Version 7.3.1

PVsyst - Simulation report

Grid-Connected System

Project: New Project

Variant: New simulation variant

Sheds on ground

System power: 51.2 kWp

Manipur - Nepal

Author

PVsyst V7.3.1
VC0, Simulation date:
06/19/24 16:46
with v7.3.1

Project summary

Geographical Site
Manipur
Nepal

Situation

Latitude	27.60 °N
Longitude	84.31 °E
Altitude	163 m
Time zone	UTC+5.8

Project settings
Albedo 0.20

Meteo data
Purba Amritnagar
Meteonorm 8.1 (1996-2015), Sat=100% - Synthetic

System summary

Grid-Connected System
Simulation for year no 25

Sheds on ground

PV Field Orientation
Fixed plane
Tilt/Azimuth 25 / 0 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array		Inverters	
Nb. of modules	128 units	Nb. of units	2 units
Pnom total	51.2 kWp	Pnom total	40.0 kWac
		Pnom ratio	1.280

Results summary

Produced Energy	61146 kWh/year	Specific production	1194 kWh/kWp/year	Perf. Ratio PR	70.09 %

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General parameters

Grid-Connected System

Sheds on ground

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	25 / 0 °

Sheds configuration	
Nb. of sheds	16 units
Sizes	
Sheds spacing	5.00 m
Collector width	3.46 m
Ground Cov. Ratio (GCR)	69.3 %
Shading limit angle	
Limit profile angle	38.3 °

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	Longi Solar
Model	LR5-54HIH-400M
(Original PVsyst database)	
Unit Nom. Power	400 Wp
Number of PV modules	128 units
Nominal (STC)	51.2 kWp
Modules	8 Strings x 16 In series
At operating cond. (50°C)	
Pmpp	46.9 kWp
U mpp	445 V
I mpp	105 A

Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-20KTL-M3 220Vac
(Original PVsyst database)	
Unit Nom. Power	20.0 kWac
Number of inverters	2 units
Total power	40.0 kWac
Operating voltage	200-750 V
Max. power (=>40°C)	22.0 kWac
Pnom ratio (DC:AC)	1.28
Power sharing within this inverter	

Total PV power

Nominal (STC)	51 kWp
Total	128 modules
Module area	250 m²
Cell area	230 m²

Total inverter power

Total power	40 kWac
Number of inverters	2 units
Pnom ratio	1.28

Array losses

Array Soiling Losses
Loss Fraction 1.0 %

Thermal Loss factor

Module temperature according to irradiance	
Uc (const)	20.0 W/m²K
Uv (wind)	0.0 W/m²K/m/s

DC wiring losses

Global array res.	70 mΩ
Loss Fraction	1.5 % at STC

Module Quality Loss
Loss Fraction -0.4 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

Module average degradation

Year no	25
Loss factor	0.4 %/year
Mismatch due to degradation	
Imp RMS dispersion	0.4 %/year
Vmp RMS dispersion	0.4 %/year

Array losses

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

System losses

Unavailability of the system

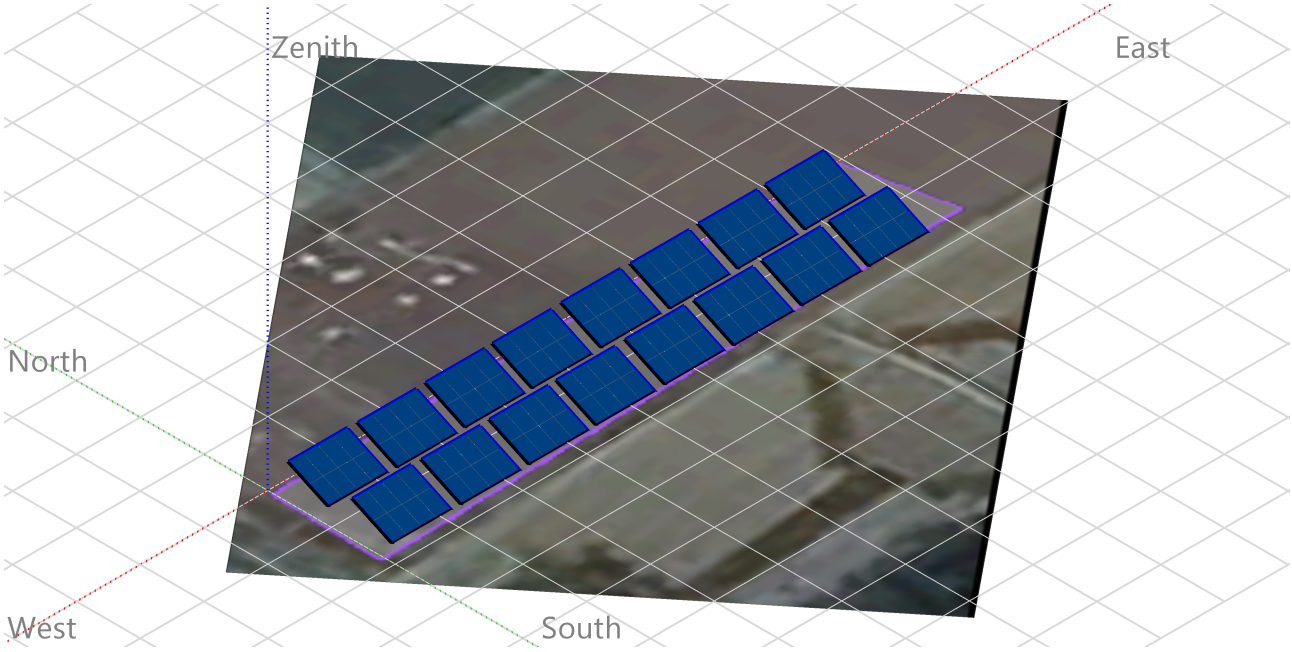
Time fraction	2.0 %
	7.3 days,
	3 periods

Auxiliaries loss

constant (fans)	1 W
0.0 kW from Power thresh.	
Night aux. cons.	1 W

Near shadings parameter

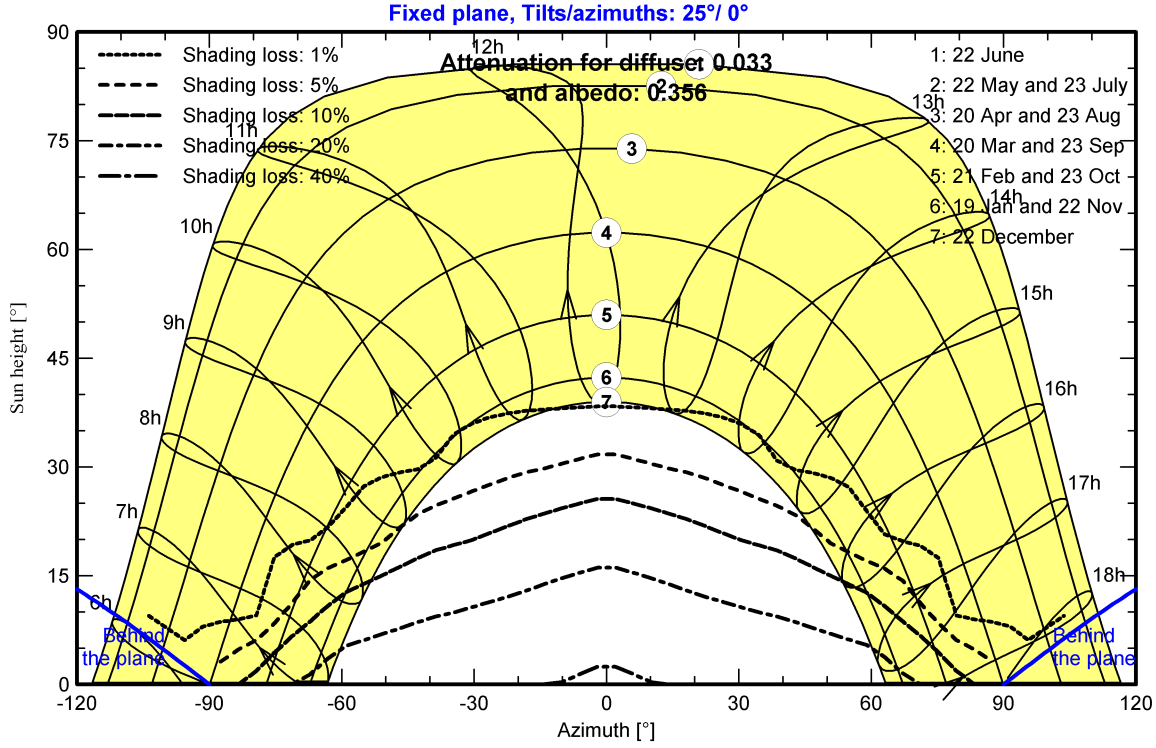
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 25°/ 0°

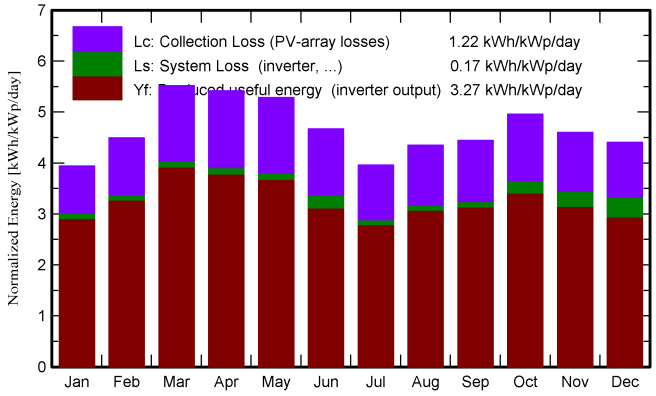


Main results

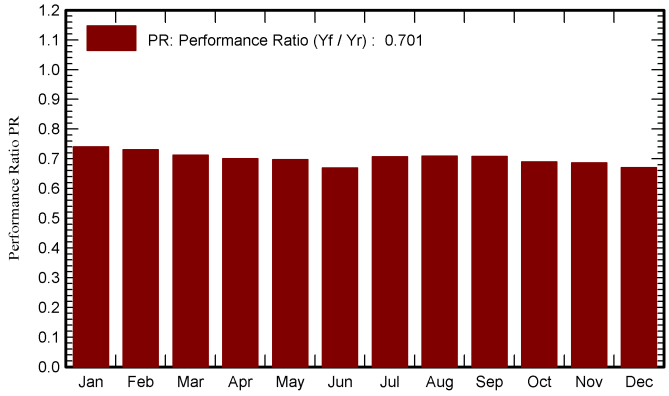
System Production

Produced Energy	61146 kWh/year	Specific production	1194 kWh/kWp/year
		Performance Ratio PR	70.09 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh	E_Grid kWh	PR ratio
January	94.3	46.30	14.18	122.2	116.5	4792	4633	0.741
February	105.3	56.71	19.11	125.8	120.5	4859	4703	0.730
March	153.9	75.48	24.75	170.9	164.6	6436	6233	0.712
April	159.9	89.20	29.37	162.4	155.7	6010	5824	0.700
May	172.0	95.91	31.02	163.7	156.5	6034	5845	0.697
June	150.7	99.69	30.66	140.0	133.1	5203	4795	0.669
July	131.8	87.38	29.54	122.8	116.4	4588	4442	0.707
August	137.6	91.49	29.36	134.8	128.2	5048	4889	0.709
September	126.3	74.79	28.39	133.3	127.3	4988	4830	0.708
October	131.4	68.65	26.24	153.6	147.7	5810	5426	0.690
November	107.5	53.07	21.01	138.0	132.0	5299	4847	0.686
December	99.8	47.16	16.18	136.5	128.9	5291	4679	0.670
Year	1570.6	885.83	25.01	1703.9	1627.4	64357	61146	0.701

Legends

GlobHor	Global horizontal irradiation
DiffHor	Horizontal diffuse irradiation
T_Amb	Ambient Temperature
GlobInc	Global incident in coll. plane
GlobEff	Effective Global, corr. for IAM and shadings
EArray	Effective energy at the output of the array
E_Grid	Energy injected into grid
PR	Performance Ratio

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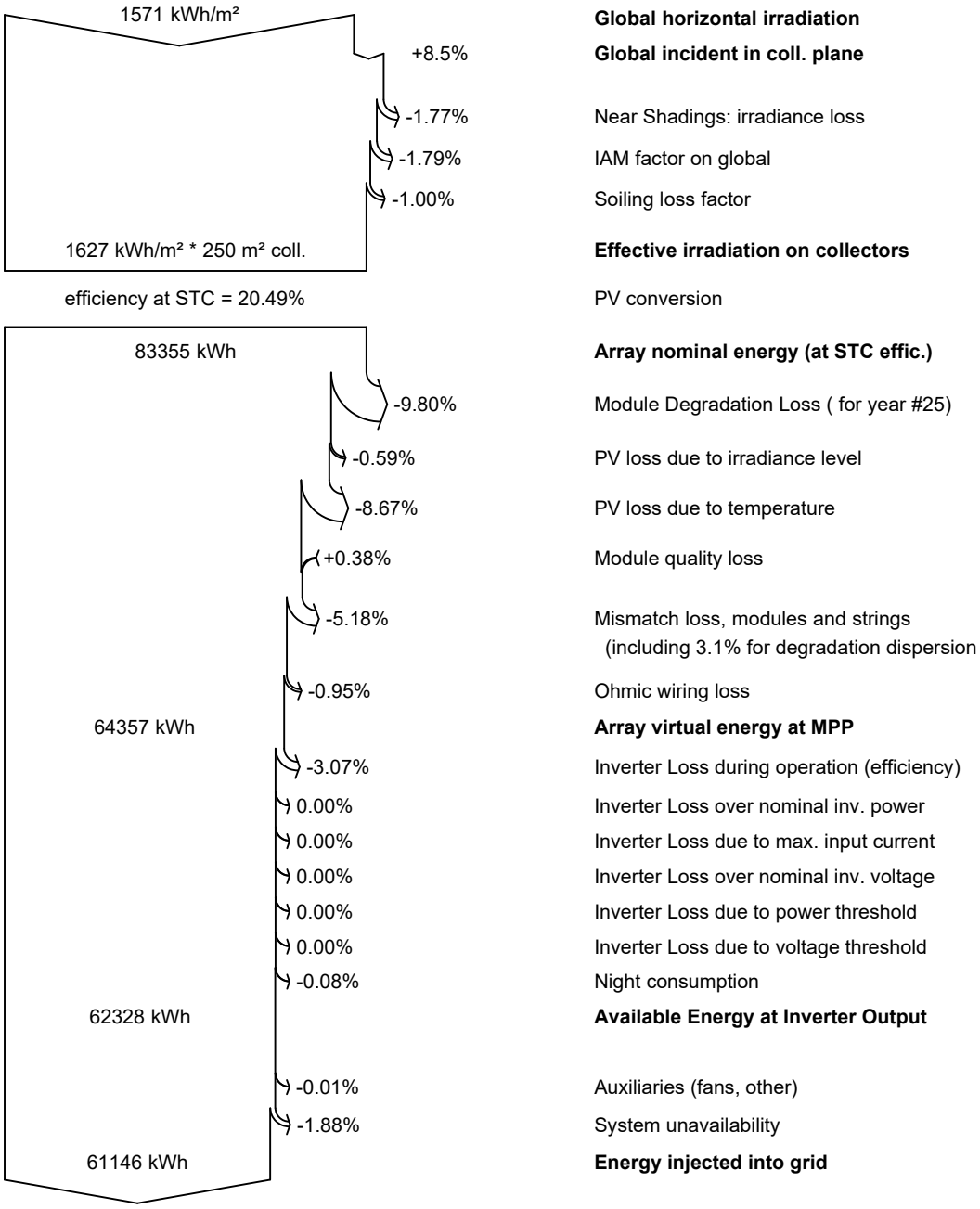
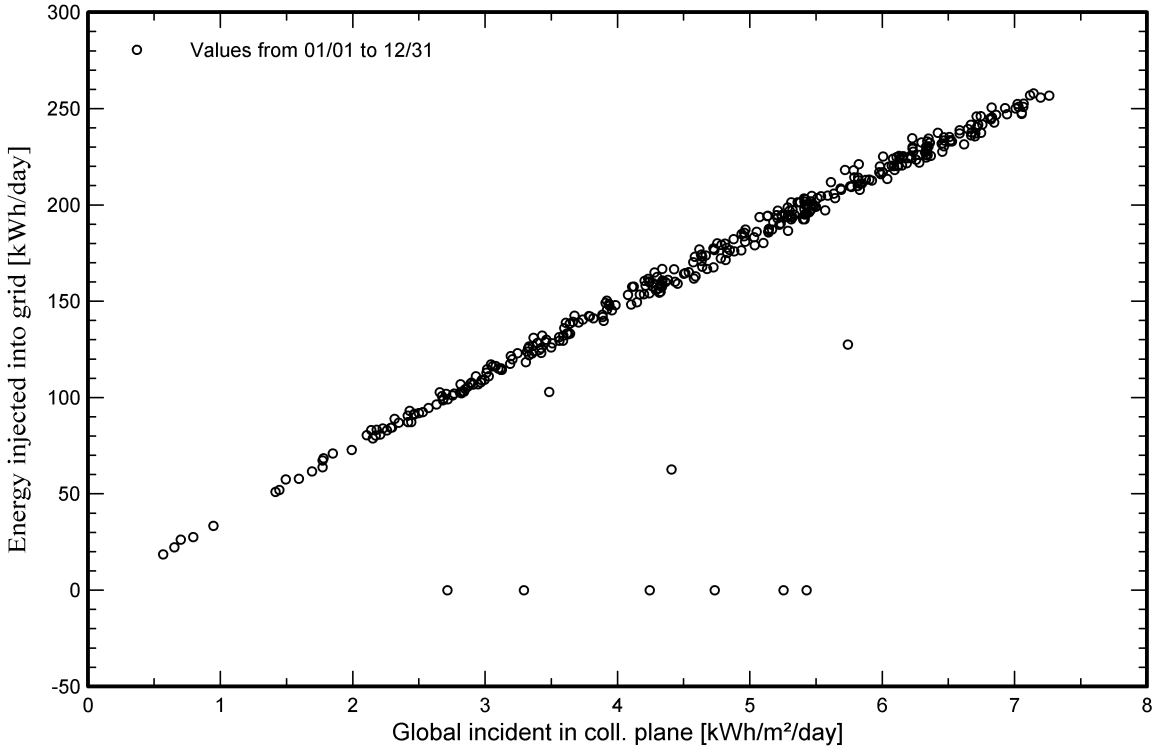
Loss diagram

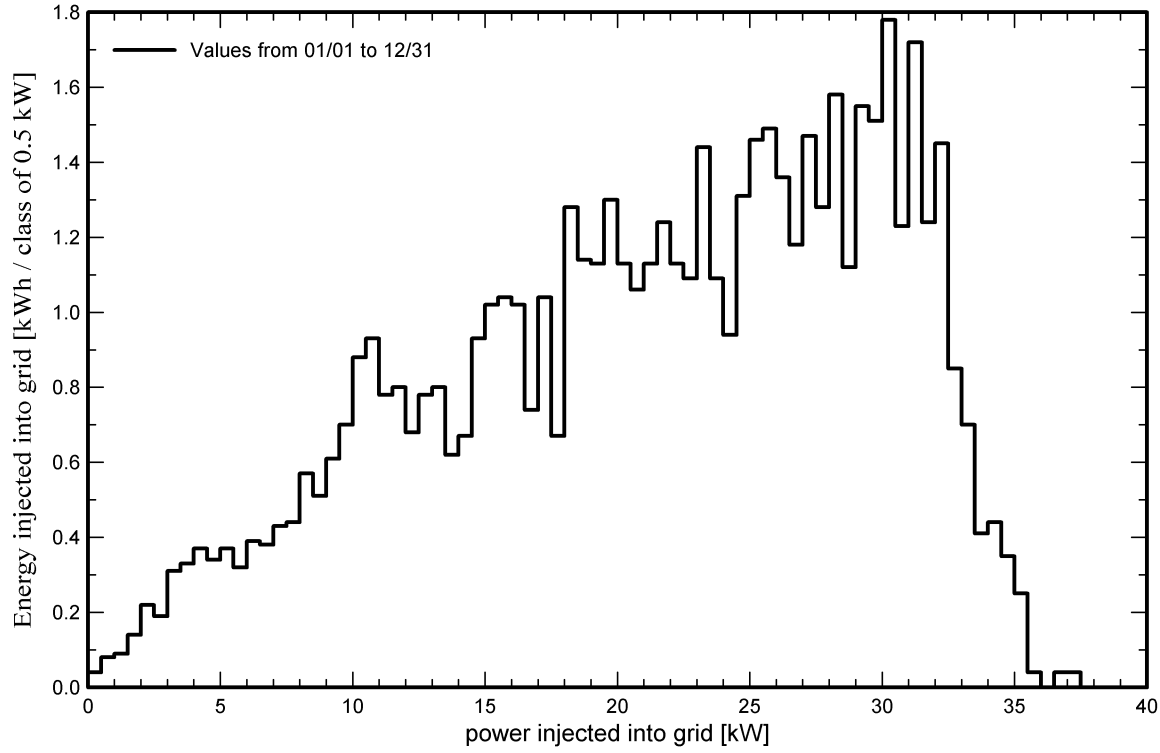


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



Single-line diagram

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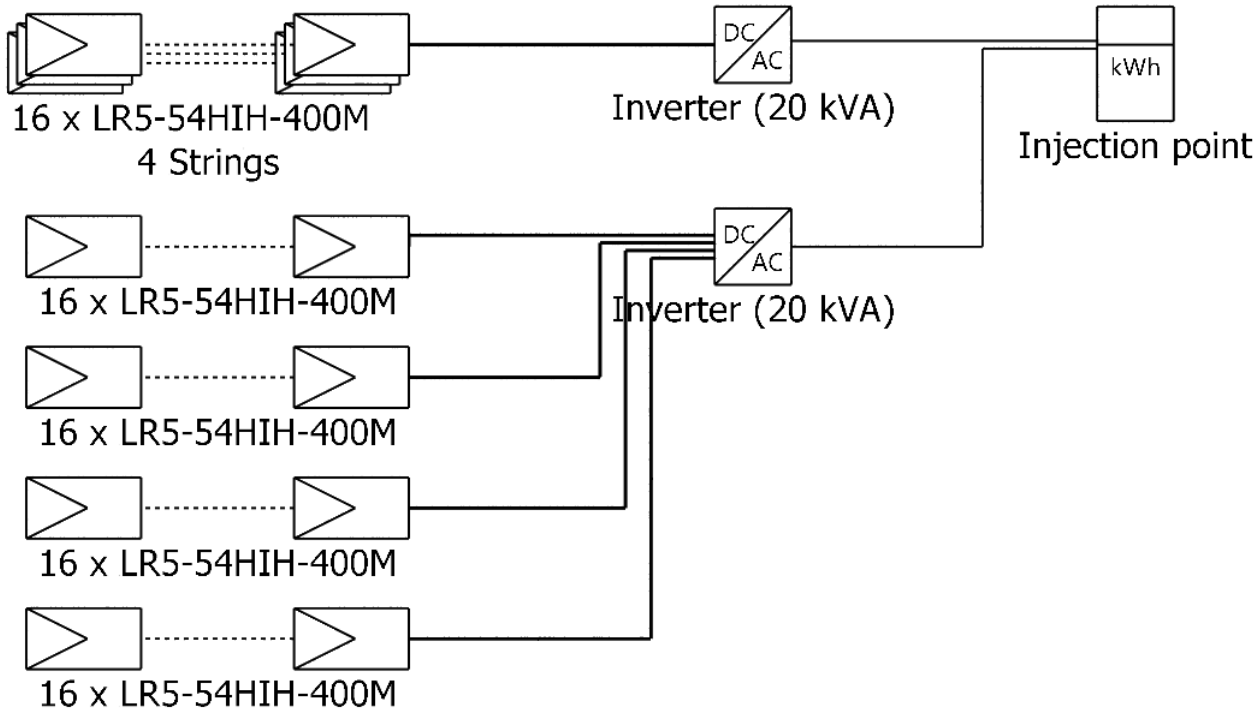

PV module	LR5-54HIH-400M
Inverter	SUN2000-20KTL-M3 220Vac
String	16 x LR5-54HIH-400M

	New Project	
	VC0 : New simulation variant	07/01/24

Cost of the system

Installation costs

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

Operating costs

Item	Total NRs/year
Total (OPEX)	0.00

System summary

Total installation cost	0.00 NRs
Operating costs	0.00 NRs/year
Produced Energy	61.2 MWh/year
Cost of produced energy (LCOE)	0.000 NRs/kWh

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CO_2 Emission Balance

Total: -19867.4 tCO_2

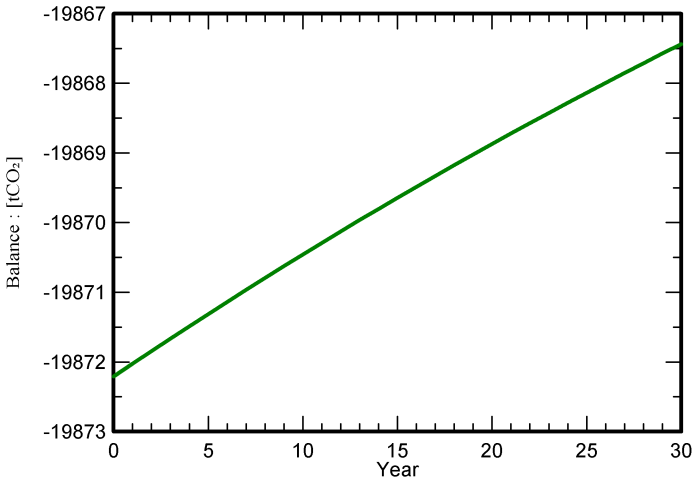
Generated emissions

Total: 19872.21 tCO_2
Source: Detailed calculation from table below:

Replaced Emissions

Total: 5.5 tCO_2
System production: 61.15 MWh/yr
Grid Lifecycle Emissions: 3 gCO_2/kWh
Source: IEA List
Country: Nepal
Lifetime: 30 years
Annual degradation: 1.0 %

Saved CO_2 Emission vs. Time



System Lifecycle Emissions Details

Item	LCE	Quantity	Subtotal
			[$kgCO_2$]
Modules	2141 kgCO2/kWp	9280 kWp	19867552
Supports	0.02 kgCO2/kg	232000 kg	4642
Inverters	1.98 kgCO2/	8.00	15.9