Version 7.2.8

PVsyst - Simulation report

Stand alone system

Project: Graphite Mine Limpopo

Variant: New simulation variant

Stand alone system with batteries

System power: 3505 kWp

Streamboat Farm - South Africa

Author

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Project summary

Geographical Site
Streamboat Farm
South Africa

Situation

Latitude	-22.68 °S
Longitude	29.06 °E
Altitude	817 m
Time zone	UTC+2

Project settings

Albedo	0.20

Meteo data
Streamboat Farm
Meteonorm 8.0 (1991-2005), Sat=100% - Synthetic

System summary

Stand alone system

Stand alone system with batteries

PV Field Orientation

Fixed plane	
Tilt/Azimuth	15 / 0 °

User's needs
Daily household consumers
Constant over the year
Average 18.00 MWh/Day

System information

PV Array

Nb. of modules	7704 units
Pnom total	3505 kWp

Battery pack

Technology	Lithium-ion, LFP
Nb. of units	970 units
Voltage	384 V
Capacity	49082 Ah

Results summary

Available Energy	6839936 kWh/year	Specific production	1951 kWh/kWp/year	Perf. Ratio PR	74.39 %
Used Energy	6223304 kWh/year			Solar Fraction SF	94.72 %

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General parameters

Stand alone system | **Stand alone system with batteries**

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	15 / 0 °

Sheds configuration
No 3D scene defined

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

User's needs
Daily household consumers
Constant over the year
Average 18.00 MWh/Day

PV Array Characteristics

PV module

Manufacturer	JA Solar
Model	JAM78-S10-455-MR
(Original PVsyst database)	
Unit Nom. Power	455 Wp
Number of PV modules	7704 units
Nominal (STC)	3505 kWp
Modules	642 Strings x 12 In series
At operating cond. (50°C)	
Pmpp	3203 kWp
U mpp	493 V
I mpp	6494 A

Battery

Manufacturer	Pylontech
Model	Rack PhantomX_50Ah
Technology	Lithium-ion, LFP
Nb. of units	970 in parallel
Discharging min. SOC	10.0 %
Stored energy	16962.7 kWh
Battery Pack Characteristics	
Voltage	384 V
Nominal Capacity	49082 Ah (C10)
Temperature	Fixed 20 °C

Controller

Universal controller	
Technology	MPPT converter
Temp coeff.	-5.0 mV/°C/Elem.
Converter	
Maxi and EURO efficiencies	97.0 / 95.0 %

Battery Management control

Threshold commands as	SOC calculation
Charging	SOC = 0.96 / 0.80
Discharging	SOC = 0.10 / 0.35

Total PV power

Nominal (STC)	3505 kWp
Total	7704 modules
Module area	16728 m²

Array losses

Thermal Loss factor
Module temperature according to irradiance

Uc (const)	20.0 W/m²K
Uv (wind)	0.0 W/m²K/m/s

DC wiring losses

Global array res.	1.3 mΩ
Loss Fraction	1.5 % at STC

Serie Diode Loss

Voltage drop	0.7 V
Loss Fraction	0.1 % at STC

Module Quality Loss
Loss Fraction -0.8 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

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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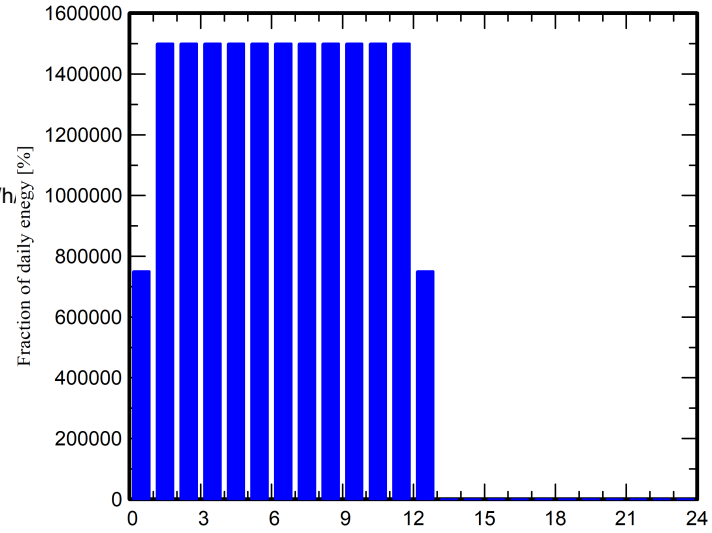
Detailed User's needs

Daily household consumers, Constant over the year, average = 18.00 MWh/day

Annual values

	Number	Power	Use	Energy
		W	Hour/day	Wh/day
Total load demand	1	750000W tot	12.0	9000000
Other uses	1	750000W tot	12.0	9000000
Stand-by consumers			24.0	24
Total daily energy				18000024Wh

Hourly distribution

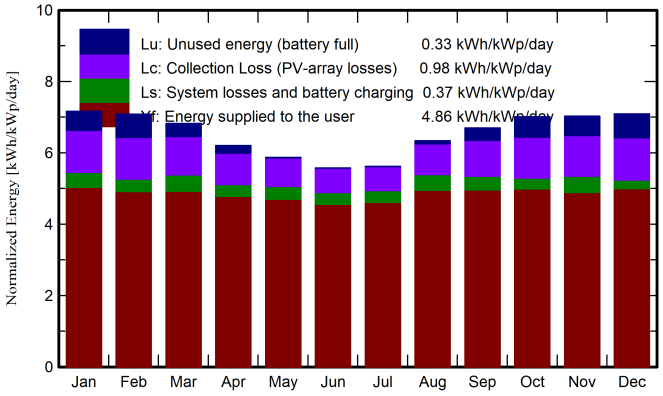


Main results

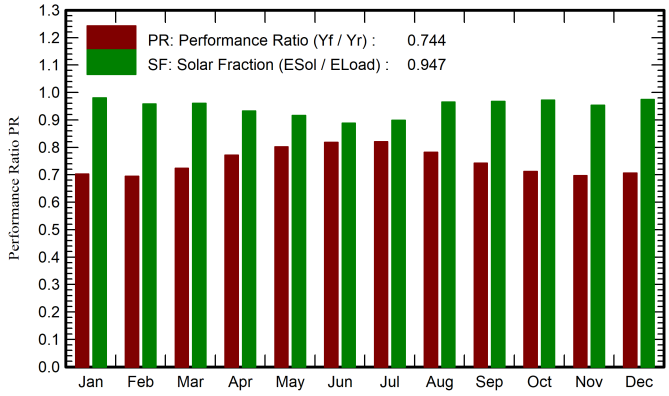
System Production

Available Energy	6839936 kWh/year	Specific production	1951 kWh/kWp/year
Used Energy	6223304 kWh/year	Performance Ratio PR	74.39 %
Excess (unused)	416652 kWh/year	Solar Fraction SF	94.72 %
Loss of Load		**Battery aging (State of Wear)**	
Time Fraction	2.7 %	Cycles SOW	96.5 %
Missing Energy	346705 kWh/year	Static SOW	80.0 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	GlobEff kWh/m²	E_Avail kWh	EUnused kWh	E_Miss kWh	E_User kWh	E_Load kWh	SolFrac ratio
January	232.7	215.2	626440	57385	10896	547105	558001	0.980
February	199.6	192.6	558660	63012	21421	482580	504001	0.957
March	199.4	205.9	600158	38938	21947	536054	558001	0.961
April	164.1	181.6	537995	21514	36816	503184	540001	0.932
May	149.5	177.0	530734	1201	46508	511493	558001	0.917
June	131.7	162.3	495134	0	60478	479522	540001	0.888
July	139.9	169.3	517379	37	56647	501354	558001	0.898
August	167.4	192.0	571948	9143	19613	538388	558001	0.965
September	184.3	196.3	574813	35378	17684	522317	540001	0.967
October	213.5	211.2	613297	61656	15313	542688	558001	0.973
November	218.0	204.3	596063	56710	25306	514695	540001	0.953
December	233.6	212.9	617315	71677	14076	543925	558001	0.975
Year	2233.7	2320.6	6839936	416652	346705	6223304	6570009	0.947

Legends

GlobHor	Global horizontal irradiation	E_User	Energy supplied to the user
GlobEff	Effective Global, corr. for IAM and shadings	E_Load	Energy need of the user (Load)
E_Avail	Available Solar Energy	SolFrac	Solar fraction (EUsed / ELoad)
EUnused	Unused energy (battery full)		
E_Miss	Missing energy		

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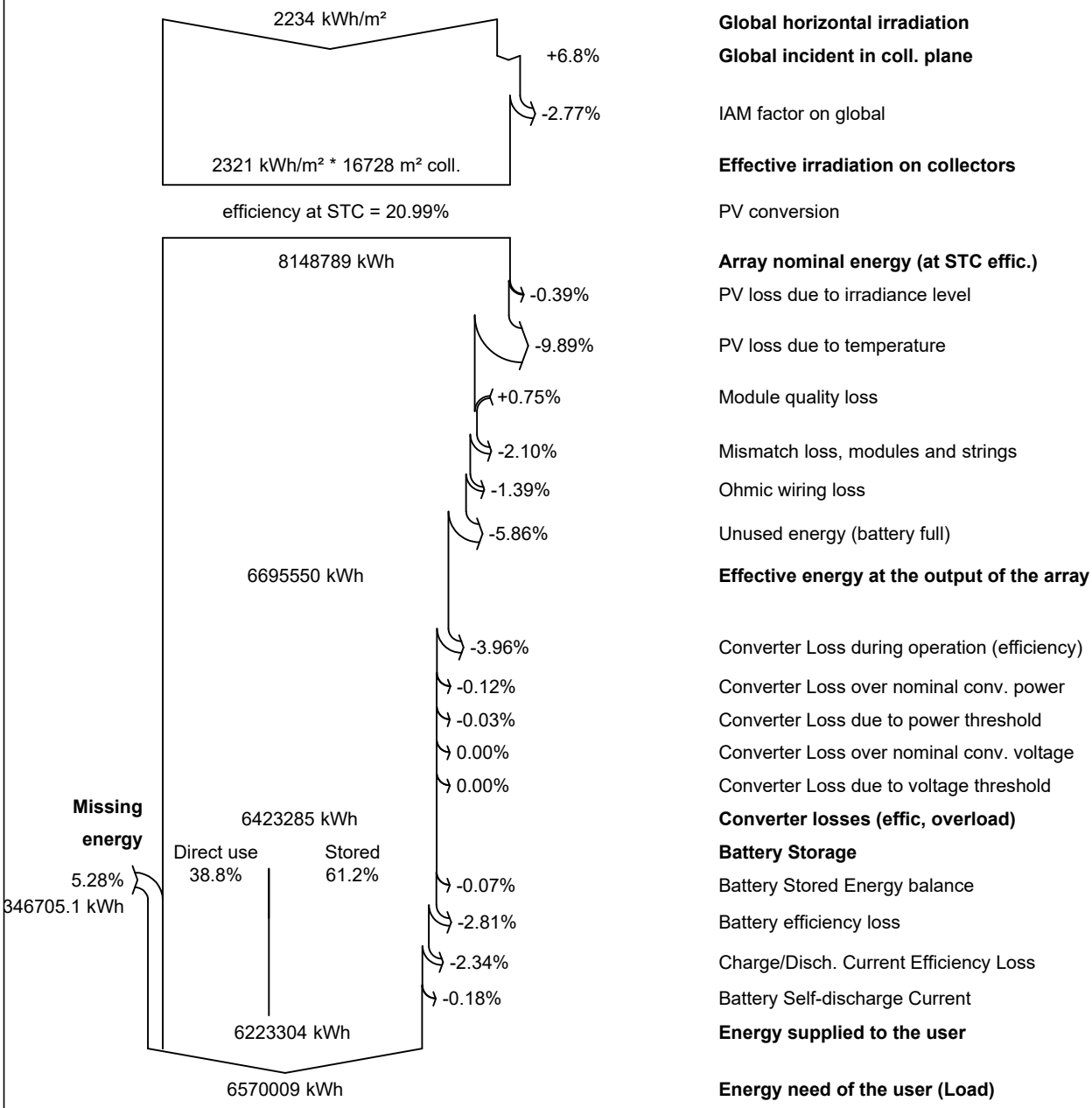
Loss diagram



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Special graphs

Daily Input/Output diagram