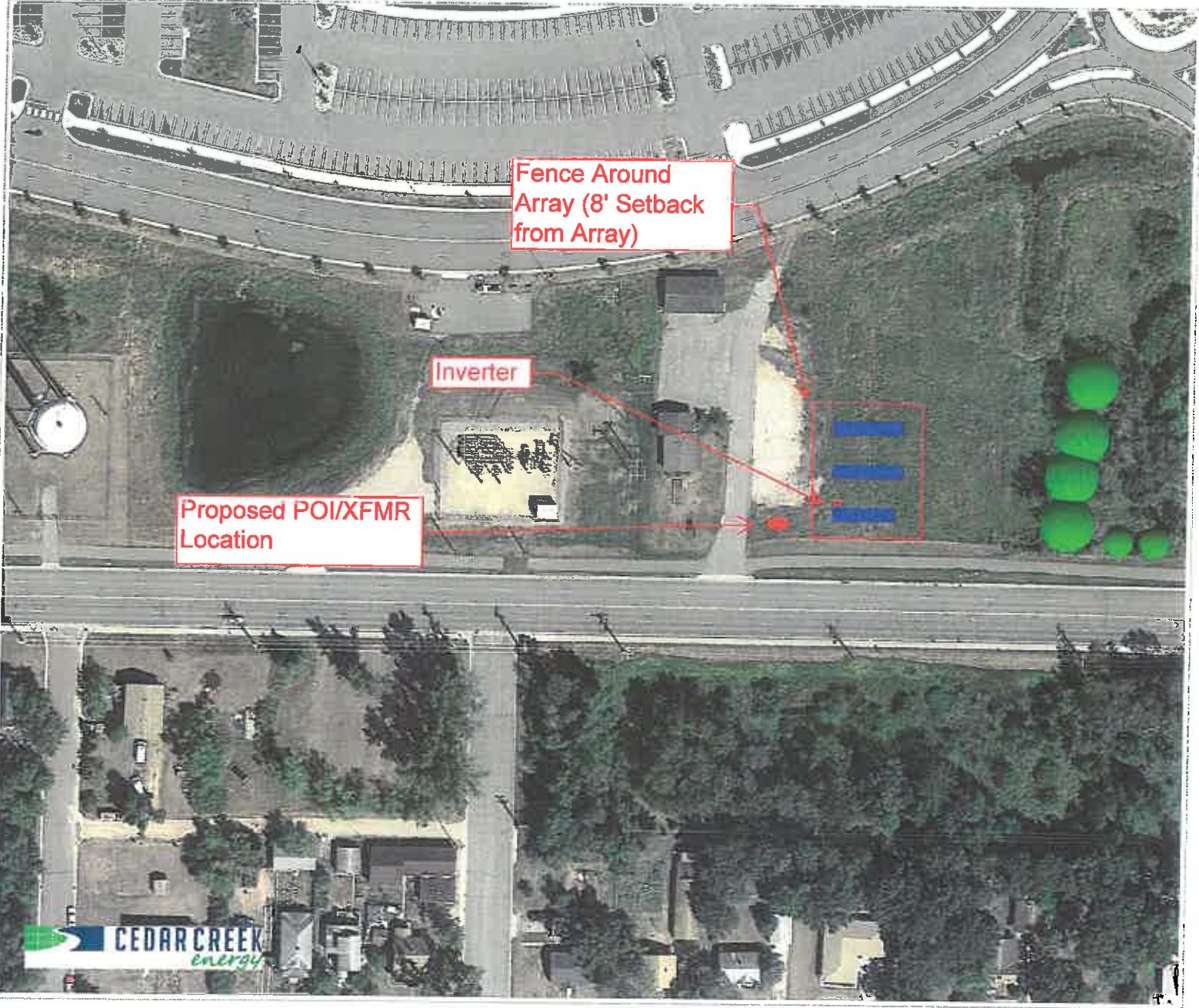
- Public school districts
- Public colleges and universities
- Public trade and technical schools
- City governments
- County governments
- Tribal governments
- Other public entities

Apply today

Contact one of our energy experts who will help you complete and return the following documents:

- Pre-Approval Application
- Renewable Energy Credit Contract
- Rebate Form

Detailed Layout



Ground Mount - R0 OTP - Sanford Center / BREC, 47.461306, -94.854472

Report

Project Name OTP - Sanford Center / BREC
Project Address 47.461306, -94.854472
Prepared By Alex Gast
 alex.gast@cedarcreekenergy.com

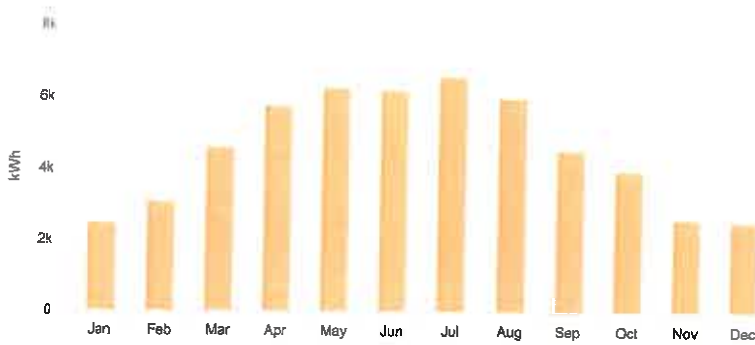
System Metrics

Design Ground Mount - R0
Module DC Nameplate 39.5 kW
Inverter AC Nameplate 33.3 kW
 Load Ratio: 1.19
Annual Production 54.93 MWh
Performance Ratio 85.5%
kWh/kWp 1,389.8
Weather Dataset TMY, 10km Grid (47.45,-94.85), NREL (prospector)
Simulator Version 43d5c023c4-49040550d2-fe9451713a-7e265618f4

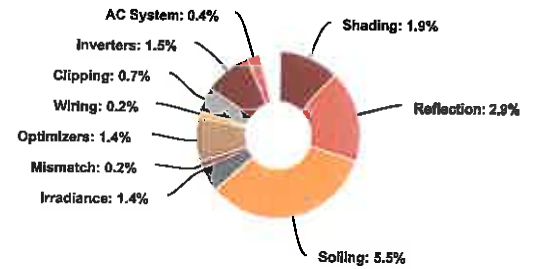
Project Location



Monthly Production



Sources of System Loss



Annual Production

Description	Output	% Delta
Irradiance (kWh/m²)		
Annual Global Horizontal Irradiance	1,349.5	
POA Irradiance	1,626.3	20.5%
Shaded Irradiance	1,595.0	-1.9%
Irradiance after Reflection	1,548.7	-2.9%
Irradiance after Soiling	1,464.2	-5.5%
Total Collector Irradiance	1,463.9	0.0%
Energy (kWh)		
Nameplate	57,896.4	
Output at Irradiance Levels	57,064.7	-1.4%
Output at Cell Temperature Derate	57,439.7	0.7%
Output After Mismatch	57,326.8	-0.2%
Optimizer Output	56,523.9	-1.4%
Optimal DC Output	56,403.7	-0.2%
Constrained DC Output	55,982.8	-0.7%
Inverter Output	55,138.0	-1.5%
Energy to Grid	54,925.0	-0.4%
Temperature Metrics		
Avg. Operating Ambient Temp	8.1 °C	
Avg. Operating Cell Temp	14.8 °C	
Simulation Metrics		
Operating Hours	4672	
Solved Hours	4672	

Condition Set

Description	Snow Loss - Ground Mount											
Weather Dataset	TMY, 10km Grid (47.45,-94.85), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	b		Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
Soiling (%)	Carport	-3.56	-0.075	3°C								
	J	F	M	A	M	J	J	A	S	O	N	D
Irradiation Variance	15	13.7	10.4	5.2	2.2	2	2	2	2	2.9	10.3	16.4
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Characterization										
	JKM 380M-72L-V (jinkosolar)	Jinko_JKM_380M_72L_V (TG).pan, PAN										
Component Characterizations	Device	Characterization										
	SE33.3KUS (SolarEdge)	CEC										
	P800S (SolarEdge)	Mfg Spec Sheet										

Components

Component	Name	Count
Inverters	SE33.3KUS (SolarEdge)	1 (33.3 kW)
AC Home Runs	6 AWG (Copper)	1 (241.8 ft)
Strings	10 AWG (Copper)	3 (150.6 ft)
Optimizers	P800S (SolarEdge)	53 (42.4 kW)
Module	Jinkosolar, JKM 380M-72L-V (380W)	104 (39.5 kW)

Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	34-36	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Landscape (Horizontal)	30°	180°	24.0 ft	4x1	26	104	39.5 kW

Sorensen Farms Array #2

- 44.2 kW (DC), Solarworld SW325 XL Mono
- 37.6 kW (AC)
 - Qty (3) SolarEdge SE10000-US, 120/240V, Single Phase, 3 Wire
 - Qty (1) SolarEdge SE7600-US, 120/240V, Single Phase, 3 Wire
- Installed September 2016



Corpus Christi Catholic Church

- 76.7 kW (DC), Solarworld SW325 XL Mono
- 66.6 kW (AC)
 - Qty (2) SolarEdge SE33.3K-US, 277/480V, 3 Phase, 4Wire
- Installed August 2018



Sanford Center Solar PV Design

925 1st St E, Bemidji, MN 56601

Below please find the system design, scope of work, and proposed build cost to install a 33.3 kW (AC). 39.52 kW (DC) ground mounted solar PV array.

System Design:

- DC Nameplate: 39.52 kW
- AC Nameplate: 33.3 kW (277/480V, 3P, 4W)
- System Peak Current: 40A, 277/480V
- Estimated Year 1 kWh: 54,900
- 180 Degree Azimuth
- 30 Degree Tilt
- 3' Off Grade to Lowest Edge
- Height Off Grade Not to Exceed 10'

PV Module:

- Jinko Solar, JKM380M-72L-V
- Qty (104) of the 380-Watt, 72 Cell Mono-crystalline Modules
- UL 1703 Listed
- 10 Year Limited Product Warranty
- Limited Power Warranty; 90% year 12, 80% Year 25

Inverter:

- SolarEdge, SE33.3K-US (-40 Cold Weather Rated), Grid Interactive Inverter
- Qty (1) of the 33.3 kW, 277/480V, 3 Phase, 4 Wire Inverters
- This inverter system utilized DC Optimizer to provide module level monitoring and diagnostics
- UL 1741 Listed, IEEE 1547
- Standard 12 Year Warranty, extendable to 20 years for \$450.00

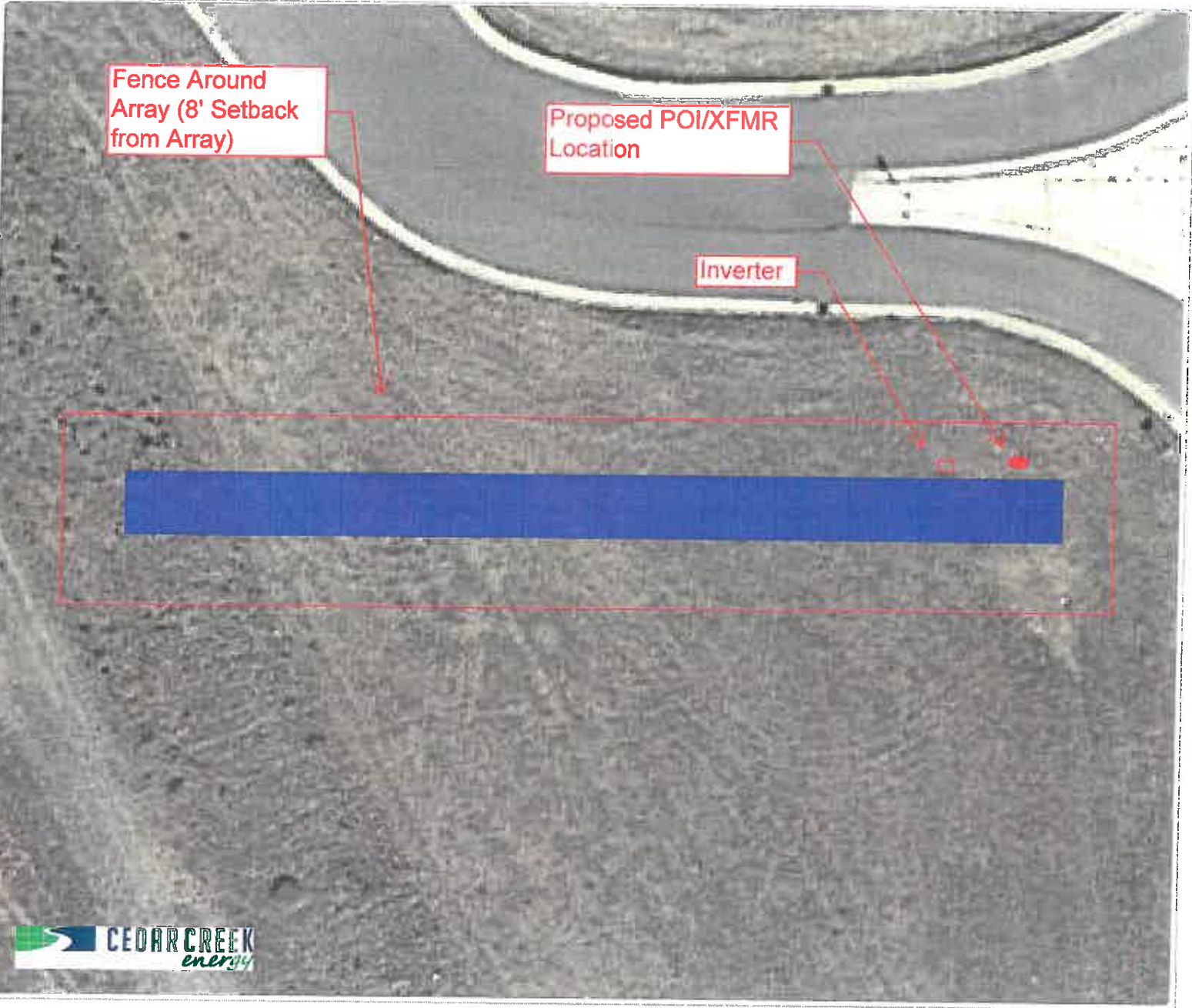
Racking:

- AP Alternatives, Modular Racking
- Qty of 3 individual arrays, 4 modules high x 8-9 modules wide
- Racking and hardware are made of hot dipped galvanized steel components
- Racking foundations utilize helical earth anchors vs driven I beams to prevent frost heave over life of system
- UL 2703 Listed
- 25 Year Warranty

Estimated Monthly PV Production

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Sanford Center	2,504	3,104	4,608	5,811	6,285	6,228	6,629	6,017	4,552	3,971	2,637	2,573	54,919

Detailed Layout



Ground Mount - R0 OTP - Paul Bunyan Dr / Washington Ave Intersection, 47.456806, -94.864500

Report

Project Name OTP - Paul Bunyan Dr / Washington Ave Intersection
Project Address 47.456806, -94.864500
Prepared By Alex Gast
 alex.gast@cedarcreekenergy.com

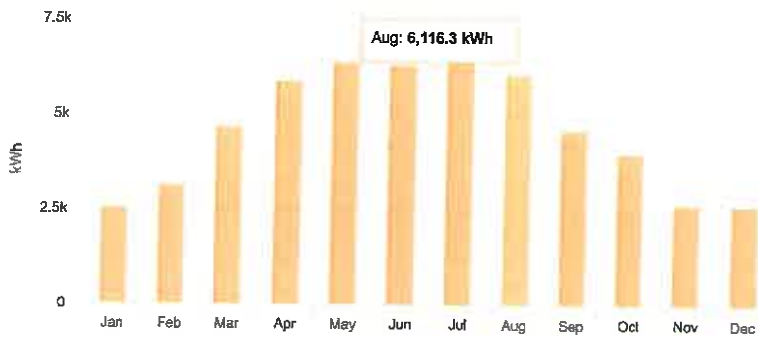
System Metrics

Design Ground Mount - R0
Module DC Nameplate 39.5 kW
Inverter AC Nameplate 33.3 kW
 Load Ratio: 1.19
Annual Production 55.96 MWh
Performance Ratio 87.1%
kWh/kWp 1,416.1
Weather Dataset TMY, 10km Grid (47.45,-94.85), NREL (prospector)
Simulator Version 43d5c023c4-49040550d2-fe9451713a-7e265618f4

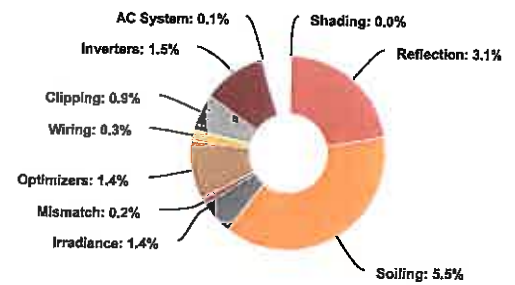
Project Location



Monthly Production



Sources of System Loss



Annual Production

Description	Output	% Delta
Irradiance (kWh/m²)		
Annual Global Horizontal Irradiance	1,349.5	
POA Irradiance	1,626.3	20.5%
Shaded Irradiance	1,625.9	0.0%
Irradiance after Reflection	1,574.9	-3.1%
Irradiance after Soiling	1,488.7	-5.5%
Total Collector Irradiance	1,488.7	0.0%
Energy (kWh)		
Nameplate	58,881.5	
Output at Irradiance Levels	58,052.4	-1.4%
Output at Cell Temperature Derate	58,414.9	0.6%
Output After Mismatch	58,322.4	-0.2%
Optimizer Output	57,505.6	-1.4%
Optimal DC Output	57,347.6	-0.3%
Constrained DC Output	56,852.5	-0.9%
Inverter Output	55,993.9	-1.5%
Energy to Grid	55,964.8	-0.1%
Temperature Metrics		
Avg. Operating Ambient Temp		8.1 °C
Avg. Operating Cell Temp		14.9 °C
Simulation Metrics		
Operating Hours	4672	
Solved Hours	4672	

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Temperature Model Parameters	Rack Type	a		b		Temperature Delta							
	Fixed Tilt	-3.56	-0.075	3°C									
	Flush Mount	-2.81	-0.0455	0°C									
	East-West	-3.56	-0.075	3°C									
Soiling (%)	Carport	-3.56	-0.075	3°C									
		J	F	M	A	M	J	J	A	S	O	N	D
		15	13.7	10.4	5.2	2.2	2	2	2	2	2.9	10.3	16.4
Irradiation Variance	5%												
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Module Binning Range	-2.5% to 2.5%												
AC System Derate	0.50%												
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Paul Bunyan Drive Solar PV Design

300 Paul Bunyan Dr SE, Bemidji, MN 56601

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System Design:

- DC Nameplate: 39.52 kW
- AC Nameplate: 33.3 kW (277/480V, 3P, 4W)
- System Peak Current: 40A, 277/480V
- Estimated Year 1 kWh: 55,960
- 180 Degree Azimuth
- 30 Degree Tilt
- 3' Off Grade to Lowest Edge
- Height Off Grade Not to Exceed 10'

PV Module:

- Jinko Solar, JKM380M-72L-V
- Qty (104) of the 380-Watt, 72 Cell Mono-crystalline Modules
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- Limited Power Warranty; 90% year 12, 80% Year 25

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- Qty of 3 individual arrays, 4 modules high x 26 modules wide
- Racking and hardware are made of hot dipped galvanized steel components
- Racking foundations utilize helical earth anchors vs driven I beams to prevent frost heave over life of system
- UL 2703 Listed
- 25 Year Warranty

Estimated Monthly PV Production

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Paul Bunyan Drive	2,581	3,169	4,704	5,899	6,384	6,338	6,736	6,116	4,629	4,049	2,694	2,660	55,959



Imagine
MINNETONKA

SUMMARY & RECOMMENDATIONS

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- 2** An Open Letter from the Imagine Minnetonka Facilitator
- 3** Project Rationale: Why this Project? Why Now?
- 6** Key Findings
 - 6** Part One: What do residents want? The Three C's
 - 15** Part Two: 16 trends that will impact Minnetonka's future
- 25** Recommendations – How to Navigate Minnetonka's Future
 - 27** 1. Monitor five signals for Minnetonka's future.
 - 28** 2. Adopt best practices for green infrastructure.
 - 31** 3. Create a visionary goal to connect all residents to Minnetonka's woods and wetlands.
 - 32** 4. Be proactive about Minnetonka's changing demographics.
 - 33** 5. Develop a multimodal transportation plan that will safely connect major pedestrian areas and all bike and hike trails by 2025.
 - 36** 6. Increase housing stock (including retrofitting vacant commercial space) that appeals to young professionals, working families, and the elderly.
 - 38** 7. Proactively engage and communicate with residents using best practices across multiple platforms.
 - 41** 8. Use best practices in suburban redevelopment to strengthen the City's village centers and develop the new Shady Oak Road/light rail transit area.
 - 42** 9. Update the Minnetonka Citizens Academy.
- 44** Methodology – Who Participated, and How?
- 46** Thank You



A Place for All People

 **St. Louis Park**
MINNESOTA

Experience VISION 3.0 in the Park

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A collage of four images: top-left shows solar panels; top-right shows a white wind turbine; bottom-left shows an aerial view of a town with colorful autumn trees; bottom-right shows a red brick building with a curved corner and a street sign that says "WELCOME to Northfield".

FY 2018 – 2020

STRATEGIC PLAN Action Plan

A commitment to strategic thinking,
measurable results and the delivery of
quality services.

October 3, 2017

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