

PVsyst - Simulation report

Standalone system

Project: Commercial Center 1

Variant: New simulation variant - Commercial Centre

Standalone system with batteries

System power: 232 kWp

Port Harcourt - Nigeria

Author

Muzan Ijeoma (United states)



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PVsyst V7.3.4

VC9, Simulation date:
24/05/23 05:56
with v7.3.4

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Project summary

Geographical Site

Port Harcourt
Nigeria

Situation

Latitude 4.78 °N
Longitude 7.01 °E
Altitude 6 m
Time zone UTC+1

Project settings

Albedo 0.20

Meteo data

Port Harcourt
NASA-SSE satellite data 1983-2005 - Synthetic

System summary

Standalone system

PV Field Orientation

Fixed plane
Tilt/Azimuth 5 / 0 °

Standalone system with batteries

User's needs

Daily household consumers
Constant over the year
Average 561 kWh/Day

System information

PV Array

Nb. of modules 396 units
Pnom total 232 kWp

Battery pack

Technology Lead-acid, sealed, Gel
Nb. of units 330 units
Voltage 60 V
Capacity 33000 Ah

Results summary

Useful energy from solar	202469 kWh/year	Specific production	874 kWh/kWp/year	Perf. Ratio PR	56.41 %
Missing Energy	2299 kWh/year	Available solar energy	308736 kWh/year	Solar Fraction SF	98.88 %
Excess (unused)	97355 kWh/year				

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General parameters

Standalone system

PV Field Orientation

Orientation

Fixed plane
Tilt/Azimuth 5 / 0 °

Standalone system with batteries

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 561 kWh/Day

PV Array Characteristics

PV module

Manufacturer Generic
Model JKM585M-7RL4-V
(Original PVsyst database)
Unit Nom. Power 585 Wp
Number of PV modules 396 units
Nominal (STC) 232 kWp
Modules 33 Strings x 12 In series

At operating cond. (50°C)

Pmpp 211 kWp
U mpp 483 V
I mpp 437 A

Controller

Universal controller
Technology MPPT converter
Temp coeff. -5.0 mV/°C/Elem.

Converter

Maxi and EURO efficiencies 97.0 / 95.0 %

Total PV power

Nominal (STC) 232 kWp
Total 396 modules
Module area 1083 m²

Battery

Manufacturer Generic
Model EosG 3000
Technology Lead-acid, sealed, Gel
Nb. of units 11 in parallel x 30 in series
Discharging min. SOC 20.0 %
Stored energy 1587.8 kWh

Battery Pack Characteristics

Voltage 60 V
Nominal Capacity 33000 Ah (C10)
Temperature Fixed 20 °C

Battery Management control

Threshold commands as SOC calculation
Charging SOC = 0.92 / 0.75
approx. 68.5 / 62.7 V
Discharging SOC = 0.20 / 0.45
approx. 58.9 / 61.1 V

Array losses

Thermal Loss factor

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

Module Quality Loss

Loss Fraction -0.8 %

IAM loss factor

Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

DC wiring losses

Global array res. 18 mΩ
Loss Fraction 1.5 % at STC

Module mismatch losses

Loss Fraction 2.0 % at MPP

Series Diode Loss

Voltage drop 0.7 V
Loss Fraction 0.1 % at STC

Strings Mismatch loss

Loss Fraction 0.1 %

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.816	0.681	0.440	0.000



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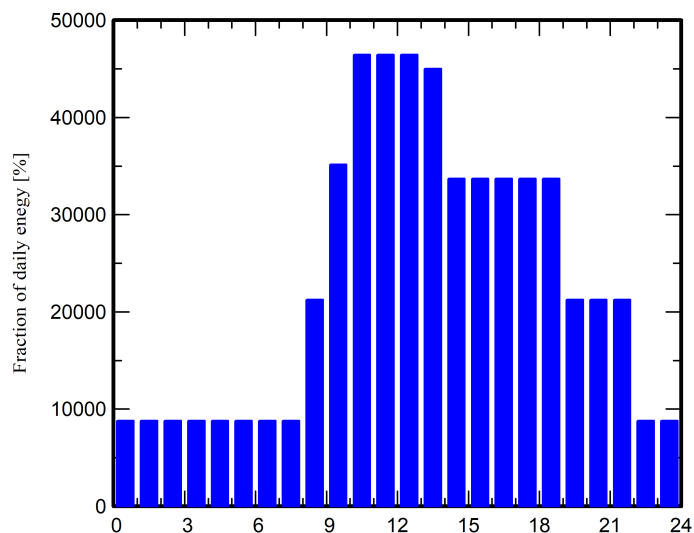
Detailed User's needs

Daily household consumers, Constant over the year, average = 561 kWh/day

Annual values

	Nb.	Power	Use	Energy
		W	Hour/day	Wh/day
Lamps (LED or fluo)	155	32/lamp	12.0	59520
ICT	30	80/app	12.0	28800
Coolers Open/Closed	20	1130/app	2.0	45200
Fridge / Deep-freeze	2		24	151699
Air Conditioning	1	22500 tot	12.0	270000
Water Heating/Cooking	1	2882 tot	2.0	5764
Stand-by consumers			24.0	24
Total daily energy				561007

Hourly distribution





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Main results

System Production

Useful energy from solar 202469 kWh/year
Available solar energy 308736 kWh/year
Excess (unused) 97355 kWh/year

Perf. Ratio PR 56.41 %
Solar Fraction SF 98.88 %

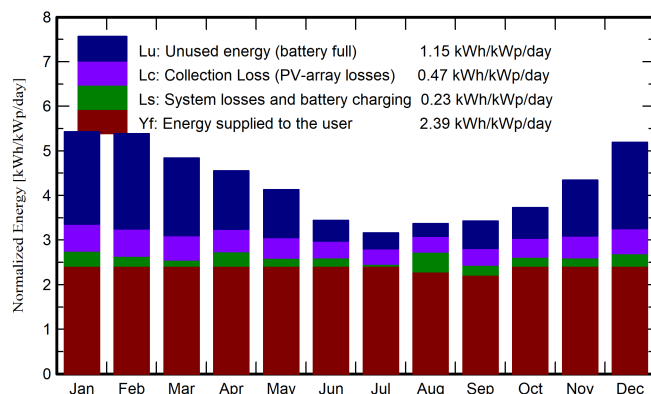
Loss of Load

Time Fraction 1.2 %
Missing Energy 2299 kWh/year

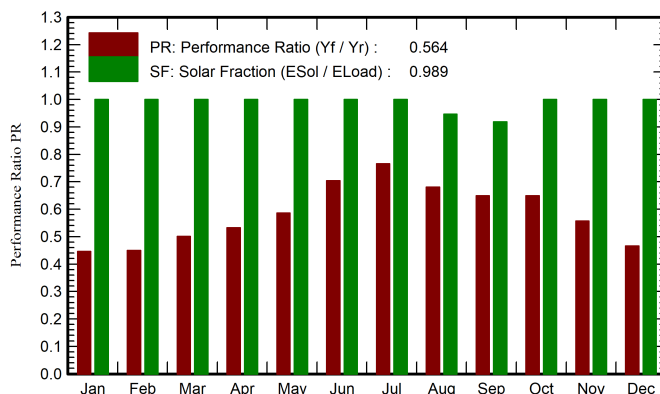
Battery aging (State of Wear)

Cycles SOW 96.4 %
Static SOW 93.3 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor	GlobEff	E_Avail	EUnused	E_Miss	E_User	E_Load	SolFrac
	kWh/m ²	kWh/m ²	kWh	kWh	kWh	kWh	kWh	ratio
January	161.2	165.0	33851	14858	0	17391	17391	1.000
February	146.7	148.2	30233	13820	0	15708	15708	1.000
March	148.8	147.1	29995	12434	0	17391	17391	1.000
April	138.0	133.6	27249	9047	0	16830	16830	1.000
May	131.1	124.8	25516	7697	0	17391	17391	1.000
June	106.2	100.4	20371	3210	0	16830	16830	1.000
July	100.4	95.3	19274	2549	0	17391	17391	1.000
August	106.0	101.7	20714	2049	925	16466	17391	0.947
September	102.9	100.1	20318	4226	1374	15457	16830	0.918
October	114.1	112.5	22744	4887	0	17391	17391	1.000
November	126.3	127.1	25955	8688	0	16830	16830	1.000
December	153.5	157.6	32517	13890	0	17391	17391	1.000
Year	1535.2	1513.6	308736	97355	2299	202469	204768	0.989

Legends

GlobHor Global horizontal irradiation
GlobEff Effective Global, corr. for IAM and shadings
E_Avail Available Solar Energy
EUnused Unused energy (battery full)
E_Miss Missing energy

E_User Energy supplied to the user
E_Load Energy need of the user (Load)
SolFrac Solar fraction (EUsed / ELoad)



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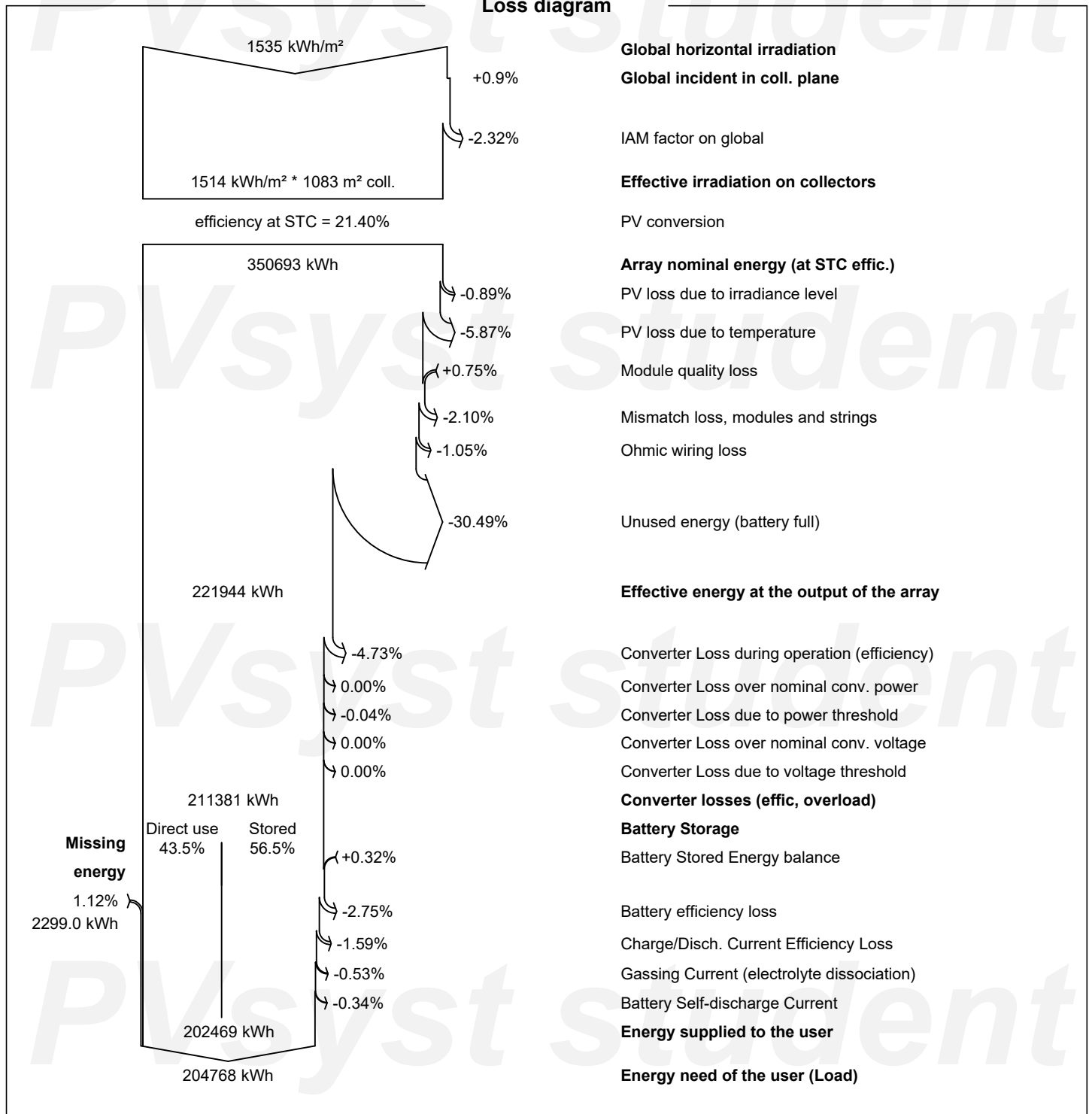
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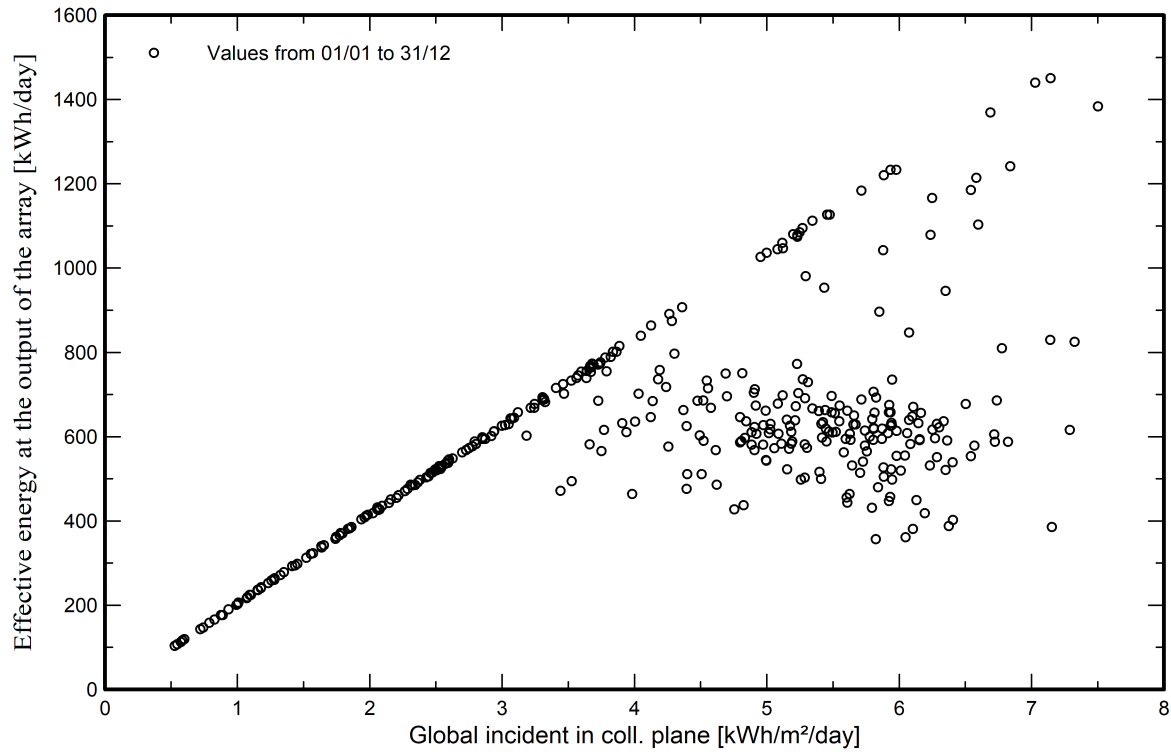
Loss diagram





Predef. graphs

Daily Input/Output diagram





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Cost of the system

Installation costs

Item	Quantity units	Cost USD	Total USD
		Total	0.00
		Depreciable asset	0.00

Operating costs

Item	Total
	USD/year
Total (OPEX)	0.00

System summary

Total installation cost	0.00 USD
Operating costs	0.00 USD/year
Excess energy (battery full)	97.4 MWh/year
Used solar energy	202 MWh/year
Used energy cost	0.367 USD/kWh