Version 7.4.5

PVsyst - Simulation report

Grid-Connected System

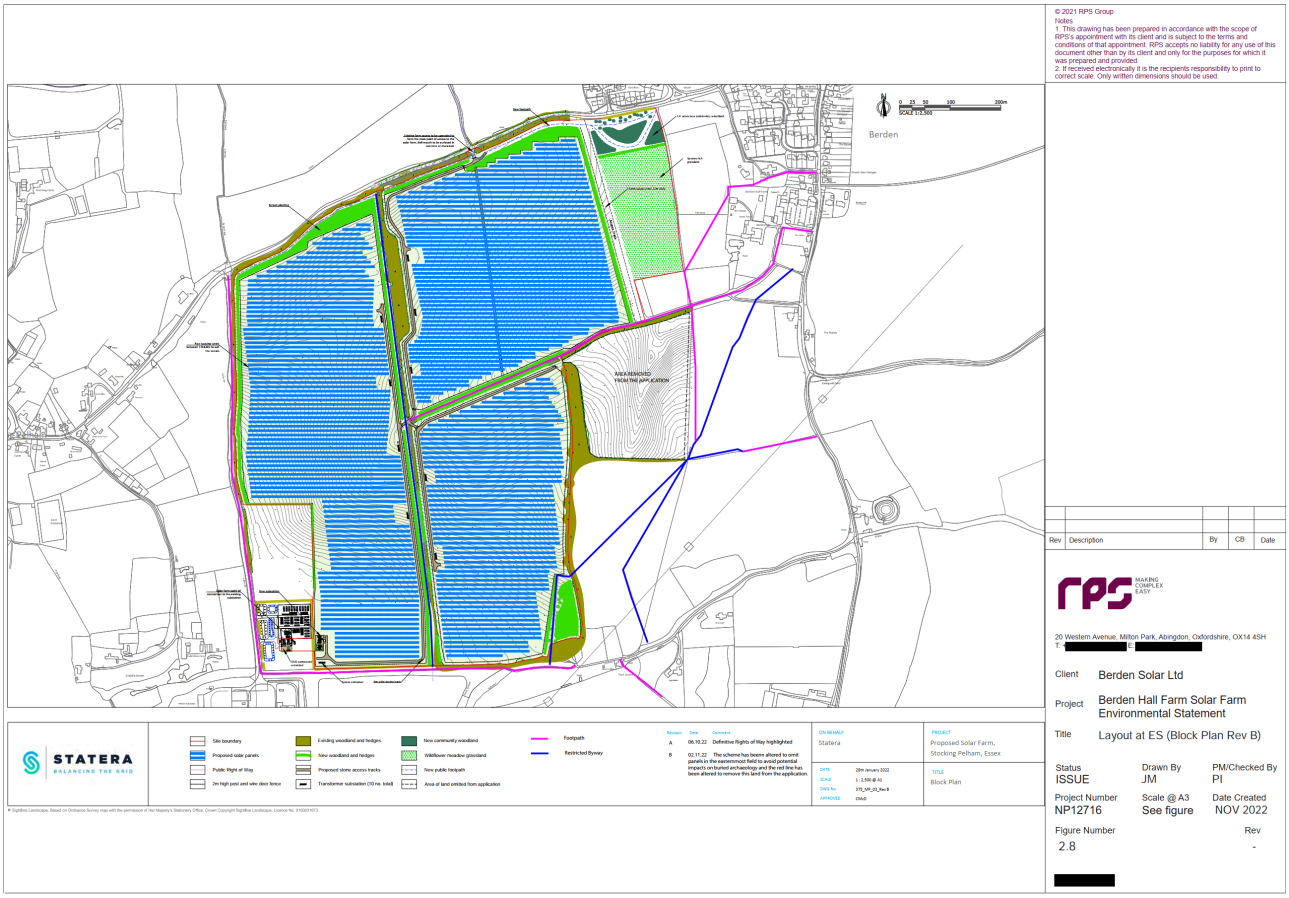
Project: SE_Pelham Solar Farm

Variant: 240304_CS6W-550 & Huawei 175kTL (full shading scene)

Ground system (tables) on a hill

System power: 52.62 MWp

StockingPelham_England - United Kingdom



Client

Statera Energy

United Kingdom

Author

Helioworks (United Kingdom)

PVsyst V7.4.5
VC4, Simulation date:
04/03/24 14:07
with v7.4.5

Project summary

Geographical Site
StockingPelham_England
United Kingdom

Situation

Latitude	51.94 °N
Longitude	0.12 °E
Altitude	114 m
Time zone	UTC

Project settings
Albedo 0.20

Meteo data
StockingPelham_England
Meteonorm 8.0 (1986-2005), Sat=100% - Synthetic

System summary

Grid-Connected System
Ground system (tables) on a hill

PV Field Orientation
Fixed plane
Tilt/Azimuth 20 / -2 °

Near Shadings
According to strings : Fast (table)
Electrical effect 50 %

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	95664 units
Pnom total	52.62 MWp

Inverters

Nb. of units	214 units
Pnom total	37.45 MWac
Pnom ratio	1.405

Results summary

Produced Energy	55578553 kWh/year	Specific production	1056 kWh/kWp/year	Perf. Ratio PR	85.17 %

Table of contents

PVsyst V7.4.5
VC4, Simulation date:
04/03/24 14:07
with v7.4.5

General parameters

Grid-Connected System

Ground system (tables) on a hill

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	20 / -2 °

Sheds configuration	
Nb. of sheds	1840 units
Sizes	
Sheds spacing	8.69 m
Collector width	4.60 m
Ground Cov. Ratio (GCR)	52.9 %

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon

Average Height	1.0 °

Near Shadings

According to strings : Fast (table)	
Electrical effect	50 %

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	CSI Solar
Model	CS6W-550MS 1500V
(Original PVsyst database)	
Unit Nom. Power	550 Wp
Number of PV modules	95664 units
Nominal (STC)	52.62 MWp
Modules	3986 string x 24 In series
At operating cond. (50°C)	
Pmpp	48.20 MWp
U mpp	902 V
I mpp	53426 A

Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-175KTL-H0
(Original PVsyst database)	
Unit Nom. Power	175 kWac
Number of inverters	214 units
Total power	37450 kWac
Operating voltage	600-1500 V
Max. power (=>25°C)	193 kWac
Pnom ratio (DC:AC)	1.40
Power sharing within this inverter	

Total PV power

Nominal (STC)	52615 kWp
Total	95664 modules
Module area	245280 m²

Total inverter power

Total power	37450 kWac
Max. power	41302 kWac
Number of inverters	214 units
Pnom ratio	1.40

Array losses

Array Soiling Losses

Loss Fraction	0.8 %

Thermal Loss factor

Module temperature according to irradiance	
Uc (const)	29.0 W/m²K
Uv (wind)	0.0 W/m²K/m/s

DC wiring losses

Global array res.	0.28 mΩ
Loss Fraction	1.5 % at STC

LID - Light Induced Degradation

Loss Fraction	1.0 %

Module Quality Loss

Loss Fraction	-0.5 %

Module mismatch losses

Loss Fraction	0.5 % at MPP

Strings Mismatch loss

Loss Fraction	0.1 %

IAM loss factor

ASHRAE Param.: IAM = 1 - bo (1/cosi -1)	
bo Param.	0.05

System losses

Auxiliaries loss

Proportionnal to Power	2.0 W/kW
0.0 kW from Power thresh.	
Night aux. cons.	2.00 kW

PVsyst V7.4.5
VC4, Simulation date:
04/03/24 14:07
with v7.4.5

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage	800	Vac tri
Loss Fraction	1.50	% at STC

Inverter: SUN2000-175KTL-H0

Wire section (214 Inv.)	Copper 214 x 3 x 70	mm²
Average wires length	148	m

MV line up to Injection

MV Voltage	11	kV
Average each inverter		
Wires	Copper 3 x 2000	mm²
Length	2500	m
Loss Fraction	0.10	% at STC

AC losses in transformers

MV transfo

Medium voltage	11	kV

One transfo parameters

Nominal power at STC	5.18	MVA
Iron Loss (24/24 Connexion)	5.18	kVA
Iron loss fraction	0.10	% at STC
Copper loss	51.86	kVA
Copper loss fraction	1.00	% at STC
Coils equivalent resistance	3 x 1.24	mΩ

Operating losses at STC (full system)

Nb. identical MV transfos	10	
Nominal power at STC	51.76	MVA
Iron loss (24/24 Connexion)	51.76	kVA
Copper loss	518.64	kVA

PVsyst V7.4.5
VC4, Simulation date:
04/03/24 14:07
with v7.4.5

Horizon definition

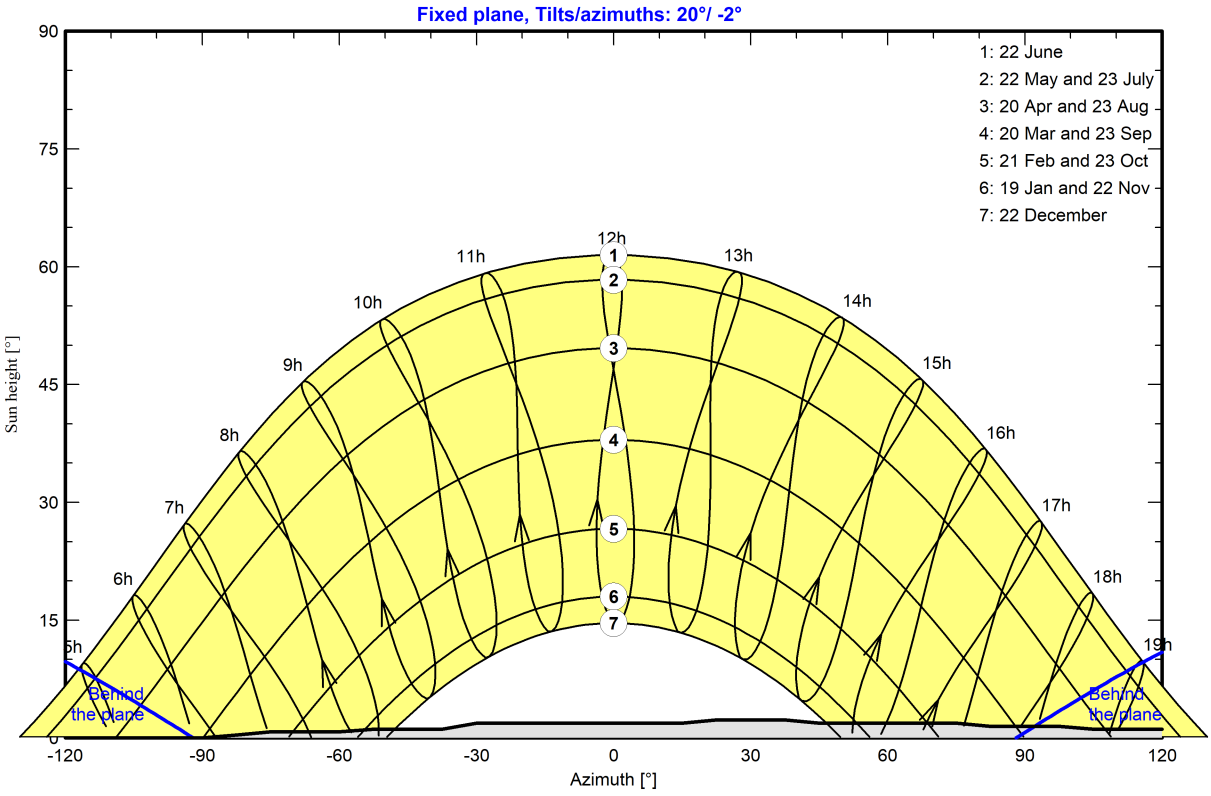
Horizon from PVGIS website API, Lat=51°56"31', Long=0°7"26', Alt=114m

Average Height	1.0 °	Albedo Factor	0.91
Diffuse Factor	0.99	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-90	-83	-75	-60	-53	-38	-30	15	23	38
Height [°]	0.0	0.0	0.4	0.8	0.8	1.1	1.1	1.9	1.9	2.3	2.3
Azimuth [°]	45	75	83	98	105	120	128	143	150	173	180
Height [°]	1.9	1.9	1.5	1.5	1.1	1.1	0.8	0.8	0.4	0.4	0.0

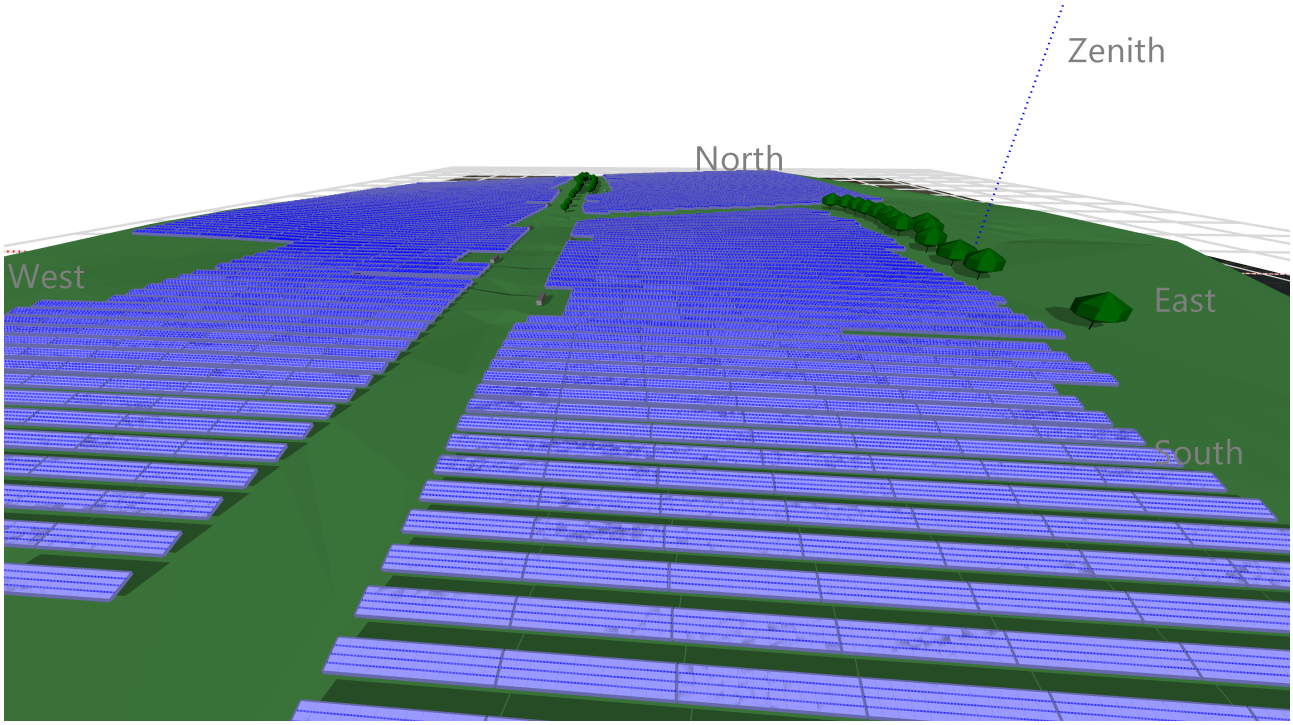
Sun Paths (Height / Azimuth diagram)



PVsyst V7.4.5
VC4, Simulation date:
04/03/24 14:07
with v7.4.5

Near shadings parameter

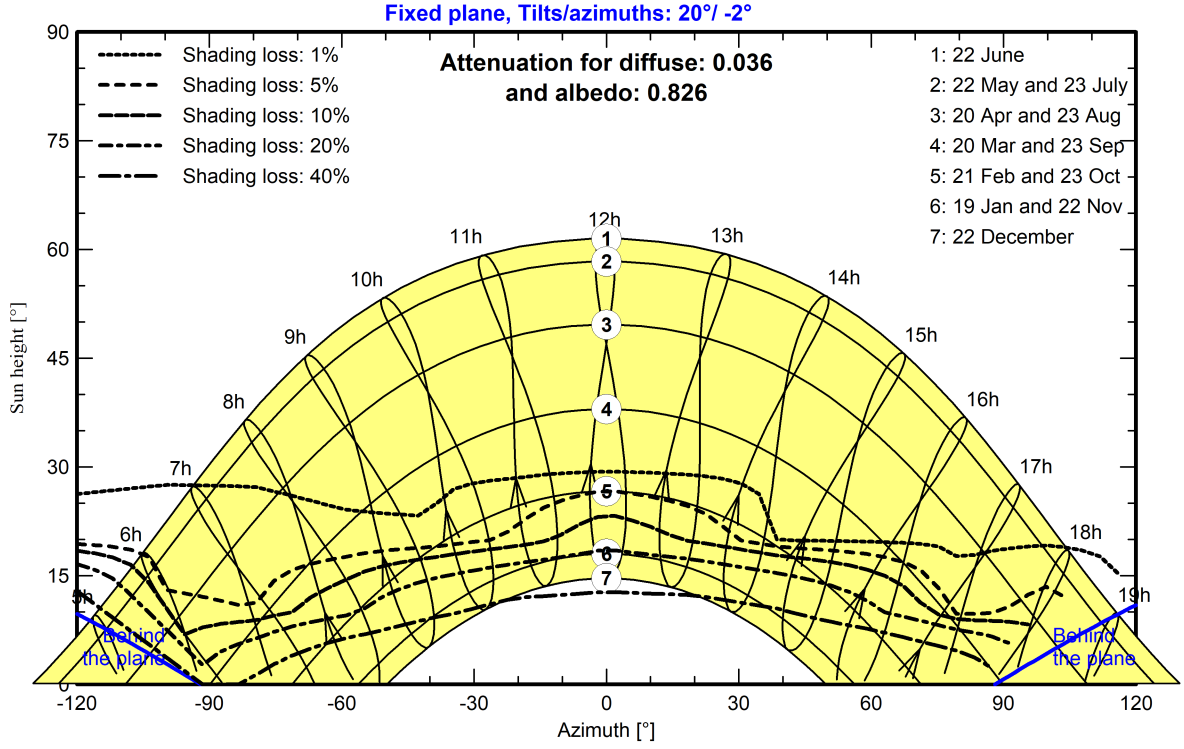
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 20°/ -2°



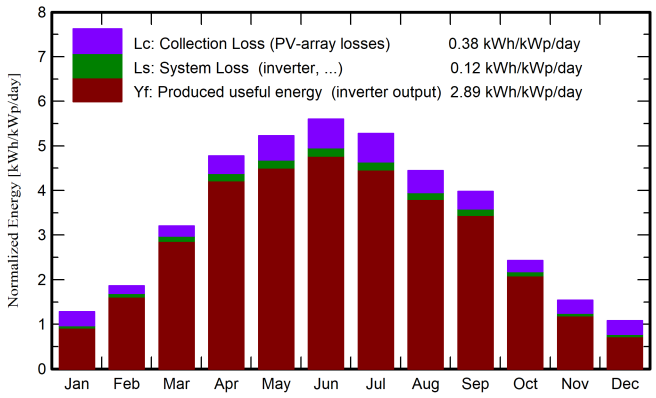
PVsyst V7.4.5
VC4, Simulation date:
04/03/24 14:07
with v7.4.5

Main results

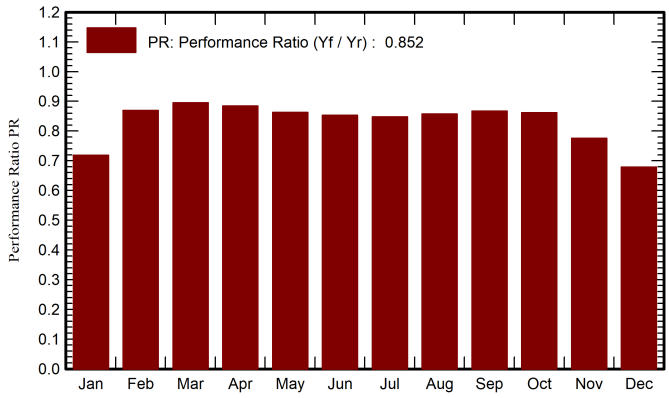
System Production

Produced Energy	55578553 kWh/year	Specific production	1056 kWh/kWp/year
		Perf. Ratio PR	85.17 %

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	23.7	13.09	4.32	39.7	31.3	1583522	1500918	0.719
February	38.3	22.71	4.41	52.2	48.0	2495731	2388669	0.869
March	78.8	42.57	6.15	99.3	93.3	4863895	4676977	0.895
April	126.6	62.37	8.64	143.3	135.4	6922707	6662537	0.884
May	153.9	71.42	11.97	162.0	153.3	7654329	7359505	0.863
June	164.5	82.73	15.01	168.0	158.8	7838302	7540477	0.853
July	158.3	82.59	17.56	163.5	154.3	7582334	7292196	0.848
August	127.9	72.59	17.07	137.8	129.9	6460270	6214276	0.857
September	97.9	44.95	14.20	119.5	112.8	5668726	5448194	0.867
October	57.2	30.97	11.01	75.2	69.9	3559188	3412754	0.862
November	29.5	16.16	6.89	46.2	39.2	1982290	1888466	0.776
December	20.0	12.41	5.07	33.4	25.2	1267720	1193585	0.679
Year	1076.6	554.56	10.23	1240.3	1151.4	57879014	55578553	0.852

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

PVsyst V7.4.5
VC4, Simulation date:
04/03/24 14:07
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Loss diagram