PVsyst - Simulation report

Grid-Connected System

Project: rice mill project

Variant: mill simulation
No 3D scene defined, no shadings
System power: 749 kWp
Uzogbon - Nigeria

Author

PVsyst V7.4.7
VC0, Simulation date:
20/07/25 13:44
with V7.4.7

Project summary

Geographical Site	Situation		Project settings	
Uzogbon	Latitude	6.73 °N	Albedo	0.20
Nigeria	Longitude	6.45 °E		
	Altitude	75 m		
	Time zone	UTC+1		

Weather data
Uzogbon
Meteonorm 8.1, Sat=100% - Synthetic

System summary

Grid-Connected System   **No 3D scene defined, no shadings**

PV Field Orientation		Near Shadings	User's needs	
Fixed plane		No Shadings	Fixed constant load	
Tilt/Azimuth	15 / 180 °		401 kW	
			Global	
			3510 MWh/Year	

System information

PV Array		Inverters		Battery pack	
Nb. of modules	1248 units	Nb. of units	6 units	Storage strategy: Self-consumption	
Pnom total	749 kWp	Pnom total	600 kWac	Nb. of units	7760 units
		Pnom ratio	1.248	Voltage	819 V
				Capacity	12028 Ah

Results summary

Produced Energy	1132695 kWh/year	Specific production	1513 kWh/kWp/year	Perf. Ratio PR	81.28 %
Used Energy	3509931 kWh/year			Solar Fraction SF	32.27 %

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General parameters

Grid-Connected System   **No 3D scene defined, no shadings**

PV Field Orientation

Orientation	Sheds configuration	Models used	
Fixed plane	No 3D scene defined	Transposition	Perez
Tilt/Azimuth 15 / 180 °		Diffuse	Perez, Meteonorm
		Circumsolar	separate

Horizon   **Near Shadings**   **User's needs**
Free Horizon   No Shadings   Fixed constant load
                                           401 kW
                                           Global
                                           3510 MWh/Year

Storage
Kind   Self-consumption
Charging strategy   **Discharging strategy**
When excess solar power is available   As soon as power is needed

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PV Array Characteristics

PV module		**Inverter**	
Manufacturer	JA solar	Manufacturer	Huawei Technologies
Model	JAM78-S30-600-MR	Model	SUN2000-100KTL-M1-480Vac
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	600 Wp	Unit Nom. Power	100 kWac
Number of PV modules	1248 units	Number of inverters	6 units
Nominal (STC)	749 kWp	Total power	600 kWac
Modules	78 string x 16 In series	Operating voltage	200-1000 V
At operating cond. (50°C)		Max. power (=>40°C)	110 kWac
Pmpp	684 kWp	Pnom ratio (DC:AC)	1.25
U mpp	651 V	Power sharing within this inverter	
I mpp	1050 A		

Total PV power		**Total inverter power**	
Nominal (STC)	749 kWp	Total power	600 kWac
Total	1248 modules	Max. power	660 kWac
Module area	3489 m²	Number of inverters	6 units
		Pnom ratio	1.25

Battery Storage

Battery
Manufacturer   Sony
Model   IJ1001M 24Ah

Battery pack		**Battery Pack Characteristics**	
Nb. of units	16 in series	Voltage	819 V
	x 485 in parallel	Nominal Capacity	12028 Ah (C10)
Discharging min. SOC	20.0 %	Temperature	Fixed 20 °C
Stored energy	7585.2 kWh		

Battery input charger
Model   Generic
Max. charg. power   640.0 kWdc
Max./Euro effic.   97.0/95.0 %
Battery to Grid inverter
Model   Generic
Max. disch. power   420.0 kWac
Max./Euro effic.   97.0/95.0 %

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Array losses

Array Soiling Losses

Loss Fraction   3.0 %

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.   10 mΩ

Loss Fraction   1.5 % at STC

Serie Diode Loss

Voltage drop   0.7 V

Loss Fraction   0.1 % at STC

LID - Light Induced Degradation

Loss Fraction   2.0 %

Module Quality Loss

Loss Fraction   -0.8 %

Module mismatch losses

Loss Fraction   2.0 % at MPP

IAM loss factor

Incidence effect (IAM): Fresnel smooth glass, n = 1.526

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.998	0.981	0.948	0.862	0.776	0.636	0.403	0.000

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Main results

System Production

Produced Energy	1132695 kWh/year	Specific production	1513 kWh/kWp/year
Used Energy	3509931 kWh/year	Perf. Ratio PR	81.28 %
		Solar Fraction SF	32.27 %

Battery aging (State of Wear)

Cycles SOW	99.9 %
Static SOW	90.0 %

Normalized productions (per installed kWp)

Lc: Collection Loss (PV-array losses)   0.82 kWh/kWp/day
Ls: System Loss (inverter, ...)   0.08 kWh/kWp/day
Yf: Produced useful energy (inverter output)   4.2 kWh/kWp/day

Performance Ratio PR

PR: Performance Ratio (Yf / Yr) : 0.813
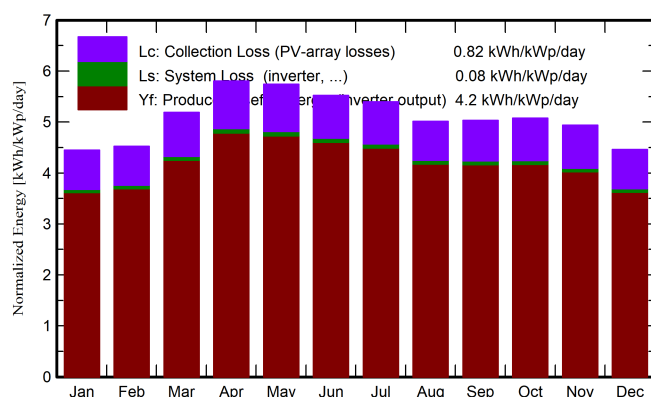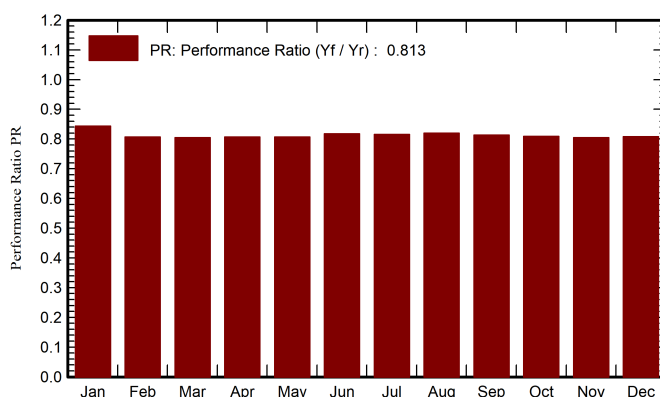
Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_User	E_Solar	E_Grid	EFrGrid
	kWh/m²	kWh/m²	°C	kWh/m²	kWh/m²	kWh	kWh	kWh	kWh	kWh
January	158.3	87.1	27.10	137.9	127.8	85514	298104	87074	0.000	211030
February	137.5	94.6	27.87	126.7	118.7	78928	269255	76564	0.000	192691
March	168.4	102.6	27.59	160.9	151.7	100552	298104	96901	0.000	201202
April	174.2	92.5	26.50	174.2	164.9	109526	288487	105315	0.000	183173
May	170.8	83.3	26.27	177.9	168.6	111884	298104	107532	0.000	190571
June	157.1	84.0	24.95	165.7	156.9	105308	288487	101504	0.000	186983
July	159.3	79.7	24.93	167.3	158.5	106171	298104	102186	0.000	195917
August	153.2	86.9	24.58	155.5	146.7	98804	298104	95482	0.000	202622
September	155.0	77.5	24.44	150.9	141.9	95327	288487	91870	0.000	196617
October	170.4	81.6	25.49	157.4	147.2	98668	298104	95322	0.000	202782
November	171.3	73.7	26.06	148.1	137.2	92036	288487	89251	0.000	199237
December	161.9	82.7	26.80	138.3	127.7	85718	298104	83694	0.000	214410
Year	1937.4	1026.1	26.04	1861.0	1747.8	1168434	3509931	1132695	0.000	2377236

Legends

GlobHor	Global horizontal irradiation		EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation		E_User	Energy supplied to the user
T_Amb	Ambient Temperature		E_Solar	Energy from the sun
GlobInc	Global incident in coll. plane		E_Grid	Energy injected into grid
GlobEff	Effective Global, corr. for IAM and shadings		EFrGrid	Energy from the grid

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Loss diagram

1937 kWh/m²	**Global horizontal irradiation**
-3.94%	**Global incident in coll. plane**
-3.18%	IAM factor on global
-3.00%	Soiling loss factor
1748 kWh/m² * 3489 m² coll.	**Effective irradiation on collectors**
efficiency at STC = 21.49%	PV conversion
1310302 kWh	**Array nominal energy (at STC effic.)**
-0.72%	PV loss due to irradiance level
-6.19%	PV loss due to temperature
+0.75%	Module quality loss
-2.00%	LID - Light induced degradation
-2.00%	Module array mismatch loss
-1.05%	Ohmic wiring loss
1168434 kWh	**Array virtual energy at MPP**
-1.77%	Inverter Loss during operation (efficiency)
0.00%	Inverter Loss over nominal inv. power
0.00%	Inverter Loss due to max. input current
0.00%	Inverter Loss over nominal inv. voltage
-0.01%	Inverter Loss due to power threshold
0.00%	Inverter Loss due to voltage threshold
-0.01%	Night consumption
1147548 kWh	**Available Energy at Inverter Output**
-0.85%	Battery IN, charger loss
+0.35%	Battery Stored Energy balance
	Battery Storage
-0.42%	Battery global loss
	(5.55% of the battery contribution)
-0.37%	Battery OUT, inverter loss
0 kWh	**Dispatch: user and grid reinjection**

grid consumption 80.5% of time

Stored 8.4%

Direct use 91.6%

2377236	1132695	0 kWh
to user from grid	to user from solar	to grid

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Predef. graphs

Daily Input/Output diagram
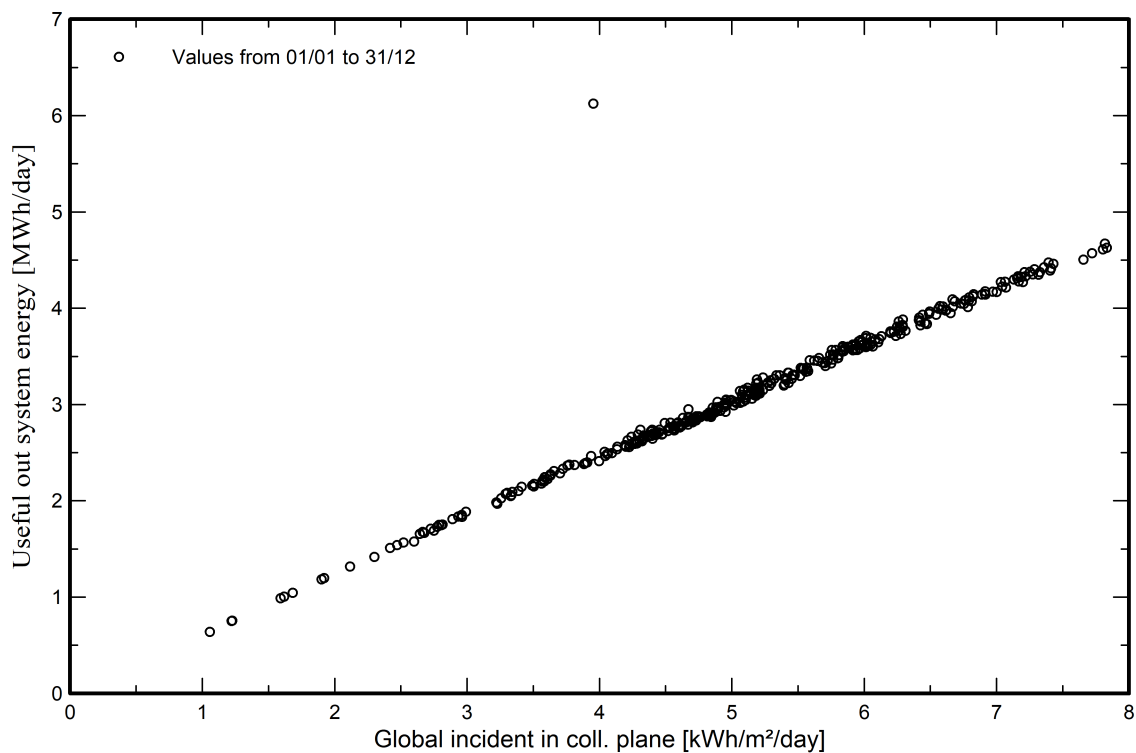
System Output Power Distribution
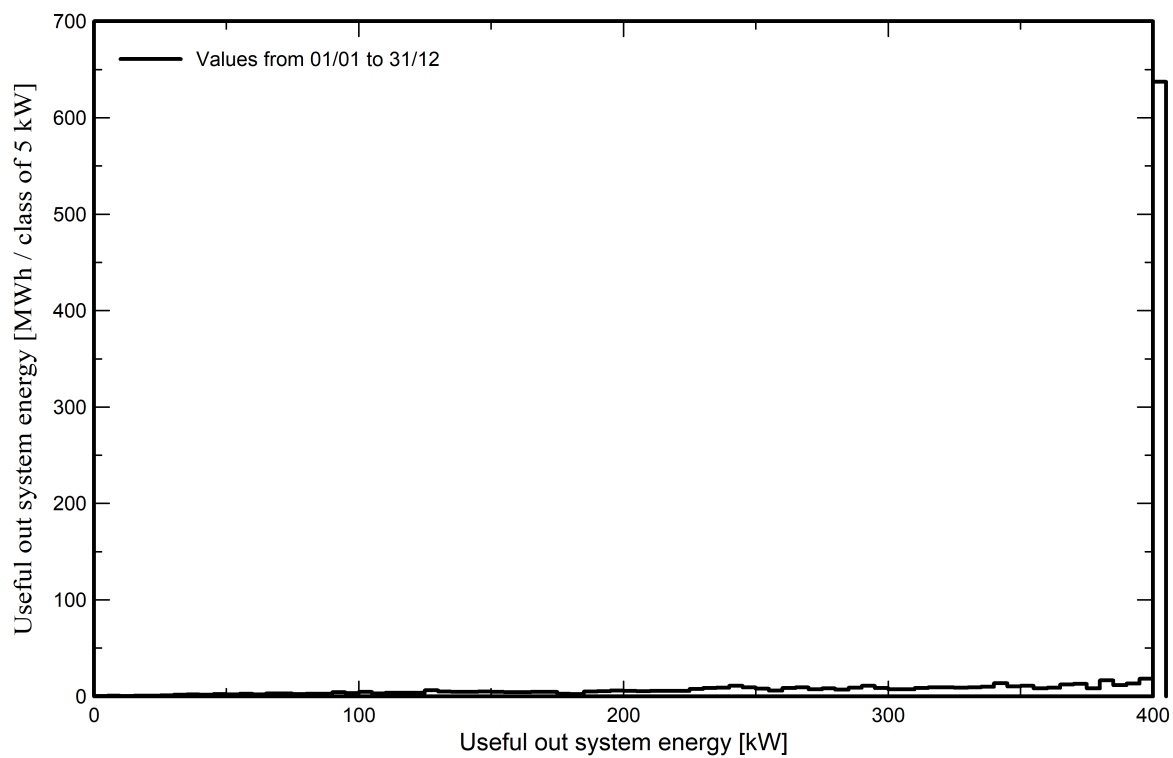
Single-line diagram

16 x JAM78-S30-600-MR
13 Strings

5 Inverter (500 kVA)

Injection point

kWh

16 x JAM78-S30-600-MR
13 Strings

Inverter (100 kVA)
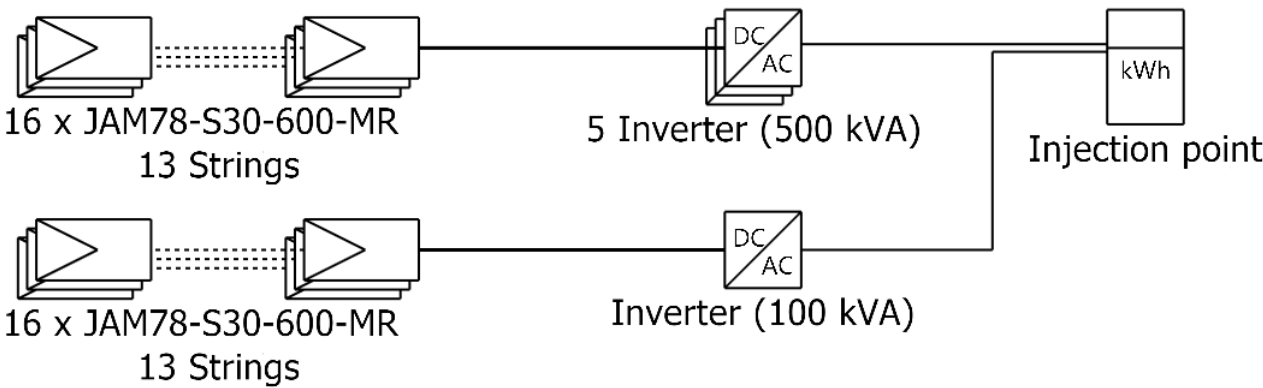
PV module	JAM78-S30-600-MR
Inverter	SUN2000-100KTL-M1-480Vac
String	16 x JAM78-S30-600-MR

rice mill project	
VC0 : mill simulation	20/07/25