

**Our Term and conditions are as follows:**

1. Include installation
2. Validity : 30 days from date of the offer
3. Delivery: 4-8 weeks
4. Installation time: To be agreed
5. All civil work are excluded
6. VAT not included

Thanks and hope that our offer will accept your acceptance.

Please, let us know if you need any clarifications.

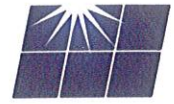
Thanks & Regards

**Eng. Mohamed Essam**

**BDM**

*M. Essam*





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**Jinko** Solar  
Building Your Trust in Solar

**Eagle 72P**  
**320-340 Watt**  
POLY CRYSTALLINE MODULE


Positive power tolerance of 0~+3%

ISO9001:2008, ISO14001:2004, OHSAS18001 certified factory  
IEC61215, IEC61730 certified products.



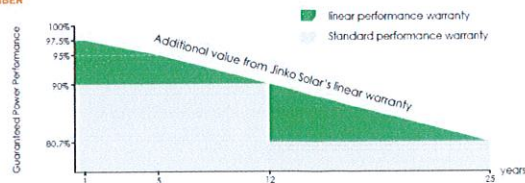

### KEY FEATURES



- 
**5 Busbar Solar Cell:**  
5 busbar solar cell adopts new technology to improve the efficiency of modules, offers a better aesthetic appearance, making it perfect for rooftop installation.
- 
**High Power Output:**  
Polycrystalline 72-cell module achieves a power output up to 340Wp.
- 
**PID RESISTANT:**  
Eagle modules pass PID test, limited power degradation by PID test is guaranteed for mass production.
- 
**Low-light Performance:**  
Advanced glass and surface texturing allow for excellent performance in low-light environments.
- 
**Severe Weather Resilience:**  
Certified to withstand wind load (2400 Pascal) and snow load (5400 Pascal).
- 
**Durability against extreme environmental conditions:**  
High salt mist and ammonia resistance certified by TUV NORD.
- 
**Temperature Coefficient:**  
Improved temperature coefficient decreases power loss during high temperatures.

### LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty • 25 Year Linear Power Warranty

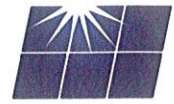


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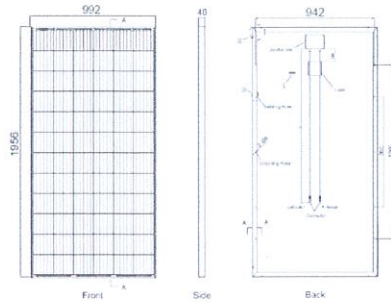
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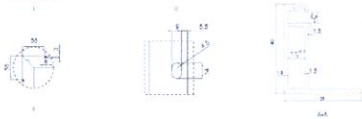
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Engineering Drawings



DETAILS

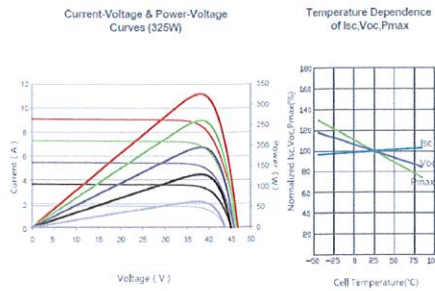


Packaging Configuration

( Two pallets - One stack )

26pcs/pallet, 52pcs/stack, 624 pcs/40HQ Container

Electrical Performance & Temperature Dependence



Mechanical Characteristics

Cell Type	Poly-crystalline 156×156mm (6 inch)
No. of cells	72 (6×12)
Dimensions	1956×992×40mm (77.01×39.05×1.57 inch)
Weight	22.5 kg (49.6 lbs.)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP67 Rated
Output Cables	TUV 1×4.0mm <sup>2</sup> , Length: 1200mm or Customized Length

SPECIFICATIONS

Module Type	JKM320PP-72		JKM325PP-72		JKM330PP-72		JKM335PP-72		JKM340PP-72	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	320Wp	237Wp	325Wp	241Wp	330Wp	245Wp	335Wp	249Wp	340Wp	253Wp
Maximum Power Voltage (Vmp)	37.4V	34.7V	37.6V	35.0V	37.8V	35.3V	38.0V	35.6V	38.2V	35.9V
Maximum Power Current (Imp)	8.56A	6.83A	8.66A	6.89A	8.74A	6.94A	8.82A	6.99A	8.91A	7.05A
Open-circuit Voltage (Voc)	46.4V	43.0V	46.7V	43.3V	46.9V	43.6V	47.2V	43.8V	47.5V	44.0V
Short-circuit Current (Isc)	9.05A	7.35A	9.10A	7.40A	9.14A	7.45A	9.18A	7.52A	9.22A	7.98A
Module Efficiency STC (%)	16.49%		16.75%		17.01%		17.25%		17.52%	
Operating Temperature(°C)	-40°C~+85°C									
Maximum system voltage	1000VDC (IEC)									
Maximum series fuse rating	20A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.40%/°C									
Temperature coefficients of Voc	-0.31%/°C									
Temperature coefficients of Isc	0.05%/°C									
Nominal operating cell temperature (NOCT)	45±2°C									

STC: Irradiance 1000W/m<sup>2</sup> Cell Temperature 25°C AM=1.5

NOCT: Irradiance 800W/m<sup>2</sup> Ambient Temperature 20°C AM=1.5 Wind Speed 1m/s

\* Power measurement tolerance: ± 3%

The company reserves the final right for explanation on any of the information presented hereby. EN-JKM-340PP-72\_rev2017

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SUNNY TRIPOWER  
15000TL / 20000TL / 25000TL**Efficient**

- Maximum efficiency of 98.4%

**Safe**

- DC surge arrester (SPD type II) can be integrated

**Flexible**

- DC input voltage of up to 1000 V
- Multistring capability for optimum system design
- Optional display

**Innovative**

- Cutting-edge grid management functions with Integrated Plant Control
- Reactive power available 24/7 (O on Demand 24/7)

**SUNNY TRIPOWER**  
**15000TL / 20000TL / 25000TL**

The versatile specialist for large-scale commercial plants and solar power plants

The Sunny Tripower is the ideal inverter for large-scale commercial and industrial plants. Not only does it deliver extraordinary high yields with an efficiency of 98.4%, but it also offers enormous design flexibility and compatibility with many PV modules thanks to its multistring capabilities and wide input voltage range.

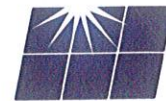
The future is now: the Sunny Tripower comes with cutting-edge grid management functions such as Integrated Plant Control, which allows the inverter to regulate reactive power at the point of common coupling. Separate controllers are no longer needed, lowering system costs. Another new feature—reactive power provision on demand (O on Demand 24/7).

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**SUNNY TRIPOWER**  
15000TL / 20000TL / 25000TL

Technical Data	Sunny Tripower 15000TL
<b>Input (DC)</b>	
Max. generator power	27000 Wp
DC rated power	15330 W
Max. input voltage	1000 V
MPP voltage range / rated input voltage	240 V to 800 V / 600 V
Min. input voltage / start input voltage	150 V / 188 V
Max. input current input A / input B	33 A / 33 A
Number of independent MPP inputs / strings per MPP input	2 / A:3, B:3
<b>Output (AC)</b>	
Rated power (at 230 V, 50 Hz)	15000 W
Max. AC apparent power	15000 VA
AC nominal voltage	3 / N / PE, 220 V / 380 V 3 / N / PE, 230 V / 400 V 3 / N / PE, 240 V / 415 V
AC voltage range	180 V to 280 V
AC grid frequency / range	50 Hz / 44 Hz to 65 Hz 60 Hz / 54 Hz to 65 Hz
Rated power frequency / rated grid voltage	50 Hz / 230 V
Max. output current / rated output current	29 A / 21.7 A
Power factor at rated power / Adjustable displacement power factor	1 / 0 overexcited to 0 underexcited
THD	≤ 3%
Feed-in phases / connection phases	3 / 3
Efficiency	
Max. efficiency / European Efficiency	98.4% / 98.0%
<b>Protective devices</b>	
DC side disconnection device	•
Ground fault monitoring / grid monitoring	• / •
DC surge arrester (Type II) can be integrated	•
DC reverse polarity protection / AC short-circuit current capability / galvanically isolated	• / • / -
All-pole sensitive residual-current monitoring unit	•
Protection class (according to IEC 62109-1) / overvoltage category (according to IEC 62109-1)	I / AC; III; DC II
<b>General data</b>	
Dimensions (W / H / D)	661 / 682 / 264 mm [26.0 / 26.9 / 10.4 inch]
Weight	61 kg [134.48 lb]
Operating temperature range	-25 °C to +60 °C [-13 °F to +140 °F]
Noise emission (typical)	51 dB(A)
Self-consumption (at night)	1 W
Topology / cooling concept	Transformerless / Optical
Degree of protection (as per IEC 60529)	IP65
Climatic category (according to IEC 60721-3-4)	4K4H
Maximum permissible value for relative humidity (non-condensing)	100%
<b>Features / function / Accessories</b>	
DC connection / AC connection	SUNCUX / spring-cage terminal
Display	•
Interface: RS485, Speedwire / Webconnect	• / •
Data interface: SMA Modbus / SunSpec Modbus	• / •
Multifunction relay / Power Control Module	• / •
OptiTrac Global Peak / Integrated Plant Control / Q on Demand 24/7	• / • / •
Grid capable / SMA Fuel Save Controller compatible	• / •
Guarantee: 5 / 10 / 15 / 20 years	• / • / • / •
Planned certificates and permits	
	ANRE 30, AS 477, BGRW 2008, C10/11 2012, CE, CEI 0-16, CEI 0-21, DEWA 2.0, EN 50638:2013*, G59/3, IEC 60088-2x, IEC 61727, IEC 62109-1/2, IEC 62116, MEA 2013, NBR 16149, NEM EN 50438, NEM 097-2-1, FEA 2013, FPL ID 1609/413, ED 661/2007, Kva. n°7/2013, SIA 977, ICB 04, TR 2 2-2, UTE C15-712-1, VDE 0126-1-1, VDEAR41 4105, VDE 0104
Type designation	STP 15000TL-30

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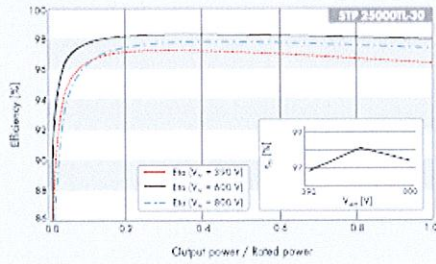
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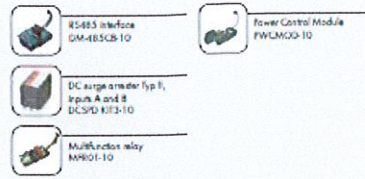
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Efficiency Curve



Accessory



● Standard features ○ Optional features - Not available  
Data of nominal conditions  
Status: October 2017

Technical Data

Input (DC)

Max. generator power  
DC rated power  
Max. input voltage  
MPP voltage range / rated input voltage  
Min. input voltage / start input voltage  
Max. input current input A / input B  
Number of independent MPP inputs / strings per MPP input

Output (AC)

Rated power (at 230 V, 50 Hz)  
Max. AC apparent power  
AC nominal voltage

AC voltage range

AC grid frequency / range

Rated power frequency / rated grid voltage

Max. output current / Rated output current

Power factor at rated power / Adjustable displacement power factor

THD

Feed-in phases / connection phases

Efficiency

Max. efficiency / European Efficiency

Protective devices

DC side disconnection device

Ground fault monitoring / grid monitoring

DC surge arrester (Type II) can be integrated

DC reverse polarity protection / AC short-circuit current capability / galvanically isolated

All-pole sensitive residual-current monitoring unit

Protection class (according to IEC 62109-1) / overvoltage category (according to IEC 62109-1)

General data

Dimensions (W / H / D)

Weight

Operating temperature range

Noise emission (typical)

Self-consumption (at night)

Topology / cooling concept

Degree of protection (as per IEC 60529)

Climatic category (according to IEC 60721-3-4)

Maximum permissible value for relative humidity (non-condensing)

Features / function / Accessories

DC connection / AC connection

Display

Interface: RS485, Speedwire/Webconnected

Data interface: SMA Modbus / SunSpec Modbus

Multifunction relay / Power Control Module

OptiTrac Global Peak / Integrated Plant Control / O on Demand 24/7

Off-Grid capable / SMA Fuel Save Controller compatible

Guarantee: 5 / 10 / 15 / 20 years

Certificates and permits (more available on request)

\* Does not apply to all national appendices of EN 50438

Type designation

Sunny Tripower

20000TL

36000 Wp

20440 W

1000 V

320 V to 800 V / 600 V

150 V / 188 V

33 A / 33 A

2 / A:3; B:3

20000 W

20000 VA

3 / N / PE, 220 V / 380 V

3 / N / PE, 230 V / 400 V

3 / N / PE, 240 V / 415 V

180 V to 280 V

50 Hz / 44 Hz to 55 Hz

60 Hz / 54 Hz to 65 Hz

50 Hz / 230 V

29 A / 29 A

1 / 0 overvoltage to 0 undervoltage

≤ 3%

3 / 3

98.4% / 98.0%

●

● / ●

○

● / ● / -

●

1 / AC III; DC II

661 / 682 / 264 mm (26.0 / 26.9 / 10.4 inch)

61 kg (134.48 lb)

-25 °C to +60 °C (-13 °F to +140 °F)

51 dB(A)

1 W

Transformerless / Optical

IP65

4K4H

100%

SUNCLIX / springcage terminal

○

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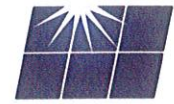
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EN 50438, AS 4777, BS EN 50438, C10/11/2012, CE, CE 016, CE 021, DEWA 7.0,

EN 50438 2011\*, GSV/3, IEC 60082-1, IEC 61217, IEC 62109-1/2, IEC 62116,

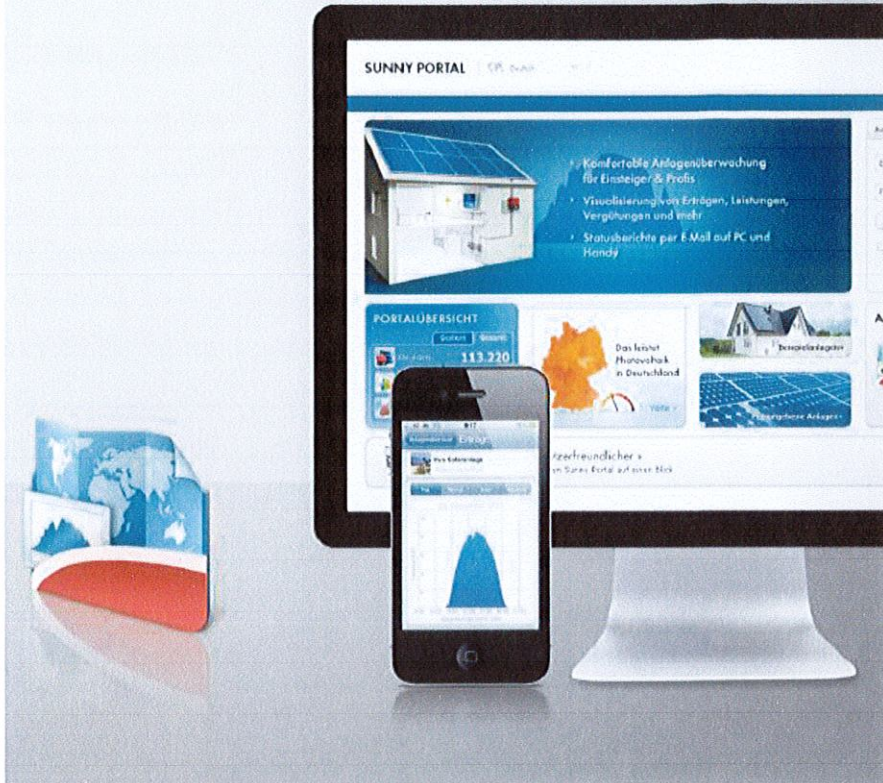
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IEC



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19/9/2018

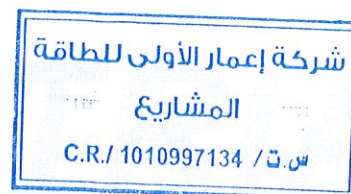
[www.firstemaarenergy.com](http://www.firstemaarenergy.com)

## Grid-Connected System: Simulation parameters

<b>Project :</b>	<b>Prince Sultan University</b>		
<b>Geographical Site</b>	<b>Riyadh</b>	<b>Country</b>	<b>Saudi Arabia</b>
<b>Situation</b>	<b>Latitude</b> 24.91° N	<b>Longitude</b>	<b>46.41° E</b>
Time defined as	<b>Legal Time</b> Time zone UT+3	<b>Altitude</b>	<b>755 m</b>
<b>Meteo data:</b>	<b>Albedo</b> 0.20	<b>Riyadh</b> MeteoNorm 7.1 station - Synthetic	

<b>Simulation variant :</b>	<b>Prince Sultan University</b>		
	<b>Simulation date</b>	<b>19/09/18 10h39</b>	

<b>Simulation parameters</b>	<b>System type</b>	<b>No 3D scene defined</b>		
<b>Collector Plane Orientation</b>	<b>Tilt</b>	<b>26°</b>	<b>Azimuth</b>	<b>0°</b>
<b>Models used</b>	<b>Transposition</b>	<b>Perez</b>	<b>Diffuse</b>	<b>Perez, Meteororm</b>
<b>Horizon</b>	<b>Free Horizon</b>			
<b>Near Shadings</b>	<b>No Shadings</b>			
<b>PV Array Characteristics</b>				
<b>PV module</b>	<b>Si-poly</b>	<b>Model</b>	<b>JKM 330P-72</b>	
Original PVsyst database		<b>Manufacturer</b>	<b>Jinkosolar</b>	
Number of PV modules		<b>In series</b>	<b>18 modules</b>	<b>In parallel</b> 23 strings
Total number of PV modules		<b>Nb. modules</b>	<b>414</b>	<b>Unit Nom. Power</b> 330 Wp
Array global power		<b>Nominal (STC)</b>	<b>137 kWp</b>	<b>At operating cond.</b> 123 kWp (50°C)
Array operating characteristics (50°C)		<b>U mpp</b>	<b>616 V</b>	<b>I mpp</b> 200 A
Total area		<b>Module area</b>	<b>803 m<sup>2</sup></b>	<b>Cell area</b> 725 m <sup>2</sup>
<b>Inverter</b>		<b>Model</b>	<b>Sunny Tripower 25000TL-JP-30</b>	
Original PVsyst database		<b>Manufacturer</b>	<b>SMA</b>	
Characteristics		<b>Operating Voltage</b>	<b>390-800 V</b>	<b>Unit Nom. Power</b> 25.0 kWac
Inverter pack		<b>Nb. of inverters</b>	<b>5 units</b>	<b>Total Power</b> 125 kWac
				<b>Pnom ratio</b> 1.09
<b>PV Array loss factors</b>				
<b>Thermal Loss factor</b>		<b>Uc (const)</b>	<b>20.0 W/m<sup>2</sup>K</b>	<b>Uv (wind)</b> 0.0 W/m <sup>2</sup> K / m/s
<b>Wiring Ohmic Loss</b>		<b>Global array res.</b>	<b>52 mOhm</b>	<b>Loss Fraction</b> 1.5 % at STC
<b>Module Quality Loss</b>				<b>Loss Fraction</b> -0.8 %
<b>Module Mismatch Losses</b>				<b>Loss Fraction</b> 1.0 % at MPP
<b>Strings Mismatch loss</b>				<b>Loss Fraction</b> 0.10 %
<b>Incidence effect, ASHRAE parametrization</b>		<b>IAM =</b>	<b>1 - bo (1/cos i - 1)</b>	<b>bo Param.</b> 0.05
<b>User's needs :</b>	<b>Unlimited load (grid)</b>			



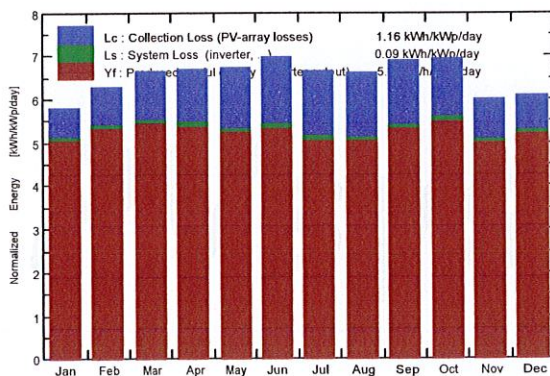
### Grid-Connected System: Main results

**Project :** Prince Sultan University  
**Simulation variant :** Prince Sultan University

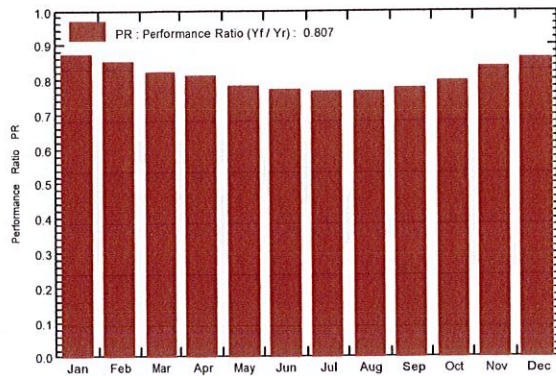
<b>Main system parameters</b>	System type	<b>No 3D scene defined</b>	
PV Field Orientation	tilt	26°	azimuth 0°
PV modules	Model	JKM 330P-72	Pnom 330 Wp
PV Array	Nb. of modules	414	Pnom total <b>137 kWp</b>
Inverter	Model	Sunny Tripower 25000TL-JP-30	25.00 kW ac
Inverter pack	Nb. of units	5.0	Pnom total <b>125 kW ac</b>
User's needs	Unlimited load (grid)		

**Main simulation results**  
 System Production **Produced Energy 262.6 MWh/year** Specific prod. 1922 kWh/kWp/year  
 Performance Ratio PR **80.73 %**

Normalized productions (per installed kWp): Nominal power 137 kWp



Performance Ratio PR



#### Prince Sultan University Balances and main results

	GlobHor kWh/m <sup>2</sup>	DiffHor kWh/m <sup>2</sup>	T Amb °C	GlobInc kWh/m <sup>2</sup>	GlobEff kWh/m <sup>2</sup>	EArray MWh	E_Grid MWh	PR
<b>January</b>	131.8	37.90	13.67	180.2	175.8	21.80	21.43	0.871
<b>February</b>	141.4	44.90	16.90	175.5	171.5	20.81	20.45	0.853
<b>March</b>	184.2	55.40	21.80	206.0	201.0	23.55	23.13	0.822
<b>April</b>	198.8	69.10	26.82	200.4	194.4	22.53	22.14	0.809
<b>May</b>	224.9	74.10	33.13	208.9	202.3	22.70	22.31	0.782
<b>June</b>	235.5	62.80	34.97	208.8	201.9	22.40	22.00	0.771
<b>July</b>	227.9	68.10	36.69	206.0	199.2	21.94	21.55	0.766
<b>August</b>	210.3	72.90	36.74	204.5	198.3	21.80	21.42	0.767
<b>September</b>	192.5	56.20	32.72	206.7	201.2	22.34	21.94	0.777
<b>October</b>	177.0	43.80	27.86	215.1	210.0	23.84	23.42	0.797
<b>November</b>	134.4	34.00	20.33	180.5	176.4	20.99	20.62	0.836
<b>December</b>	130.5	30.00	15.67	188.1	183.7	22.53	22.15	0.862
<b>Year</b>	2189.2	649.20	26.50	2380.6	2315.7	267.23	262.58	0.807

Legends: GlobHor      Horizontal global irradiation	GlobEff      Effective Global, corr. for IAM and shadings
DiffHor      Horizontal diffuse 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	PR      Performance Ratio

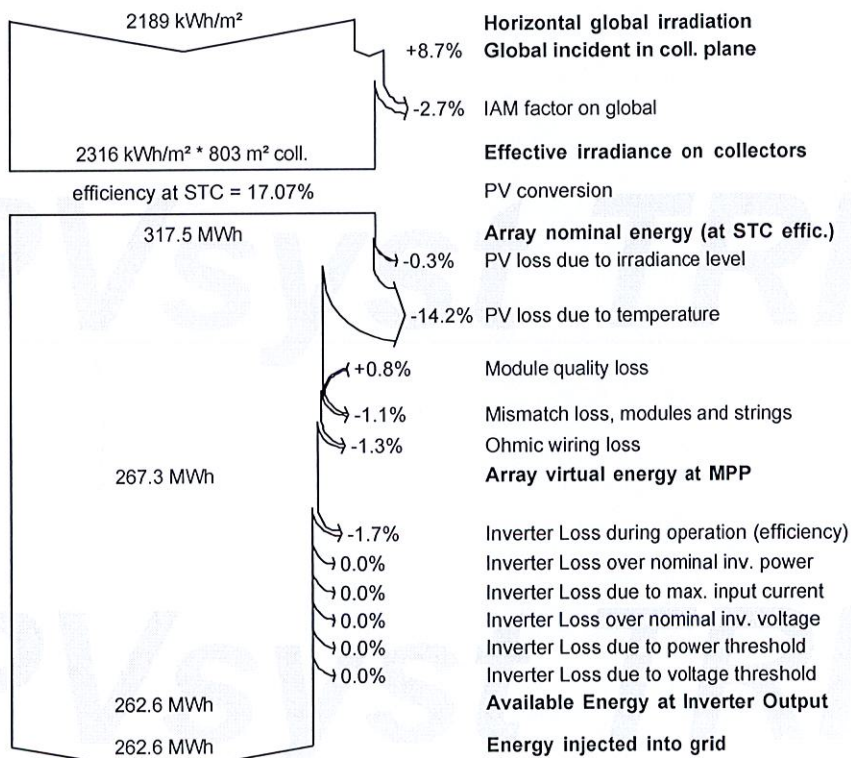
### Grid-Connected System: Loss diagram

**Project :** Prince Sultan University

**Simulation variant :** Prince Sultan University

<b>Main system parameters</b>	System type	No 3D scene defined		
PV Field Orientation	tilt	26°	azimuth	0°
PV modules	Model	JKM 330P-72	Pnom	330 Wp
PV Array	Nb. of modules	414	Pnom total	137 kWp
Inverter	Model	Sunny Tripower 25000TL-JP-30		
Inverter pack	Nb. of units	5.0	Pnom total	125 kW ac
User's needs	Unlimited load (grid)			

**Loss diagram over the whole year**



NORTH

SOUTH

KEY PLAN

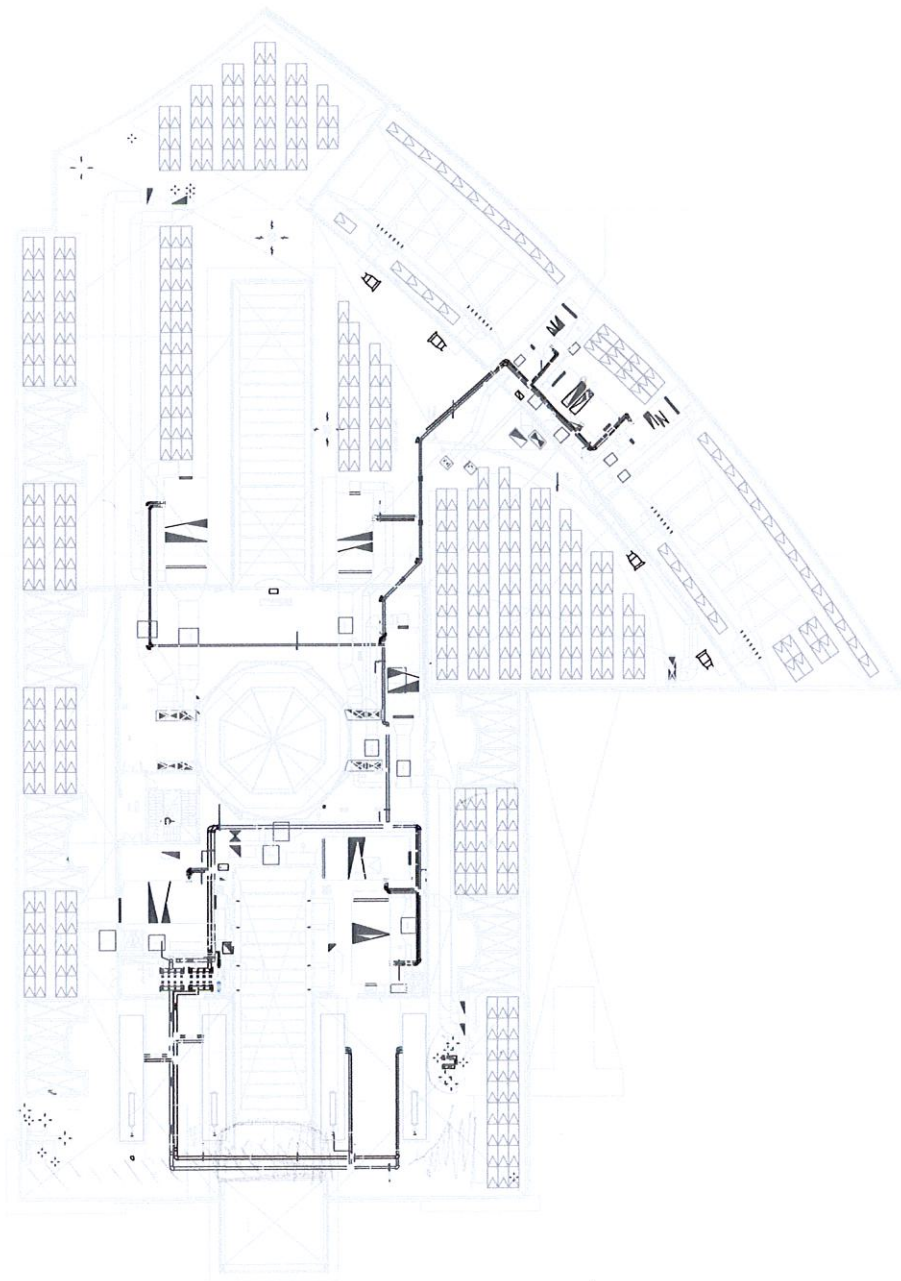


GENERAL NOTES

1. ALL MODULES SHOULD BE SET TOWARDS THE SOUTH.
2. MODULES TO BE WITHIN A RANGE OF 2% SLOPES.
3. REMOVAL OF STRUCTURE IS NOT TO BE REQUIRED.
4. ALL WIRING TO BE IN ACCORDANCE WITH THE IEC STANDARDS.
5. CONSULT THE ARCHITECT FOR ANY CHANGES.

LEGEND

PV MODULE 2m X 1m



NO. REVISION DATE CHK APP  
 COORDINATION FILE ARCH. STRUCT. MECH. ELECT.  
 NAME  
 DESIGNED BY  
 PROJECT:

PINCE SULTAN UNIVERSITY  
ROOF-TOP PV SYSTEM

Department of Civil & Environmental Engineering

DATE



DESIGNAL CONTRACTOR



FIRST EMAAR ENERGY  
for Solar Energy

Office: Jeddah, Saudi Arabia - P.O. Box 114566, Jeddah, Saudi Arabia  
Tel: +966-11-4624515 Fax: +966-11-4624516

TITLE

DNV No. No. 11  
 SHEET No. 1  
 JOB No. 114566  
 DATE 11/2015

# PAY BACK STUDY (ON-GRAD)



إعمار الأولى للطاقة  
FIRST EMAAR ENERGY

Project	Prince Sultan University	Date	19/9/2018
Location	Riyadh		

## Project Data

Total Area	4000 m2	Available Area	1000 m2
Total Solar power Generated	137 KW	<u>±15% As per day losses</u>	
Total project Cost	SAR 438,400.00		
SEC Power cost	SAR 0.30 per kw/hr		

## Payback

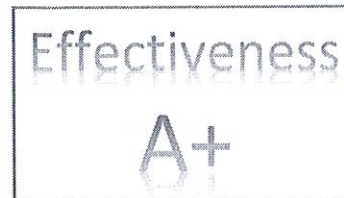
Working Hours per day	8	Hr
Working Days per month	30	day
Total Energy per day (kwh/day)	1096	kwh/day
Received Cost per day	SAR 328.80	SAR
Received Cost per Month	SAR 9,864.00	SAR
Received Cost per Year	SAR 118,368.00	SAR
<b><u>Payback years</u></b>	<b>3.70</b>	

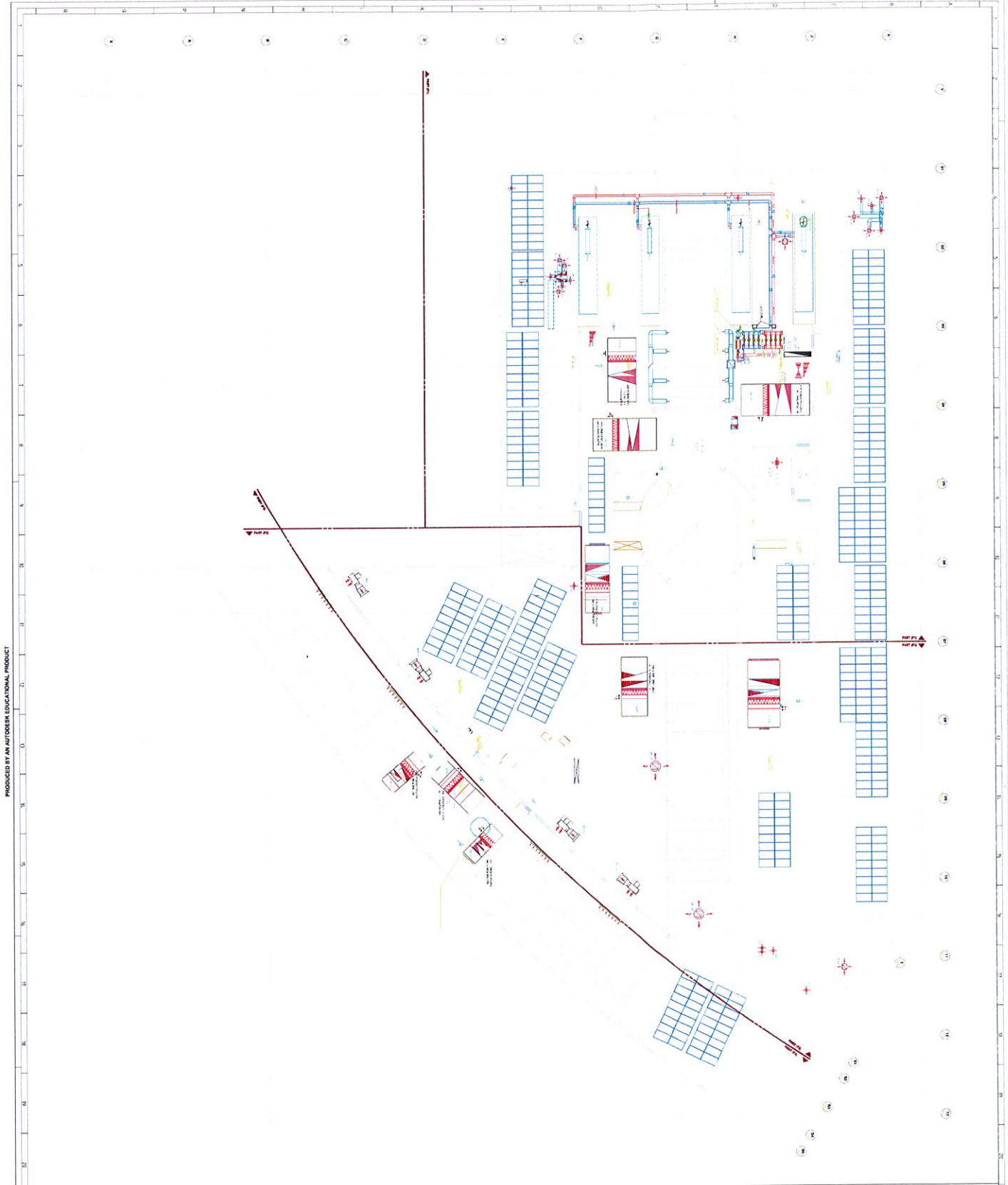


**Where the lifetime of solar system is 25 years, and payback is 3.70 years, So the system will be Achieves profits 30,254,860 SR at 21.3 years**

2,478,000

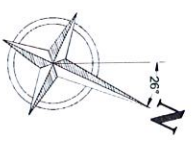
Seals Engineer  
Eng. Hadi Nizar Muradagh





Prince Sultan University Building-105	
Total PV Installed Capacity	136.62 KWP
Module Type	Jinko Solar, JK430PP-72
Total number of Modules	414
Solar Inverter Type	Schneider Electric CL-60E
Total number of Inverters	2

Solar panel dimension:  
1960x922x40mm



**Green-C**

Project Name	Prince Sultan University Building-105
Client	Prince Sultan University
Location	Riyadh, Saudi Arabia
Design Date	2023-10-27
Scale	1:100
Author	Green-C
Reviewer	Green-C
Approved	Green-C

