

Project Name: Meadow Bank, Whitehough Head Lane

05/07/2023

Your PV system

Address of Installation

Meadow Bank, Whitehough Head Lane,
Chinley, High Peak, SK23 6EJ



Positive Energy Solutions

Project Description:

Meadow Bank,
Whitehough Head Lane

Project Overview

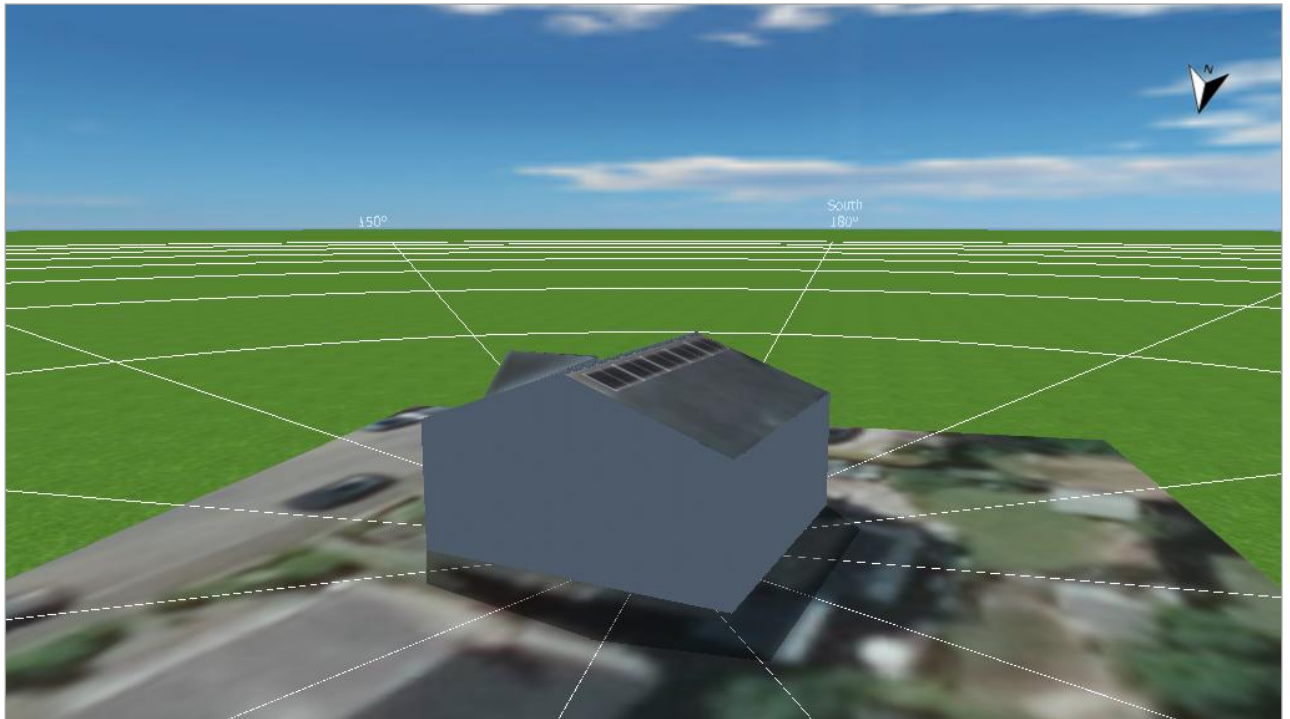


Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System with Electrical Appliances and Battery Systems

Climate Data	High Peak, GBR (1996 - 2015)
Values source	Meteonorm 8.1(i)
PV Generator Output	4.05 kWp
PV Generator Surface	19.5 m ²
Number of PV Modules	10
Number of Inverters	1
No. of battery systems	1

Meadow Bank, Whitehough Head Lane

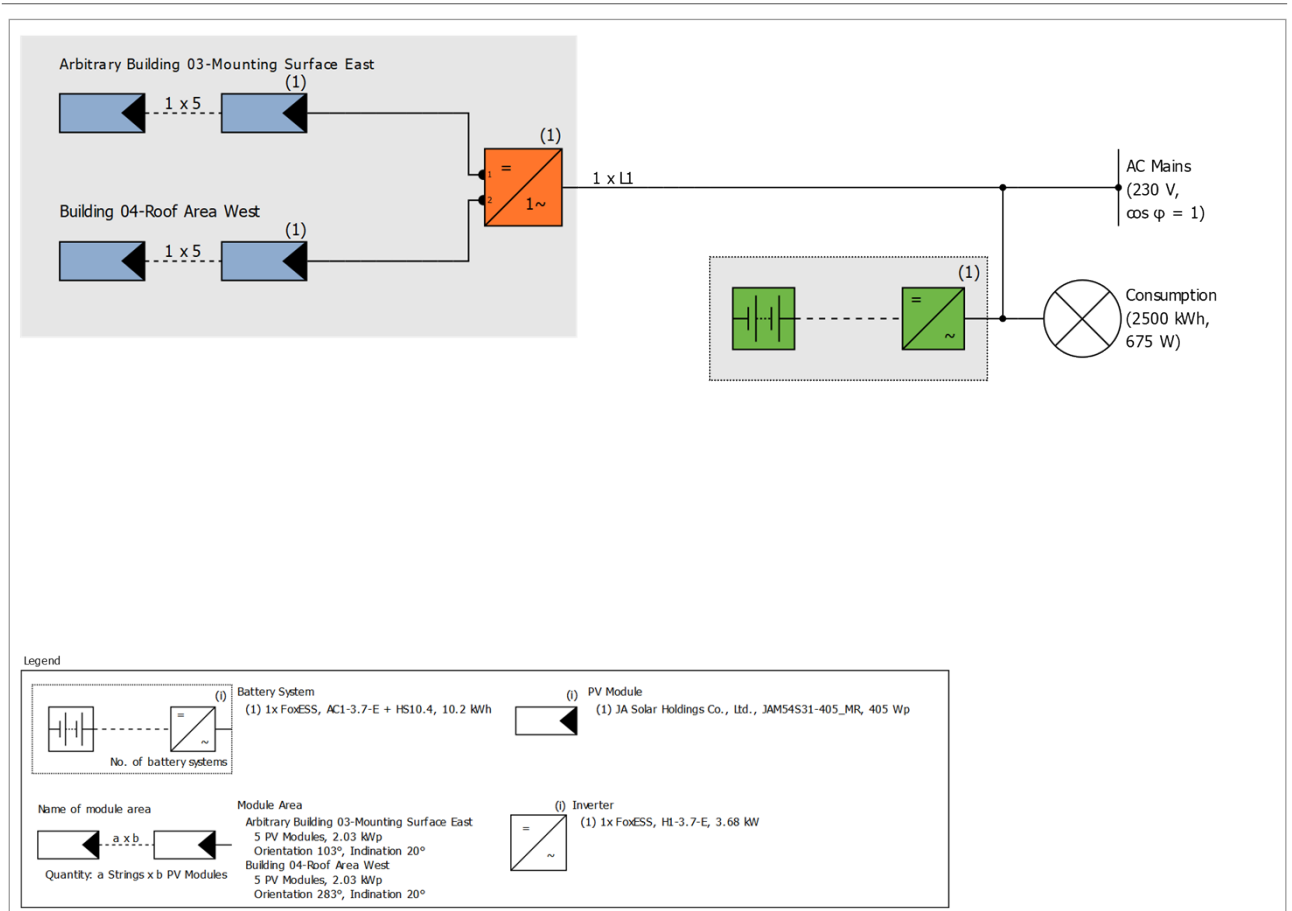


Figure: Schematic diagram

Production Forecast

Production Forecast

PV Generator Output	4.05 kWp
Spec. Annual Yield	877.12 kWh/kWp
Performance Ratio (PR)	91.67 %
Yield Reduction due to Shading	1.1 %
PV Generator Energy (AC grid)	3,563 kWh/Year
Direct Own Use	960 kWh/Year
Battery Charge	1,022 kWh/Year
Down-regulation at Feed-in Point	0 kWh/Year
Grid Export	1,581 kWh/Year
Own Power Consumption	55.5 %
CO ₂ Emissions avoided	1,578 kg / year
Level of Self-sufficiency	71.6 %

Financial Analysis

Your Gain

Total investment costs	0.00 £
Internal Rate of Return (IRR)	268.33 %
Amortization Period	0.0 Years
Electricity Production Costs	0 £/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 and Battery Systems
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Climate Data

Location	High Peak, GBR (1996 - 2015)
Values source	Meteonorm 8.1(i)
Resolution of the data	1 h
Simulation models used:	
- Diffuse Irradiation onto Horizontal Plane	Hofmann
- Irradiance onto tilted surface	Hay & Davies

Consumption

Total Consumption	2500 kWh
UK Household	2500 kWh
Load Peak	0.7 kW

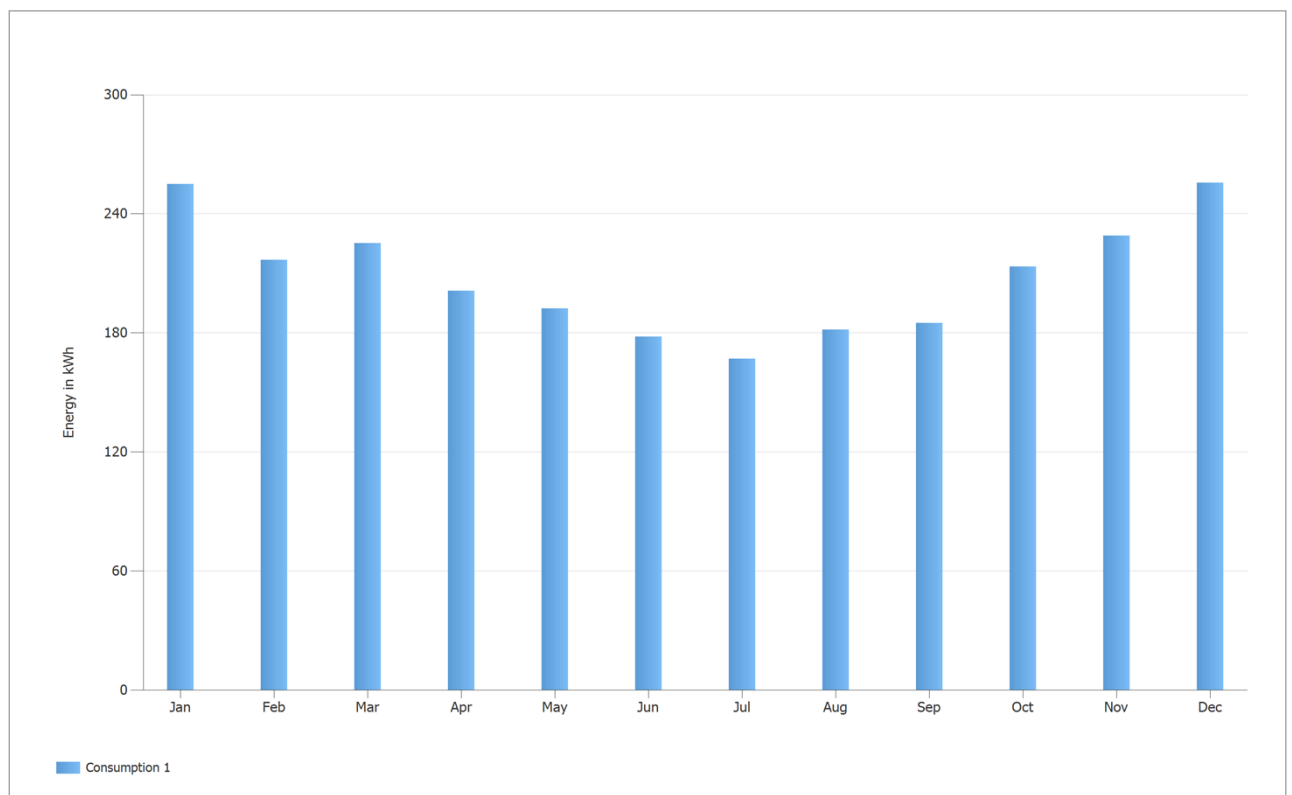


Figure: Consumption

Module Areas

1. Module Area - Arbitrary Building 03-Mounting Surface East

PV Generator, 1. Module Area - Arbitrary Building 03-Mounting Surface East

Name	Arbitrary Building 03-Mounting Surface East
PV Modules	5 x JAM54S31-405_MR (v1)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	20 °
Orientation	East 103 °
Installation Type	Roof parallel
PV Generator Surface	9.8 m ²

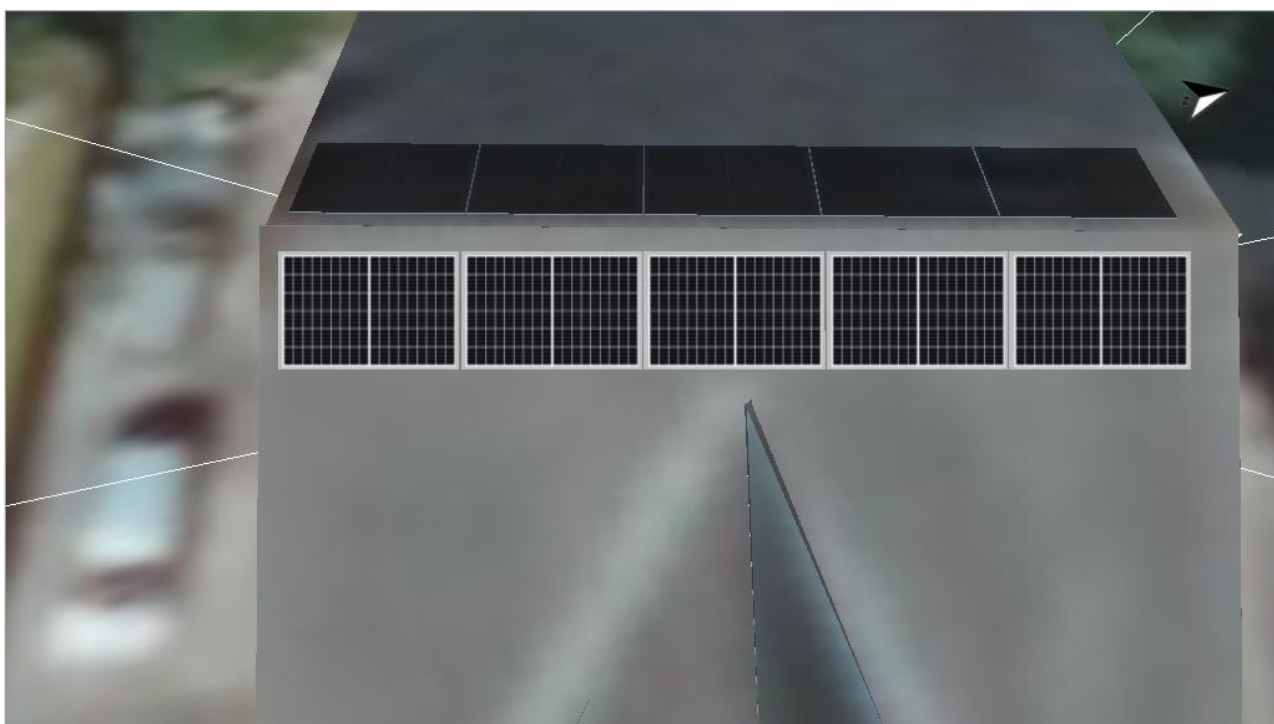


Figure: 1. Module Area - Arbitrary Building 03-Mounting Surface East

2. Module Area - Building 04-Roof Area West

PV Generator, 2. Module Area - Building 04-Roof Area West

Name	Building 04-Roof Area West
PV Modules	5 x JAM54S31-405_MR (v1)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	20 °
Orientation	West 283 °
Installation Type	Roof parallel
PV Generator Surface	9.8 m²

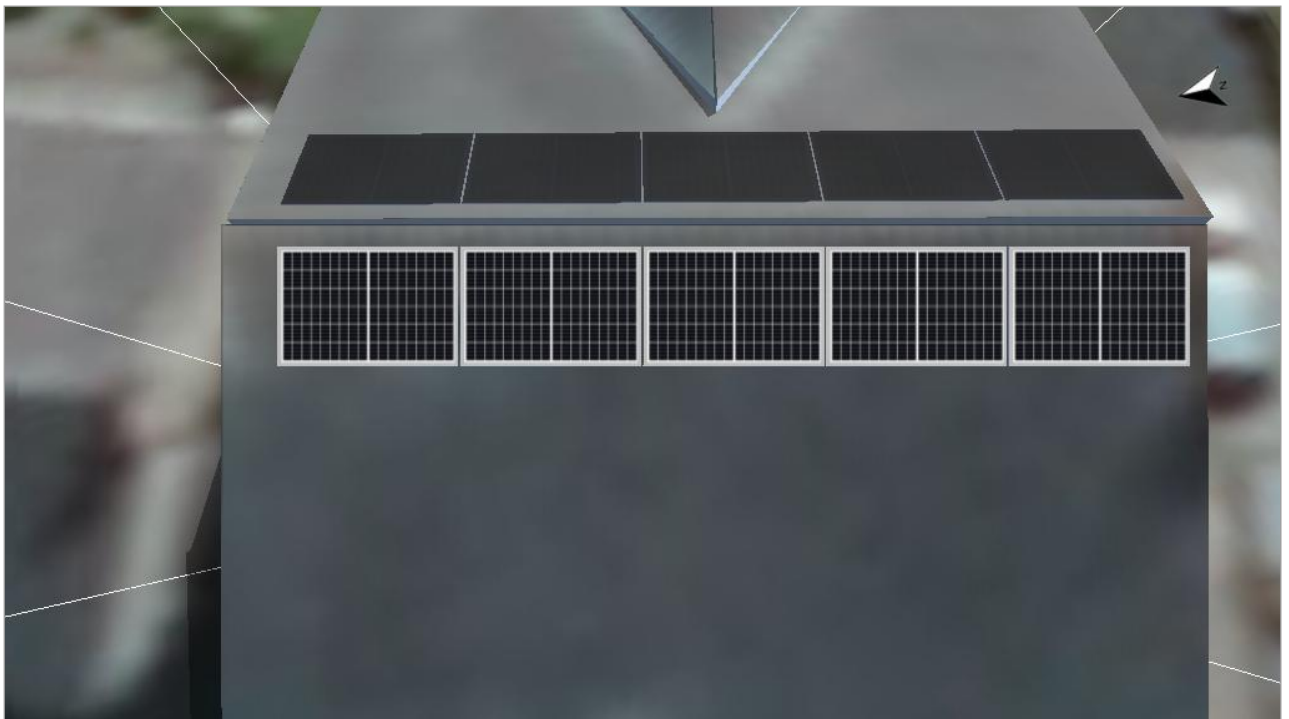


Figure: 2. Module Area - Building 04-Roof Area West

Horizon Line, 3D Design

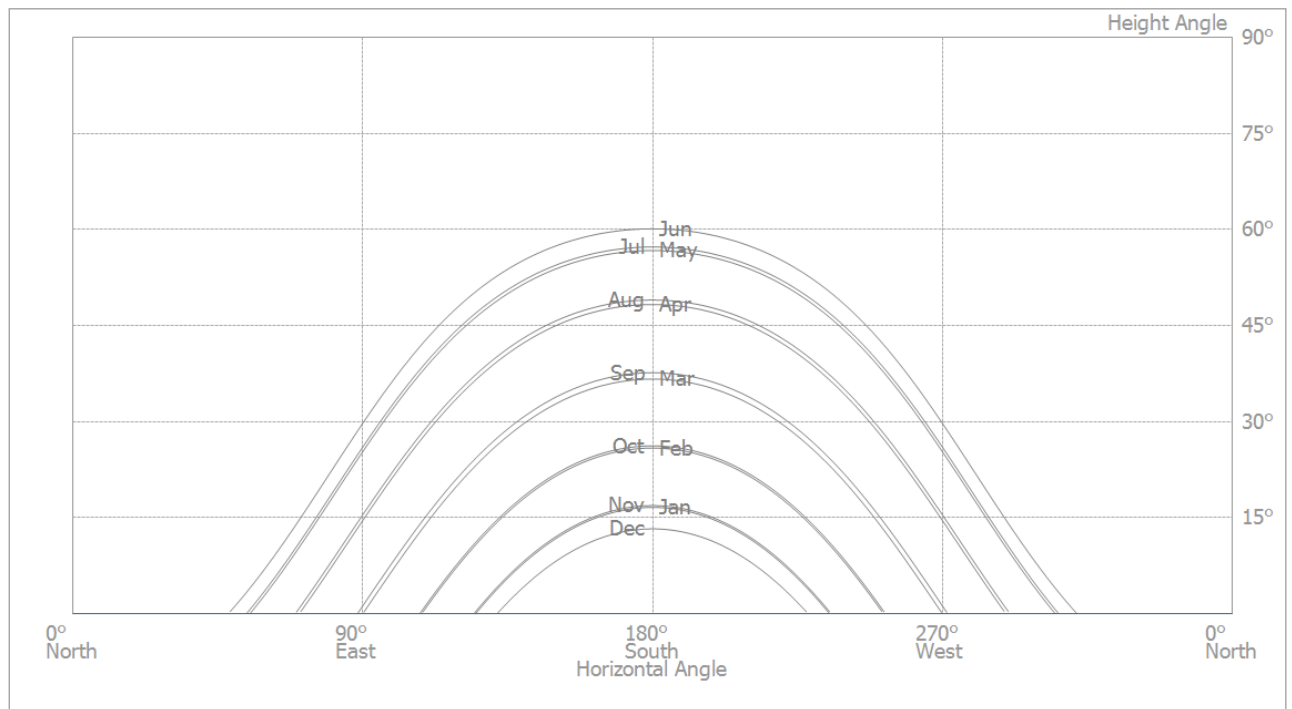


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Areas	Arbitrary Building 03-Mounting Surface East + Building 04-Roof Area West
Inverter 1	
Model	H1-3.7-E (v1)
Manufacturer	FoxESS
Quantity	1
Sizing Factor	110.1 %
Configuration	MPP 1: 1 x 5 MPP 2: 1 x 5

AC Mains

AC Mains

Number of Phases	3
Mains voltage between phase and neutral	230 V
Displacement Power Factor (cos phi)	+/- 1

Battery Systems

Battery System

Model	AC1-3.7-E + HS10.4 (v1)
Manufacturer	FoxESS
Quantity	1
Battery Inverter	
Type of Coupling	AC coupling
Nominal output	3.68 kW
Battery	
Manufacturer	FoxESS
Model	HS10.4 (v1)
Quantity	1
Battery Energy	10.2 kWh
Battery Type	Lithium iron phosphate

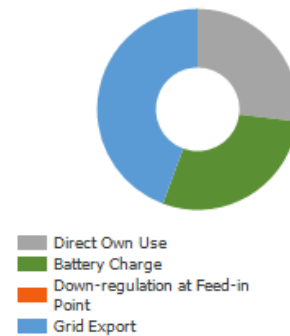
Simulation Results

Results Total System

PV System

PV Generator Output	4.05 kWp
Spec. Annual Yield	877.12 kWh/kWp
Performance Ratio (PR)	91.67 %
Yield Reduction due to Shading	1.1 %
PV Generator Energy (AC grid)	3,563 kWh/Year
Direct Own Use	960 kWh/Year
Battery Charge	1,022 kWh/Year
Down-regulation at Feed-in Point	0 kWh/Year
Grid Export	1,581 kWh/Year
Own Power Consumption	55.5 %
CO ₂ Emissions avoided	1,578 kg / year

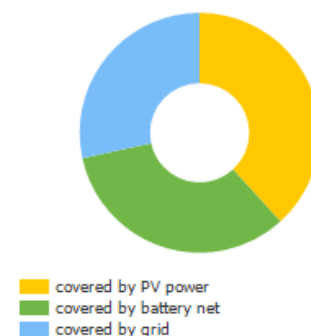
PV Generator Energy (AC grid)



Appliances

Appliances	2,500 kWh/Year
Standby Consumption (Inverter)	11 kWh/Year
Total Consumption	2,511 kWh/Year
covered by PV power	960 kWh/Year
covered by battery net	838 kWh/Year
covered by grid	713 kWh/Year
Solar Fraction	71.6 %

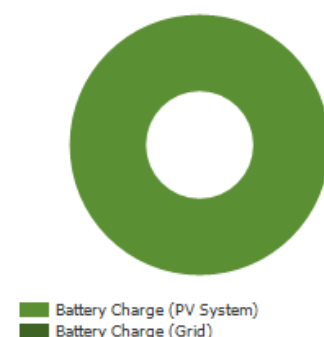
Total Consumption



Battery System

Charge at beginning	10 kWh
Battery Charge (Total)	1,022 kWh/Year
Battery Charge (PV System)	1,022 kWh/Year
Battery Charge (Grid)	0 kWh/Year
Battery Energy for the Covering of Consumption	838 kWh/Year
Losses due to charging/discharging	183 kWh/Year
Losses in Battery	12 kWh/Year
Cycle Load	2.0 %
Service Life	>20 Years

Battery Charge (Total)



Level of Self-sufficiency

Total Consumption	2,511 kWh/Year
covered by grid	713 kWh/Year
Level of Self-sufficiency	71.6 %

Energy Flow Graph

Project: 1 Whiteshough Head Lane

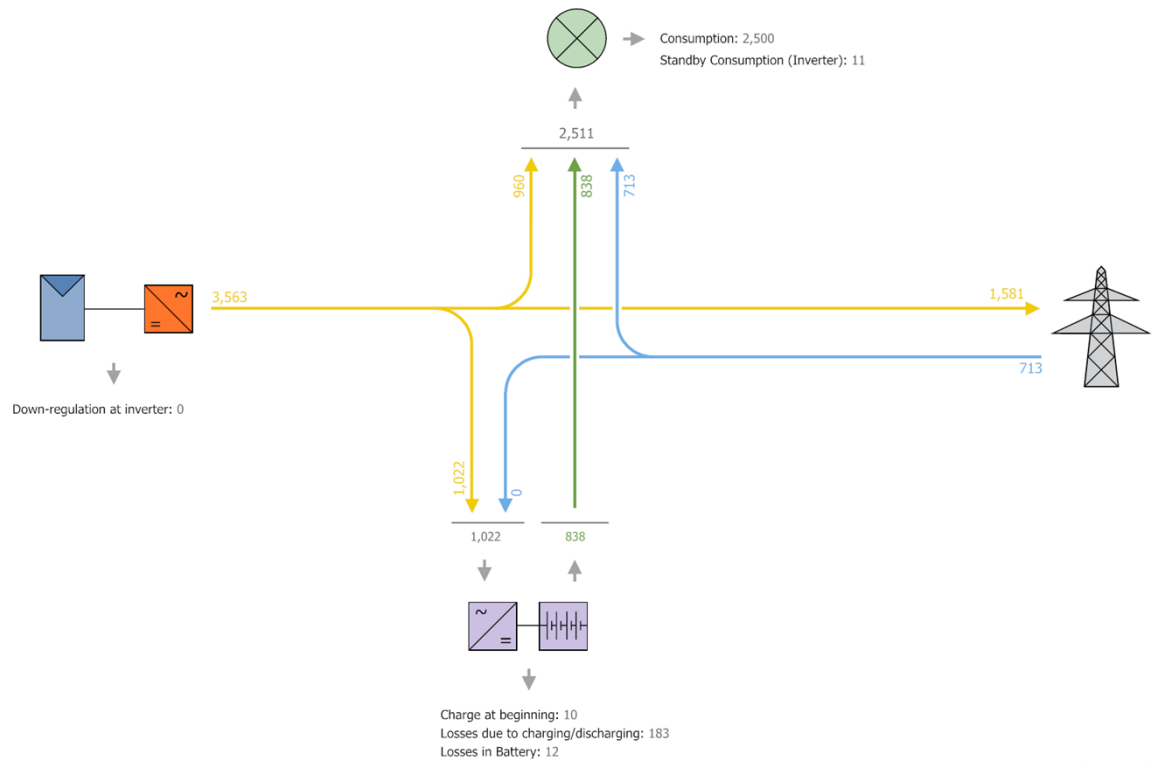


Figure: Energy flow

Meadow Bank, Whitehough Head Lane

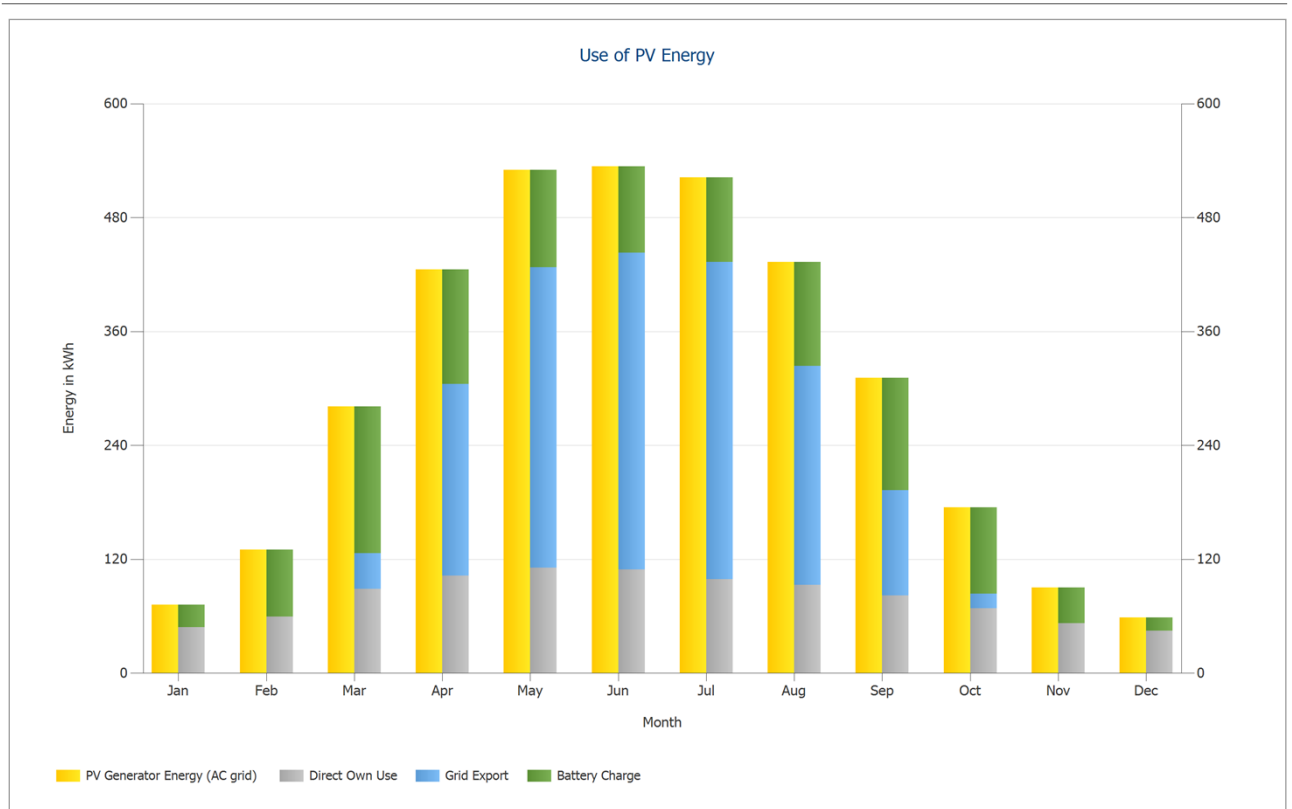


Figure: Use of PV Energy

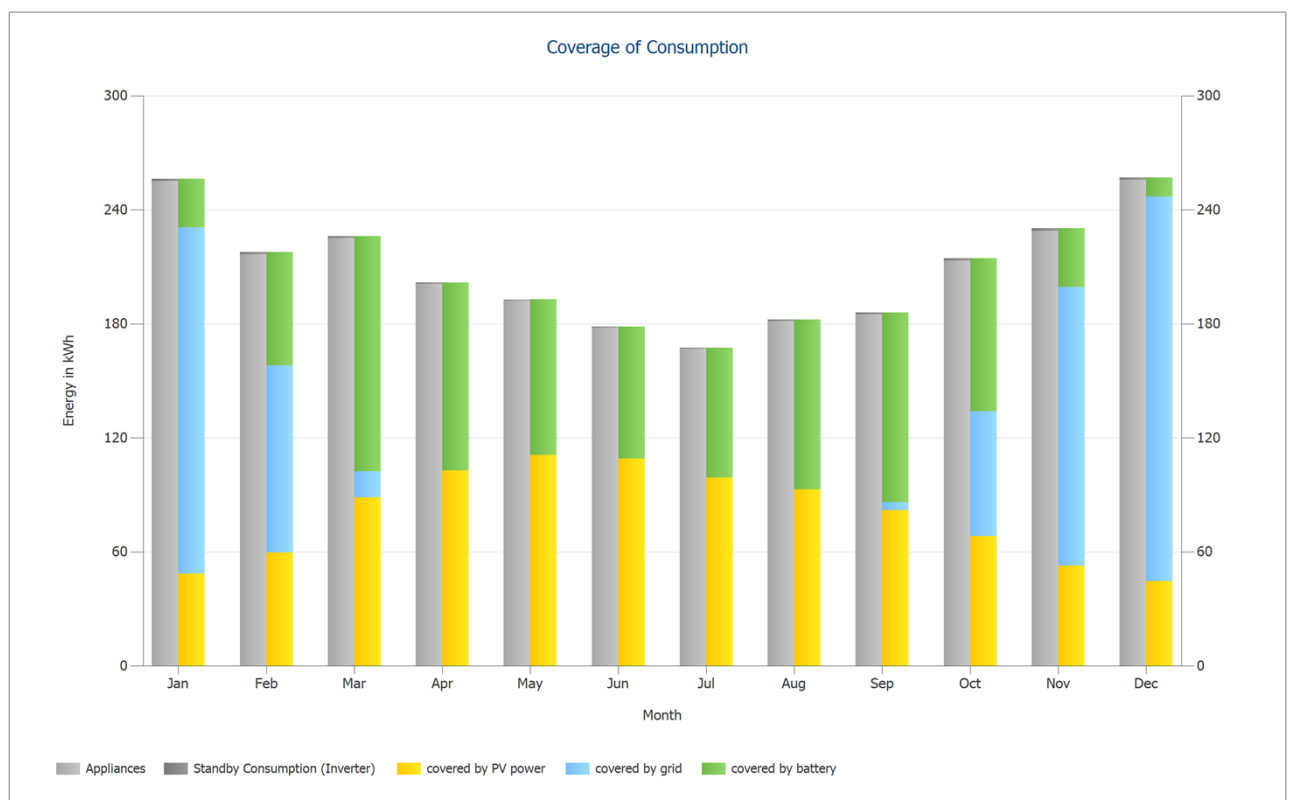


Figure: Coverage of Consumption

Meadow Bank, Whitehough Head Lane

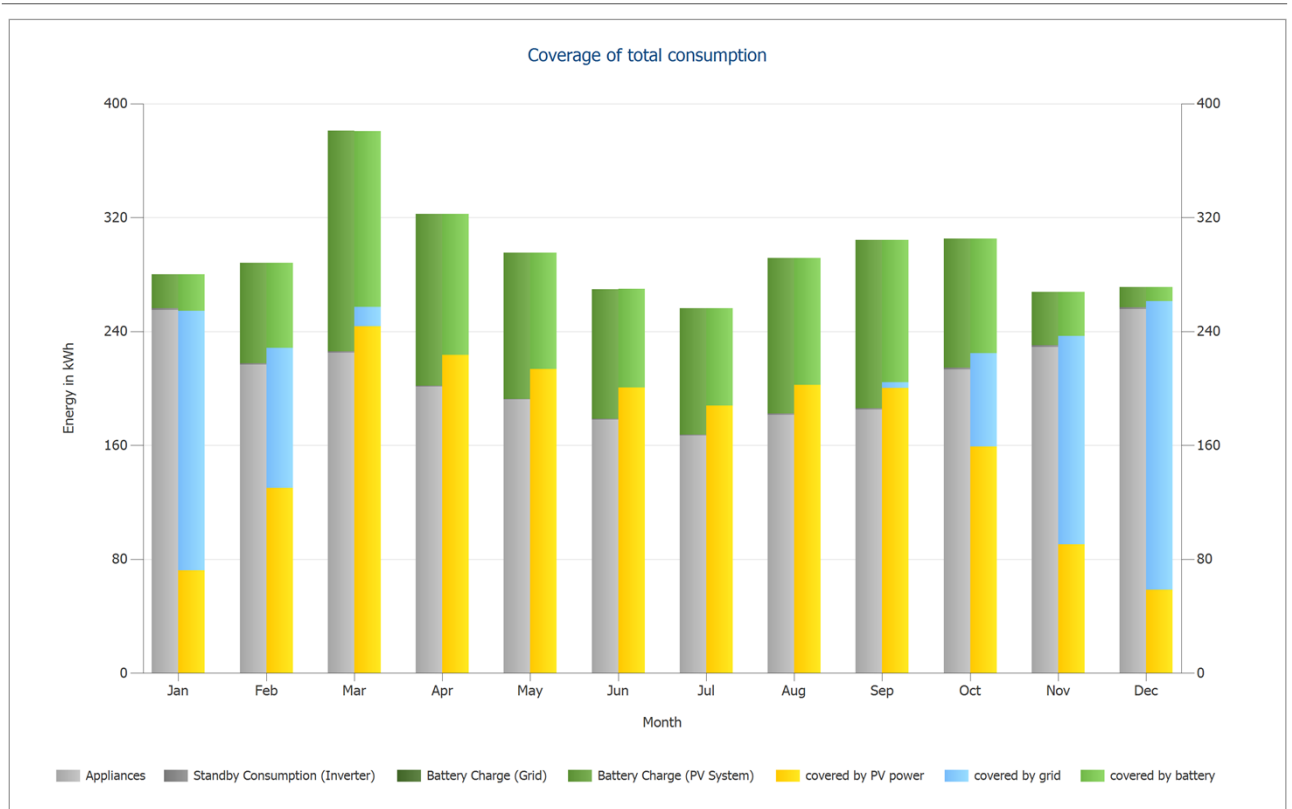


Figure: Coverage of total consumption

Financial Analysis

Overview

System Data

Grid Export in the first year (incl. module degradation)	1,581 kWh/Year
PV Generator Output	4.1 kWp
Start of Operation of the System	05/07/2023
Assessment Period	25 Years
Interest on Capital	1 %

Economic Parameters

Internal Rate of Return (IRR)	268.33 %
Accrued Cash Flow (Cash Balance)	34,067.40 £
Amortization Period	0.0 Years
Electricity Production Costs	0 £/kWh

Payment Overview

Specific Investment Costs	0.00 £/kWp
Investment Costs	0.00 £
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	0.00 £/Year
First year savings	589.72 £/Year

New Tariff (Example)

Energy Price	0.33 £/kWh
Inflation Rate for Energy Price	7.5 %/Year

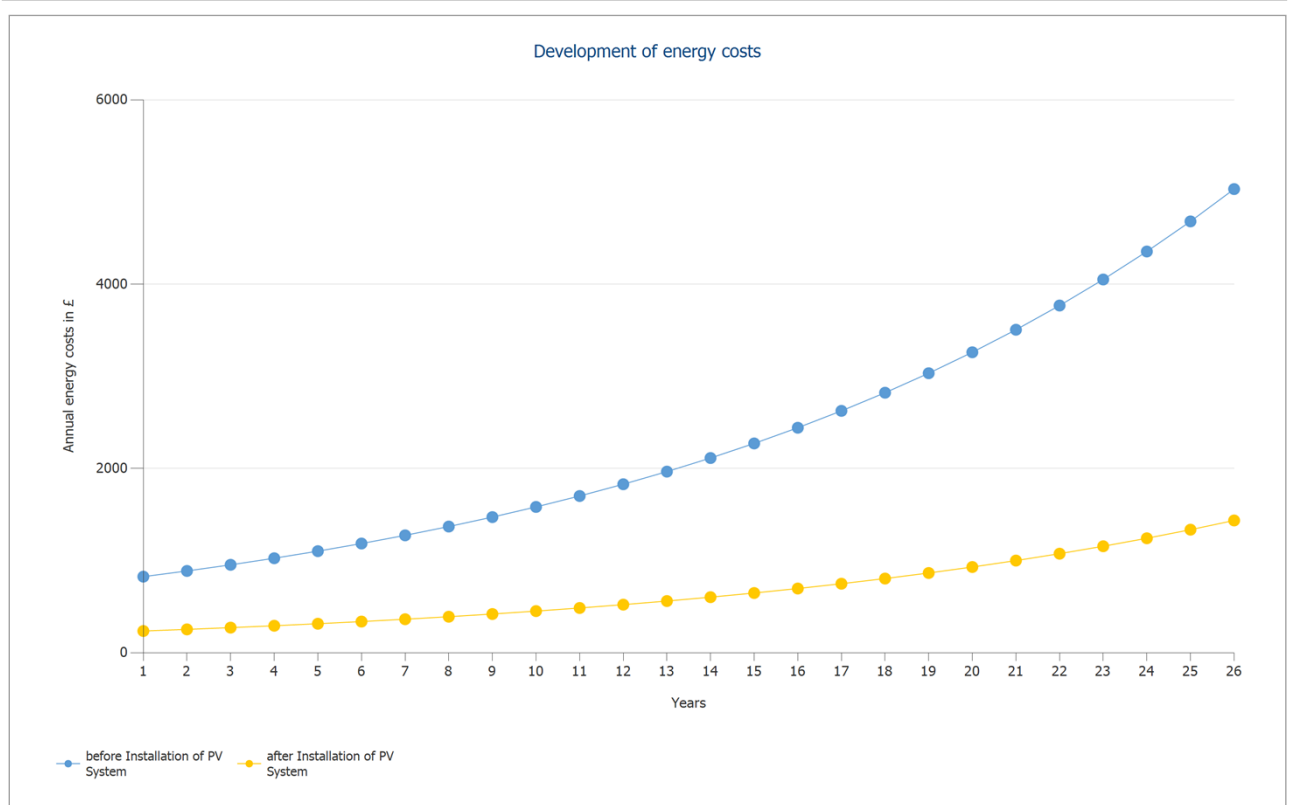


Figure: Development of energy costs

Cash flow

Cash flow

	Year 1	Year 2	Year 3	Year 4	Year 5
Electricity Savings	£580.82	£621.46	£661.46	£704.02	£749.33
Annual Cash Flow	£580.82	£621.46	£661.46	£704.02	£749.33
Accrued Cash Flow (Cash Balance)	£580.82	£1,202.28	£1,863.73	£2,567.76	£3,317.09

Cash flow

	Year 6	Year 7	Year 8	Year 9	Year 10
Electricity Savings	£797.56	£848.89	£903.52	£961.66	£1,023.55
Annual Cash Flow	£797.56	£848.89	£903.52	£961.66	£1,023.55
Accrued Cash Flow (Cash Balance)	£4,114.65	£4,963.53	£5,867.05	£6,828.71	£7,852.26

Cash flow

	Year 11	Year 12	Year 13	Year 14	Year 15
Electricity Savings	£1,089.42	£1,159.54	£1,234.16	£1,313.59	£1,398.12
Annual Cash Flow	£1,089.42	£1,159.54	£1,234.16	£1,313.59	£1,398.12
Accrued Cash Flow (Cash Balance)	£8,941.69	£10,101.22	£11,335.38	£12,648.97	£14,047.09

Cash flow

	Year 16	Year 17	Year 18	Year 19	Year 20
Electricity Savings	£1,488.10	£1,583.87	£1,685.80	£1,794.29	£1,909.77
Annual Cash Flow	£1,488.10	£1,583.87	£1,685.80	£1,794.29	£1,909.77
Accrued Cash Flow (Cash Balance)	£15,535.19	£17,119.06	£18,804.87	£20,599.16	£22,508.93

Cash flow

	Year 21	Year 22	Year 23	Year 24	Year 25
Electricity Savings	£2,032.68	£2,163.49	£2,302.73	£2,450.92	£2,608.65
Annual Cash Flow	£2,032.68	£2,163.49	£2,302.73	£2,450.92	£2,608.65
Accrued Cash Flow (Cash Balance)	£24,541.60	£26,705.10	£29,007.82	£31,458.74	£34,067.40

Degradation and inflation rates are applied on a monthly basis over the entire observation period. This is done in the first year.

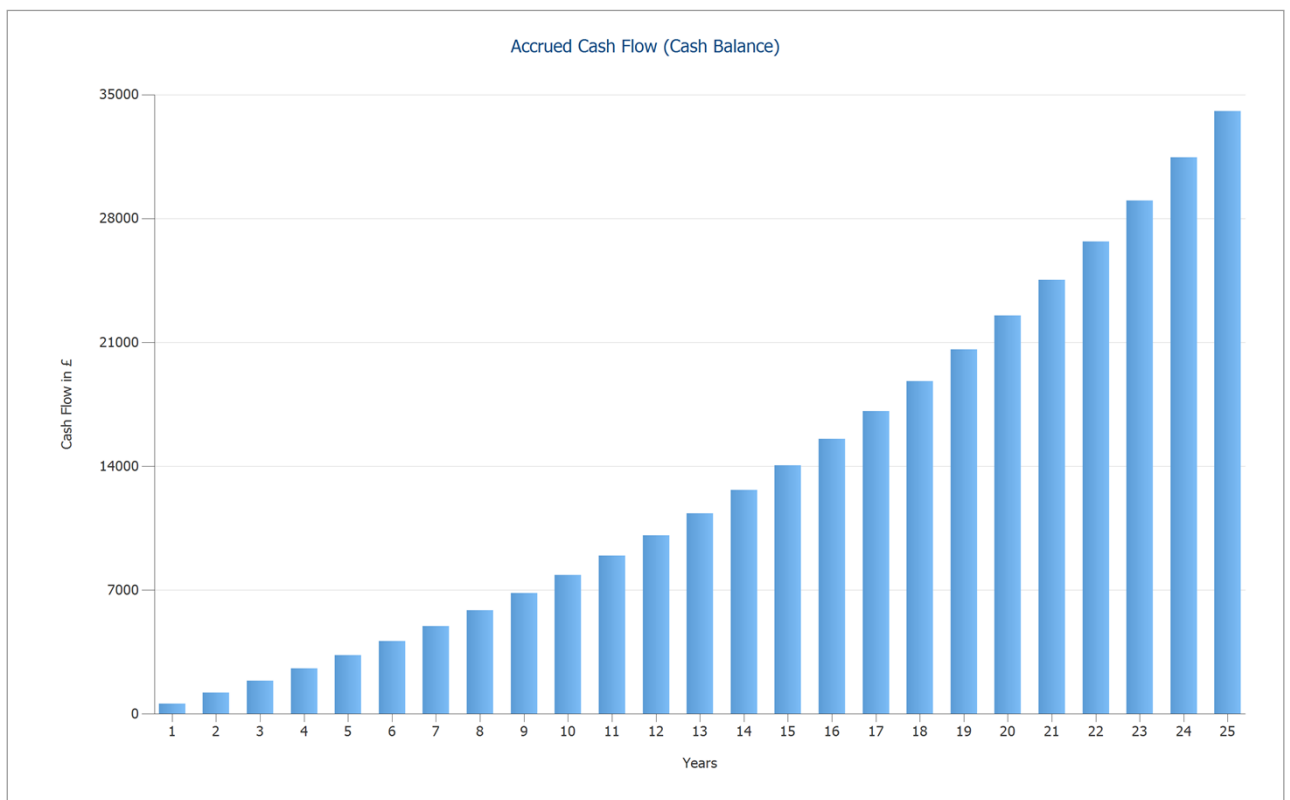


Figure: Accrued Cash Flow (Cash Balance)

Plans and parts list

Circuit Diagram

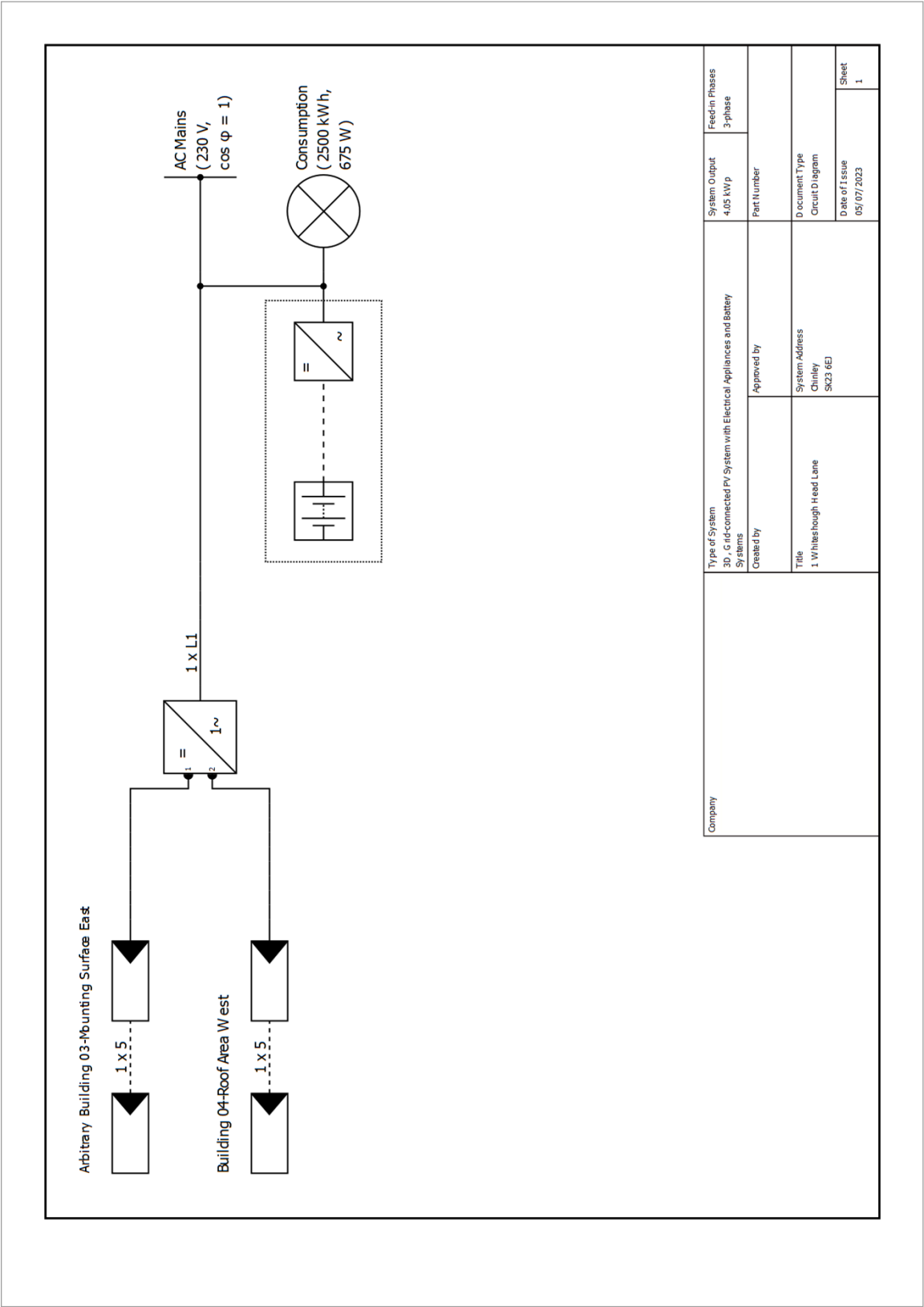


Figure: Circuit Diagram

Overview plan

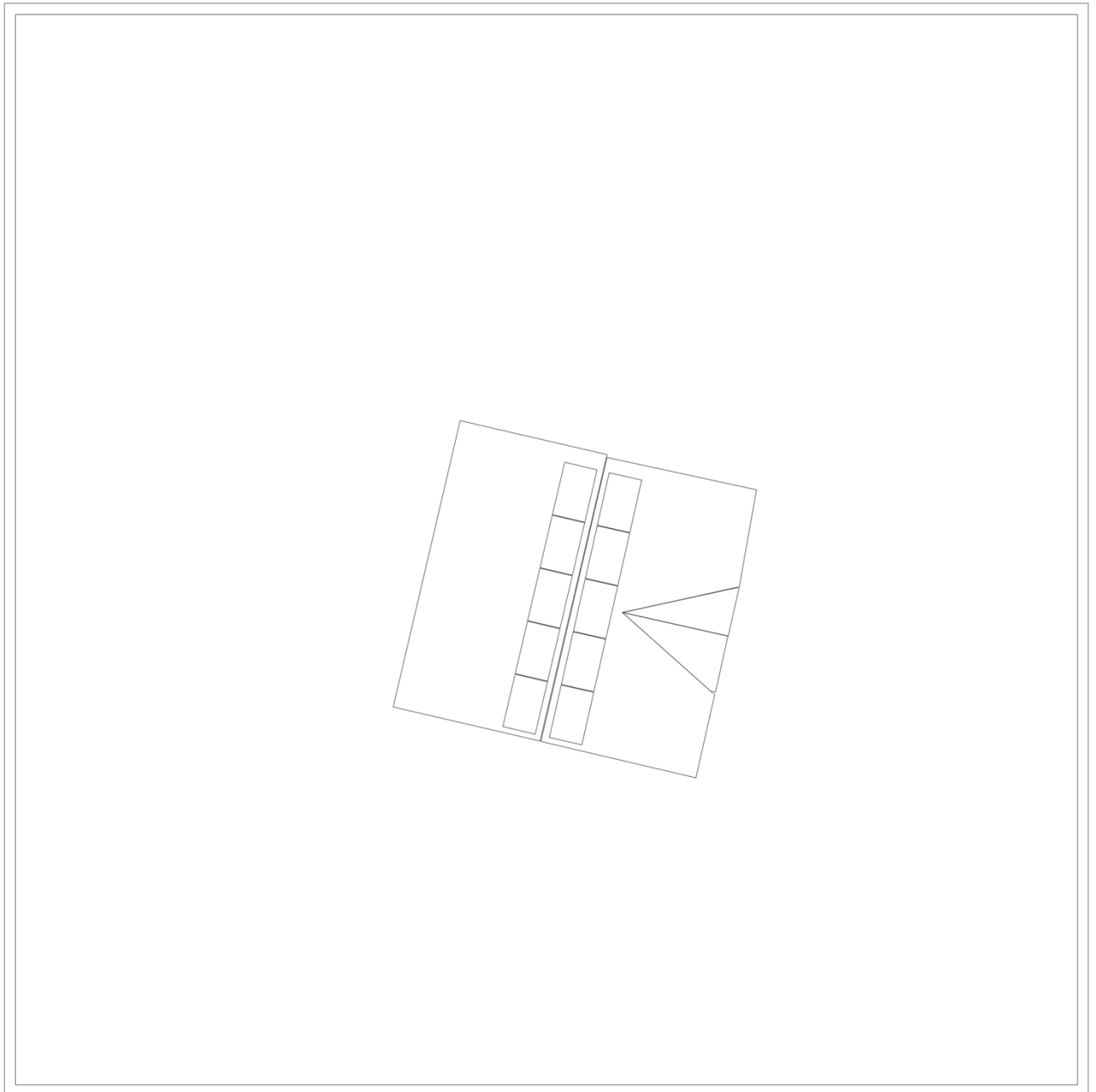


Figure: Overview plan

Dimensioning Plan

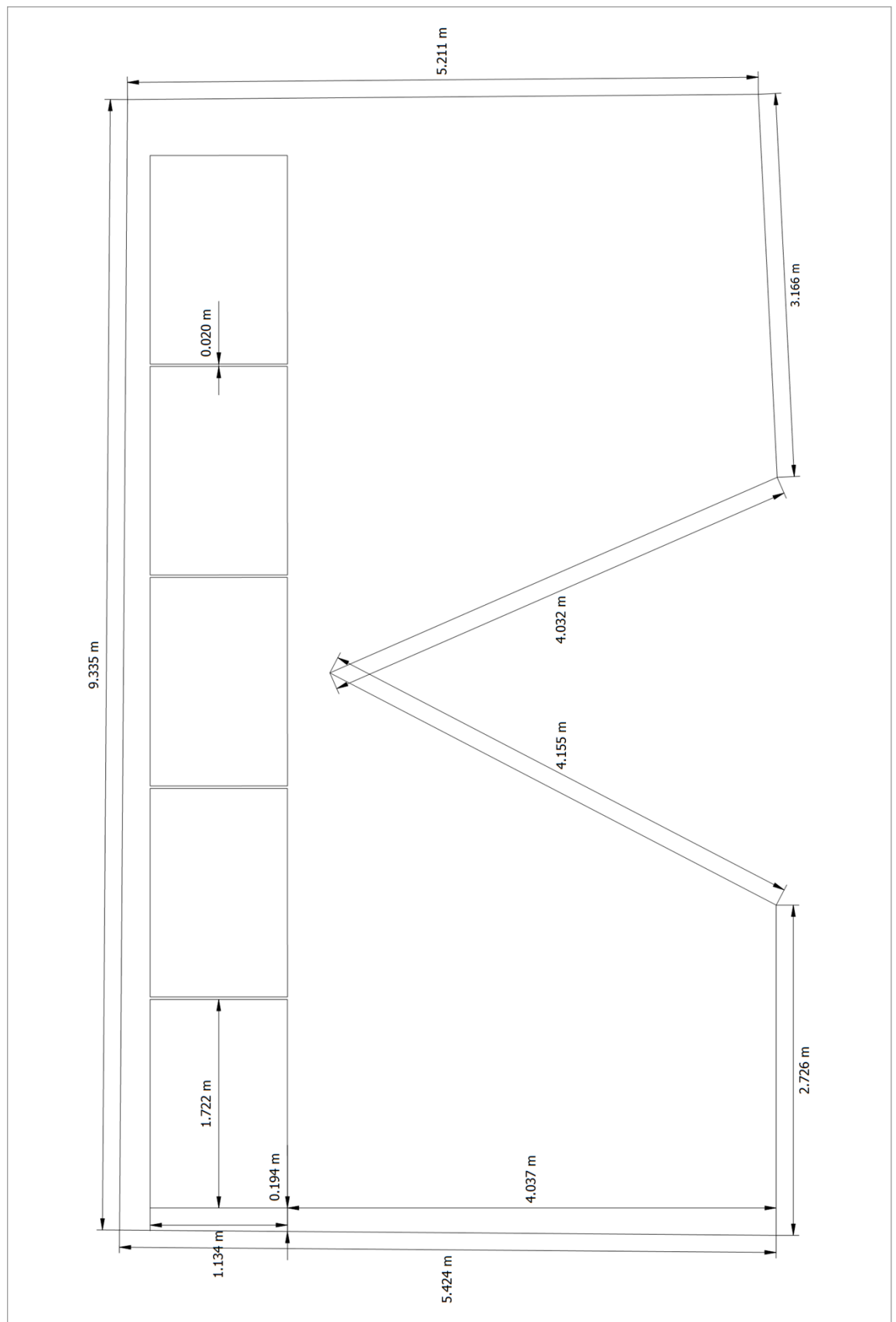


Figure: Arbitrary Building 03 - Mounting Surface East

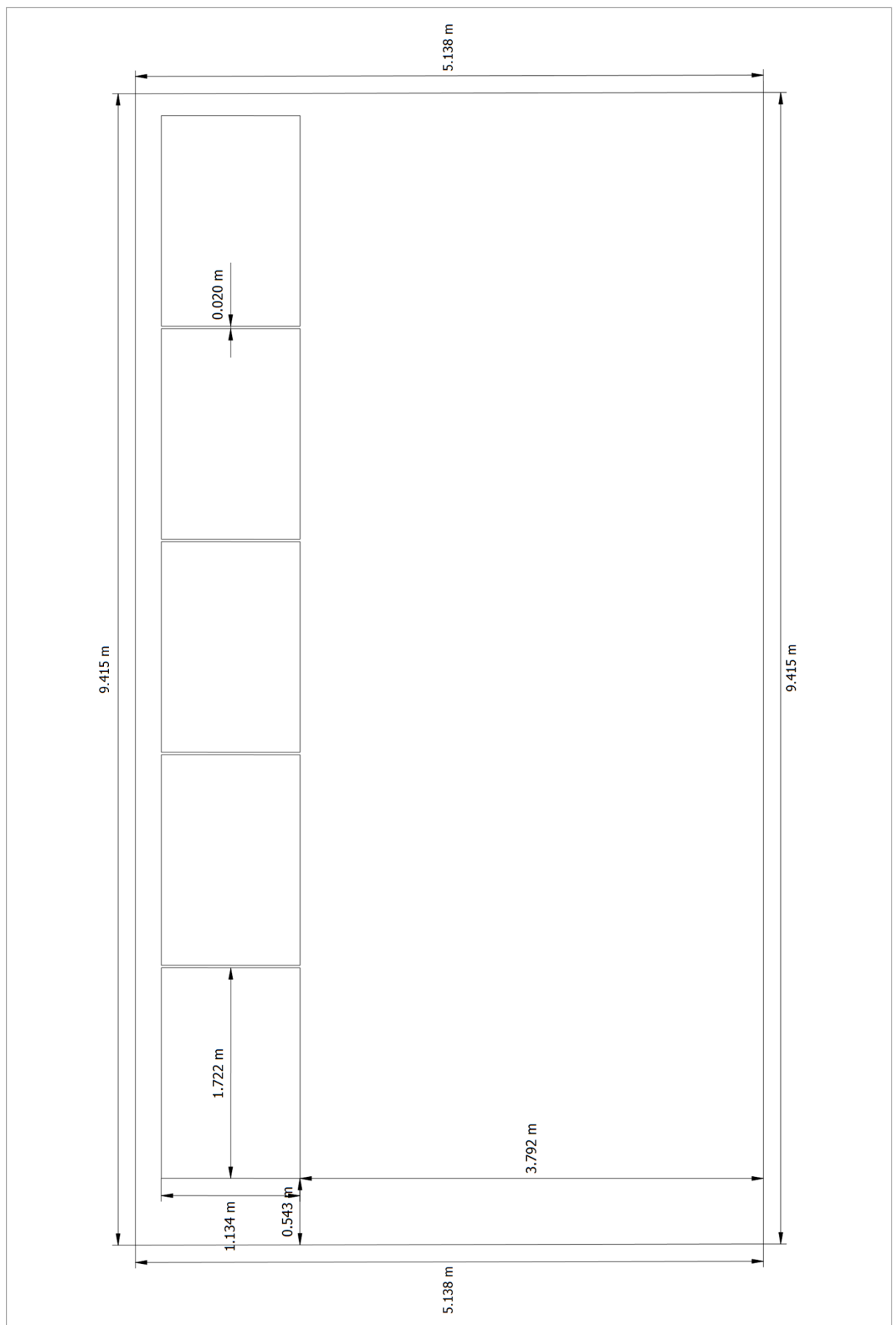


Figure: Building 04 - Roof Area West

String Plan

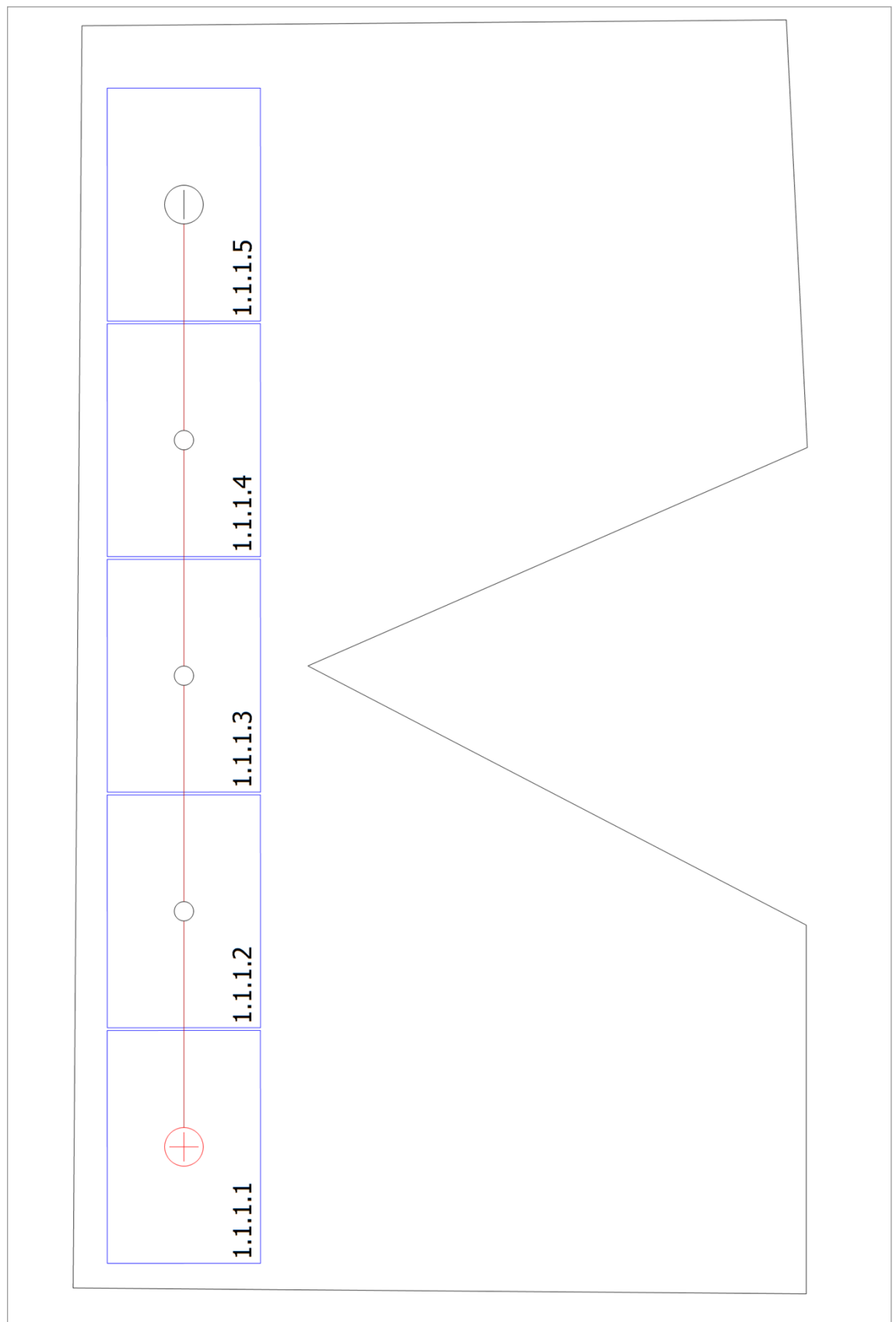


Figure: Arbitrary Building 03 - Mounting Surface East

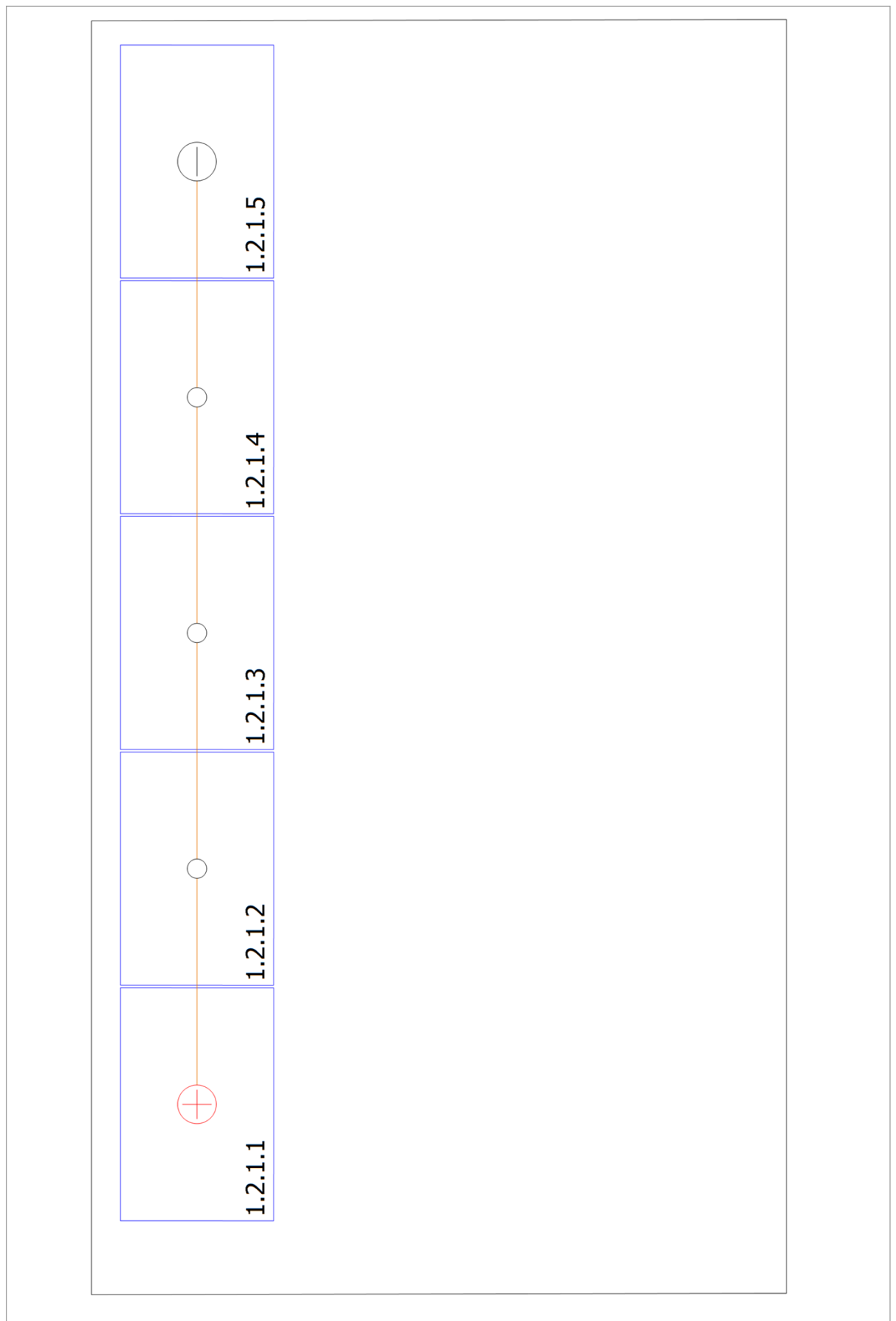


Figure: Building 04 - Roof Area West

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		JA Solar Holdings Co., Ltd.	JAM54S31-405_MR	10	Piece
2	Inverter		FoxESS	H1-3.7-E	1	Piece
3	Battery System		FoxESS	AC1-3.7-E + HS10.4	1	Piece