Version 7.3.4

PVsyst - Simulation report

Grid-Connected System

Project: CLP 375MW RAJASTHAN

Variant: Inverter 1

Unlimited sheds

System power: 294 kWp

Bhuraj - India

Author

GENSOL ENGINEERING LIMITED (India)

PVsyst V7.3.4
VEL, Simulation date:
01/11/23 20:43
with v7.3.4

GENSOL ENGINEERING LIMITED (India)

Project summary

Geographical Site
Bhuraj
India

Situation

Latitude	27.43 °N
Longitude	72.05 °E
Altitude	202 m
Time zone	UTC+5.5

Project settings

Albedo	0.20

Meteo data
Bhuraj
SolarGIs Monthly - Synthetic

System summary

Grid-Connected System
Simulation for year no 1

Unlimited sheds

PV Field Orientation

Sheds	
Tilt	18 °
Azimuth	0 °

Near Shadings
Mutual shadings of sheds
Electrical effect

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	540 units
Pnom total	294 kWp

Inverters

Nb. of units	1 unit
Pnom total	200 kWac
Grid power limit	200 kWac
Grid lim. Pnom ratio	1.472

Results summary

Produced Energy	522.75 MWh/year	Specific production	1776 kWh/kWp/year	Perf. Ratio PR	80.57 %

Table of contents

PVsyst V7.3.4
VEL, Simulation date:
01/11/23 20:43
with v7.3.4

GENSOL ENGINEERING LIMITED (India)

General parameters

Grid-Connected System

Unlimited sheds

PV Field Orientation

Orientation	
Sheds	
Tilt	18 °
Azimuth	0 °

Sheds configuration	
Nb. of sheds	999 units
Unlimited sheds	
Sizes	
Sheds spacing	7.50 m
Collector width	3.94 m
Ground Cov. Ratio (GCR)	52.5 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m
Shading limit angle	
Limit profile angle	18.1 °
Shadings electrical effect	
Cell size	15.6 cm
Strings in width	2 units

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
Mutual shadings of sheds
Electrical effect

User's needs
Unlimited load (grid)

Grid power limitation

Active power	200 kWac
Pnom ratio	1.472

PV Array Characteristics

PV module

Manufacturer	Trina Solar
Model	TSM-545DE19
(Custom parameters definition)	
Unit Nom. Power	545 Wp
Number of PV modules	540 units
Nominal (STC)	294 kWp
Modules	15 Strings x 36 In series
At operating cond. (50°C)	
Pmpp	270 kWp
U mpp	1019 V
I mpp	265 A

Inverter

Manufacturer	Sungrow
Model	SG250HX-IN
(Custom parameters definition)	
Unit Nom. Power	200 kWac
Number of inverters	1 unit
Total power	200 kWac
Operating voltage	600-1500 V
Max. power (=>30°C)	250 kWac
Pnom ratio (DC:AC)	1.47
Power sharing within this inverter	

Total PV power

Nominal (STC)	294 kWp
Total	540 modules
Module area	1411 m²
Cell area	1310 m²

Total inverter power

Total power	200 kWac
Max. power	250 kWac
Number of inverters	1 unit
Pnom ratio	1.47

Array losses

Array Soiling Losses

Loss Fraction	0.5 %

Thermal Loss factor

Module temperature according to irradiance	
Uc (const)	29.0 W/m²K
Uv (wind)	0.0 W/m²K/m/s

DC wiring losses

Global array res.	21 mΩ
Loss Fraction	0.5 % at STC

LID - Light Induced Degradation

Loss Fraction	1.5 %

Module Quality Loss

Loss Fraction	-0.6 %

Module mismatch losses

Loss Fraction	0.5 % at MPP

PVsyst V7.3.4
VEL, Simulation date:
01/11/23 20:43
with v7.3.4

GENSOL ENGINEERING LIMITED (India)

Array losses

Module average degradation

Year no	1
Loss factor	1 %/year

Mismatch due to degradation

Imp RMS dispersion	0.4 %/year
Vmp RMS dispersion	0.4 %/year

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.999	0.996	0.978	0.944	0.856	0.622	0.000

System losses

Unavailability of the system

Time fraction	0.7 %
	2.5 days,
	3 periods

Auxiliaries loss

Proportionnal to Power	2.0 W/kW
0.0 kW from Power thresh.	

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage	800 Vac tri
Loss Fraction	1.50 % at STC

Inverter: SG250HX-IN

Wire section (1 Inv.)	Copper 1 x 3 x 2500 mm²
Wires length	4405 m

MV line up to Injection

MV Voltage	33 kV
Wires	Copper 3 x 500 mm²
Length	499590 m
Loss Fraction	0.50 % at STC

AC losses in transformers

MV transfo

Medium voltage	33 kV

Transformer parameters

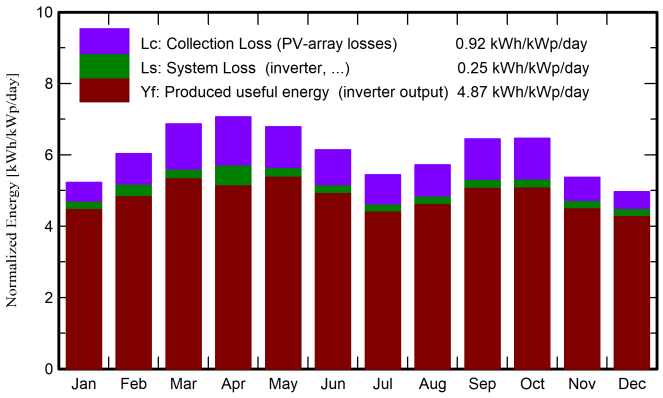
Nominal power at STC	290 kVA
Iron Loss (24/24 Connexion)	0.58 kVA
Iron loss fraction	0.20 % at STC
Copper loss	3.48 kVA
Copper loss fraction	1.20 % at STC
Coils equivalent resistance	3 x 26.50 mΩ

Main results

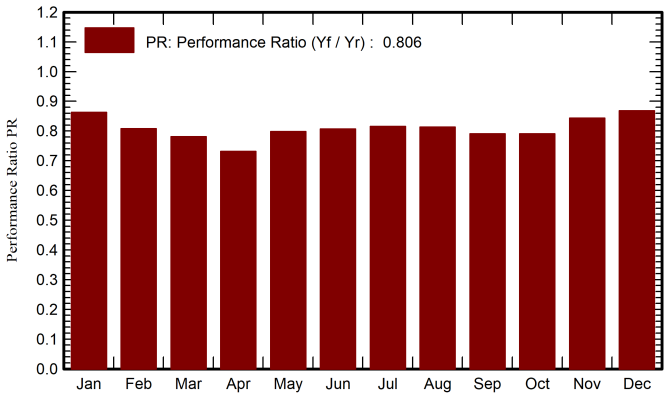
System Production

Produced Energy	522.75 MWh/year	Specific production	1776 kWh/kWp/year
		Perf. Ratio PR	80.57 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR ratio
January	126.3	47.7	13.70	162.0	159.1	42.98	41.15	0.863
February	140.0	49.0	17.30	168.8	166.1	42.78	40.12	0.807
March	190.8	68.5	23.60	212.8	209.2	51.15	48.95	0.781
April	204.7	85.8	29.40	212.0	207.9	50.57	45.63	0.731
May	214.1	107.3	34.20	210.3	205.7	51.58	49.39	0.798
June	191.7	104.1	35.90	184.1	179.8	45.66	43.73	0.807
July	173.9	103.5	34.60	168.6	164.3	42.24	40.45	0.816
August	176.1	92.4	33.40	177.4	173.3	44.36	42.46	0.814
September	179.6	72.9	32.10	193.4	189.8	47.01	44.99	0.790
October	171.0	58.9	27.20	200.3	196.9	48.70	46.60	0.790
November	129.2	51.6	20.30	161.0	158.3	41.79	39.95	0.843
December	118.2	44.9	15.08	153.9	151.3	41.12	39.33	0.868
Year	2015.6	886.6	26.44	2204.6	2161.7	549.94	522.75	0.806

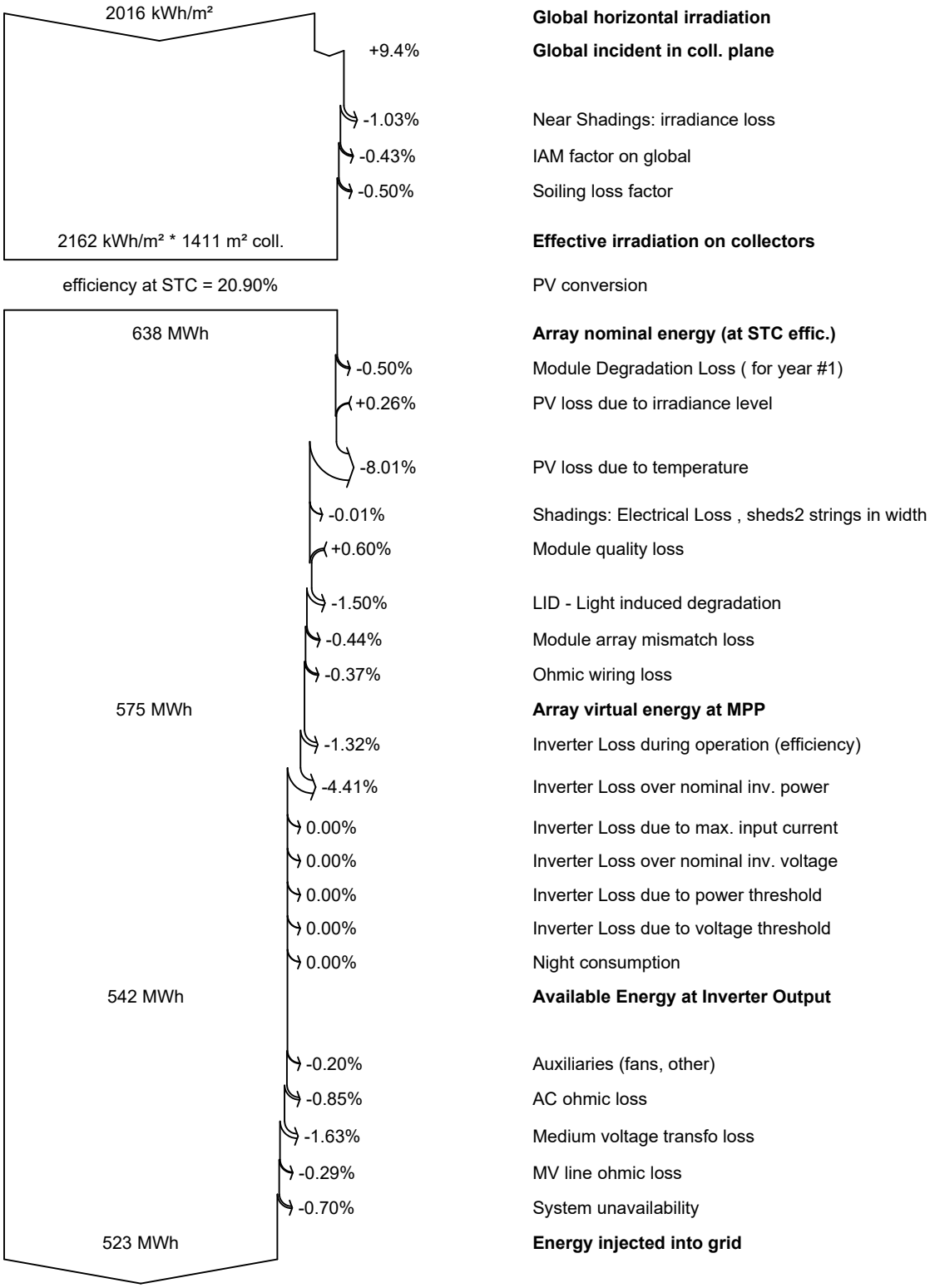
Legends

GlobHor	Global horizontal irradiation
DiffHor	Horizontal diffuse irradiation
T_Amb	Ambient Temperature
GlobInc	Global incident in coll. plane
GlobEff	Effective Global, corr. for IAM and shadings
EArray	Effective energy at the output of the array
E_Grid	Energy injected into grid
PR	Performance Ratio

PVsyst V7.3.4
VEL, Simulation date:
01/11/23 20:43
with v7.3.4

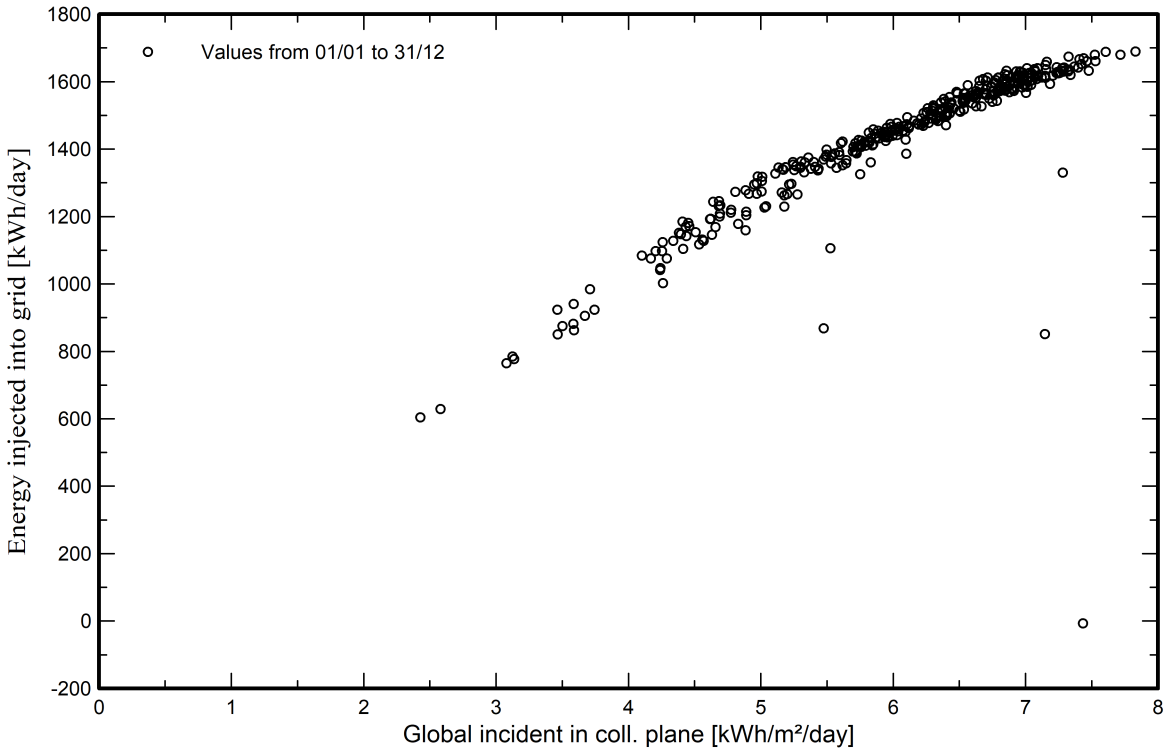
GENSOL ENGINEERING LIMITED (India)

Loss diagram

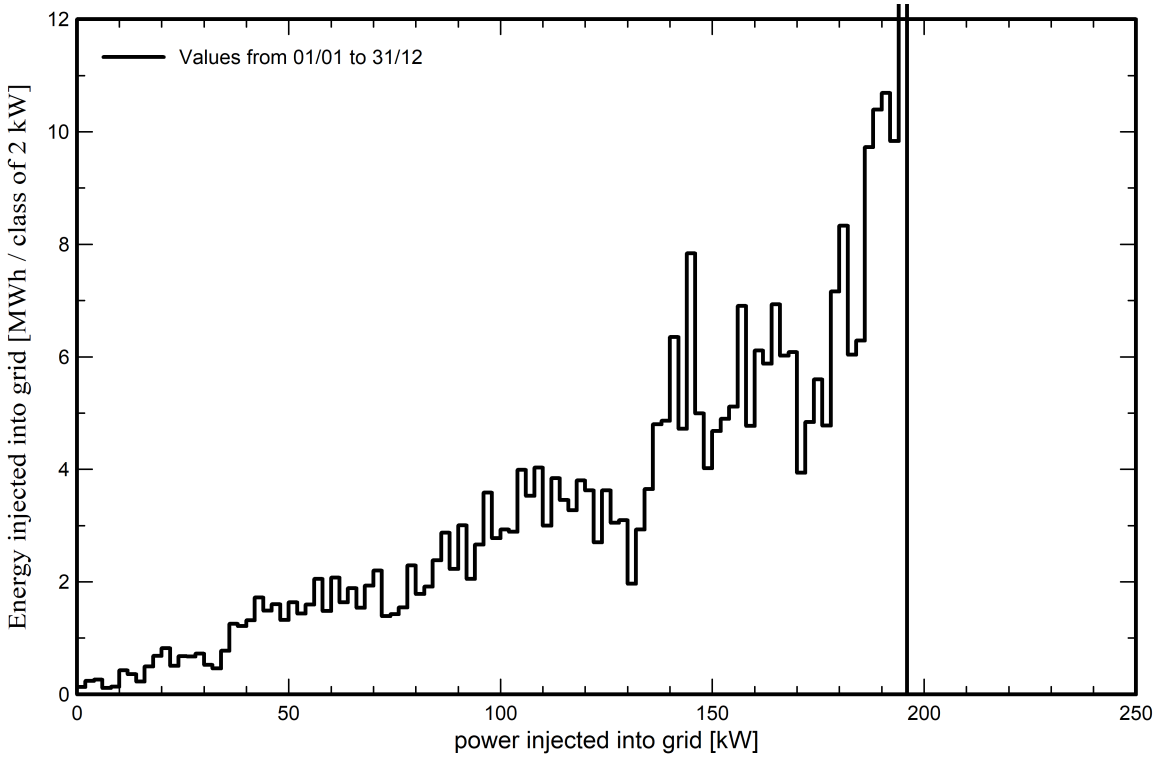


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



P50 - P90 evaluation

Meteo data

Source	SolarGIs Monthly
Kind	Monthly averages
Synthetic - Multi-year average	
Year-to-year variability(Variance)	5.4 %

Specified Deviation

Climate change	0.0 %

Global variability (meteo + system)

Variability (Quadratic sum)	5.7 %

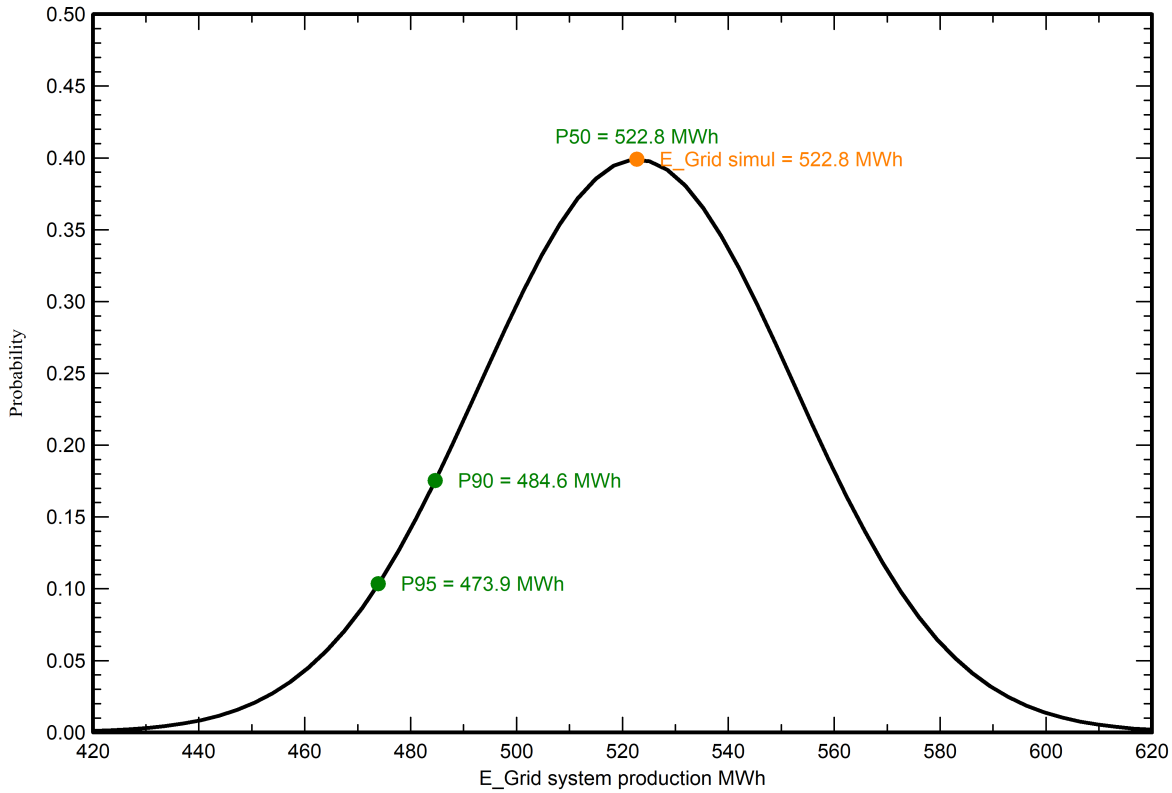
Simulation and parameters uncertainties

PV module modelling/parameters	1.0 %
Inverter efficiency uncertainty	0.5 %
Soiling and mismatch uncertainties	1.0 %
Degradation uncertainty	1.0 %

Annual production probability

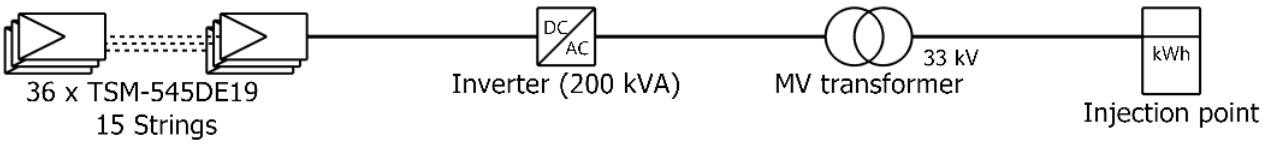
Variability	29.7 MWh
P50	522.8 MWh
P90	484.6 MWh
P95	473.9 MWh

Probability distribution



Single-line diagram

PVsyst V7.3.4
VEL, Simulation date:
01/11/23 20:43
with v7.3.4



PV module	TSM-545DE19
Inverter	SG250HX-IN
String	36 x TSM-545DE19

	CLP 375MW RAJASTHAN	GENSOL ENGINEE RING LIMITED (In
	VEL : Inverter 1	01/11/23