

Holsen Solar Change Order Form

Project Name: Vergas Solar Energy System with Energy Storage

Project Address: 140 W Linden Street, Vergas, N 56587

Owner/Client Name: City o Vergas

Original Contract Date: 8/5/2025

Change Order Number: CO-140

1. Description of Change

Changing the 30kW 208V Sol-Ark inverter to two EG4 18KPV-12LV 12kW 240V inverters to meet OTPC system design requirements. Solar Panels will not change.

New system specs: 26.16kW DC / 24kW AC (240V), 48 545W Panels, 27,450kWh Estimated Annual Generation.

Old system specs: 26.16kW DC / 30kW AC (208V), 48 545W Panels, 27,170kWh Estimated Annual Generation.

2. Reason for Change

(Check one or more)

☐ Owner Request

☐ Unforeseen Condition

☐ Code Compliance Requirement

☐ Design Modification

☒ Other: tility company interconnection requirement.

3. Change in Contract Price

Original Contract Price: \$ 104,280.23

Net Change (Increase/Decrease): \$ NO C ANGE

New Contract Price: \$ 104,280.23

4. Change in Contract Time

Original Completion Date: _____

Additional Days Required: _____

Revised Completion Date: _____

5. Authorization

By signing below, both parties agree to the terms outlined in this Change Order and understand that this document modifies the original contract.

Project Representative

Holsen Solar

(Signature)

Jessica Grondahl
Jessica Grondahl, COO (Signature)

Date Signed

11/17/2025
Date Signed



240v System - Under 120% Cooperative Purchasing Connection - Vergas, 140 W Linden St, Vergas, MN 56587

Report

Project Name	Cooperative Purchasing Connection - Vergas
Project Address	140 W Linden St, Vergas, MN 56587
Prepared By	Benjamin Holsen holsenb@gmail.com

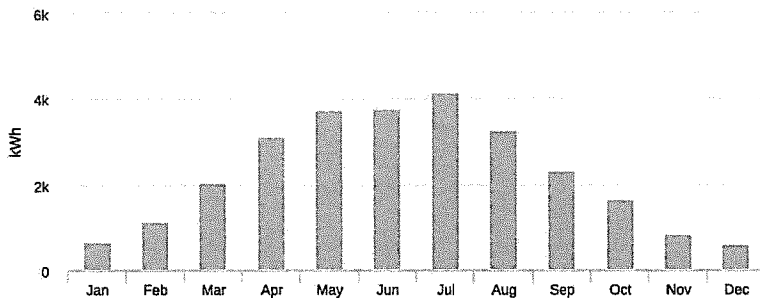
System Metrics

Design	240v System - Under 120%
Module DC Nameplate	26.16 kW
Inverter AC Nameplate	24.00 kW Load Ratio: 1.09
Annual Production	27.45 MWh
Performance Ratio	81.8%
kWh/kWp	1,049.2
Weather Dataset	TMY, 10km Grid (46.65, -95.85), NREL (prospector)
Simulator Version	c48caa2351-44327059d6- a5eacfeacd-29f963356f

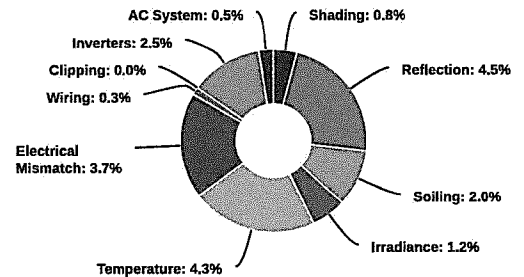
Project Location



Monthly Production



Sources of System Loss





⚡ Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,343.4	
	POA Irradiance	1,281.9	-4.6%
	Shaded Irradiance	1,271.5	-0.8%
	Irradiance after Reflection	1,214.6	-4.5%
	Irradiance after Soiling	1,190.3	-2.0%
	Total Collector Irradiance	1,190.6	0.0%
Energy (kWh)	Nameplate	31,155.5	
	Output at Irradiance Levels	30,782.4	-1.2%
	Output at Cell Temperature Derate	29,454.0	-4.3%
	Output after Electrical Mismatch	28,364.9	-3.7%
	Optimal DC Output	28,291.3	-0.3%
	Constrained DC Output	28,291.1	0.0%
	Inverter Output	27,583.8	-2.5%
	Energy to Grid	27,445.9	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp	9.1 °C	
	Avg. Operating Cell Temp	21.0 °C	
Simulation Metrics			
	Operating Hours	4669	
	Solved Hours	4669	

☁ Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (46.65,-95.85), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
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								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module & Component Characterizations	Type	Component							Characterization			
	Module	LR5-72HPH-545M (2022) (Longi)							Spec Sheet Characterization, PAN			
	Inverter	EG4® 18KPV-12LV (EG4 Electronics)							Spec Sheet			

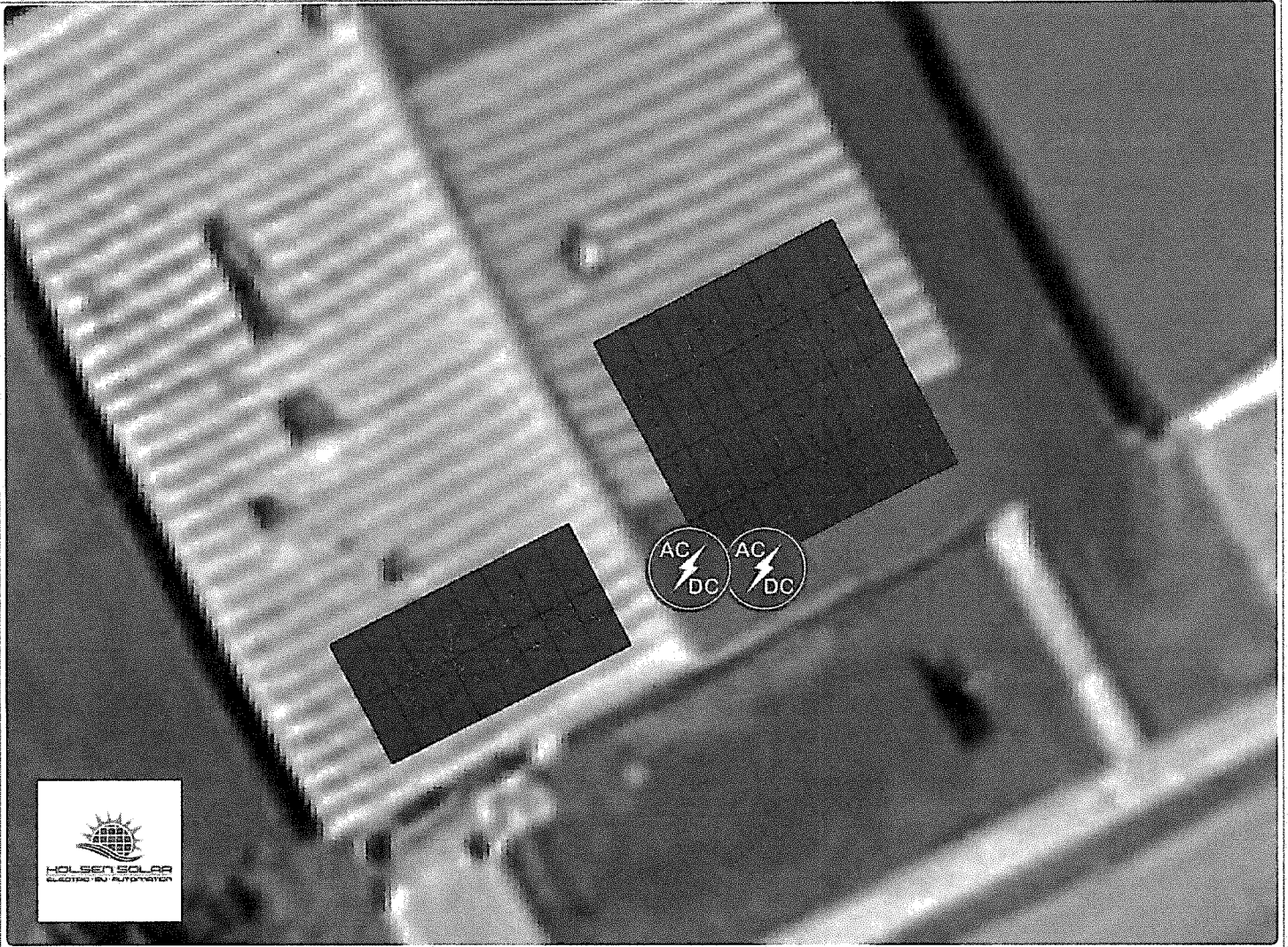


Components		
Component	Name	Count
Inverters	EG4® 18KPV-12LV (EG4 Electronics)	2 (24.00 kW)
Strings	10 AWG (Copper)	6 (204.7 ft)
Module	Longi, LR5-72HPH-545M (2022) (545W)	48 (26.16 kW)

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	3-10	Along Racking

Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Flush Mount	Landscape (Horizontal)	10°	63°	0.0 ft	1x1	32	32	17.44 kW
Field Segment 2	Flush Mount	Landscape (Horizontal)	10°	63°	0.0 ft	1x1	16	16	8.72 kW

Detailed Layout2



Vergas, MN 56587

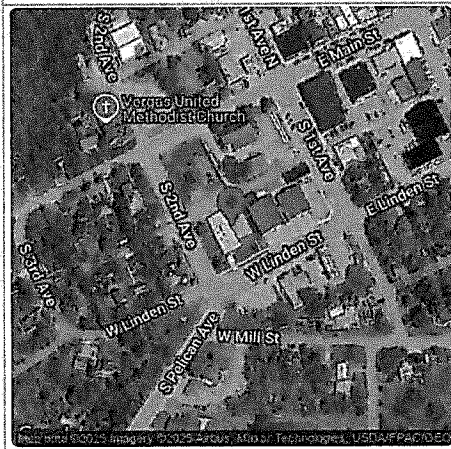
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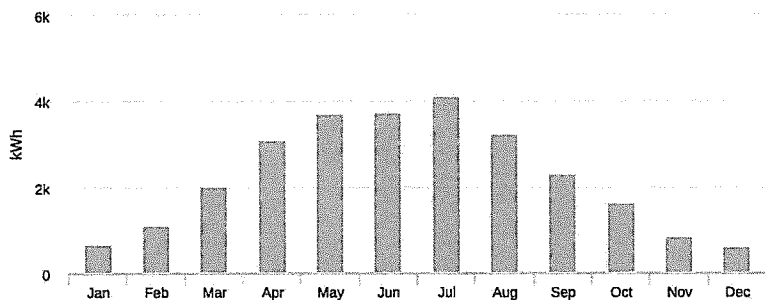
System Metrics

Design	208v System - Under 120%
Module DC Nameplate	26.16 kW
Inverter AC Nameplate	30.00 kW
	Load Ratio: 0.87
Annual Production	27.17 MWh
Performance Ratio	81.0%
kWh/kWp	1,038.7
Weather Dataset	TMY, 10km Grid (46.65,-95.85), NREL (prospector)
Simulator Version	39df44ffcb-e2e15aa632- 6dbe468a4a-3744ec5a22

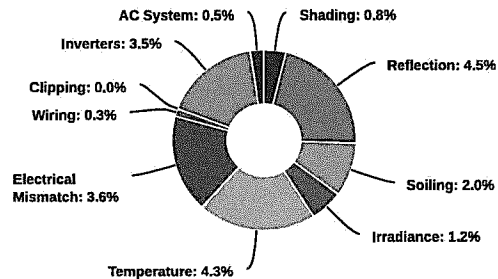
📍 Project Location



Monthly Production



❶ Sources of System Loss





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	Total Collector Irradiance	1,190.4	0.0%
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	Output at Irradiance Levels	30,774.1	-1.2%
	Output at Cell Temperature Derate	29,446.9	-4.3%
	Output after Electrical Mismatch	28,379.0	-3.6%
	Optimal DC Output	28,299.9	-0.3%
	Constrained DC Output	28,299.6	0.0%
	Inverter Output	27,309.1	-3.5%
	Energy to Grid	27,172.6	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp	9.1 °C	
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Simulation Metrics			
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Module Binning Range	-2.5% to 2.5%												
AC System Derate	0.50%												
Module & Component Characterizations	Type	Component						Characterization					
	Module	LR5-72HPH-545M (2022) (Longi)						Spec Sheet Characterization, PAN					
	Inverter	Sol-Ark 30K-3P-208V (Sol-Ark)						Spec Sheet					



Components		
Component	Name	Count
Inverters	Sol-Ark 30K-3P-208V (Sol-Ark)	1 (30.00 kW)
Strings	10 AWG (Copper)	5 (243.8 ft)
Module	Longi, LRS-72HPH-545M (2022) (545W)	48 (26.16 kW)

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	4-10	Along Racking

Field Segments									
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● Detailed Layout2

