FEASIBILITY REPORT

ON

300MW SOLAR PV PROJECT

AT

BAP, JODHPUR (DT), RAJASTHAN



List of Abbreviations

AC	•	Alternate Current
°C	:	Degree Celsius
DC	:	Direct Current
km	:	Kilometer
kV	:	Kilovolt
LOA	:	Letter of Award
MW	:	Megawatt
NTPC	:	National Thermal Power Corporation Limited
PGCIL	:	Power Grid Corporation of India
PPA	:	Power Purchase Agreement
PV	:	Photovoltaic
SCD	:	Scheduled Commissioning Date

<u>INDEX</u>

Chapter No.	Description
Chapter - 1	Executive Summary
Chapter - 2	Details of Solar Project
Chapter - 3	Site Details
Chapter - 4	Land Details
Chapter - 5	Solar Resource Assessment
Chapter - 6	Power Evacuation
Chapter - 7	Project Implementation and Schedule
Chapter - 8	Estimations of Project Cost

PROJECT AT A GLANCE

S. No.	Particulars	Description
1	Project Company	M/s ABC Solar (India) Private Limited
2	Project SPV	M/s ABC Renewable Energy (RJ-01) Private Limited
3	Project Capacity	300 MW AC
4	Project Site	Badri Sid Village, Bap Tehsil
5	District Name	Jodhpur
6	State	Rajasthan
7	Country	India
8	Latitude	27°28'31.80"N
9	Longitude	72°26'17.40"E
10	Nearest railway station	Phalodi (Rajasthan)
11	Nearest International airport	Phalodi Airport 40 km
12	Nearest Highway	NH-15
13	Distance from Town	35 km from Phalodi.
14	Climate in Jodhpur District	Hot & Semiarid
15	Minimum Temperature	10°C
16	Maximum Temperature	41°C
17	Relative Humidity	24%
18	Power Evacuation	Bhadla II 765/ 400/220KV Pooling station
19	Required Land Area	Approx. 1549.42 Acres
20	Elevation	190-220m above Mean Sea Level

CHAPTER-1 EXECUTIVE SUMMARY

1.Project Overview

National thermal Power Corporation Limited (NTPC) has floated a tender for setting up of 1200 MW ISTS connected solar PV power project anywhere in India through its RfS No. RE-CS-0000-BOO-5 dated 10.08.2019. After successful completion of bid submission and reverse auction, ABC Solar (India) Private Limited previously known as TBEA Solar (India) Private Limited was declared as successful bidder and the Letter of Award (LoA) was issued on 20.11.2019 for a capacity of 300 MW. The Project can be implemented under the SPV name of ABC Renewable Energy (RJ-01) Private Limited.

Axis Energy Ventures India Pvt. Ltd. (AEVIPL) had been established in the year 2010 with the objective of becoming a major renewable energy developer in the country and has developed renewable energy projects in India having total capacity of 1024 MW with additional projects of 1080 MW in the advanced stages of development. AEVIPL holds 49% stake and ABC (Solar) India Pvt Ltd holds 51% stake in ABC Renewable Energy (RJ-01) Private Limited.

CHAPTER – 2 DETAILS OF SOLAR PROJECT

2. Details of the Solar Project

Salient Features of Solar Project

The indicative features of the Solar project are as under:

1	District	Jodhpur					
2	State	Rajasthan					
3	Country	India					
4	Latitude	27°28'31.80"N					
5	Longitude	72°26'17.40"E					
6	Project Capacity	300 MW AC					
7	Nearest Highway	NH-15					
8	Nearest railway station	Phalodi (Rajasthan)					
9	Nearest Airport	Phalodi Airport 40km					
10	Distance from Town	35 km from Phalodi					
11	Power Evacuation	Bhadla II 765/400/220kV PGCIL substation					
12	Elevation	190-220 m above Mean Sea Level					

CHAPTER – 3 SITE DETAILS

3.Site Details

Bap Village is located in Bap tehsil of Jodhpur district of Rajasthan. Bap village with an average elevation of 200 meters. It has well road and rail connectivity from Jodhpur, Jaisalmer and Bikaner. The capacity of proposed Solar power plant is 300 MW AC.



Figure represents the district map of Jodhpur indicating the proposed site.

Fig: District map of Bap (Bap), Jodhpur

Jodhpur is located in the State of Rajasthan in western India.

Figure represents the satellite image of the region indicating the proposed site for setting up 300MW A C solar PV power project.



Fig: Satellite map of Bap (Bap), Jodhpur

The 300 MW AC Solar Power Project is proposed at Badi Sird Village in Bap Tehsil of Jodhpur District in the state of Rajasthan. The project will be set up for supplying power to National Thermal Power Corporation (NTPC) Limited through Inter-State Transmission System (ISTS).

Project Location Connectivity Details:

- Bap is located around 25-30 km from Phalodi Tehsil of Jodhpur district
- Bap, Phalodi towns of Jodhpur district are nearby towns and are connected with national Highway (NH-15) and also with rail way connections.
- The total land availability is around 4686.33 Bighas/1549.42 Acres.
- The nearest sub-station for power evacuation is about 9 km from the Site.
- Bhadla-II PGCIL is the nearest grid substation from the site.
- The specification of Bhadla-II PGCIL substation is 765/400/220 kV.

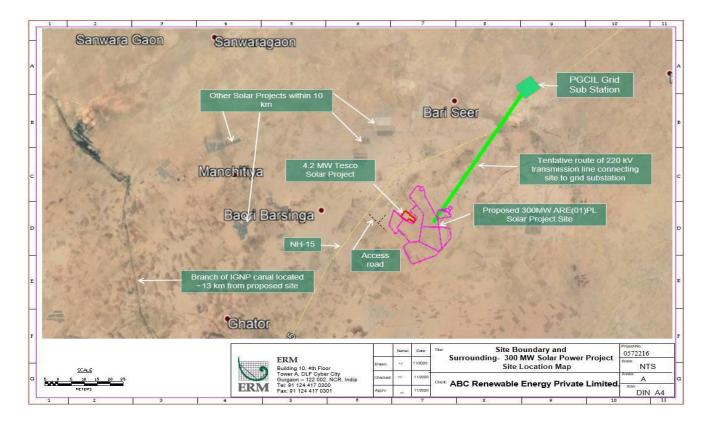
CHAPTER-4 LAND DETAILS

4.Land Details

Bap is a town in Jodhpur district in the Indian state of Rajasthan. Though it is geographically connected to Bikaner and Jaisalmer district of Rajasthan, it comes under Jodhpur district. It is located 150 km from Jodhpur which is a business capital and a globally recognized tourist place. The location of village-Bhadla falls in the Bap taluk of the district. Also, it is adjacent to Jodhpur-Bikaner National Highway (NH-15).

The project is located in an open area, with an elevation ranging between 195 m to 215 m above mean sea level slightly sloping from North (N) to South (S). The proposed site is irregular in shape with land parcel admeasuring 1549.42 acres. A 4.2 MW operational solar power plant developed by Tesco Energy Private Limited is located along the boundary of the proposed site towards north west direction. Furthermore, there are several other solar power projects located within 10 km of the proposed site. The proposed project area is not falling in GIB priority area.

The nearest village to the site is Baori Barsinga located approximately 500 m (aerial distance) from site towards west direction. Badi Sird village is located approximately 1.5 km (aerial distance) from site towards north direction. The approach road is well connected to National Highway (NH)-15.

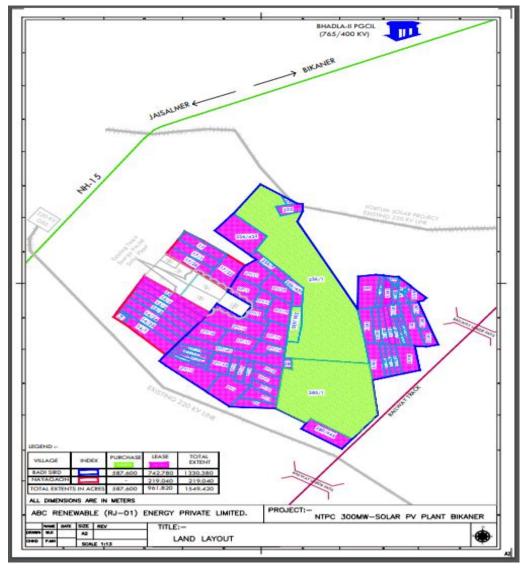


The indicative location of the project is as provided in below fig.

For the proposed solar plant, we have identified around 1549.42 Acres of Land, of which 961.82 acres will be taken on lease and 587.60 acres will be purchased for the Project from private landowners.

The total lease and purchase land for the solar plant is from two (2) villages of Bap Tehsil of Jodhpur District, Rajasthan:

- Badi Sird (1330.38 acres); and
- Naya Gaon (219.04 acres).



The indicative Plant Layout of the project is as provided in below fig.

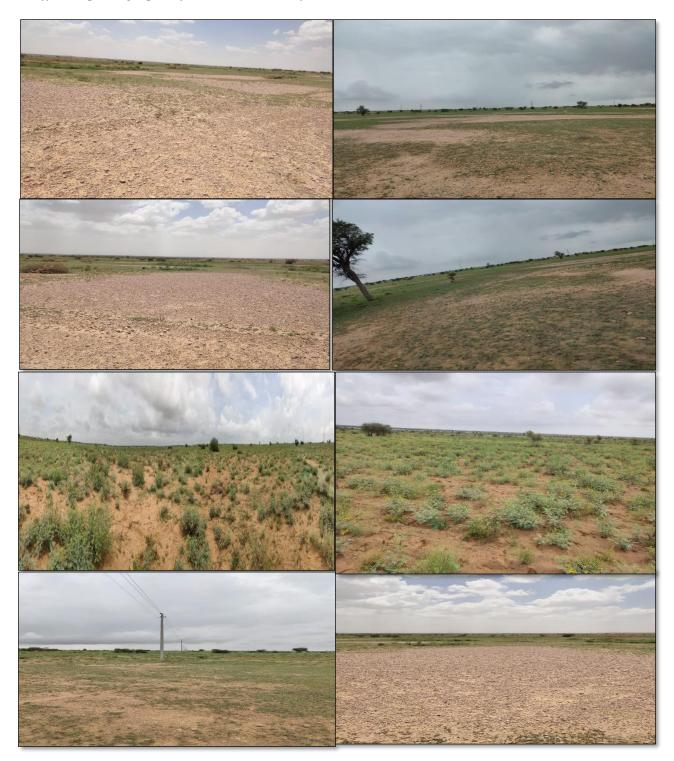
Fig: Plant Layout of Proposed 300 MW AC Solar Power Plant

The proposed 300 MW AC project land details are enlisted below:

S.No	Survey No	Khata No	Village Name	Total Extent (Acres)
1	236/1	1	Badi Sird	346.4000
2	236/430	380	Badi Sird	16.0000
3	285/1	1	Badi Sird	225.2000
	Sub Total	Badi Sird Purchase Exten	t	587.6000
4	235	403	Badi Sird	8.9200
5	236	298	Badi Sird	1.8600
6	236/3	313	Badi Sird	12.4000
7	236/431	269	Badi Sird	11.6000
8	236/432	12	Badi Sird	40.0000
9	277	212	Badi Sird	11.7200
10	277/1	368	Badi Sird	19.0000
11	277/2	174	Badi Sird	11.7800
12	277/3	429	Badi Sird	10.8000
13	277/4	359	Badi Sird	32.0000
14	277/6	134	Badi Sird	8.0000
15	277/7	121	Badi Sird	6.5600
16	277/9	167	Badi Sird	6.5600
17	277/10	434	Badi Sird	6.5600
18	277/11	408	Badi Sird	20.0000
19	277/12	521	Badi Sird	10.0400
20	277/13	133	Badi Sird	32.0000
21	277/14	4	Badi Sird	11.7600
22	277/15	281	Badi Sird	20.0000
23	277/16	137	Badi Sird	38.3000
24	277/17	354	Badi Sird	20.0000
25	277/18	355	Badi Sird	20.0000
26	277/19	5	Badi Sird	20.0000
27	277/20	431	Badi Sird	8.0000
28	277/21	432	Badi Sird	8.0000
29	277/22	432	Badi Sird	8.0000
30	277/23	97	Badi Sird	6.5800
31	277/24	134	Badi Sird	8.0000
32	277/25	378	Badi Sird	20.0000
33	277/435	83	Badi Sird	6.5600
34	277/436	165	Badi Sird	14.5600
35	277/441	80	Badi Sird	35.5600
36	280/445	227	Badi Sird	24.9200

	Fig: Details of Land Status							
		Total Extent		1,549.4200				
		al Naya Gaon Lease Exten		219.0400				
74	17/26	4	Naya Gaon	16.8000				
73	17/22	3	Naya Gaon	26.0000				
72	17/1	5	Naya Gaon	17.2600				
71	17	6	Naya Gaon	17.2600				
70	14/25	16	Naya Gaon	20.0000				
69	14/24	15	Naya Gaon	20.0000				
68	14/1	13	Naya Gaon	24.9200				
67	13/3	10	Naya Gaon	3.2000				
66	15/2	7	Naya Gaon	18.4000				
64 65	15/1 15/2	17 8	Naya Gaon Naya Gaon	18.4000 18.4000				
			Naya Gaon					
63	15	9	Nava Goon	18.4000				
~-		tal Badi Sird Lease Extent		742.7800				
62	290	516	Badi Sird	4.2200				
61	289/5	142	Badi Sird	8.0000				
60	289/4	426	Badi Sird	8.0000				
59	289/2	284	Badi Sird	4.8200				
57	289/1 289/2	209	Badi Sird Badi Sird	10.0000				
57		106	Badi Sird	3.1800				
56	289	516	Badi Sird	23.6000				
55	288	142	Badi Sird	0.4400				
54	287/11	162	Badi Sird	4.8200				
53	287/10	106	Badi Sird	1.6400				
52	287/9	533	Badi Sird	4.8200				
51	287/8	502	Badi Sird	14.3400				
50	287/0	191	Badi Sird	12.6600				
48	287/5 287/6	29 186	Badi Sird Badi Sird	12.6600 4.8200				
47 48	287/4	220	Badi Sird	5.3400				
46	287/3	427	Badi Sird	5.3400				
45	287/2	10	Badi Sird	5.3200				
44	287/1	768	Badi Sird	12.6800				
43	287	139	Badi Sird	16.0000				
42	286/5	139	Badi Sird	18.9400				
41	286/4	220	Badi Sird	6.3000				
40	286/3	188	Badi Sird	18.9400				
39	286/1 286/2	10	Badi Sird	6.3200				
38	206/1	427	Badi Sird	6.3000				

Fig: Details of Land Status



Different photographs of the land selected for Bhadla 300 MWAC Solar Plant:

CHAPTER-5 SOLAR RESOURCE ASSESSMENT

5.Solar Resource Assessment

Rajasthan is one of India's most solar-developed states, with its total photovoltaic capacity reaching 5137.91 MW by end of Dec 2020. Jodhpur district leads the state with installed capacity of over 1,500 MW, followed by Jaisalmer and Bikaner.

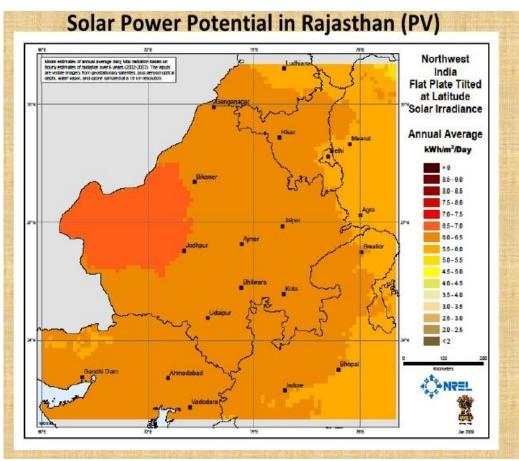


Fig: Annual Global Solar Radiation Map of India

Jodhpur

Jodhpur is the second-largest city in the Indian state of Rajasthan. It was formerly the seat of a princely state of Jodhpur State. Jodhpur was historically the capital of the Kingdom of Marwar, which is now part of Rajasthan. Jodhpur is a popular tourist destination, featuring many palaces, forts, and temples, set in the stark landscape of the Thar Desert. Jodhpur experiences a bright and sunny weather all through the year. For this, the city is also known as "Sun City". It is popularly known as the "Blue City" among people of Rajasthan and all over India. It serves as the administrative headquarters of the Jodhpur district and Jodhpur division. The climate of Jodhpur is hot and semiarid during its nearly year-long dry season, but contains a brief rainy season from late June to September. The average rainfall is around 362 mm. Temperatures are extreme from March to October, except when the monsoonal rain produces thick clouds to lower it slightly. In April, May, and June, high temperatures routinely exceed 40°C. During the monsoon season, average temperatures decrease slightly, but the city's generally low humidity rises, which adds to the perception of the heat.



Fig: Jodhpur Jodhpur District Map of Rajasthan

Solar Assessment

Energy Yield Analysis

The proposed technology will consist of an arrangement of several components, including solar panels to absorb and directly convert sunlight into electricity, a solar inverter to change the electric current from DC to AC, as well as mounting, cabling and other electrical accessories.

All components of the PV plant are in accordance with technical specifications given in relevant IEC standards.

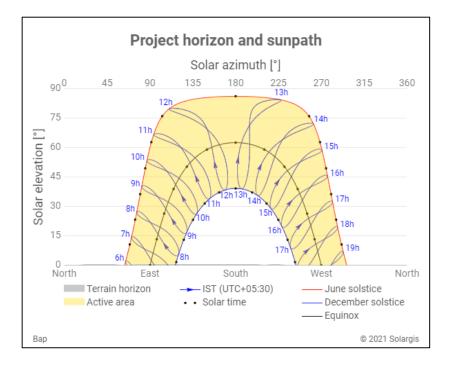
Brief about the Technology

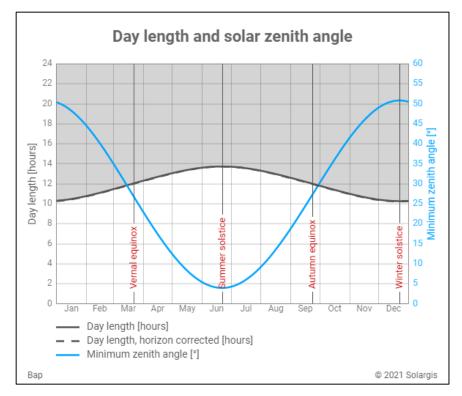
We had computed the preliminary annual energy yields for the 300 MW Solar PV Plant using two different overloading's with the basic designs and indicative layout. We are in the process of evaluating the latest technologies for better generation.

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	<mark>GlobInc</mark> kWh/m²	<mark>GlobEff</mark> kWh/m²	EArray MWh	E_Grid MWh	PR ratio
January	120.3	40.1	15.42	162.5	153.7	63054	60742	0.831
February	138.8	38.1	19.85	174.9	167.3	66933	62118	0.789
March	178.1	64.8	26.45	201.6	192.2	74937	72168	0.796
April	199.9	75.6	31.21	206.9	196.8	75018	72291	0.776
May	211.9	95.4	35.51	205.0	194.0	73482	68179	0.739
June	195.1	100.9	34.68	183.7	173.1	66221	63966	0.774
July	178.0	101.6	33.10	169.9	159.6	61670	59594	0.780
August	170.6	95.5	31.72	170.0	160.1	62155	60010	0.784
September	172.0	69.3	31.21	186.3	176.9	68049	65605	0.782
October	156.5	58.2	29.35	187.1	178.2	68900	66426	0.789
November	125.4	38.9	22.89	165.3	157.5	62556	58159	0.782
December	111.0	36.5	17.55	153.2	14 <mark>4</mark> .7	58886	56725	0.823
Year	1957.7	814.9	27.44	2166.4	2054.1	801859	765984	0.786

Solar Radiation of the proposed site:

Project horizon and sun path of proposed site:





Project Day Length and Zenith Angle of proposed site:

Estimated Annual Produced energy from Solar plant is 765984 MWh/Year and the CUF is 29.15%

The Proposed 300MW AC Project evaluated in PVSYST Software at two different overloading's i.e., 50% and 60% are and the reports are attached as Annexure-I.

CHAPTER-6 POWER EVACUATION

6.Power Evacuation

The power generated from the Proposed 300 MW AC Project will be evacuated as detailed under: -

Project Capacity	:	300 MW
Customer	:	NTPC
Type of Project	:	Solar
ISTS Transmission system	:	PGCIL
Proposed Connecting Sub-Station	:	Bhadla-II PGCIL (765/400/220 kV)

- Proposed to construct 33/220KV Pooling substations at suitable project location in the region of Bap, by laying 220KV SC line from proposed pooling substations to existing Bhadla II Substations at 220KV level. Further, the power can be evacuated to the Substation connecting 220KV SC line.
- The project got Stage I and Stage II connectivity approvals received from Power Grid Corporation of India Limited (PGCIL) on 10th February, 2020.
- The transmission agreement had executed with PGCIL on15th July 2020 by submitting Con.BG. PGCIL has allotted 220 kV bay at Bhadla-II PS for evacuating 300 MW Ac.

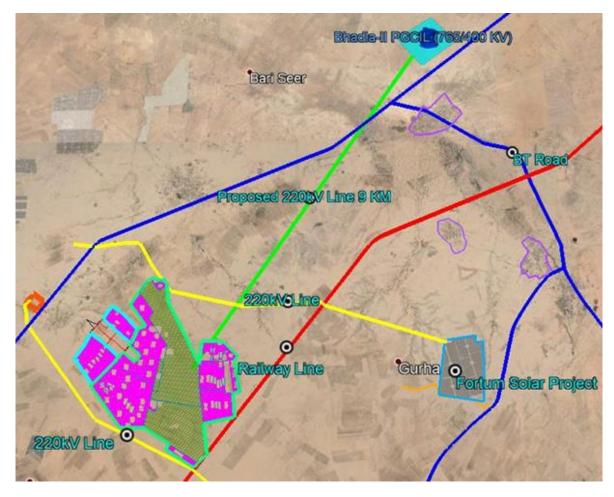


Fig: Power Evacuation Facility of Proposed Site

CHAPTER-7 PROJECT IMPLEMENTATION SCHEDULE

7. Project Implementation Schedule

The Project is Planned to be implemented at the earliest. The most essential aspect regarding the implementation of this Project will be commissioning of project within the stipulated timeline.

The Scheduled Commissioning Date (SCD) shall be the date as on 18 months from the effective date of PPA.

Accordingly, key timelines are furnished below;

RfS no	: "RE-CS-0000-BOO-5"
RfS issued date	: 10.08.2019
Last Date of bid submission	: 30.09.2019
Date of Reverse Auction	: 25.10.2019
Date of LOA	: 20.11.2019
Effective date of PPA	: 19.01.2020 for 100 MW and balance 200 MW yet to execute
	the PPA
Date of Financial Closure	: Within 12 Months from the Effective Date of PPA
SCD	: Date as on 18 months from the Effective date of PPA

Timelines of Financial Closure and SCD will be extended considering the blanket extension of 5 months granted by MNRE due to COVID-19. Further extension, if any, will be taken up as per the terms of PPA.

CHAPTER-8 ESTIMATIONS OF PROJECT COST

8.Estimation of Project Cost

Cost Estimates for Solar Plant are furnished as under:

The total estimated project cost is approximately Rs. 1200 cr.

PVSYST 7.0.10 Axis	s Energy Ventures Inc	dia Pvt. Ltd. (Ind	dia)	19/02/21	Page 1/	
Grid-Co	onnected System	n: Simulatio	n parameters			
Project : BAP Pr	oject					
Geographical Site	Вр		Country	India		
Situation	Latitude	27.40° N Longitude 72.37° E				
Time defined as	Legal Time	Time zone UT+5.5 Altitude 199 m				
Meteo data:	Albedo B p		8 (2001-2010), Sat=	100% - Svr	nthetic	
Simulation variant : 300 MW	•		(,,			
	Simulation date	19/02/21 17h34	4			
Simulation parameters	System type	Unlimited she	ds			
Collector Plane Orientation	Tilt	22°	Azimuth	n O°		
Sheds configuration	Nb. of sheds	10	Unlimited sheds			
	Sheds spacing		Collector width			
Inactive band	Тор	0.02 m	Bottom	n 0.02 m		
Shading limit angle	Limit profile angle	31.2° Grou	nd Cov. Ratio (GCR) 64.4%		
Models used	Transposition	Perez	Diffuse Circumsola		Meteonorm e	
Horizon	Free Horizon					
Near Shadings Mut	tual shadings of sheds					
User's needs :	Unlimited load (grid)					
PV Array Characteristics	Cimena Madal		40.00			
PV module Original PVsyst database	Si-mono Model Manufacturer	LR5-72 HPH 5	40 IVI			
Number of PV modules	In series	27 modules	In paralle	l 30864 s	strings	
Total number of PV modules	nb. modules	833328	Unit Nom. Powe	r 540 Wp	-	
Array global power			A			
	Nominal (STC)	-	At operating cond			
Array operating characteristics (50°C) U mpp	1008 V	l mpp	408105	A	
Array operating characteristics (50°C Total area		-		408105	A	
Total area) U mpp Module area Model	1008 V 2130026 m ² SG3125HV-32	l mpp	408105	A	
Total area Inverter Custom parameters definition) U mpp Module area Model Manufacturer	1008 V 2130026 m ² SG3125HV-32 Sungrow	I mpp Cell area	9 408105 9 193198 9	A 8 m²	
Total area) U mpp Module area Model	1008 V 2130026 m ² SG3125HV-32	l mpp	9 408105 9 193198 9	A 8 m²	
Total area Inverter Custom parameters definition) U mpp Module area Model Manufacturer Unit Nom. Power Max. power (=>30°C) Total power	1008 V 2130026 m ² SG3125HV-32 Sungrow 3125 kWac 3781 kWac 300000 kWac	I mpp Cell area	 408105 193198 960-130 	A 8 m²	
Total area Inverter Custom parameters definition Characteristics Inverter pack	e) U mpp Module area Model Manufacturer Unit Nom. Power Max. power (=>30°C) Total power Nb. of inverters	1008 V 2130026 m ² SG3125HV-32 Sungrow 3125 kWac 3781 kWac 300000 kWac 96 units	I mpp Cell area Oper. Voltage Pnom ratio	 408105 193198 960-130 1.50 	8 m²	
Total area Inverter Custom parameters definition Characteristics) U mpp Module area Model Manufacturer Unit Nom. Power Max. power (=>30°C) Total power	1008 V 2130026 m ² SG3125HV-32 Sungrow 3125 kWac 3781 kWac 300000 kWac	I mpp Cell area Oper. Voltage	 408105 193198 960-130 1.50 	A 8 m²	
Total area Inverter Custom parameters definition Characteristics Inverter pack Total	e) U mpp Module area Model Manufacturer Unit Nom. Power Max. power (=>30°C) Total power Nb. of inverters	1008 V 2130026 m ² SG3125HV-32 Sungrow 3125 kWac 3781 kWac 300000 kWac 96 units	I mpp Cell area Oper. Voltage Pnom ratio	 408105 193198 960-130 1.50 	A 8 m²	
Total area Inverter Custom parameters definition Characteristics Inverter pack Total PV Array loss factors	e) U mpp Module area Model Manufacturer Unit Nom. Power Max. power (=>30°C) Total power Nb. of inverters	1008 V 2130026 m ² SG3125HV-32 Sungrow 3125 kWac 3781 kWac 300000 kWac 96 units	I mpp Cell area Oper. Voltage Pnom ratio	 408105 193198 960-130 1.50 1.50 	A 8 m²	
Total area Inverter Custom parameters definition Characteristics Inverter pack Total	e) U mpp Module area Model Manufacturer Unit Nom. Power Max. power (=>30°C) Total power Nb. of inverters	1008 V 2130026 m ² SG3125HV-32 Sungrow 3125 kWac 3781 kWac 300000 kWac 96 units	I mpp Cell area Oper. Voltage Pnom ratio	 408105 193198 960-130 1.50 1.50 2.0 % 	A 8 m²	
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Total area Inverter Custom parameters definition Characteristics Inverter pack Total PV Array loss factors Array Soiling Losses Thermal Loss factor Wiring Ohmic Loss Serie Diode Loss LID - Light Induced Degradation	b) U mpp Module area Model Manufacturer Unit Nom. Power Max. power (=>30°C) Total power Nb. of inverters Total power Uc (const) Global array res.	1008 V 2130026 m² SG3125HV-32 Sungrow 3125 kWac 3781 kWac 300000 kWac 96 units 300000 kWac 29.0 W/m ² K 0.041 m	I mpp Cell area Oper. Voltage Pnom ratio Pnom ratio Loss Fractior Uv (wind Loss Fractior Loss Fractior Loss Fractior	 408105 193198 960-130 1.50 1.50 1.50 0.0 W/n 1.5 % a 0.1 % a 0.1 % a 0.0 % 0.0 % 2.0 % a 	A 8 m ²)0 V n ² K / m/s t STC t STC	

Grid-Connected System: Simulation parameters

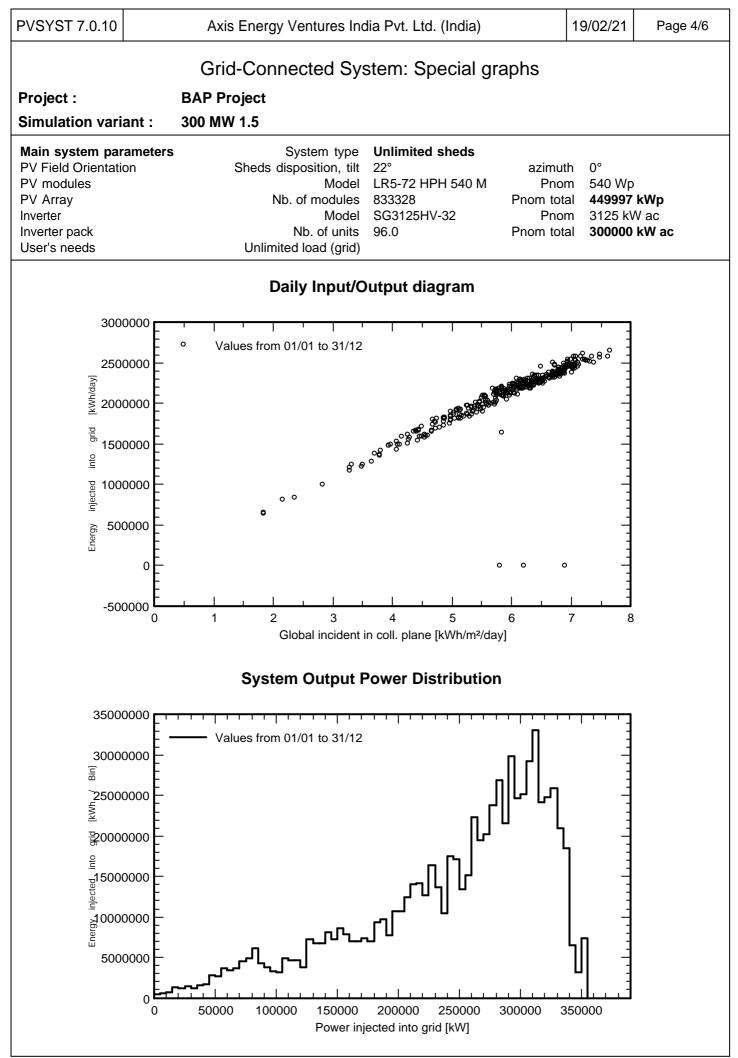
Incidence effect (IAM): User defined profile

		,	•						
	0°	25°	45°	60°	65°	70°	75°	80°	90°
	1.000	1.000	0.995	0.962	0.936	0.903	0.851	0.754	0.000
System loss factors AC wire loss inverter to transfo				Inverter volt 3 x 100000	J	Vac tri m	Loss Fr	action 2	2.2 % at STC
MV tran	sfo			Grid Vol	tage 20 k	:V			
One MV Operatin	′ transfo ng losses at	STC	Iron loss (24 Coppe	l/24 Conne» r (resistive)	,).1 % at STC I.0 % at STC
Unavaila	ability of the	system	3.	7 days, 3 pe	eriods		Time f	raction	1.0 %

VSYST 7.0.10	Ax	kis Energy	Ventures Ir	ndia Pvt.	Ltd. (India))	19/02/21	Page 3/
	(Grid-Cor	nnected S	System	n: Main r	esults		
oject :	BAP I	Project						
mulation variant	: 300 M	W 1.5						
lain system parame V Field Orientation V modules V Array verter verter pack ser's needs	eters	Sheds d Ni	System type isposition, til Mode b. of modules Mode Nb. of units ed load (grid	t 22° I LR5-72 s 833328 I SG312 s 96.0	i ted sheds 2 HPH 540 3 25HV-32	azimu M Pno Pnom tot Pno Pnom tot	m 540 Wp al 449997 m 3125 k\	″ kWp № ac
ain simulation res	ults	- Oriminit)				
ystem Production			uced Energy nce Ratio PF			r Specific pro	d. 1702 k	Wh/kWp/yea
ormalized productions (pe	er installed kWp)	: Nominal po	wer 449997 kWp			Performance F	latio PR	
Ls: System L Ls: System L V/ Proved 1 Particular 1 Jan Feb Mar Ap	ni e r (inverter out		Oct Nov Dec	0.6 0.7 20 0.6 20 0.6 0.2 0.3 0.2 0.1 0.1		ı I I I I	Jul Aug Sep	L L L L
			300 Balances ar	MW 1.5 nd main re	esults			
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	_	_Grid	PR
January February March	kWh/m ² 120.3 138.8 178.1	kWh/m ² 40.1 38.1 64.8	°C 15.42 19.85 26.45	kWh/m ² 162.5 174.9 201.6	kWh/m ² 153.7 167.3 192.2	66933	60742 (62118 (ratio).831).789).796
April May June July	199.9 211.9 195.1 178.0	75.6 95.4 100.9 101.6	31.21 35.51 34.68 33.10	206.9 205.0 183.7 169.9	196.8 194.0 173.1 159.6	75018 73482 66221	72291 (68179 (63966 ().776).739).774).780
August September October November December	170.6 172.0 156.5 125.4 111.0	95.5 69.3 58.2 38.9 36.5	31.72 31.21 29.35 22.89 17.55	170.0 186.3 187.1 165.3 153.2	160.1 176.9 178.2 157.5 144.7	62155 68049 68900 62556	60010 0 65605 0 66426 0 58159 0).784).782).789).782).782).823
Year	1957.7	814.9	27.44	2166.4	2054.1	801859 7	65984 0).786
Legends: Globł DiffH T_An	or Horizo	horizontal irra intal diffuse ir			GlobEff EArray E_Grid	Effective Global, Effective energy Energy injected i	at the output	•

GlobInc Global incident in coll. plane PR

Performance Ratio



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PVSYST 7.0.10	Axis E	nergy Ventures Inc	lia Pvt. Ltd. (India)		19/02/21	Page 5/6
	Grid-	Connected Sy	stem: Loss diag	Iram		
Project :	BAP Proj	ect				
Simulation vai	riant : 300 MW 1	.5				
Main system pa PV Field Orienta PV modules PV Array Inverter Inverter pack User's needs	tion SI	System type neds disposition, tilt Model Nb. of modules Model Nb. of units Unlimited load (grid)	Unlimited sheds 22° LR5-72 HPH 540 M 833328 SG3125HV-32 96.0	azimuth Pnom Pnom total Pnom Pnom total	540 Wp 449997 3125 kV	V ac
		Loss diagram ov	ver the whole year			
	1958 kWh/m ²	+10.7%	Global horizontal ir Global incident in c			
) -1.82%) -1.45%) -2.00%	Near Shadings: irradia IAM factor on global Soiling loss factor	ance loss		
	2054 kWh/m ² * 2130026 m ²		Effective irradiation	on collectors		
	efficiency at STC = 21.1	7%	PV conversion			
	926250 MWh	-0.27% -8.31%	Array nominal energy PV loss due to irradian PV loss due to temper	nce level	c.)	
		, 7-2.00%)-2.10% -1.15%	LID - Light induced de Mismatch loss, modul Ohmic wiring loss	-		
	803247 MWh	→-1.30% →-0.09% →0.00% →0.00% →-0.01% →-0.09%	Array virtual energy Inverter Loss during of Inverter Loss over nor Inverter Loss due to n Inverter Loss over nor Inverter Loss due to p Inverter Loss due to v	peration (efficie minal inv. power nax. input currer minal inv. voltage power threshold	nt Ə	
	791272 MWh	7-0.01%	Night consumption Available Energy at			
		9-1.23% 9-1.06% 90.00% 9-0.94%	AC ohmic loss Medium voltage transf MV line ohmic loss System unavailability	fo loss		
	765984 MWh		Energy injected into	o grid		

PVSYST 7.0.10		19/02/21	Page 6/6		
	Grid-Connected System	m: P50 - P90 ev	aluation		
Project :	BAP Project				
Simulation variant :	300 MW 1.5				
Main system parameters PV Field Orientation PV modules PV Array Inverter Inverter pack User's needs	s System type Sheds disposition, tilt Model Nb. of modules Model Nb. of units Unlimited load (grid)	LR5-72 HPH 540 M 833328	azimut Pnoi Pnom tota Pnoi Pnom tota	m 540 Wp al 449997 m 3125 kV	kWp V ac
	ction probability forecast			-1	
	n of the system production forecast or the simulation, and depends on t	•	ainly depen	dent	
Meteo data source	א מים שווועומוטרו, מוע עבףבוועט טוו	Meteonorm 7.3 (2001)	-2010) Sat	-100%	
Meteo data Meteo data Specified Deviation Year-to-year variability	Kind Climate change Variance	TMY, multi-year 0.0 %	-2010), Sat	-100%	
Specified Deviation		1.0 % 0.5 % 1.0 % 1.5 %	uncertaintie uadratic sun		
	Probability	distribution			
Viliceord	0.50 0.45 0.40 0.35 0.30 0.25 0.20 0.15 0.10 0.05 0.00 680000000 720000000 740000000	50 = 765984365 kWh E_Grid simul = 7659 P75 = 749052993 kWh 733780358 kWh		11111111111111111111111111111111111111	

PVSYST 7.0.10 Ax	is Energy Ventures Inc	lia Pvt. Ltd. (Ind	dia)	19/02/21	Page 1/
Grid-C	onnected System	n: Simulatio	n parameters		
Project : BAP P	Project				
Geographical Site	Вр		Country	India	
Situation Time defined as	Latitude Legal Time Albedo		Longitude -5.5 Altitude		Ξ
Meteo data:	Вр	Meteonorm 7.3	(2001-2010), Sat=1	100% - Syr	nthetic
Simulation variant : 300 M	W 1.6				
	Simulation date	19/02/21 17h45	5		
Simulation parameters	System type	Unlimited she	ds		
Collector Plane Orientation	Tilt	22°	Azimuth	0°	
Sheds configuration Inactive band Shading limit angle	Nb. of sheds Sheds spacing Top Limit profile angle	0.02 m	Unlimited sheds Collector width Bottom nd Cov. Ratio (GCR)	4.25 m 0.02 m	
Models used	Transposition	Perez	Diffuse Circumsolar		Meteonorm e
Horizon	Free Horizon				
Near Shadings M	utual shadings of sheds				
User's needs :	Unlimited load (grid)				
PV Array Characteristics PV module Original PVsyst database Number of PV modules Total number of PV modules Array global power Array operating characteristics (50° Total area Inverter Custom parameters definition Characteristics	Manufacturer In series nb. modules Nominal (STC)	27 modules 888894 480003 kWp 1008 V 2272056 m ² SG3125HV-32 Sungrow	In paralle Unit Nom. Power At operating cond. I mpp Cell area	540 Wp 438749 435317 206081	kWp (50°C) A 2 m²
Characteristics	Unit Nom. Power Max. power (=>30°C) Total power	3125 kWac 3781 kWac 300000 kWac	Oper. Voltage Pnom ratio		00 V
	Nb. of inverters	96 units			
Total	Total power	300000 kWac	Pnom ratio	1.60	
PV Array loss factors Array Soiling Losses Thermal Loss factor Wiring Ohmic Loss Serie Diode Loss LID - Light Induced Degradation Module Quality Loss Module mismatch losses Strings Mismatch loss	Uc (const) Global array res. Voltage drop	29.0 W/m²K 0.038 m 0.7 V	Loss Fraction Uv (wind) Loss Fraction Loss Fraction Loss Fraction Loss Fraction Loss Fraction Loss Fraction	0.0 W/r 1.5 % a 0.1 % a 2.0 % 0.0 % 2.0 % a	t STC

Grid-Connected System: Simulation parameters

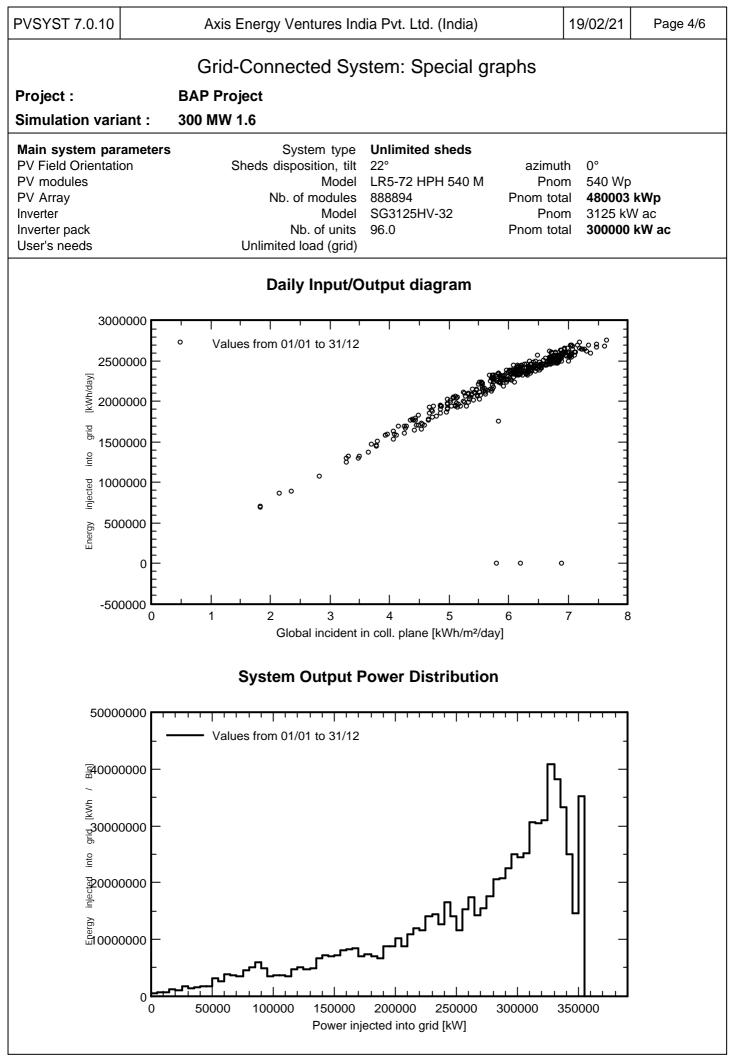
Incidence effect (IAM): User defined profile

	0°	25°	45°	60°	65°	70°	75°	80°	90°
	1.000	1.000	0.995	0.962	0.936	0.903	0.851	0.754	0.000
•	loss factors loss inverte			age 660 mm² 115	Loss Fraction 2.4 % at STO				
MV tran	sfo			Grid Vol	tage 20 k	V			
One MV transfo Operating losses at STC		Iron loss (24/24 Connexion) 473.69 kW Copper (resistive) loss 3 x 0.01 m				Loss Fi Loss Fi		0.1 % at STC 1.0 % at STC	
Unavaila	ability of the	system	3.	7 days, 3 pe	eriods		Time f	raction	1.0 %

/SYST 7.0.10	A	kis Energy	Ventures Ir	ndia Pvt.	Ltd. (India)		19/02/2	21 Page 3/
	(Grid-Cor	nnected \$	System	n: Main re	esults		
oject :		Project						
- mulation variant		W 1.6						
ain system parame	eters		System type	Unlimi	ted sheds			
/ Field Orientation		Sheds d	isposition, til			azim	nuth 0°	
/ modules			Mode	l LR5-72	2 HPH 540 N	1 Pr	nom 540	Wp
/ Array		N	b. of modules			Pnom t		003 kWp
/erter			Mode		5HV-32			5 kW ac
verter pack			Nb. of units			Pnom t	otal 300	000 kW ac
ser's needs		Unlimit	ed load (grid)				
ain simulation resu stem Production	ults		uced Energy nce Ratio PF		9 MWh/year %	Specific p	rod. 1692	2 kWh/kWp/yea
ormalized productions (per	r installed kWp)	: Nominal po	wer 480003 kWp			Performance	Ratio PR	
8	<u> </u>			1.0		mance Ratio (Yf / Yr)	· 0.781	
Kingung 2 1 Jan Feb Mar Apr	- H - H May Jun Ju	Aug Sep	Oct Nov Dec	90 0.6 90 0.5 90 0.4 0.3 0.2 0.1 0.1		1 1 1 Apr May Ju	n Jul Aug	L L L Sep Oct Nov De
				MW 1.6				
			Balances ar	na main re	esults			
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	MWh	MWh	ratio
January	120.3	40.1	15.42	162.5	153.7	67134	64609	0.828
February	138.8	38.1	19.85	174.9	167.3	70902	65731	0.783
March	178.1	64.8	26.45	201.6	192.2	79304	76304	0.789
April	199.9	75.6	31.21	206.9	196.8	78945	76019	0.765
May	211.9	95.4	35.51	205.0	194.0	77952	72270	0.735
June	195.1	100.9	34.68	183.7	173.1	70453	67993	0.771
July	178.0	101.6	33.10	169.9	159.6	65668	63403	0.778
August	170.6	95.5	31.72	170.0	160.1	66109	63773	0.782
Contor-l		69.3	31.21	186.3 187.1	176.9 178.2	71855	69219 70254	0.774 0.783
September	172.0	FOO			1 1/8.2	73043	70356	11783 1
October	156.5	58.2	29.35			66440		
October November	156.5 125.4	38.9	22.89	165.3	157.5	66668 62746	61916	0.780
October November December	156.5 125.4 111.0	38.9 36.5	22.89 17.55	165.3 153.2	157.5 144.7	62746	61916 60384	0.780 0.821
October November	156.5 125.4	38.9	22.89	165.3	157.5		61916	0.780

egends: GlobHor DiffHor T_Amb GlobInc

Horizontal diffuse irradiation T amb. Global incident in coll. plane GlobEff EArray E_Grid PR Effective Global, corr. for IAM and shadings Effective energy at the output of the array Energy injected into grid Performance Ratio



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PVSYST 7.0.1	0 Axis E	nergy Ventures Inc	lia Pvt. Ltd. (India)	1	9/02/21	Page 5/6
	Grid	Connected Sy	stem: Loss diag	Iram		
Project :	BAP Proj	ect				
Simulation va	ariant : 300 MW 1	.6				
Main system p PV Field Orient PV modules PV Array Inverter Inverter pack User's needs	ation S	System type neds disposition, tilt Model Nb. of modules Model Nb. of units Unlimited load (grid)	Unlimited sheds 22° LR5-72 HPH 540 M 888894 SG3125HV-32 96.0	azimuth Pnom Pnom total Pnom Pnom total	540 Wp 480003 3125 kV	Vac
		Loss diagram ov	ver the whole year			
	1958 kWh/m²	+10.7%	Global horizontal ir Global incident in c			
		7-1.82%)>-1.45%)>-2.00%	Near Shadings: irradia IAM factor on global Soiling loss factor			
	2054 kWh/m² * 2272056 m		Effective irradiation	on collectors		
	efficiency at STC = 21.1 988012 MWh	-0.27% -8.31%	PV conversion Array nominal energy PV loss due to irradian PV loss due to temper	nce level	c.)	
	050007 MM/k	9 -2.00% 9 -2.10% 9 -1.15%	LID - Light induced de Mismatch loss, modul Ohmic wiring loss	es and strings		
	856807 MWh	7-1.31% 7-0.64% 70.00% 70.00% 7-0.01% 7-0.07% 7-0.01%	Array virtual energy Inverter Loss during of Inverter Loss over nor Inverter Loss due to nor Inverter Loss due to p Inverter Loss due to v Night consumption	peration (efficien minal inv. power nax. input currer minal inv. voltage power threshold roltage threshold	nt e	
	839378 MWh	∀-1.30% ∀-1.06% ∀0.00% ∀-0.94%	Available Energy at AC ohmic loss Medium voltage transi MV line ohmic loss System unavailability		ut	
	811979 MWh	, 0.0 - 70	Energy injected into	o arid		

PVSYST 7.0.10	Axis Energy Ventures Inc	dia Pvt. Ltd. (India)		19/02/21	Page 6/6
	Grid-Connected Syster	m: P50 - P90 eva	aluation		
Project :	BAP Project				
Simulation variant :	300 MW 1.6				
Main system parameters PV Field Orientation PV modules PV Array Inverter Inverter pack User's needs	System type Sheds disposition, tilt Model Nb. of modules Model Nb. of units Unlimited load (grid)	22° LR5-72 HPH 540 M 888894	azimutl Pnom Pnom tota Pnom Pnom tota	n 540 Wp al 480003 n 3125 kV	kWp N ac
	tion probability forecast of the system production forecast the simulation, and depends on t	•	ainly depend	dent	
Meteo data source Meteo data Specified Deviation Year-to-year variability	Kind Climate change Variance		·2010), Sat=	100%	
Specified Deviation P Soi	variance is also depending on so V module modelling/parameters Inverter efficiency uncertainty ling and mismatch uncertainties Degradation uncertainty	1.0 % 0.5 % 1.0 % 1.5 %			
Global variability (meteo +	system) Variance	3.3 % (qu	adratic sum	1)	
Annual production probabil	ity Variability P50 P90	26622 MWh 811979 MWh 777841 MWh			
	Probability	distribution			
Probability	0.40 0.35 0.30 0.25 0.20 0.15 0.10 0.05	= 811978547 kWh E_Grid simul = 811978 P75 = 7940300 6 kWh	547 kWh		
	0.00 72000000074000000076000000780000000000 E_Grid sy	000008200000084000000860000 stem production kWh For ABC S(A) PRIVAT	E LIMITED Y PUROHIT d Signatory