

Powering change

Spirit Energy

Spirit House, 25 Albury Close . Reading RG30 1EA

Contact person:

N Rifai Phone: 0118 951 4490 E-Mail: najeyr@spiritenergy.co.uk

Customer No.: 37513 Project Name: Tok Charles - Solar Consultancy Example

18/04/2024

Your PV system from Spirit Energy

Address of Installation

Tok Charles Spirit Energy Spirit House 25 Albury Close Reading



Project Description: Example Advanced Modelling for Solar Consultancy



Created with PV*SOL premium 2024 (R6)

Spirit Energy Tok Charles



Project Overview



Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV system with Electrical Appliances, Electric Vehicles and Battery Systems

Climate Data	Reading (MET-N-8), GBR (2001 -
	2020)
Values source	Meteonorm 8.2(i)
PV Generator Output	10.53 kWp
PV Generator Surface	50.8 m ²
Number of PV Modules	26
Number of Inverters	2
No. of battery systems	1
No. of vehicles	1



Spirit Energy



Figure: Schematic diagram

SPILIT

ENERGY

Powering change

Production Forecast

Production Forecast	
PV Generator Output	10.53 kWp
Spec. Annual Yield	759.04 kWh/kWp
Performance Ratio (PR)	76.33 %
Yield Reduction due to Shading	10.3 %
PV Generator Energy (AC grid)	8,003 kWh/Year
Direct Own Use	5,658 kWh/Year
Battery Charge	1,015 kWh/Year
Charge of the electric vehicle	1,264 kWh/Year
Clipping at Feed-in Point	0 kWh/Year
Grid Export	66 kWh/Year
Own Power Consumption	99.2 %
CO ₂ Emissions avoided	3,714 kg/year
Level of Self-sufficiency	29.8 %



Financial Analysis

Your Gain	
Total investment costs	19,830.00 £
Internal Rate of Return (IRR)	12.65 %
Amortization Period	8.6 Years
Electricity Production Costs	0.0992 £/kWh
Energy Balance/Feed-in Concept	Surplus Feed-in

The results have been calculated with a mathematical model calculation from Valentin Software GmbH (PV*SOL algorithms). The actual yields from the solar power system may differ as a result of weather variations, the efficiency of the modules and inverter, and other factors.









Set-up of the System

Overview

System Data	
Type of System	3D, Grid-connected PV system with Electrical Appliances, Electric Vehicles and Battery Systems
Start of Operation	18/04/2024
Climate Data	
Location	Reading (MET-N-8), GBR (2001 - 2020)
Values source	Meteonorm 8.2(i)
Resolution of the data	1 min
Simulation models used:	
- Diffuse Irradiation onto Horizontal Plane	Hofmann
- Irradiance onto tilted surface	Hay & Davies

Consumption	
Total Consumption	24000 kWh
Annual Half Hourly Electrical Consumption	24000 kWh
Load Peak	2.7 kW



Figure: Consumption





Module Areas

1. Module Area - House 3D Model 01-Sketched mounting surface 03

PV Generator, 1. Module Area - House 3D Model 01-Sketched mounting surface 03

Name	House 3D Model 01-Sketched
	mounting surface 03
PV Modules	12 x Clearline PV16-405 (v1)
Manufacturer	Viridian Solar
Inclination	35 °
Orientation	West 249 °
Installation Type	Roof integrated - rear ventilation
PV Generator Surface	23.4 m ²



Figure: 1. Module Area - House 3D Model 01-Sketched mounting surface 03



Spirit Energy

Powering change

SPIRIT

ENERGY

Degradation of Module, 1. Module Area - House 3D Model 01-Sketched mounting surface 03	
Characteristic curve	Exponential
Remaining power (power output) after 1 year	98 %
Remaining power (power output) after 25 years	85 %



Figure: Degradation of Module, 1. Module Area - House 3D Model 01-Sketched mounting surface 03





2. Module Area - House 3D Model 01-Sketched mounting surface 02

PV Generator, 2. Module Area - House 3D Model 01-Sketched mounting surface 02

	-
Name	House 3D Model 01-Sketched
	mounting surface 02
PV Modules	8 x Clearline PV16-405 (v1)
Manufacturer	Viridian Solar
Inclination	35 °
Orientation	East 69 °
Installation Type	Roof integrated - rear ventilation
PV Generator Surface	15.6 m ²



Figure: 2. Module Area - House 3D Model 01-Sketched mounting surface 02



Spirit Energy

Degradation of Module, 2. Module Area - House 3D Model 01-Sketched mounting surface 02

Characteristic curve	Exponential
Remaining power (power output) after 1 year	98 %
Remaining power (power output) after 25 years	85 %



Figure: Degradation of Module, 2. Module Area - House 3D Model 01-Sketched mounting surface 02



SPILIT

ENERGY

Powering change



3. Module Area - House 3D Model 01-Sketched mounting surface 01

PV Generator, 3. Module Area - House 3D Model 01-Sketched mounting surface 01

Name House 3D Model 01-Sketched	
mounting surface 01	
PV Modules 6 x Clearline PV16-405 (v1)	
Manufacturer Viridian Solar	
Inclination 45 °	
Orientation South 159 °	
Installation Type Roof integrated - rear ventilation	
PV Generator Surface 11.7 m ²	



Figure: 3. Module Area - House 3D Model 01-Sketched mounting surface 01



Spirit Energy

Degradation of Module, 3. Module Area - House 3D Model 01-Sketched mounting surface 01

Characteristic curve	Exponential
Remaining power (power output) after 1 year	98 %
Remaining power (power output) after 25 years	85 %



Figure: Degradation of Module, 3. Module Area - House 3D Model 01-Sketched mounting surface 01



SPILIT

ENERGY

Powering change



Horizon Line, 3D Design



Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

0	
Module Areas	House 3D Model 01-Sketched mounting surface 03 + House 3D Model 01-Sketched mounting surface 02
Inverter 1	
Model	Solis-1P8K-5G (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	101.3 %
Configuration	MPP 1: 1 x 12

Configuration	MPP 1: 1 x 12
	MPP 2: 1 x 8

urface 01
2.5K (v2)
ong (Solis)
1
97.2 %
P 1: 1 x 3
P 2: 1 x 3



AC Mains

AC Mains	
Number of Phases	1
Mains voltage between phase and neutral	230 V
Displacement Power Factor (cos phi)	+/- 1

Battery Systems

Battery System - Group 1

Model	Tesla Powerwall 2.0 AC (v3)
Manufacturer	Tesla Motors
Quantity	1
Battery Inverter	
Type of Coupling	AC coupling
Nominal output	4.6 kW
Battery	
Manufacturer	Tesla Motors
Model	Powerwall 2 (v1)
Quantity	1
Battery Energy	13.5 kWh
Battery Type	Lithium iron phosphate

Electric Vehicles

Electric vehicle - Group 1

Electric vehicle	
Model	Model Y Max. Range (AC charging)
	(v1)
Manufacturer	Tesla
No. of vehicles	1
Range in accordance with WLTP	533 km
Battery Capacity	78.1 kWh
Consumption	16 kWh / 100km
Charging station	
Charging Power	11 kW
Charging technology	AC Typ 2
Charging mode	PV optimized
Discharge for covering consumption	No
Use	
Desired range per week	250 km
Mileage per year	13036 km



SPILIT

ENERGY

Powering change



Simulation Results

Results Total System



Electric vehicle Charge at beginning 78 kWh Charge of the electric vehicle (Total) Charge of the electric vehicle (Total) 2,338 kWh/Year covered by PV power 1,264 kWh/Year covered by battery 34 kWh/Year covered by grid 1,040 kWh/Year Discharging the electric vehicle for 0 kWh/Year consumption Losses due to charging/discharging 226 kWh/Year Losses in Battery 104 kWh/Year Consumption due to kilometres driven 2086 kWh/Year covered by PV power 🛛 🗾 covered by grid Mileage per year 13036 km/Year covered by battery of which is solar 7240 km/Year





Spirit Energy

Battery System		
Charge at beginning	14 kWh	Battery Charge (Total)
Battery Charge (Total)	1,045 kWh/Year	, 30, ,
covered by PV power	1,015 kWh/Year	
covered by grid	30 kWh/Year	
Battery Energy for the Covering of Consumption	968 kWh/Year	
Charge of the electric vehicle	34 kWh/Year	
Consumption	933 kWh/Year	
Losses due to charging/discharging	87 kWh/Year	-
Losses in Battery	4 kWh/Year	
Cycle Load	2.7 %	covered by PV power covered by gr
Service Life	>20 Years	

Level of Self-sufficiency

Total Consumption	26,348 kWh/Year
covered by grid	18,489 kWh/Year
Level of Self-sufficiency	29.8 %



Figure: Energy flow



SPIRIT ENERGY Powering change

Spirit Energy



Figure: Production Forecast with consumption



Figure: Use of PV Energy





Spirit Energy





Figure: Coverage of Consumption

Figure: Coverage of total consumption





Results per Module Area

House 3D Model 01-Sketched mounting surface 03

PV Generator Output	4.86 kWp
PV Generator Surface	23.43 m ²
Global Radiation at the Module	971.70 kWh/m²
Global Radiation on Module without reflection	1024.27 kWh/m²
Performance Ratio (PR)	84.41 %
PV Generator Energy (AC grid)	4203.29 kWh/Year
Spec. Annual Yield	864.87 kWh/kWp

House 3D Model 01-Sketched mounting surface 02

PV Generator Output	3.24 kWp
PV Generator Surface	15.62 m²
Global Radiation at the Module	783.27 kWh/m ²
Global Radiation on Module without reflection	838.31 kWh/m²
Performance Ratio (PR)	74.43 %
PV Generator Energy (AC grid)	2022.15 kWh/Year
Spec. Annual Yield	624.12 kWh/kWp

House 3D Model 01-Sketched mounting surface 01

PV Generator Output	2.43 kWp
PV Generator Surface	11.72 m ²
Global Radiation at the Module	1093.41 kWh/m²
Global Radiation on Module without reflection	1141.37 kWh/m²
Performance Ratio (PR)	64.05 %
PV Generator Energy (AC grid)	1777.13 kWh/Year
Spec. Annual Yield	731.33 kWh/kWp



PV System Energy Balance

PV System Energy Balance			
Global radiation - horizontal	1,027.38	kWh/m²	
Deviation from standard spectrum	-10.27	kWh/m²	-1.00 %
Ground Reflection (Albedo)	21.02	kWh/m²	2.07 %
Orientation and inclination of the module surface	-33.65	kWh/m²	-3.24 %
Module-independent shading	-10.41	kWh/m²	-1.04 %
Reflection on the Module Surface	-52.27	kWh/m²	-5.26 %
Global Radiation at the Module	941.81	kWh/m²	
	941.81	kWh/m²	
	x 50.771	m²	
	= 47,816.99	kWh	
Global PV Radiation	47,816.99	kWh	
Soiling	0.00	kWh	0.00 %
STC Conversion (Rated Efficiency of Module 20.75 %)	-37,896.78	kWh	-79.25 %
Rated PV Energy	9,920.21	kWh	
Module-specific Partial Shading	-746.75	kWh	-7.53 %
Low-light performance	-314.10	kWh	-3.42 %
Deviation from the nominal module temperature	-169.08	kWh	-1.91 %
Diodes	-19.97	kWh	-0.23 %
Mismatch (Manufacturer Information)	-173.41	kWh	-2.00 %
Mismatch (Configuration/Shading)	-80.33	kWh	-0.95 %
PV Energy (DC) without inverter clipping	8,416.58	kWh	
Failing to reach the DC start output	-16.93	kWh	-0.20 %
Clipping on account of the MPP Voltage Range	-25.89	kWh	-0.31 %
Clipping on account of the max. DC Current	-11.96	kWh	-0.14 %
Clipping on account of the max. DC Power	-0.05	kWh	0.00 %
Clipping on account of the max. AC Power/cos phi	-1.13	kWh	-0.01 %
MPP Matching	-1.77	kWh	-0.02 %
PV energy (DC)	8,358.85	kWh	
Energy at the Inverter Input	8,358.85	kWh	
Input voltage deviates from rated voltage	-8.27	kWh	-0.10 %
DC/AC Conversion	-283.48	kWh	-3.39 %
Standby Consumption (Inverter)	-9.90	kWh	-0.12 %
Total Cable Losses	-64.54	kWh	-0.80 %
PV energy (AC) minus standby use	7,992.67	kWh	
PV Generator Energy (AC grid)	8.002.57	kWh	





Financial Analysis

Overview

System Data		
Grid Export in the first year (incl. module degradation)	65	kWh/Year
PV Generator Output	10.5	kWp
Start of Operation of the System	18/04/2024	
Assessment Period	25	Years
Interest on Capital	0	%
Economic Parameters		
Internal Rate of Return (IRR)	12.65	%
Accrued Cash Flow (Cash Balance)	65,465.22	£
Amortization Period	8.6	Years
Electricity Production Costs	0.0992	£/kWh
Travel cost without PV	4.45	£/100 km
Travel cost with PV	3.01	£/100 km
Payment Overview		
Specific Investment Costs	1,883.19	£/kWp
Investment Costs	19,830.00	£
One-off Payments	0.00	£
Incoming Subsidies	0.00	£
Annual Costs	0.00	£/Year
Other Revenue or Savings	0.00	£/Year
Remuneration and Savings		
Total Payment from Utility in First Year	11.72	£/Year
First year savings	2,006.17	£/Year
Octonus Flux (17.70n/WM/h) Duilding System		
Validity	12/02/2024	11/02/2040
Specific feed in / expert Remuneration	12/03/2024 -	£/k/k/b
Specific feed-in / export Remuneration	0.1779	£/Xoor
Inflation Pato for Food in / Export Tariff		V/Voor
	5.00	/0/ 1001
Octopus Flux (Octopus)		
Energy Price Tariff period 1	0.2466	£/kWh
Saving Tariff period 1	1,700.28	£/Year
Energy Price Tariff period 2	0.1479	£/kWh
Saving Tariff period 2	1.24	£/Year
Energy Price Tariff period 3	0.3452	£/kWh
Saving Tariff period 3	326.67	£/Year
Base Price	18.51	£/Month
Inflation Rate for Energy Price	5	%/Year









Figure: Development of energy costs





Cash flow

SPIRIT
ENERGY
Powering change

Cash flow					
	Year 1	Year 2	Year 3	Year 4	Year 5
Investments	-£19,830.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£11.09	£12.07	£12.47	£12.90	£13.38
Electricity Savings	£1,976.88	£2,065.87	£2,132.22	£2,205.20	£2,284.86
Annual Cash Flow	-£17,842.03	£2,077.94	£2,144.68	£2,218.10	£2,298.24
Accrued Cash Flow (Cash Balance)	-£17,842.03	-£15,764.08	-£13,619.40	-£11,401.30	-£9,103.06
Cash flow					
	Year 6	Year 7	Year 8	Year 9	Year 10
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£13.89	£14.45	£15.05	£15.69	£16.38
Electricity Savings	£2.371.26	£2,464,49	£2,564,65	£2.671.90	£2.786.41
Annual Cash Flow	£2.385.16	£2.478.94	£2.579.70	£2.687.59	£2.802.78
Accrued Cash Flow (Cash Balance)	-£6,717.90	-£4,238.96	-£1,659.26	£1,028.33	£3,831.12
Cash flow					
	Year 11	Year 12	Year 13	Year 14	Year 15
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£17.11	£17.89	£18.71	£19.59	£20.52
Electricity Savings	£2,908.35	£3,037.96	£3,175.47	£3,321.14	£3,475.29
Annual Cash Flow	£2,925.46	£3,055.84	£3,194.18	£3,340.74	£3,495.81
Accrued Cash Flow (Cash Balance)	£6,756.57	£9,812.42	£13,006.60	£16,347.33	£19,843.14
Cash flow					
	Year 16	Year 17	Year 18	Year 19	Year 20
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£21.50	£22.54	£23.64	£24.80	£26.02
Electricity Savings	£3,638.21	£3,810.25	£3,991.78	£4,183.20	£4,384.93
Annual Cash Flow	£3,659.71	£3,832.80	£4,015.43	£4,208.00	£4,410.95
Accrued Cash Flow (Cash Balance)	£23,502.85	£27,335.65	£31,351.07	£35,559.07	£39,970.03
Cash flow					
	Year 21	Year 22	Year 23	Year 24	Year 25
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£27.31	£28.67	£30.10	£31.61	£33.20
Electricity Savings	£4,597.41	£4,821.12	£5,056.57	£5,304.30	£5,564.88
Annual Cash Flow	£4,624.72	£4,849.79	£5,086.68	£5,335.92	£5,598.08
Accrued Cash Flow (Cash Balance)	£44,594.75	£49,444.54	£54,531.22	£59,867.14	£65,465.22
Degradation and inflation rates are applied on a monthly basis over the entire observation period. This is done in the first year.					



Spirit Energy

-20000

1 2 3 4 5







ż

6

9 10 11 12 13

8

15 16

17 18

14

Years

Figure: Accrued Cash Flow (Cash Balance)

19 20 21 22 23 24 25





Data Sheets

PV Module Data Sheet

PV Module: Clearline PV16-405 (v1)

Manufacturer	Viridian Solar	
Available	Yes	
Flastwisel Data		
	Si monocrystalling	
Half coll modulo	Simonocrystalline	
	109	
Number of Bynass Diodes	100	
Loss voltage per hypass diode	1	V
Integrated power ontimizer	No	v
Only Transformer Inverters suitable	No	
I/V Characteristics at STC		
MPP Voltage	31.02	V
MPP Current	13.06	A
Open Circuit Voltage	37.05	V
Short-Circuit Current	13.62	A
Increase open circuit voltage before stabilisation	0	%
Nominal output	405	W
Fill Factor	80.28	%
	20.75	%
Efficiency	20.75	/0
Efficiency I/V Part Load Characteristics (calculated)	20.75	70
Efficiency I/V Part Load Characteristics (calculated) Values source	Standard (PV*SOL Model)	70
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance	Standard (PV*SOL Model) 200	W/m ²
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load	20.73 Standard (PV*SOL Model) 200 29.32	W/m ² V
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load	20.73 Standard (PV*SOL Model) 200 29.32 2.61	W/m² V A
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load)	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35	W/m ² V A V
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72	W/m ² V A V A
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72	W/m ² V A V A
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 -103.2	W/m ² V A V A mV/K
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 -103.2 6.8	W/m ² V A V A mV/K mA/K
Efficiency // Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Pmpp	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 -103.2 6.8 -0.35	W/m ² V A V A M V A M V/K mA/K %/K
Efficiency I/V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Pmpp Incident Angle Modifier (IAM)	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 2.72 -103.2 6.8 -0.35 95	W/m ² V A V A M V A M V/K M K %
Efficiency // Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Pmpp Incident Angle Modifier (IAM) Maximum System Voltage	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 2.72 -103.2 6.8 -0.35 95 1000	W/m ² V A V A M V A M V K % K % V
Efficiency // Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Pmpp Incident Angle Modifier (IAM) Maximum System Voltage Mechanical Data	Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 	W/m ² V A V A V A M V/K % K % V V
Efficiency // Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Pmpp Incident Angle Modifier (IAM) Maximum System Voltage Mechanical Data Width	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 	W/m ² V A V A V A M V/K mA/K %/K % V
Efficiency // Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Pmpp Incident Angle Modifier (IAM) Maximum System Voltage Mechanical Data Width Height	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72 	W/m ² V A V A V A M V/K mA/K %/K % V V mm mm mm
Efficiency // V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Isc Temperature Coefficient of Pmpp Incident Angle Modifier (IAM) Maximum System Voltage Mechanical Data Width Height Depth	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72	W/m ² V A V A V A M V/K mA/K %/K %/K %/K % V V
Efficiency //V Part Load Characteristics (calculated) Values source Irradiance Voltage in MPP at Part Load Current in MPP at Part Load Open Circuit Voltage (Part Load) Short Circuit Current at Part Load Additional Parameters Temperature Coefficient of Voc Temperature Coefficient of Isc Temperature Coefficient of Isc Temperature Coefficient of Pmpp Incident Angle Modifier (IAM) Maximum System Voltage Mechanical Data Width Height Depth Frame Width	20.73 Standard (PV*SOL Model) 200 29.32 2.61 33.35 2.72	W/m ² V A V A V A M V/K % V/K % V V M M M M M M M M M M M M M M M M M



Inverter Data Sheet

	Ciplene (Calia)
	Giniong (Solis)
Available	Yes
Electrical data - DC	
DC nominal output	8 kW
Max. DC Power	12 kW
Nom. DC Voltage	330 V
Max. Input Voltage	600 V
Max. Input Current	37.5 A
Max. short circuit current	49.5 A
Number of DC Inlets	3
Electrical data - AC	
AC Power Rating	8 kW
Max. AC Power	8 kVA
Nom. AC Voltage	230 V
Number of Phases	1
With Transformer	No
Electrical data _ other	
cieculical data - Other Change in Efficiency when Input Voltage deviates from Pated	0.2 %/1001/
Voltage	0.2 %/1000
Vin. Feed-in Power	38 W
Standby Consumption	1 W
Night Consumption	1 W
MPP Tracker	
Dutput Range < 20% of Power Rating	99.9 %
Dutput Range > 20% of Power Rating	100 %
Count of MPP Trackers	2
Count of different trackers	2
MPP Tracker Type 1	
Quantity	1
MPP Tracker	1
Max. Input Current	12.5 A
Max. short circuit current	19.5 A
Max. Input Power	8 kW
Min. MPP Voltage	90 V
Max. MPP Voltage	520 V
MPP Tracker Type 2	
Quantity	1
MPP Tracker	2
Max. Input Current	25 A
Max. short circuit current	30 A
Max. Input Power	8 kW
Min. MPP Voltage	90 V
Max, MPP Voltage	520 V





Spirit Energy



Manufacturer	Ginlong (Solis)
Available	Yes
Electrical data - DC	
DC nominal output	2.5 kW
Max. DC Power	5.6 kW
Nom. DC Voltage	250 V
Max. Input Voltage	550 V
Max. Input Current	28 A
Max. short circuit current	44 A
Number of DC Inlets	2
Electrical data - AC	
AC Power Rating	2.5 kW
Max. AC Power	2.8 kVA
Nom. AC Voltage	230 V
Number of Phases	1
With Transformer	No
Electrical data - other	
Change in Efficiency when Input Voltage deviates from Rated Voltage	0.2 %/100\
Min. Feed-in Power	30 W
Standby Consumption	1 W
Night Consumption	1 W
MPP Tracker	
Output Range < 20% of Power Rating	99.9 %
Output Range > 20% of Power Rating	100 %
Count of MPP Trackers	2
MPP Tracker 1-2	
Max. Input Current	14 A
Max. short circuit current	22 A
Max. Input Power	2.8 kW
Min. MPP Voltage	50 V
Max. MPP Voltage	450 V





Battery System Data Sheet

Battery System: Tesla Powerwall 2.0 AC (v3)

Manufacturer	Tesla Motors
Available	Yes
Battery Inverter	
Nominal output	4.6 kW
Maximum Charging Power	4.6 kW
Maximum Discharge Power	4.6 kW
Type of Coupling	AC coupling
Battery	
Manufacturer Battery	Tesla Motors
Model	Powerwall 2 (v1)
Quantity	1 (1×1)
DC Battery System Voltage	50.1 V
Usable Battery Energy	13.5 kWh
Capacity at t=10h	270 Ah

Battery Data Sheet

Battery: Powerwall 2 (v1)		
Manufacturer	Tesla Motors	
Available	Yes	
Electrical Data		
Battery Type	Lithium iron phosphate	
Cell voltage	3.34 V	
No. of Cells in Series	15	
Nom. Voltage	50.1 V	
Number of Battery Strings	2	
Internal Resistance	0.7 mΩ	
Self-Discharge	3 %/Month	
Service Life in Charge-discharge Cycles (DoD = 40 %)	11480	
Mechanical Data		
Length	155 mm	
Width	755 mm	
Height	1150 mm	
Weight	120 kg	





Electrical Vehicle Data Sheet

Electric vehicle: Model Y Max. Range (AC charging) (AC Typ 2) (v1)

Manufacturer	Tesla
Available	Yes
Vehicle	
Range in accordance with WLTP	533 km
Consumption	16 kWh / 100km
Battery Capacity	78.1 kWh
Discharge Power	11 kW
Engine power	378 kW
Number of seats	5
Charging station	
Charging technology	AC Typ 2
Charging Power	11 kW
Discharge for covering consumption	No









Figure: Circuit Diagram





Overview plan





Figure: Overview plan





Dimensioning Plan

























String Plan



Figure: House 3D Model 01 - Sketched mounting surface 03









Figure: House 3D Model 01 - Sketched mounting surface 02



Spirit Energy





Figure: House 3D Model 01 - Sketched mounting surface 01







Parts list

Parts list

#	Туре	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Viridian Solar	Clearline PV16-405	26	Piece
2	Inverter		Ginlong (Solis)	Solis-1P8K-5G	1	Piece
3	Inverter		Ginlong (Solis)	S6-GR1P2.5K	1	Piece
4	Battery System		Tesla Motors	Tesla Powerwall 2.0 AC	1	Piece
5	Electric vehicle		Tesla	Model Y Max. Range (AC charging)	1	Piece
6	Components			Feed-in Meter	1	Piece
7	Components			House connection	1	Piece
8	Components			Bidirectional Meter	1	Piece

