

PVsyst - Simulation report

Standalone system

Project: Commercial Center 1

Variant: New simulation variant - Commercial Centre

Standalone system with batteries

System power: 183 kWp

Port Harcourt - Nigeria

Author

Muzan Ijeoma (United states)



Project: Commercial Center 1

Variant: New simulation variant - Commercial Centre

PVsyst V7.3.4

VC9, Simulation date:
24/05/23 07:17
with v7.3.4

Muzan Ijeoma (United states)

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 312 units
Pnom total 183 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	196780 kWh/year	Specific production	1078 kWh/kWp/year	Perf. Ratio PR	69.58 %
Missing Energy	7987 kWh/year	Available solar energy	241630 kWh/year	Solar Fraction SF	96.10 %
Excess (unused)	37436 kWh/year				

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Detailed User's needs	4
Main results	5
Loss diagram	6
Predef. graphs	7
Cost of the system	8



Project: Commercial Center 1

Variant: New simulation variant - Commercial Centre

PVsyst V7.3.4

VC9, Simulation date:
24/05/23 07:17
with v7.3.4

Muzan Ijeoma (United states)

General parameters

Standalone system

PV Field Orientation

Orientation

Fixed plane
Tilt/Azimuth 5 / 0 °

User's needs

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

Standalone system with batteries

Sheds configuration

No 3D scene defined

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

PV Array Characteristics

PV module

Manufacturer Generic
Model JKM585M-7RL4-V
(Original PVsyst database)
Unit Nom. Power 585 Wp
Number of PV modules 312 units
Nominal (STC) 183 kWp
Modules 26 Strings x 12 In series

At operating cond. (50°C)

Pmpp 167 kWp
U mpp 483 V
I mpp 345 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) 183 kWp
Total 312 modules
Module area 853 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. 68.1 / 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. 23 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



PVsyst V7.3.4

VC9, Simulation date:
24/05/23 07:17
with v7.3.4

Muzan Ijeoma (United states)

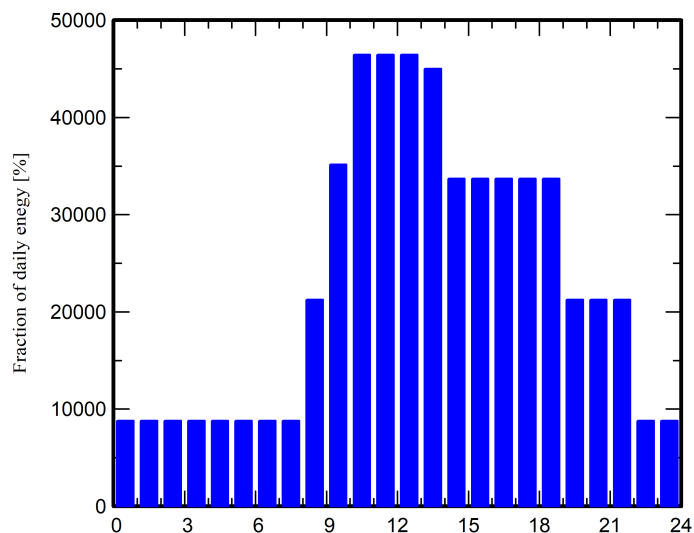
Detailed User's needs

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





Project: Commercial Center 1

Variant: New simulation variant - Commercial Centre

PVsyst V7.3.4

VC9, Simulation date:
24/05/23 07:17
with v7.3.4

Muzan Ijeoma (United states)

Main results

System Production

Useful energy from solar 196780 kWh/year
Available solar energy 241630 kWh/year
Excess (unused) 37436 kWh/year

Perf. Ratio PR 69.58 %
Solar Fraction SF 96.10 %

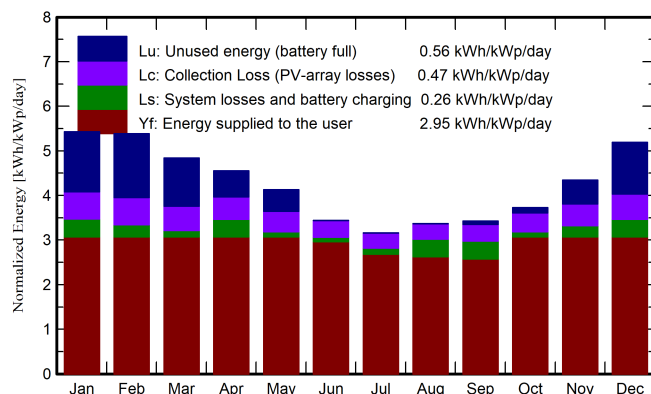
Loss of Load

Time Fraction 3.9 %
Missing Energy 7987 kWh/year

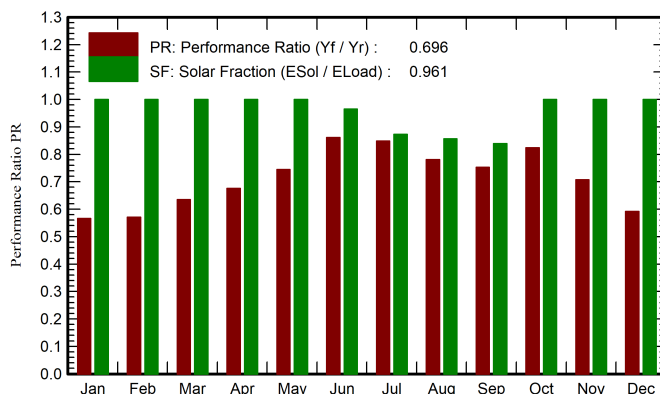
Battery aging (State of Wear)

Cycles SOW 97.0 %
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	26508	7627	0	17391	17391	1.000
February	146.7	148.2	23675	7301	0	15708	15708	1.000
March	148.8	147.1	23483	6077	0	17391	17391	1.000
April	138.0	133.6	21311	3163	0	16830	16830	1.000
May	131.1	124.8	19966	2712	0	17391	17391	1.000
June	106.2	100.4	15943	2	590	16240	16830	0.965
July	100.4	95.3	15094	2	2201	15191	17391	0.873
August	106.0	101.7	16248	1	2489	14903	17391	0.857
September	102.9	100.1	15879	410	2708	14123	16830	0.839
October	114.1	112.5	17781	654	0	17391	17391	1.000
November	126.3	127.1	20291	2916	0	16830	16830	1.000
December	153.5	157.6	25451	6571	0	17391	17391	1.000
Year	1535.2	1513.6	241630	37436	7987	196780	204768	0.961

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)



Project: Commercial Center 1

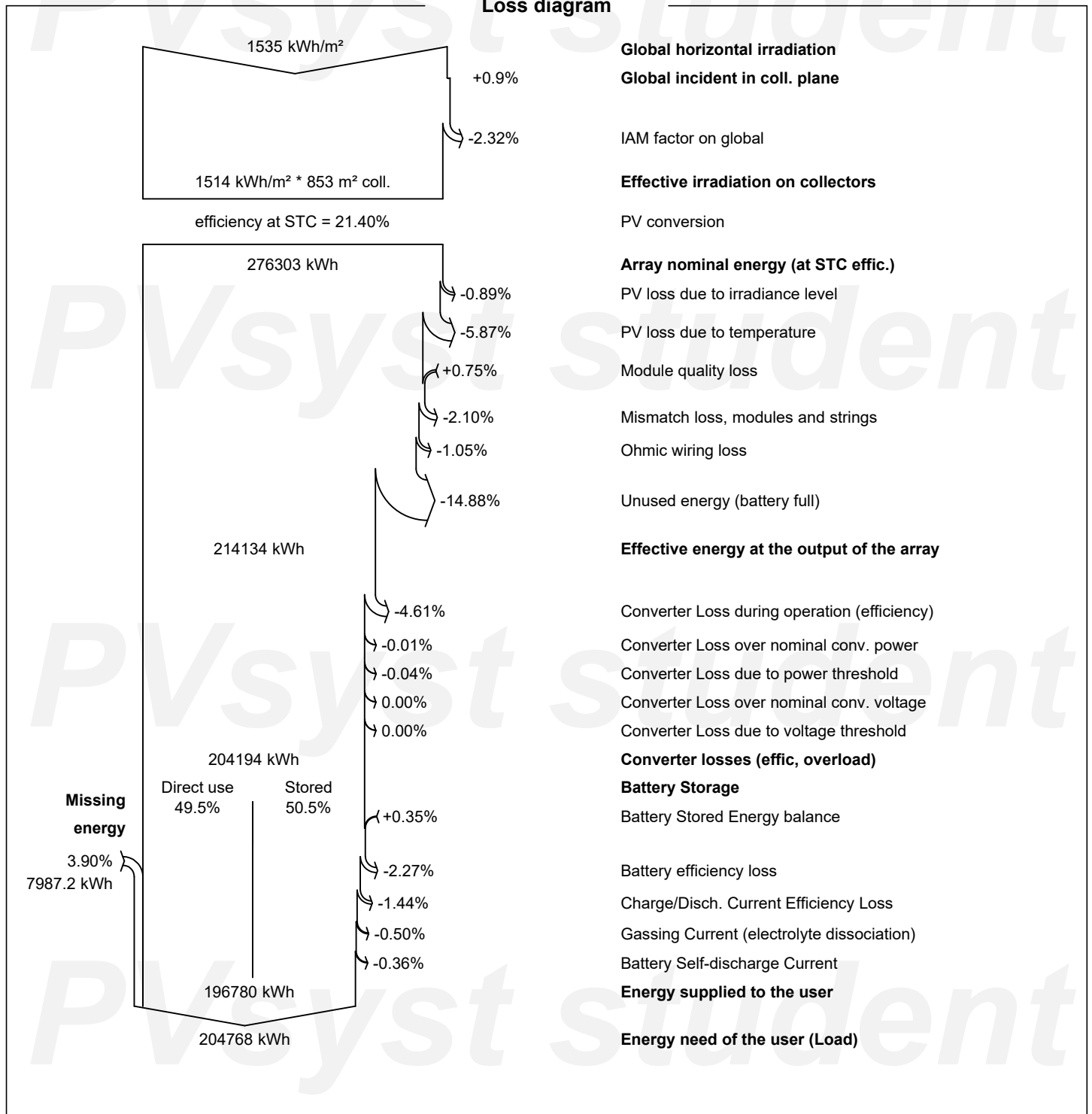
Variant: New simulation variant - Commercial Centre

PVsyst V7.3.4

VC9, Simulation date:
24/05/23 07:17
with v7.3.4

Muzan Ijeoma (United states)

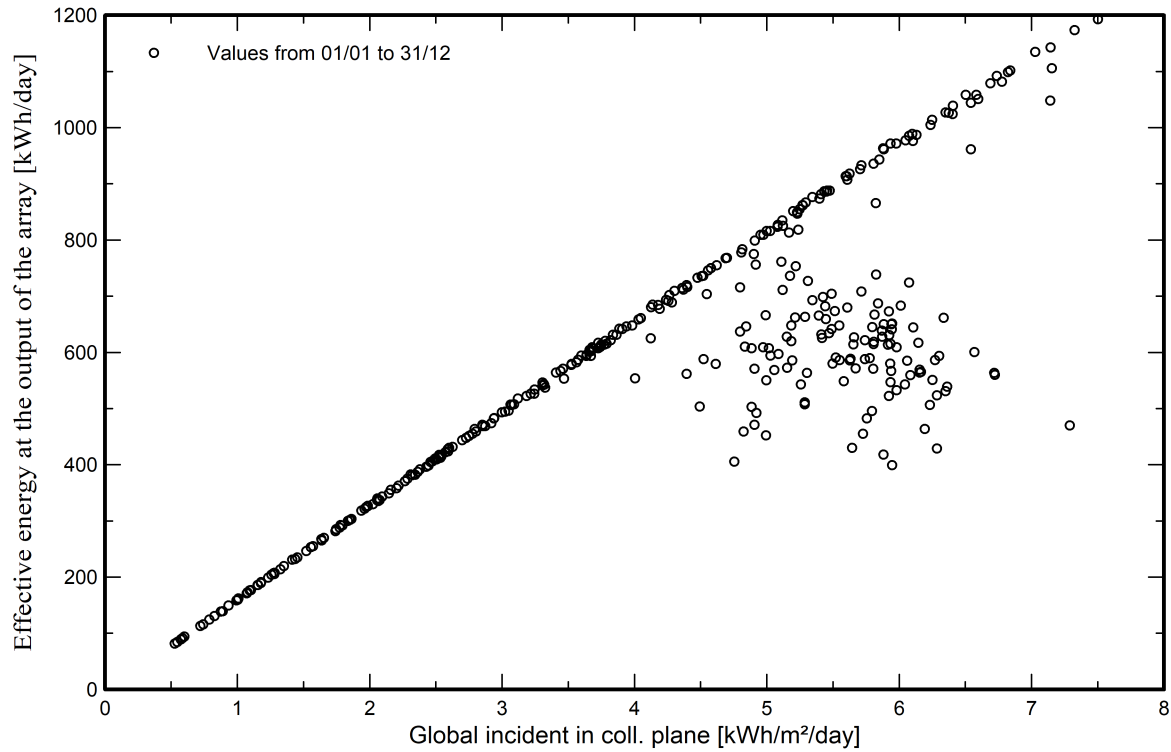
Loss diagram





Predef. graphs

Daily Input/Output diagram





Project: Commercial Center 1

Variant: New simulation variant - Commercial Centre

PVsyst V7.3.4

VC9, Simulation date:
24/05/23 07:17
with v7.3.4

Muzan Ijeoma (United states)

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)	37.4 MWh/year
Used solar energy	197 MWh/year
Used energy cost	0.377 USD/kWh