

DAFTAR PUSTAKA

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LAMPIRAN

Hasil Simulasi Pvsyst



Version 7.4.0

PVsys - Simulation report

Standalone system

Project: Umbrella Charging Station

Variant: Umbrella Charging Station

Standalone system with batteries

System power: 100 Wp

Cilacap - Indonesia

| Author

**PVsyst V7.4.0**

VC1 - Simulation date:
17/08/23 13:49
with v7.4.0

Project: Umbrella Charging Station

Variant: Umbrella Charging Station

Project summary

Geographical Site	Situation	Project settings
Cilacap	Latitude -7.73 °S	Albedo 0.20
Indonesia	Longitude 109.01 °E	
	Altitude 17 m	
	Time zone UTC+7	
Meteo data		
Cilacap		
Meteonorm 8.1 (2016-2021), Sat=100% - Synthetic		

System summary

Standalone system	Standalone system with batteries	
PV Field Orientation	Near Shadings	User's needs
Fixed plane	Linear shadings	Daily household consumers
Tilt/Azimuth 15 / 0 °		Constant over the year
		Average 0.4 kWh/Day
System Information	Battery pack	
PV Array	Technology	Lead-acid, sealed, tubular
Nb. of modules 2 units	Nb. of units	1 unit
Prom total 100 Wp	Voltage	12 V
	Capacity	100 Ah

Results summary

Useful energy from solar 128.03 kWh/year	Specific production 1280 kWh/kWp/year	Perf. Ratio PR 70.64 %
Missing Energy 3.37 kWh/year	Available solar energy 137.90 kWh/year	Solar Fraction SF 97.44 %
Excess (unused) 4.28 kWh/year		

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General parameters

Standalone system		Standalone system with batteries	
PV Field Orientation			
Orientation			
Fixed plane			
Tilt/Azimuth	15 / 0 °		
Horizon			
Average Height	2.7 °		
Sheds configuration			
		Models used	
		Transposition	Perez
		Diffuse	Perez, Meteonorm
		Circumsolar	separate
Near Shadings			
		User's needs	
		Daily household consumers	
		Constant over the year	
		Average	0.4 kWh/Day

PV Array Characteristics

PV module		Battery	
Manufacturer	Solar Cells	Manufacturer	Volta
Model	SMAL 436	Model	Volta 6SB100
(Original PVsyst database)		Technology	Lead-acid, sealed, tubular
Unit Nom. Power	50 Wp	Nb. of units	1 Unit
Number of PV modules	2 units	Discharging min. SOC	10.0 %
Nominal (STC)	100 Wp	Stored energy	1.1 kWh
Modules	2 Strings x 1 In series	Battery Pack Characteristics	
At operating cond. (50°C)		Voltage	12 V
Pmpp	95 Wp	Nominal Capacity	100 Ah (C10)
U mpp	15 V	Temperature	Fixed 20 °C
I mpp	6.3 A	Battery Management control	
Controller		Threshold commands as	SOC calculation
Universal controller		Charging	SOC = 0.96 / 0.80
Technology	MPPT converter	approx.	14.6 / 12.4 V
Temp coeff	-5.0 mV/°C/Elem.	Discharging	SOC = 0.10 / 0.35
Converter		approx.	11.1 / 12.0 V
Maxi and EURO efficiencies	97.0 / 95.0 %		
Total PV power			
Nominal (STC)	0.100 kWp		
Total	2 modules		
Module area	1.5 m²		

Array losses

Thermal Loss factor		DC wiring losses		Serie Diode Loss	
Module temperature according to irradiance		Global array res.	39 mΩ	Voltage drop	0.7 V
Uc (const)	29.0 W/m²K	Loss Fraction	1.5 % at STC	Loss Fraction	4.3 % at STC
Uv (wind)	0.0 W/m²K/m/s				
Module Quality Loss		Module mismatch losses		Strings Mismatch loss	
Loss Fraction	1.0 %	Loss Fraction	0.0 % at MPP	Loss Fraction	0.2 %
IAM loss factor					
ASHRAE Param.: IAM = 1 - bo (1/cos(-1))					
bo Param.: 0.05					



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Horizon definition

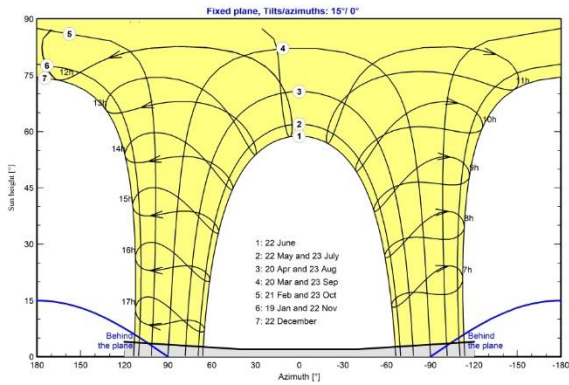
Horizon line at Cilacap

Average Height 2.7 °
Diffuse Factor 0.99
Albedo Factor 0.90
Albedo Fraction 100 %

Horizon profile

Azimuth [°]	-120	-40	40	120
Height [°]	4.0	2.0	2.0	4.0

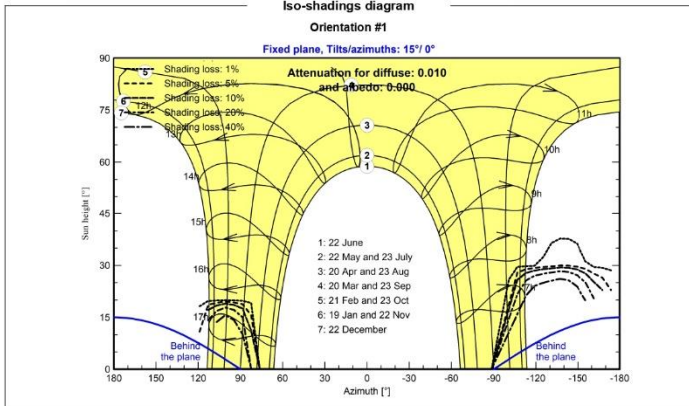
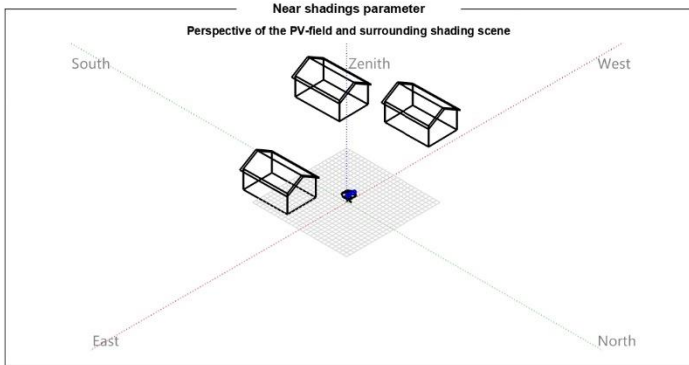
Sun Paths (Height / Azimuth diagram)





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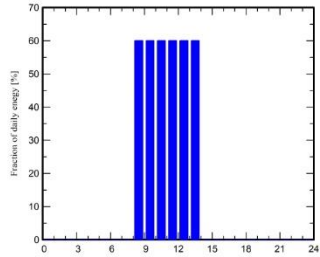
Detailed User's needs

Daily household consumers, Constant over the year, average = 0.4 kWh/day

Annual values

	Nb.	Power W	Use Hour/day	Energy Wh/day
Mobile	3	20/app	4.0	240
Laptop	1	60/app	2.0	120
Total daily energy				360

Hourly distribution





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Main results

System Production

Useful energy from solar 128.03 kWh/year
Available solar energy 137.90 kWh/year
Excess (unused) 4.28 kWh/year

Perf Ratio PR 70.64 %
Solar Fraction SF 97.44 %

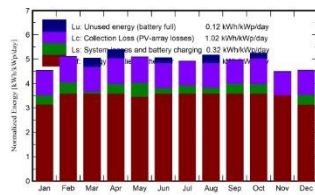
Loss of Load

Time Fraction 2.5 %
Missing Energy 3.37 kWh/year

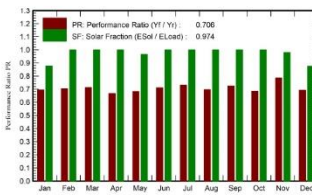
Battery aging (State of Wear)

Cycles SOW 94.6 %
Static SOW 90.0 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	GlobEff kWh/m ²	E_Avail kWh	EUnused kWh	E_Miss kWh	E_User kWh	E_Load kWh	SoIFrac ratio
January	153.4	134.0	10.42	0.000	1.376	9.78	11.16	0.877
February	150.8	137.8	10.84	0.000	0.000	10.08	10.08	1.000
March	157.5	151.2	11.96	1.069	0.000	11.16	11.16	1.000
April	154.3	157.0	12.44	0.990	0.000	10.80	10.80	1.000
May	144.2	153.1	11.98	0.000	0.383	10.78	11.16	0.966
June	135.8	147.4	11.60	0.614	0.000	10.80	10.80	1.000
July	138.2	148.2	11.68	0.000	0.000	11.16	11.16	1.000
August	149.6	155.6	12.39	0.958	0.000	11.16	11.16	1.000
September	147.5	144.4	11.47	0.000	0.000	10.80	10.80	1.000
October	168.0	157.0	12.50	0.649	0.000	11.16	11.16	1.000
November	143.9	129.0	10.12	0.000	0.210	10.59	10.80	0.981
December	154.6	134.4	10.50	0.000	1.397	9.76	11.16	0.875
Year	1797.8	1749.1	137.90	4.281	3.366	128.03	131.40	0.974

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)
SoIFrac Solar fraction (EUsed / ELoad)

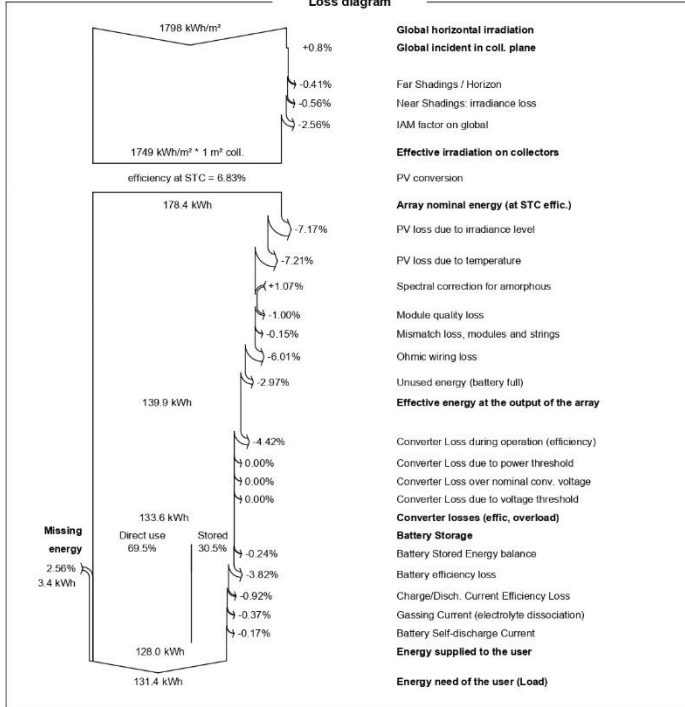


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Loss diagram

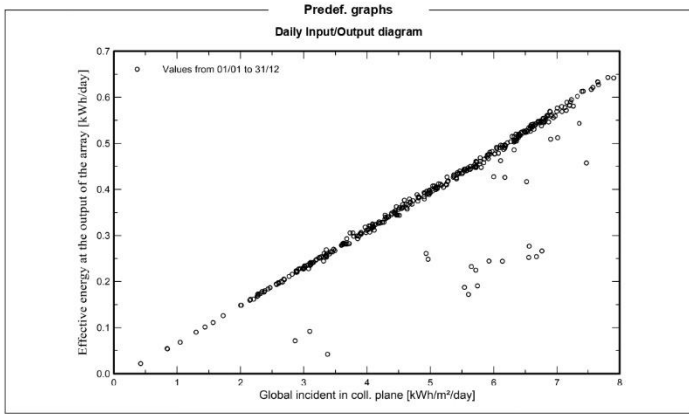




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BIODATA PENULIS



Nama : Nashrul Azmi
Tempat/Tanggal Lahir : Tasikmalaya, 25 Maret 2001
Alamat : Kp. Cantigi RT/RW 002/008
Desa/Kec. Cisayong Kab.
Tasikmalaya Jawa Barat 46153
Email : nashrul.azmi@gmail.com
Telepon/Hp : 087710113031
Hobi : -
Motto : *Lorem Ipsum Dolor Sit Amet*

Riwayat Pendidikan

- SDN 1 Cikadu Tahun 2008-2014
- SMP IT At-Taufiq Al-Islamy Tahun 2014-2017
- SMAN 2 Tasikmalaya Tahun 2017-2020
- Politeknik Negeri Cilacap Tahun 2020-2023
Prodi D3 Teknik Listrik