

PVsyst - Simulation report

Stand alone system

Project: BMLWE Mazraat Yachouaa

Variant: New simulation variant

Stand alone system with batteries

System power: 890 Wp

Haï el Aïn - Lebanon

**PVsyst V7.2.5**VCO, Simulation date:
01/10/21 17:45
with v7.2.5**Project summary****Geographical Site**Haï el Aïn
Lebanon**Situation**Latitude 33.88 °N
Longitude 35.61 °E
Altitude 554 m
Time zone UTC+2**Project settings**

Albedo 0.20

Meteo dataHaï el Aïn
Meteonorm 7.3 (2003-2010), Sat=100% - Synthetic**System summary****Stand alone system****PV Field Orientation**Fixed plane
Tilt/Azimuth 30 / 0 °**Stand alone system with batteries****User's needs**Daily household consumers
Constant over the year
Average 1.3 kWh/Day**System information****PV Array**Nb. of modules 2 units
Pnom total 890 Wp**Battery pack**Technology Lead-acid, sealed, Gel
Nb. of units 1 Unit
Voltage 12 V
Capacity 200 Ah**Results summary**

Available Energy	1622 kWh/year	Specific production	1822 kWh/kWp/year	Perf. Ratio PR	24.75 %
Used Energy	469 kWh/year			Solar Fraction SF	99.87 %

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General parameters

Stand alone system		Stand alone system with batteries	
PV Field Orientation		Sheds configuration	
Orientation		No 3D scene defined	
Fixed plane			
Tilt/Azimuth	30 / 0 °		
User's needs		Models used	
Daily household consumers		Transposition	Perez
Constant over the year		Diffuse	Perez, Meteonorm
Average		Circumsolar	separate
Average		1.3 kWh/Day	

PV Array Characteristics

PV module		Battery	
Manufacturer	Longi Solar	Manufacturer	Narada
Model	LR4-72 HPH 445 M G2	Model	AcmeG 12V 200
(Original PVsyst database)		Technology	Lead-acid, sealed, Gel
Unit Nom. Power	445 Wp	Nb. of units	1 Unit
Number of PV modules	2 units	Discharging min. SOC	20.0 %
Nominal (STC)	890 Wp	Stored energy	2.0 kWh
Modules	1 String x 2 In series	Battery Pack Characteristics	
At operating cond. (50°C)		Voltage	12 V
Pmpp	814 Wp	Nominal Capacity	200 Ah (C10)
U mpp	74 V	Temperature	External ambient temperature
I mpp	11 A	Battery Management control	
Controller		Threshold commands as	SOC calculation
Universal controller		Charging	SOC = 0.90 / 0.75
Technology	MPPT converter	approx.	13.7 / 12.7 V
Temp coeff.	-5.0 mV/°C/Elem.	Discharging	SOC = 0.20 / 0.45
Converter		approx.	11.8 / 12.3 V
Maxi and EURO efficiencies	97.0 / 95.0 %		
Total PV power			
Nominal (STC)	1 kWp		
Total	2 modules		
Module area	4.3 m ²		
Cell area	4.0 m ²		

Array losses

Thermal Loss factor		DC wiring losses		Serie Diode Loss				
Module temperature according to irradiance		Global array res.	111 mΩ	Voltage drop	0.7 V			
Uc (const)	20.0 W/m ² K	Loss Fraction	1.5 % at STC	Loss Fraction	0.9 % at STC			
Uv (wind)	0.0 W/m ² K/m/s							
Module Quality Loss		Module mismatch losses		Strings Mismatch loss				
Loss Fraction	-0.4 %	Loss Fraction	2.0 % at MPP	Loss Fraction	0.1 %			
IAM loss factor								
Incidence effect (IAM): User defined profile								
0°	25°	45°	60°	65°	70°	75°	80°	90°
1.000	1.000	0.995	0.962	0.936	0.903	0.851	0.754	0.000



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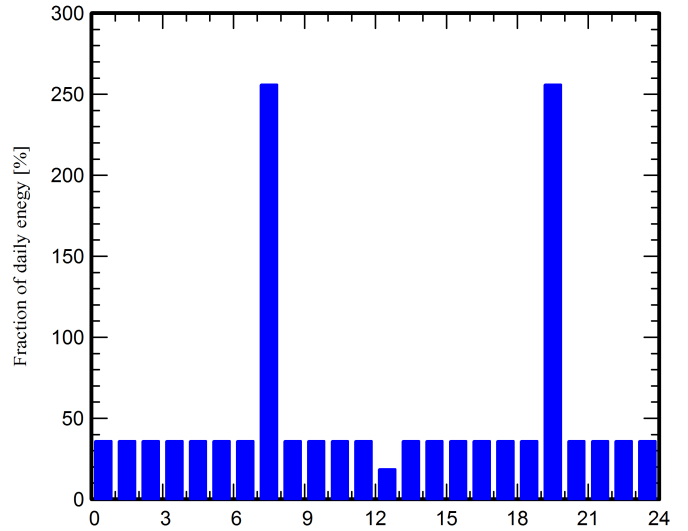
Detailed User's needs

Daily household consumers, Constant over the year, average = 1.3 kWh/day

Annual values

	Number	Power	Use	Energy
		W	Hour/day	Wh/day
Dosing Pump	1	35W/app	23.5	823
Mixer	1	220W/app	2.0	440
Stand-by consumers			24.0	24
Total daily energy				1287Wh/day

Hourly distribution





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Main results

System Production

Available Energy 1622 kWh/year
Used Energy 469 kWh/year
Excess (unused) 1138 kWh/year

Specific production 1822 kWh/kWp/year
Performance Ratio PR 24.75 %
Solar Fraction SF 99.87 %

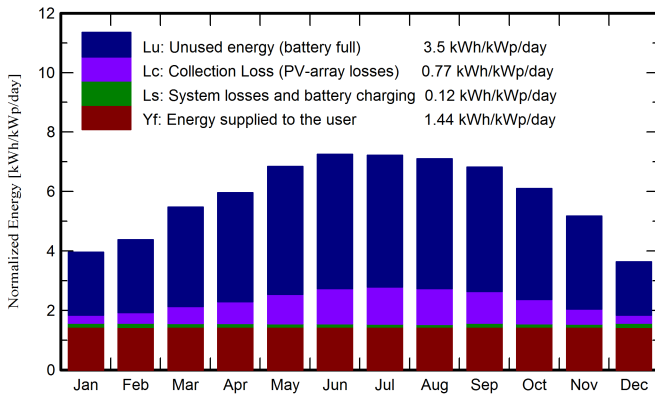
Loss of Load

Time Fraction 0.1 %
Missing Energy 1 kWh/year

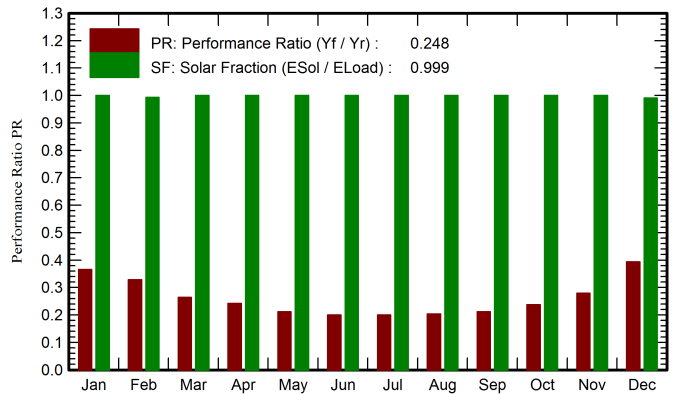
Battery aging (State of Wear)

Cycles SOW 80.0 to 68.2 %
Static SOW 80.0 to 71.3 %

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	82.4	120.8	99.7	58.2	0.000	39.88	39.88	1.000
February	92.6	120.6	98.4	60.9	0.258	35.76	36.02	0.993
March	143.6	167.2	133.3	92.1	0.000	39.88	39.88	1.000
April	170.5	175.7	137.7	97.9	0.000	38.59	38.59	1.000
May	222.0	207.8	159.5	118.5	0.000	39.88	39.88	1.000
June	239.6	212.8	160.2	120.5	0.000	38.59	38.59	1.000
July	241.4	219.1	162.9	122.2	0.000	39.88	39.88	1.000
August	215.6	216.2	161.0	120.6	0.000	39.88	39.88	1.000
September	176.9	201.3	151.7	111.4	0.000	38.59	38.59	1.000
October	142.7	186.5	143.9	102.8	0.000	39.88	39.88	1.000
November	103.0	153.5	122.9	83.4	0.000	38.59	38.59	1.000
December	73.3	111.1	90.6	49.3	0.358	39.52	39.88	0.991
Year	1903.6	2092.6	1621.7	1137.5	0.616	468.96	469.57	0.999

Legends

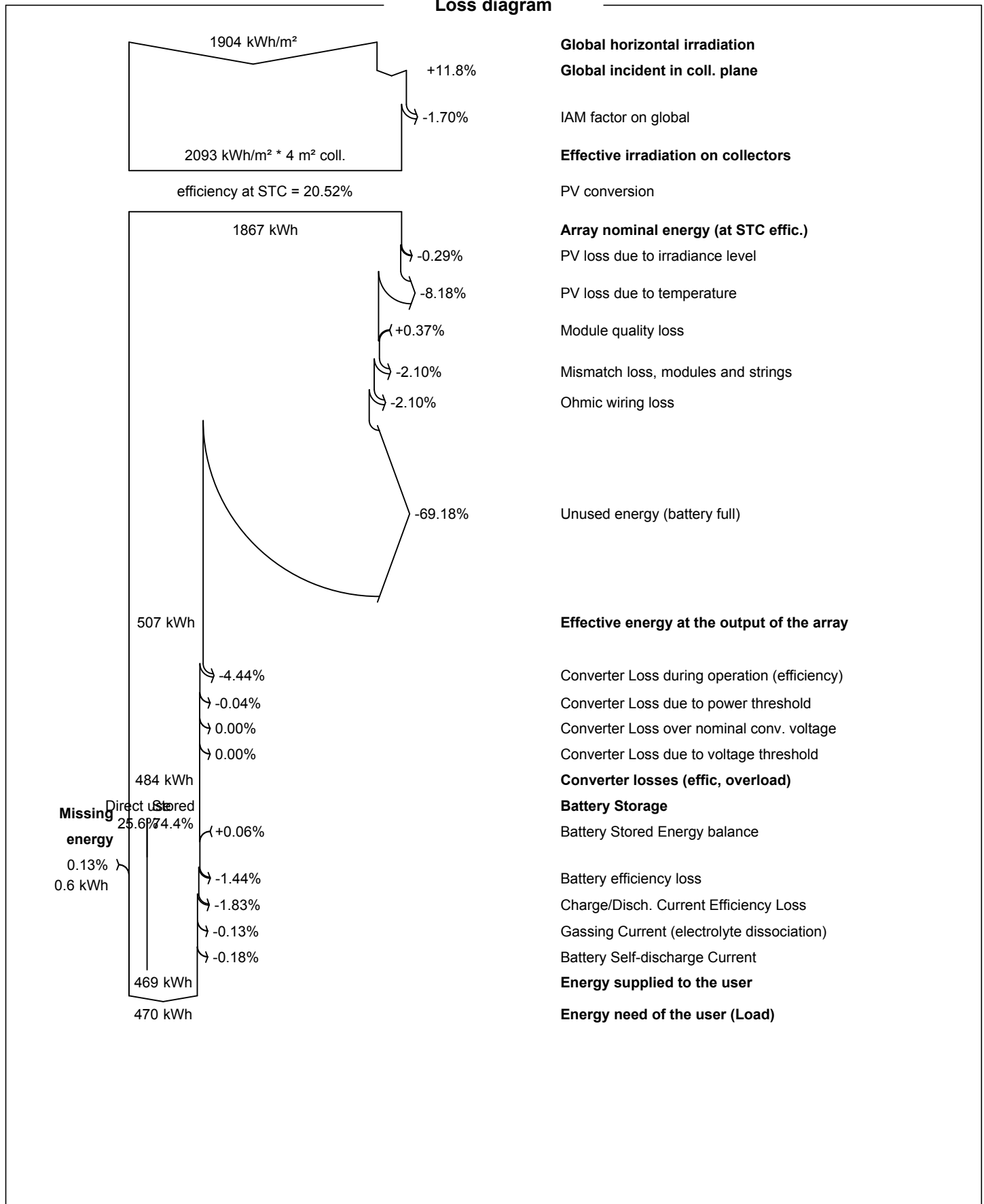
- GlobHor Global horizontal irradiation
- GlobEff Effective Global, corr. for IAM and shadings
- E_Avail Available Solar Energy
- EUnused Unused energy (battery full)
- E_Miss Missing energy
- E_User Energy supplied to the user
- E_Load Energy need of the user (Load)
- SoIFrac Solar fraction (EUsed /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



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Loss diagram





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Special graphs

Daily Input/Output diagram

