

PVsyst - Simulation report

Standalone system

Project: Kongsberg Variant: New simulation variant Standalone system with batteries System power: 4100 Wp Kongsberg - Norway

> Author Differ Energy (Norway)



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PVsyst V7.4.0 VC1, Simulation date: 24/07/23 13:21 with v7.4.0

				Pro	oject su	mmary						
Geographical Site Kongsberg Norway			Situ Lati Lon Altit Tim	u ation tude gitude ude e zone		59.67 9.65 159 UTC+1	Meteo data'NKongsberg'EMeteonorm 8.1 (1991-2010), Sat=m		=100% - Sy			
				Mont	hly albe	do value:	S					
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Albedo	0.82	0.55	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.82	0.82

		System s	ummary ——			
Standalone system		Standalone system	n with batteries			
PV Field Orientation Fixed plane		User's needs Daily household consu	imers			
Tilt/Azimuth	30/0°	Seasonal modulation				
		Average	2.3 kWh/Day			
System information						
PV Array			Battery pack			
Nb. of modules		10 units	Technology	Lithium-ion, LF	Р	
Pnom total		4100 Wp	Nb. of units		1 unit	
			Voltage	4	.8 V	
			Capacity	20	0 Ah	
		Results s	ummary ——			
Useful energy from solar	706 79 kWh/vear	Specific production	172 kWh/kWp/year	Perf Ratio PR	13 57 %	
Missing Energy	136.56 kWh/vear	Available solar energy	4156.34 kWh/vear	Solar Fraction SF	83.81 %	
Excess (unused)	1.10 kWh/year		······································			
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General parameters

Standalone system with batteries

PV Field Orientation Orientation Sheds configuration Models used Fixed plane No 3D scene defined Transposition Perez Tilt/Azimuth 30 / 0 ° Diffuse Perez, Meteonorm Circumsolar separate User's needs Daily household consumers Seasonal modulation Average 2.3 kWh/Day **PV Array Characteristics PV** module Battery Manufacturer Longi Solar Manufacturer Huawei Model LR5-54HIB-410M Model Luna2000-10-SO, with inverter5 kW (Original PVsyst database) Technology Lithium-ion, LFP Unit Nom. Power 410 Wp Nb. of units 1 Unit Number of PV modules 10 units Discharging min. SOC 10.0 % Nominal (STC) 4100 Wp Stored energy 8.6 kWh 2 Strings x 5 In series Modules **Battery Pack Characteristics** At operating cond. (50°C) Voltage 48 V 3753 Wp Nominal Capacity 200 Ah (C10) Pmpp 142 V Temperature Fixed 20 °C U mpp 26 A I mpp Controller **Battery Management control** Manufacturer Victron Threshold commands as Battery voltage Model SmartSolar MPPT 250/60 48V Charging 57.1 / 49.6 V Technology MPPT converter Discharging 44.9 / 48.8 V -2.7 mV/°C/Elem. Temp coeff. Converter Maxi and EURO efficiencies 99.0 / 97.0 % **Total PV power**

Nominal (STC) 4.10	kWp
Total 10	modules
Module area 19.5	m²
Cell area 18.0	m²

-0.4 %

Array losses

Array So	ling Losse	es									
Average lo	ss Fraction			20.0 %							
Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
60.0%	75.0%	45.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.0%	45.0%
Thermal Loss factor Module temperature according to irradiance			DC wiring losses Global array res.		88	88 mΩ		Serie Diode Loss Voltage drop		s 0.7 V	
Uc (const)		20.0 W	//m²K	Loss Fra	iction	1.5 % at STC		t STC Loss Fraction		0.5 % at S	
Uv (wind)		0.0 W	//m²K/m/s								
Module Quality Loss			Module	mismatch	losses		String	gs Mismat	ch loss		

Loss Fraction

2.0 % at MPP

Loss Fraction

Loss Fraction

0.2 %



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Array losses								
IAM loss fact Incidence effec	t or t (IAM): User de	fined 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

Domestic appliances

Fridge / Deep-freeze

Stand-by consumers

Total daily energy

Daily household consumers, Seasonal modulation, average = 2.3 kWh/day

Summer (Jun-Aug) Nb. Power Use Energy Wh/day W Hour/day Lamps (LED or fluo) 6 10/lamp 4.0 240 TV / PC / Mobile 1 75/app 3.0 225 Domestic appliances 1 200/app 3.0 600 799 Fridge / Deep-freeze 1 24 Stand-by consumers 24.0 144 Total daily energy 2008

Winter (Dec-Feb)

	Nb.	Power	Use	Energy
		W	Hour/day	Wh/day
Lamps (LED or fluo)	6	10/lamp	6.0	360
TV / PC / Mobile	1	75/app	6.0	450
Domestic appliances	1	200/app	4.0	800
Fridge / Deep-freeze	1		24	799
Stand-by consumers			24.0	144
Total daily energy				2553

Nb. Energy Power Use W Hour/day Wh/day Lamps (LED or fluo) 10/lamp 6 5.0 TV / PC / Mobile 1 75/app 4.0

200/app

1

1

300

300

800

799

144

2343

4.0

24

24.0

Autumn (Sep-Nov)

Spring (Mar-May)

	Nb.	Power	Use	Energy
		W	Hour/day	Wh/day
Lamps (LED or fluo)	6	10/lamp	5.0	300
TV / PC / Mobile	1	75/app	4.0	300
Domestic appliances	1	200/app	4.0	800
Fridge / Deep-freeze	1		24	799
Stand-by consumers			24.0	144
Total daily energy				2343





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Main results **System Production** Useful energy from solar 706.79 kWh/year Perf. Ratio PR 4156.34 kWh/year Solar Fraction SF Available solar energy Excess (unused) 1.10 kWh/year Loss of Load Time Fraction 15.1 % Cycles SOW Static SOW **Missing Energy** 136.56 kWh/year

Normalized productions (per installed kWp)



Battery aging (State of Wear)Cycles SOW98.4 %Static SOW90.0 %

13.57 %

83.81 %



Balances and main results

	GlobHor	GlobEff	E_Avail	EUnused	E_Miss	E_User	E_Load	SolFrac
	kWh/m²	kWh/m²	kWh	kWh	kWh	kWh	kWh	ratio
January	9.6	8.1	26.1	0.197	49.37	29.78	79.15	0.376
February	27.4	12.6	42.0	0.218	33.71	37.78	71.49	0.528
March	78.7	65.8	257.7	0.177	0.33	72.31	72.64	0.996
April	124.1	154.5	585.4	0.022	0.00	70.30	70.30	1.000
Мау	160.6	172.9	633.8	0.000	0.00	72.64	72.64	1.000
June	169.9	173.4	628.1	0.042	0.00	60.25	60.25	1.000
July	165.4	170.4	612.7	0.000	0.00	62.25	62.25	1.000
August	127.9	147.6	536.4	0.021	0.00	62.25	62.25	1.000
September	87.0	118.6	441.3	0.000	0.00	70.30	70.30	1.000
October	43.1	71.0	269.7	0.000	0.00	72.64	72.64	1.000
November	13.6	26.0	98.6	0.184	2.88	67.42	70.30	0.959
December	5.1	7.1	24.4	0.242	50.27	28.88	79.15	0.365
Year	1012.6	1127.9	4156.3	1.104	136.56	706.79	843.35	0.838

Legends

Legen	45		
GlobHo	r 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)
EUnuse	ed Unused energy (battery full)		
E_Miss	Missing energy		



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