



BEST AND FINAL OFFER
PROPOSAL TO PROVIDE ASSESSMENT, DESIGN,
INSTALLATION, AND OPERATION AND MAINTENANCE
OF PHOTOVOLTAIC SYSTEM
RFQ/RFP No. 3005
MOUNT SAN ANTONIO COLLEGE



BORREGO SOLAR

Cameron Thorne, P.E.
Project Developer
Borrego Solar Systems, Inc.
(619) 961-4514
cthorne@borregosolar.com

June 19, 2015

Teresa Patterson
Manager, Purchasing
Mt. San Antonio Community College – RFQ/RFP No. 3005
1100 North Grand Avenue
Walnut, CA 91786

Dear Teresa,

Per your request, I am pleased to share Borrego Solar's Best and Final Offer to assess, design, install and operate a 2.2 MW solar photovoltaic system to generate clean electricity at Mt. San Antonio Community College.

We understand and appreciate the College's intent to proceed with a 2.2 MW non-export configuration with the goal to transfer to the RES-BCT schedule after June 30 2017.

Our updated offering includes two options: A fixed tilt offering as well as a ground mounted single-axis tracking solution, both sized to 2.2 MW. We have provided separate layouts, pricing, and energy production estimates for both options. As requested by the College, these updated offerings exclude copper wiring or privacy slats. We have received and acknowledge receipt of both the District's request for a Best and Final Offer as well as Addendum 1 to this request.

Consistent with our previous offerings for this project, we continue to specify only the highest possible quality equipment: Premium high efficiency monocrystalline solar modules from LG and inverters from SMA. The LG modules specified for this project are some of the most efficient modules available in the world and are over 22% more efficient than standard modules. Additionally LG is one of the most bankable and stable module manufactures in the business. The SMA inverters specified for this project have a 97.8% CEC efficiency rating. SMA is not only the world's leading inverter manufacturer by market share, but also has the best reputation for quality in the industry.

Additionally, we continue to offer one the of industry's most highly regarded Operations and Maintenance programs with two washings per year, a rigorous preventive maintenance program and 24/7 web-based monitoring. Our confidence in our O&M offering enables Borrego Solar to offer one of the strongest performance guarantees in the industry. Our 35 year operating track record plus our consistent profitability means we have the demonstrated stability and longevity to stand behind our commitments.

Why Borrego Solar?

Borrego Solar offers the College several key value propositions that are unique in the industry:

- **The highest quality products:** LG modules, SMA inverters, and racking from TerraSmart and Array Technologies. These products come with some of the strongest warranties in the industry.
- **The most licensed solar firm in the state of California:** Borrego has over 9 different licenses including A (General Engineering), B (General Building), C-10 (Electrical), C-46 (Solar) and others.
- **Demonstrated Non-Export and RES-BCT interconnection experience:** We have successfully designed, constructed, and interconnected RES-BCT systems and we are actively constructing and interconnecting an on-site 3.2 MW non-export solar system for the San Diego International Airport.

Generate Change. Choose Solar.

- **A full team of licensed Professional Engineers:** Borrego Solar’s in-house engineering staff includes a full team of licensed professional civil and electrical engineers to ensure the highest standards of quality for the College.
- **An industry-leading O&M program backed by the strongest performance guarantee in the industry:** In 2014 Borrego Solar systems produced at 102% of expected energy production.

We believe that for all of these reasons Borrego Solar is the College’s lowest risk partner for this project. Additionally, we understand the District’s need to meet key CSI milestones that require a successfully executed contract. Borrego Solar’s executive team is standing by to personally manage a smooth and fast execution of this contract.

This project has the highest priority in our company and full support and attention at the executive level. Please do not hesitate to contact us if we can answer any further questions.

Sincerely,



Cameron Thorne, P.E.
Project Developer
Borrego Solar Systems, Inc.
(619) 961-4523
cthorne@borregosolar.com



Mike Hall
Chief Executive Officer
Borrego Solar Systems, Inc.

Table of Contents

PART V Pricing Proposal and Production Form.....6
PART VI Technical Proposal.....9
Revised Preliminary Layout of the System.....10

Revised Attachments:

J. Revised PVSyst Output Reports.....14

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PART V Pricing Proposal and Production Form

2.2 MW Fixed-Tilt Ground Mount System

Attachment B.2 – Pricing Proposal and Production Form (Bid Sheet)

Bid Sheet

Proposer:	Borrego Solar Systems, Inc.
------------------	-----------------------------

Site:	Solar Site
System Information:	
System Size (kWdc)	2,196.81
System Output (kWh)*	4,129,686

*Totaled from 8760 Generation Worksheet

Ownership System Pricing	
Capital Costs:	
Project Management & Administration	\$ 53,109.00
All Design	\$ 61,462.00
PV Modules	\$ 2,405,636.00
Inverters	\$ 314,509.00
Electrical Switchgear and Metering	\$ 160,414.00
All Structures	\$ 518,884.00
All Construction	\$ 1,354,926.00
Balance of System Components (e.g., Wiring, Conduit, Junction Boxes, Fuses, Fencing, Signage, etc.)	\$ 308,080.00
Monitoring System & Weather Station	\$ 20,146.00
Testing (Start-up, Acceptance, Inspections, etc.)	\$ 19,518.00
Other (e.g., Training, Documentation, Permits, Warranties, etc.)	\$ 150,496.00
Subtotal Capital Costs	\$ 5,367,180.00
Operations and Maintenance Costs:	
Year One Operation & Maintenance Cost	\$ 31,668.02
O&M Escalator	2.00%
Performance Guarantee Costs:	
20 Year Performance Guarantee Costs:	\$ -

2.2 MW Ground Mounted Single-Axis Tracker

Attachment B.2 – Pricing Proposal and Production Form (Bid Sheet)

Bid Sheet

Proposer:	Borrego Solar Systems, Inc.
------------------	-----------------------------

Site:	Solar Site
System Information:	
System Size (kWdc)	2,196.81
System Output (kWh)*	4,622,355

*Totaled from 8760 Generation Worksheet

Ownership System Pricing	
Capital Costs:	
Project Management & Administration	\$ 52,791.00
All Design	\$ 96,045.00
PV Modules	\$ 2,391,226.00
Inverters	\$ 312,625.00
Electrical Switchgear and Metering	\$ 159,453.00
All Structures	\$ 1,016,350.00
All Construction	\$ 1,504,775.00
Balance of System Components (e.g., Wiring, Conduit, Junction Boxes, Fuses, Fencing, Signage, etc.)	\$ 306,235.00
Monitoring System & Weather Station	\$ 32,009.00
Testing (Start-up, Acceptance, Inspections, etc.)	\$ 19,400.00
Other (e.g., Training, Documentation, Permits, Warranties, etc.)	\$ 167,056.00
Subtotal Capital Costs	\$ 6,057,965.00
Operations and Maintenance Costs:	
Year One Operation & Maintenance Cost	\$ 34,841.68
O&M Escalator	2.00%
Performance Guarantee Costs:	
20 Year Performance Guarantee Costs:	\$ -

PART VI Technical Proposal

Revised Proposed System Overview:

Proposed DC System Size & Energy Production			
Offering Type	Capacity (kWp DC)	1st Year Expected AC output (kWh)	25 Year Expected AC output (kWh)
2.2 MW Fixed Tilt System	2,203.740	4,129,686	97,278,671
2.2 MW Tracking System	2,196.810	4,622,355	108,883,975

Revised Proposed Equipment List:

Equipment & Warranty Specifications			
Equipment Type	Qty	Description	Warranty
LG 315 W modules (Fixed Tilt Option)	6996	LG315N1C-G4 Premium Efficiency, Monocrystalline Solar Module.	10 Year Workmanship, 25 Year Power Output
LG 315 W modules (Tracking Option)	6974	LG315N1C-G4 Premium Efficiency, Monocrystalline Solar Module.	10 Year Workmanship, 25 Year Power Output
SMA 2200 kW Central Inverter	1	SMA SC2200-US-10 1000V Central Inverter	10 Year
DuraTrack HZ Single Axis Tracking System Solution (Tracking Option)	--	DuraTrack HZ	5 Year
TerraSmart TerraFarm Racking Solution (Fixed Tilt Option)	--	Fixed Tilt Racking Solution	1 Year Workmanship, 20 Year Ground Screw Warranty, 20 Year Product Warranty
AlsoEnergy Monitoring System	1	Gateway, Logger, & Monitoring Package	5 Year Warranty on all AlsoEnergy Equipment

Revised Preliminary Layout of the System:

Revised preliminary layouts of both options can be found on the following pages.

MT. SAN ANTONIO COLLEGE - LG 315 - FIXED TILT - EXPANDED - PV PROJECT



PROJECT LOCATION

PROPOSAL SPECIFICATION

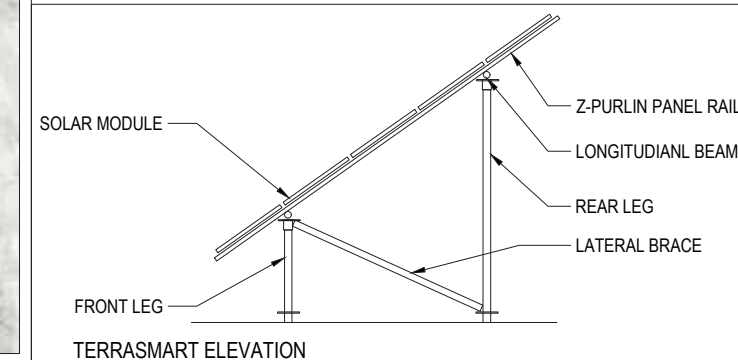
SYSTEM SIZE DC (kW)	2,203.740		
SYSTEM SIZE AC (kW)	2200		
DC TO AC RATIO	1.00		
MODULE INFORMATION	(6,996) LG315		
STRING INFORMATION	(318) PARALLELED STRINGS OF (22)		
INVERTER INFORMATION	(1) SMA 2200 - US		
TRANSFORMER INFORMATION	(1) 2000 KVA		
INTERCONNECTION VOLTAGE	12 kV		
RACKING DETAILS	GROUND MOUNTED TERRASSMART		
ARRAY PITCH (METER)	9.40	SITE LATITUDE	34.02 N

ARRAY INFORMATION

ARRAY NO.	AZIMUTH	TILT ANGLE	NO. OF MODULES	NO. OF STRINGS	KW DC	INV - # CONNECTED
ARY-1	180°	20°	6,996	318	2,203.740	(1) 2200
TOTAL	-	-	6,996	318	2,203.740	-

LEGEND

GROUPING OF 30 MODULES MOUNTED IN LANDSCAPE (5x6)



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MT. SAN ANTONIO COLLEGE
1100 N GRAND AVE
WALNUT, CA 91789

PROJECT NUMBER:
P-SD-007307

RELEASE LEVEL	PROPOSAL LAYOUT	PROPOSAL REVISION 1	PROPOSAL REVISION 2	PROPOSAL REVISION 3	PROPOSAL REVISION 4	PROPOSAL REVISION 5	PROPOSAL REVISION 6
CHECKED	JH	JH	JH	JH	JH	JH	DM
DRAWN	RD	EH	RD	RD	RD	TAY	DM
DATE	04/30/15	05/04/15	05/05/15	05/20/15	05/28/15	05/29/15	06/17/2015
REV	1	2	3	4	5	6	7

SCALE: 1"=300'
VALID ONLY WHEN PLOTTED
ANSI FULL BLEED B 11" X 17"

PV-1

L1 PROPOSAL LAYOUT

MT. SAN ANTONIO COLLEGE - PV PROJECT



PROJECT INFORMATION

PROPOSAL SPECIFICATION

SYSTEM SIZE DC (kW)	2,196.810		
SYSTEM SIZE AC (kW)	2200		
DC TO AC RATIO	1.00		
MODULE INFORMATION	(6,974) LG 315		
STRING INFORMATION	(317) PARALLELED STRINGS OF (22)		
INVERTER INFORMATION	(1) SMA 2200-US		
TRANSFORMER INFORMATION	(1) 2000 kVA		
INTERCONNECTION VOLTAGE	12 kV		
RACKING DETAILS	GROUND MOUNTED TRACKER		
GROUND COVER RATIO	50%	SITE LATITUDE	41.07 N

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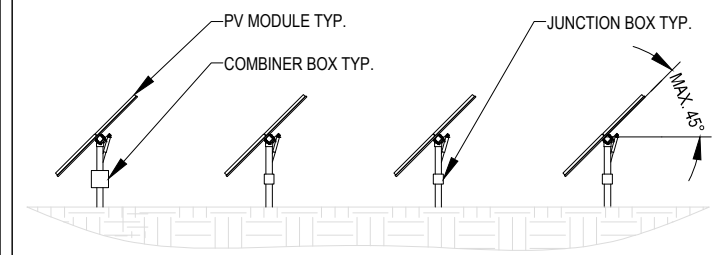
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WWW.BORREGOSOLAR.COM

ARRAY INFORMATION

ARRAY NO.	AZIMUTH	TILT ANGLE	NO. OF MODULES	NO. OF STRINGS	KW DC	INV - # CONNECTED
ARY-1	180°	±45°	6,974	317	2,196.810	(1) 2200
TOTAL	-	-	6,974	317	2,196.810	-

MT. SAN ANTONIO COLLEGE
1100 N GRAND AVE
WALNUT, CA 91789

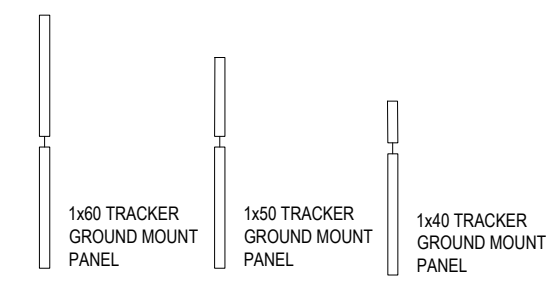


TRACKER ELEVATION

PROJECT NUMBER:
P-SD-007307

RELEASE LEVEL	CHECKED	DRAWN	DATE	REV
PROPOSAL LAYOUT	JH	RD	04/24/15	1
PROPOSAL REVISION 1	JH	EH	06/18/15	2
PROPOSAL REVISION 2	JH	EH	06/19/15	3

LEGEND



SCALE: 1"=300'
VALID ONLY WHEN PLOTTED
ANSI FULL BLEED B 11" X 17"

PV-1

L1 PROPOSAL LAYOUT

Revised Attachments:

J. Revised PVSyst Output Reports

Grid-Connected System: Simulation parameters

Project : **15036 - Mt San Antonio College**

Geographical Site **Mt SAC** **Country** **United States**

Situation Latitude 34.0°N Longitude 117.9°W
 Time defined as Legal Time Time zone UT-8 Altitude 236 m
 Albedo 0.20

Meteo data : 117853405_9809, NREL SPP

Simulation variant : **Fixed - T20 A0 - 2.2 MW**

Simulation date 19/06/15 16h02

Simulation parameters

Collector Plane Orientation Tilt 20° Azimuth 0°
20 Sheds Pitch 9.40 m Collector width 5.10 m
 Inactive band Top 0.00 m Bottom 0.00 m
 Shading limit angle Gamma 20.74 ° Occupation Ratio 54.3 %
 Shadings electrical effect Cell size 15.6cm Strings in width 5

Models used Transposition Perez Diffuse Measured

Horizon Average Height 3.8°

Near Shadings Mutual shadings of sheds Electrical effect

PV Array Characteristics

PV module Si-mono Model **LG315N1C-G4 BSS01**
 Manufacturer LG Electronics
 Number of PV modules In series 22 modules In parallel 318 strings
 Total number of PV modules Nb. modules 6996 Unit Nom. Power 315 Wp
 Array global power Nominal (STC) **2204 kWp** At operating cond. 1986 kWp (50°C)
 Array operating characteristics (50°C) U mpp 653 V I mpp 3040 A
 Total area Module area **11473 m²** Cell area 10217 m²

Inverter Model **SMA SC-2MVA w110 v2**
 Manufacturer SMA
 Characteristics Operating Voltage 570-1000 V Unit Nom. Power 2200 kW AC

PV Array loss factors

Thermal Loss factor U_c (const) 25.0 W/m²K U_v (wind) 1.2 W/m²K / m/s
 => Nominal Oper. Coll. Temp. (G=800 W/m², T_{amb}=20°C, Wind=1 m/s.) NOCT 47 °C
 Wiring Ohmic Loss Global array res. 3.6 mOhm Loss Fraction 1.5 % at STC

Array Soiling Losses

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
0.9%	0.9%	0.9%	0.9%	1.7%	0.9%	1.7%	0.9%	1.7%	2.6%	0.9%	0.9%

Module Quality Loss Loss Fraction -0.1 %
 Module Mismatch Losses Loss Fraction 0.5 % at MPP
 Incidence effect, ASHRAE parametrization IAM = 1 - bo (1/cos i - 1) bo Parameter 0.04

System loss factors

AC wire loss inverter to transfo Inverter voltage 360 Vac tri
 Wires 69 m 3x5000 mm² Loss Fraction 0.5 % at STC
 External transformer Iron loss (24H connection) 2150 W Loss Fraction 0.1 % at STC
 Resistive/Inductive losses 0.6 mOhm Loss Fraction 1.0 % at STC

Grid-Connected System: Simulation parameters (continued)

User's needs :

Unlimited load (grid)

Grid-Connected System: Horizon definition

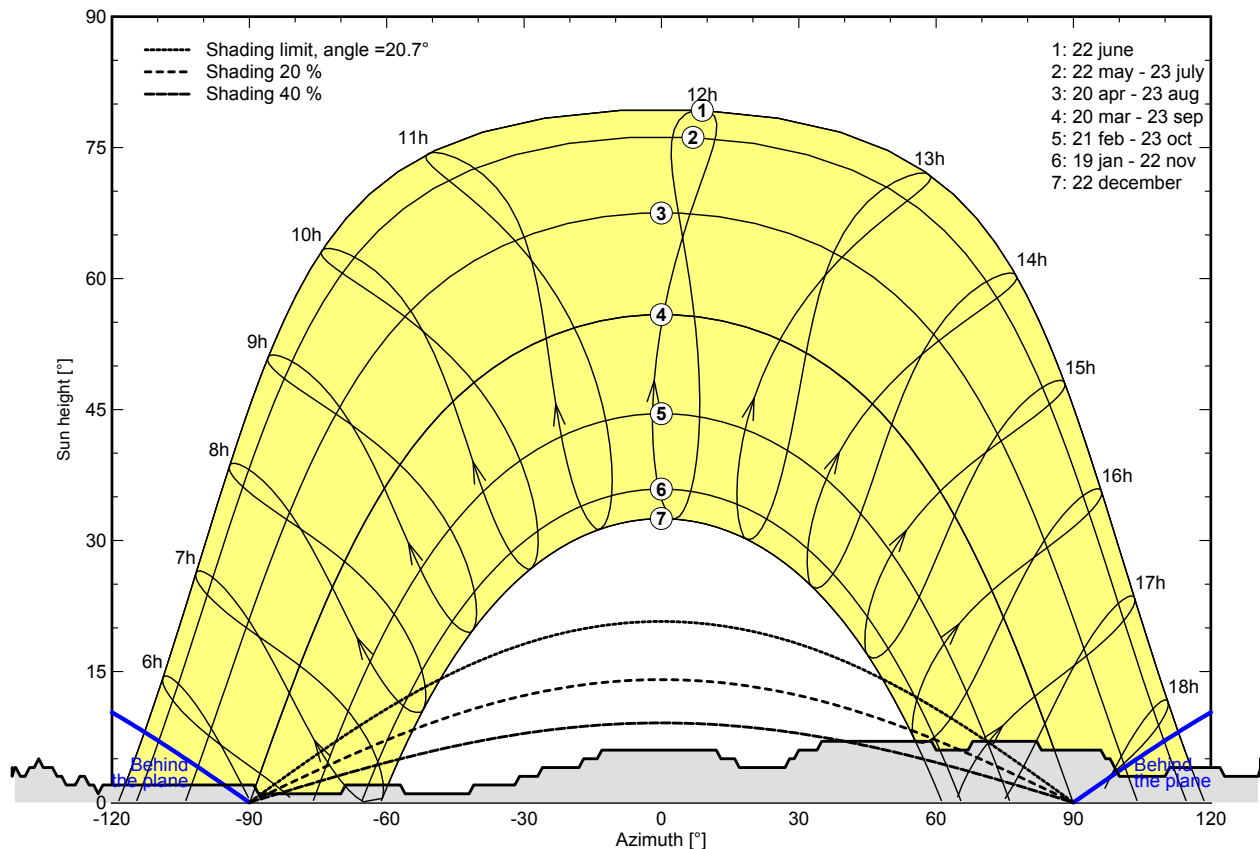
Project : 15036 - Mt San Antonio College
Simulation variant : Fixed - T20 A0 - 2.2 MW

Main system parameters	System type	Grid-Connected		
Horizon	Average Height	3.8°		
PV Field Orientation	Sheds disposition, tilt	20°	azimuth	0°
PV modules	Model	LG315N1C-G4 BSS01	Pnom	315 Wp
PV Array	Nb. of modules	6996	Pnom total	2204 kWp
Inverter	Model	!SMA SC-2MVA w110 v2	Pnom	2200 kW ac
User's needs	Unlimited load (grid)			

Horizon	Average Height	3.8°	Diffuse Factor	0.98
	Albedo Factor	100 %	Albedo Fraction	0.77

Height [°]	4.0	4.0	3.0	3.0	4.0	4.0	3.0	3.0	4.0	4.0	5.0	4.0	4.0
Azimuth [°]	-180	-164	-163	-145	-144	-141	-140	-139	-138	-137	-136	-135	-133
Height [°]	3.0	3.0	2.0	2.0	3.0	3.0	2.0	2.0	1.0	2.0	2.0	1.0	1.0
Azimuth [°]	-132	-131	-130	-128	-127	-126	-125	-124	-123	-122	-89	-88	-70
Height [°]	2.0	2.0	1.0	1.0	2.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	6.0
Azimuth [°]	-69	-57	-56	-42	-41	-32	-31	-27	-26	-18	-17	-14	-13
Height [°]	6.0	5.0	5.0	4.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0	6.0	6.0
Azimuth [°]	12	13	16	17	27	28	29	30	34	35	59	60	67
Height [°]	7.0	7.0	6.0	6.0	5.0	5.0	3.0	3.0	4.0	4.0	3.0	3.0	4.0
Azimuth [°]	68	82	83	96	97	98	100	110	111	122	123	148	149
Height [°]	3.0	3.0	4.0	4.0	5.0	5.0	4.0	4.0					
Azimuth [°]	150	156	157	161	162	169	170	180					

Meteonorm horizon for, Lat. = 34.040°, Long. = -117.845°



Grid-Connected System: Main results

Project : 15036 - Mt San Antonio College

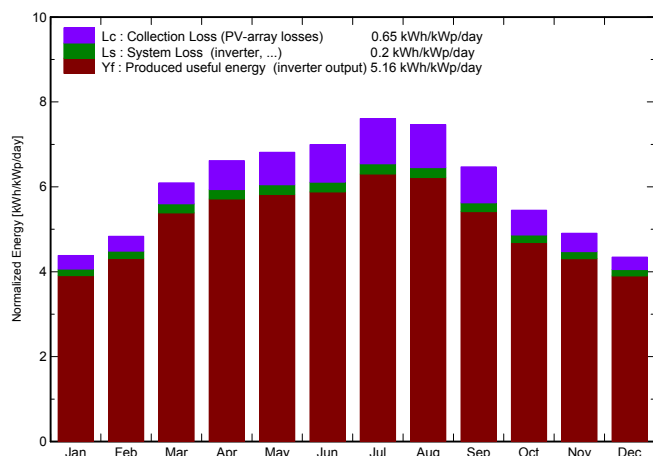
Simulation variant : Fixed - T20 A0 - 2.2 MW

Main system parameters	System type	Grid-Connected	
Horizon	Average Height	3.8°	
PV Field Orientation	Sheds disposition, tilt	20°	azimuth 0°
PV modules	Model	LG315N1C-G4 BSS01	Pnom 315 Wp
PV Array	Nb. of modules	6996	Pnom total 2204 kWp
Inverter	Model	!SMA SC-2MVA w110 v2	Pnom 2200 kW ac
User's needs	Unlimited load (grid)		

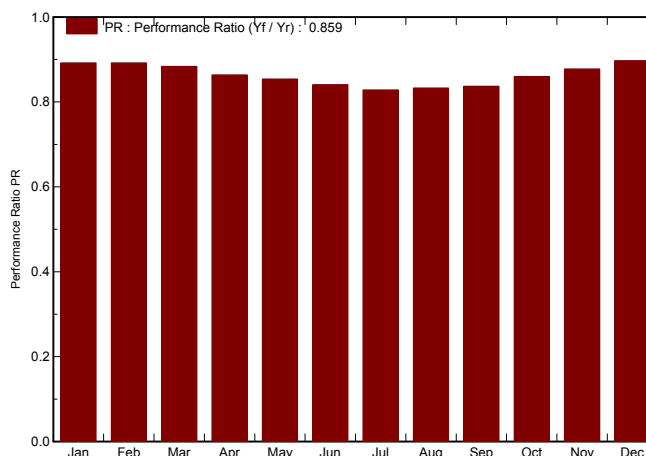
Main simulation results

System Production **Produced Energy 4150 MWh/year** Specific prod. 1883 kWh/kWp/year
 Performance Ratio PR **85.9 %**

Normalized productions (per installed kWp): Nominal power 2204 kWp



Performance Ratio PR



Fixed - T20 A0 - 2.2 MW Balances and main results

	GlobHor	T Amb	GlobInc	GlobEff	EArray	E_Grid	EffArrR	EffSysR
	kWh/m ²	°C	kWh/m ²	kWh/m ²	MWh	MWh	%	%
January	96.8	10.33	135.9	129.0	277.5	267.1	17.80	17.13
February	106.0	8.88	135.4	129.8	276.7	266.2	17.81	17.14
March	162.6	10.49	188.9	181.6	382.5	367.9	17.65	16.98
April	186.4	14.23	198.5	191.3	392.6	377.8	17.24	16.59
May	211.4	15.48	211.3	203.2	413.2	397.7	17.04	16.40
June	215.5	20.12	209.8	201.7	403.8	388.8	16.77	16.15
July	239.3	22.96	235.8	227.7	447.0	430.5	16.52	15.91
August	221.8	23.64	231.5	223.9	440.9	424.9	16.60	16.00
September	172.7	21.05	194.2	187.2	371.8	358.2	16.69	16.08
October	136.2	14.48	169.0	162.3	332.5	320.2	17.15	16.52
November	106.7	13.71	147.2	140.5	295.8	284.7	17.51	16.86
December	92.1	7.51	134.7	126.9	276.9	266.4	17.91	17.23
Year	1947.4	15.27	2192.2	2105.1	4311.0	4150.4	17.14	16.50

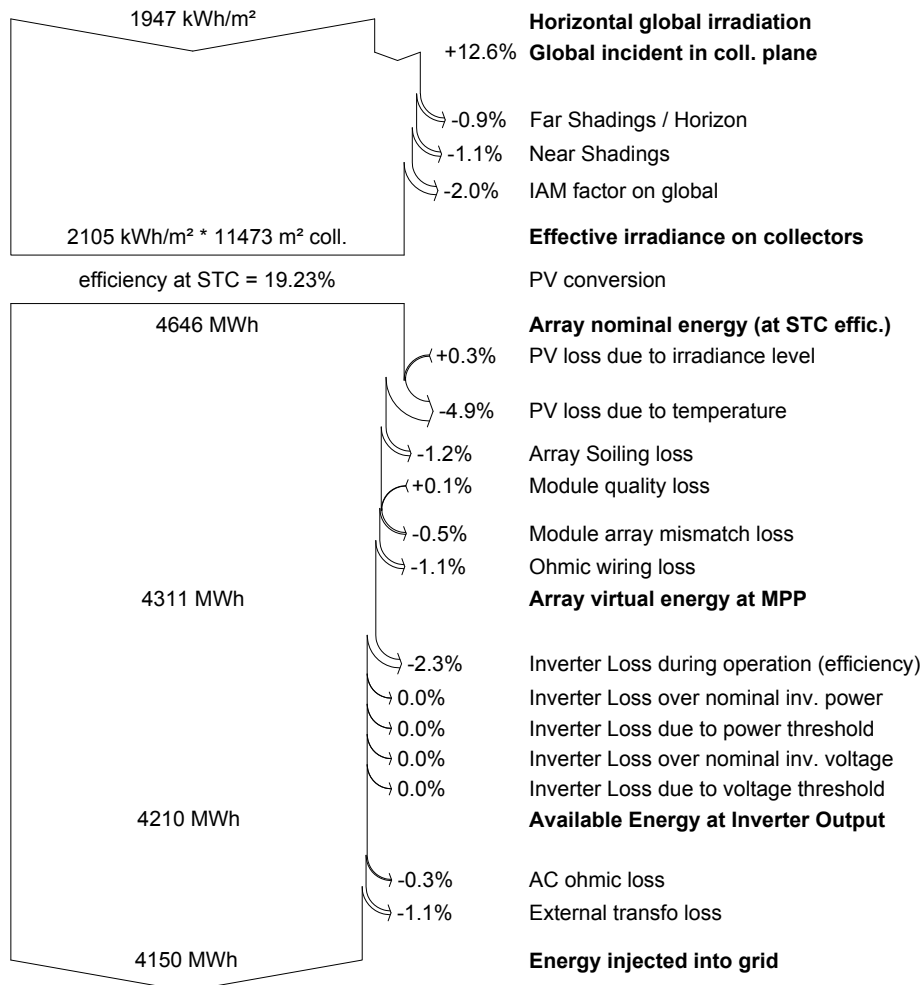
Legends: GlobHor Horizontal global irradiation EArray Effective energy at the output of the array
 T Amb Ambient Temperature E_Grid Energy injected into grid
 GlobInc Global incident in coll. plane EffArrR Effic. Eout array / rough area
 GlobEff Effective Global, corr. for IAM and shadings EffSysR Effic. Eout system / rough area

Grid-Connected System: Loss diagram

Project : 15036 - Mt San Antonio College
Simulation variant : Fixed - T20 A0 - 2.2 MW

Main system parameters	System type	Grid-Connected	
Horizon	Average Height	3.8°	
PV Field Orientation	Sheds disposition, tilt	20°	azimuth 0°
PV modules	Model	LG315N1C-G4 BSS01	Pnom 315 Wp
PV Array	Nb. of modules	6996	Pnom total 2204 kWp
Inverter	Model	!SMA SC-2MVA w110 v2	Pnom 2200 kW ac
User's needs	Unlimited load (grid)		

Loss diagram over the whole year



Grid-Connected System: Simulation parameters

Project : **15036 - Mt San Antonio College**

Geographical Site **Mt SAC** **Country** **United States**

Situation Latitude 34.0°N Longitude 117.9°W
 Time defined as Legal Time Time zone UT-8 Altitude 236 m
 Albedo 0.20

Meteo data : 117853405_9809, NREL SPP

Simulation variant : **Tracker - T0 A0 - 2.2 MW**

Simulation date 19/06/15 15h49

Simulation parameters

Tracking plane, tilted Axis Axis Tilt 0° Axis Azimuth 0°
 Rotation Limitations Minimum Phi -45° Maximum Phi 45°

Backtracking strategy Tracker Spacing 3.28 m Collector width 1.64 m
 Inactive band Left 0.00 m Right 0.00 m

Models used Transposition Perez Diffuse Measured

Horizon Average Height 3.8°

Near Shadings No Shadings

PV Array Characteristics

PV module Si-mono Model **LG315N1C-G4 BSS01**
 Manufacturer LG Electronics

Number of PV modules In series 22 modules In parallel 317 strings
 Total number of PV modules Nb. modules 6974 Unit Nom. Power 315 Wp
 Array global power Nominal (STC) **2197 kWp** At operating cond. 1980 kWp (50°C)
 Array operating characteristics (50°C) U mpp 653 V I mpp 3031 A
 Total area Module area **11437 m²** Cell area 10185 m²

Inverter Model **SMA SC-2MVA w110 v2**
 Manufacturer SMA

Characteristics Operating Voltage 570-1000 V Unit Nom. Power 2200 kW AC

PV Array loss factors

Thermal Loss factor U_c (const) 25.0 W/m²K U_v (wind) 1.2 W/m²K / m/s
 => Nominal Oper. Coll. Temp. (G=800 W/m², T_{amb}=20°C, Wind=1 m/s.) NOCT 47 °C

Wiring Ohmic Loss Global array res. 3.6 mOhm Loss Fraction 1.5 % at STC

Array Soiling Losses

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
0.9%	0.9%	0.9%	0.9%	1.7%	0.9%	1.7%	0.9%	1.7%	2.6%	0.9%	0.9%

Module Quality Loss Loss Fraction -0.1 %
 Module Mismatch Losses Loss Fraction 0.5 % at MPP
 Incidence effect, ASHRAE parametrization IAM = 1 - bo (1/cos i - 1) bo Parameter 0.04

System loss factors

AC wire loss inverter to transfo Inverter voltage 360 Vac tri
 Wires 34 m 3x2500 mm² Loss Fraction 0.5 % at STC

External transformer Iron loss (24H connection) 2144 W Loss Fraction 0.1 % at STC
 Resistive/Inductive losses 0.6 mOhm Loss Fraction 1.0 % at STC

User's needs : Unlimited load (grid)

Grid-Connected System: Horizon definition

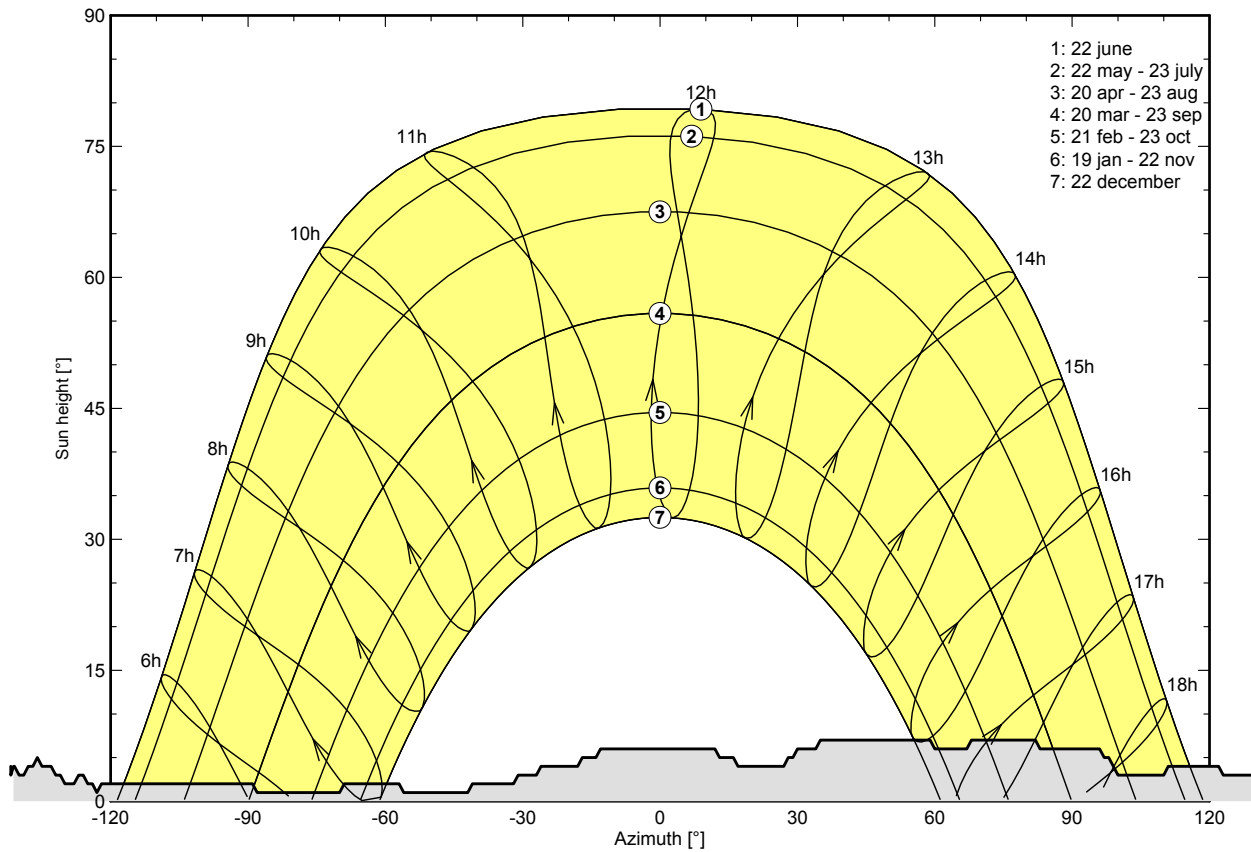
Project : 15036 - Mt San Antonio College
Simulation variant : Tracker - T0 A0 - 2.2 MW

Main system parameters		System type	Grid-Connected	
Horizon		Average Height	3.8°	
PV Field Orientation	tracking, tilted axis, Axis Tilt	0°	Axis Azimuth	0°
PV modules	Model	LG315N1C-G4 BSS01	Pnom	315 Wp
PV Array	Nb. of modules	6974	Pnom total	2197 kWp
Inverter	Model	ISMA SC-2MVA w110 v2	Pnom	2200 kW ac
User's needs	Unlimited load (grid)			

Horizon	Average Height	3.8°	Diffuse Factor	1.00
	Albedo Factor	100 %	Albedo Fraction	0.00

Height [°]	4.0	4.0	3.0	3.0	4.0	4.0	3.0	3.0	4.0	4.0	5.0	4.0	4.0
Azimuth [°]	-180	-164	-163	-145	-144	-141	-140	-139	-138	-137	-136	-135	-133
Height [°]	3.0	3.0	2.0	2.0	3.0	3.0	2.0	2.0	1.0	2.0	2.0	1.0	1.0
Azimuth [°]	-132	-131	-130	-128	-127	-126	-125	-124	-123	-122	-89	-88	-70
Height [°]	2.0	2.0	1.0	1.0	2.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	6.0
Azimuth [°]	-69	-57	-56	-42	-41	-32	-31	-27	-26	-18	-17	-14	-13
Height [°]	6.0	5.0	5.0	4.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0	6.0	6.0
Azimuth [°]	12	13	16	17	27	28	29	30	34	35	59	60	67
Height [°]	7.0	7.0	6.0	6.0	5.0	5.0	3.0	3.0	4.0	4.0	3.0	3.0	4.0
Azimuth [°]	68	82	83	96	97	98	100	110	111	122	123	148	149
Height [°]	3.0	3.0	4.0	4.0	5.0	5.0	4.0	4.0					
Azimuth [°]	150	156	157	161	162	169	170	180					

Meteorom horizon for, Lat. = 34.040°, Long. = -117.845°



Grid-Connected System: Main results

Project : 15036 - Mt San Antonio College

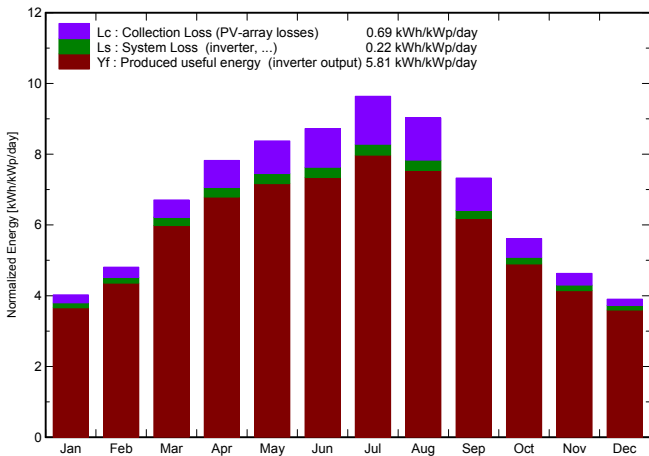
Simulation variant : Tracker - T0 A0 - 2.2 MW

Main system parameters		System type	Grid-Connected	
Horizon		Average Height	3.8°	
PV Field Orientation	tracking, tilted axis, Axis Tilt	0°	Axis Azimuth	0°
PV modules		Model	LG315N1C-G4 BSS01	Pnom 315 Wp
PV Array		Nb. of modules	6974	Pnom total 2197 kWp
Inverter		Model	!SMA SC-2MVA w110 v2	Pnom 2200 kW ac
User's needs	Unlimited load (grid)			

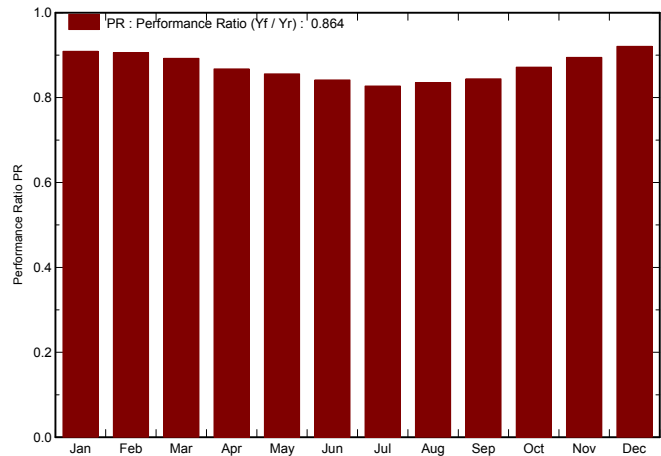
Main simulation results

System Production **Produced Energy 4660 MWh/year** Specific prod. 2121 kWh/kWp/year
 Performance Ratio PR **86.4 %**

Normalized productions (per installed kWp): Nominal power 2197 kWp



Performance Ratio PR



Tracker - T0 A0 - 2.2 MW Balances and main results

	GlobHor kWh/m ²	T Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	EffArrR %	EffSysR %
January	96.8	10.33	124.8	119.3	258.6	249.2	18.12	17.46
February	106.0	8.88	134.6	130.0	278.1	267.9	18.07	17.41
March	162.6	10.49	207.9	202.1	423.7	407.6	17.82	17.14
April	186.4	14.23	234.8	229.5	465.2	447.5	17.32	16.67
May	211.4	15.48	259.7	253.9	507.7	488.2	17.09	16.44
June	215.5	20.12	261.7	256.1	502.7	483.8	16.80	16.16
July	239.3	22.96	298.7	292.8	563.9	542.9	16.50	15.89
August	221.8	23.64	279.9	274.6	533.4	513.6	16.66	16.04
September	172.7	21.05	219.8	214.4	423.0	407.6	16.82	16.21
October	136.2	14.48	174.1	168.7	346.1	333.6	17.38	16.75
November	106.7	13.71	138.9	133.6	283.3	273.0	17.83	17.18
December	92.1	7.51	121.0	115.6	254.0	244.7	18.36	17.69
Year	1947.4	15.27	2455.9	2390.7	4839.9	4659.6	17.23	16.59

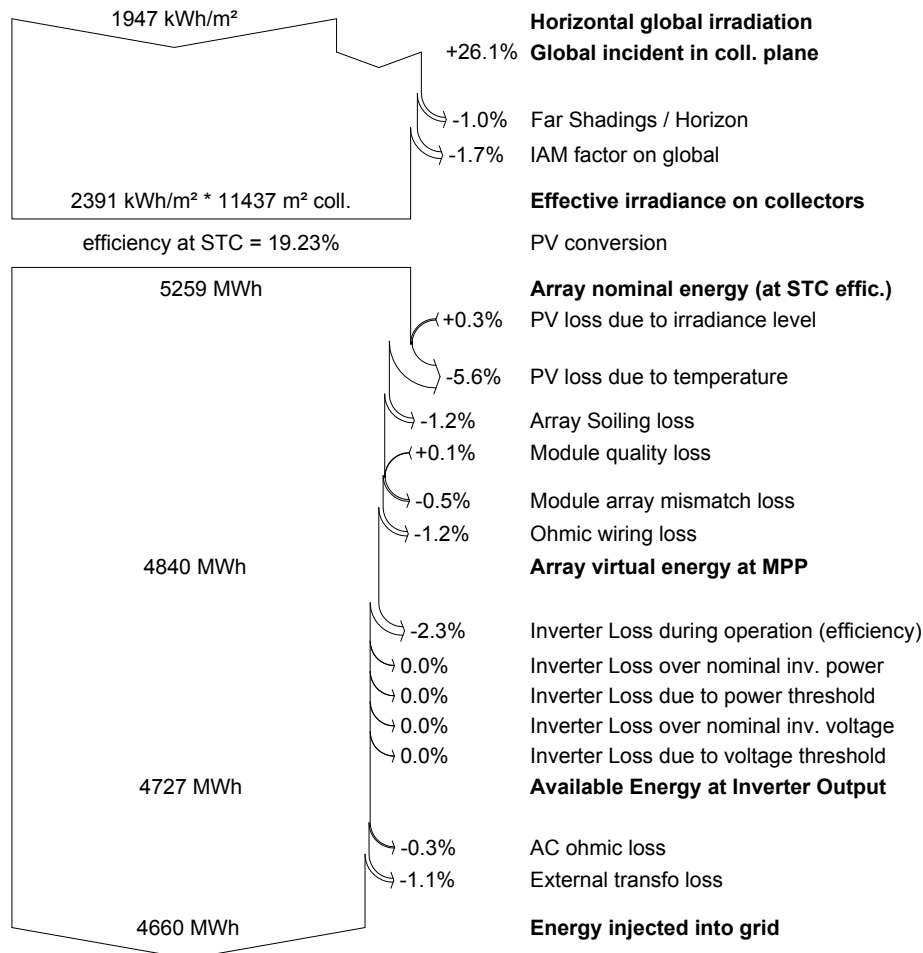
Legends: GlobHor Horizontal global irradiation EArray Effective energy at the output of the array
 T Amb Ambient Temperature E_Grid Energy injected into grid
 GlobInc Global incident in coll. plane EffArrR Effic. Eout array / rough area
 GlobEff Effective Global, corr. for IAM and shadings EffSysR Effic. Eout system / rough area

Grid-Connected System: Loss diagram

Project : 15036 - Mt San Antonio College
Simulation variant : Tracker - T0 A0 - 2.2 MW

Main system parameters	System type	Grid-Connected		
Horizon	Average Height	3.8°		
PV Field Orientation	tracking, tilted axis, Axis Tilt	0°	Axis Azimuth	0°
PV modules	Model	LG315N1C-G4 BSS01	Pnom	315 Wp
PV Array	Nb. of modules	6974	Pnom total	2197 kWp
Inverter	Model	!SMA SC-2MVA w110 v2	Pnom	2200 kW ac
User's needs	Unlimited load (grid)			

Loss diagram over the whole year





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