

Avrenim

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Xaverian College, Lower Park Road, Manchester

Project Name: Xaverian College

19/12/2023

Your PV system from Avrenim

Address of Installation

Xaverian College, Lower Park Road, Manchester



Project Overview

PV System

Grid-connected PV System with Electrical Appliances

Climate Data	Manchester-Ringway, GBR (1996 - 2015)
Values source	Meteonorm 8.1
PV Generator Output	25.07 kWp
PV Generator Surface	118.8 m ²
Number of PV Modules	46
Number of Inverters	1

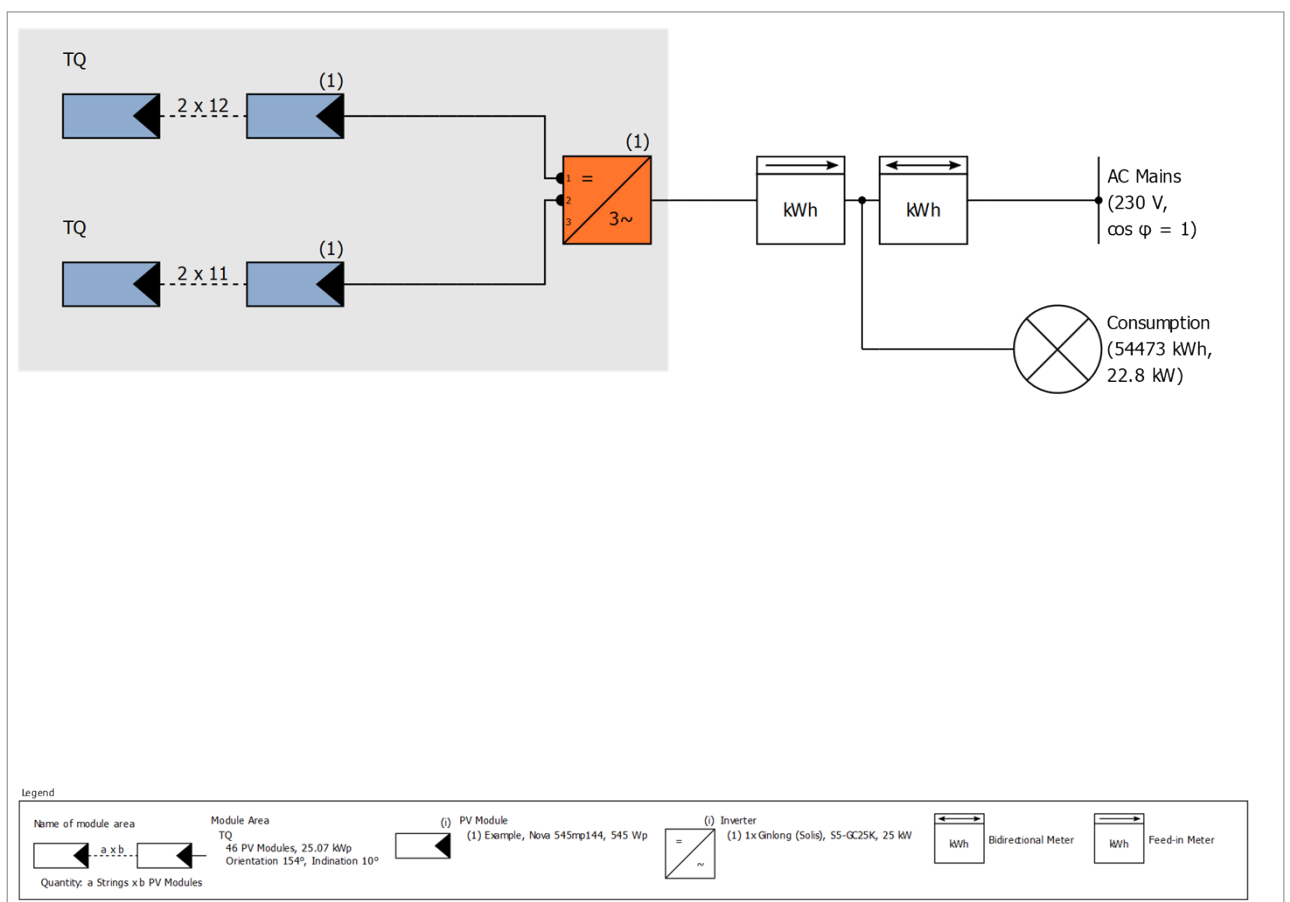


Figure: Schematic diagram

Production Forecast

Production Forecast

PV Generator Output	25.07 kWp
Spec. Annual Yield	800.71 kWh/kWp
Performance Ratio (PR)	80.70 %
PV Generator Energy (AC grid)	20,090 kWh/Year
Own Consumption	16,009 kWh/Year
Down-regulation at Feed-in Point	0 kWh/Year
Grid Feed-in	4,081 kWh/Year
Own Power Consumption	79.7 %
CO ₂ Emissions avoided	9,435 kg / year
Level of Self-sufficiency	29.4 %

Financial Analysis

Your Gain

Total investment costs	34,307.84 £
Internal Rate of Return (IRR)	8.72 %
Amortization Period	10.3 Years
Electricity Production Costs	0.136 £/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	Grid-connected PV System with Electrical Appliances
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Climate Data

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

Consumption

Total Consumption	54473 kWh
TQ Monthly Data HH	54473 kWh
Load Peak	22.8 kW

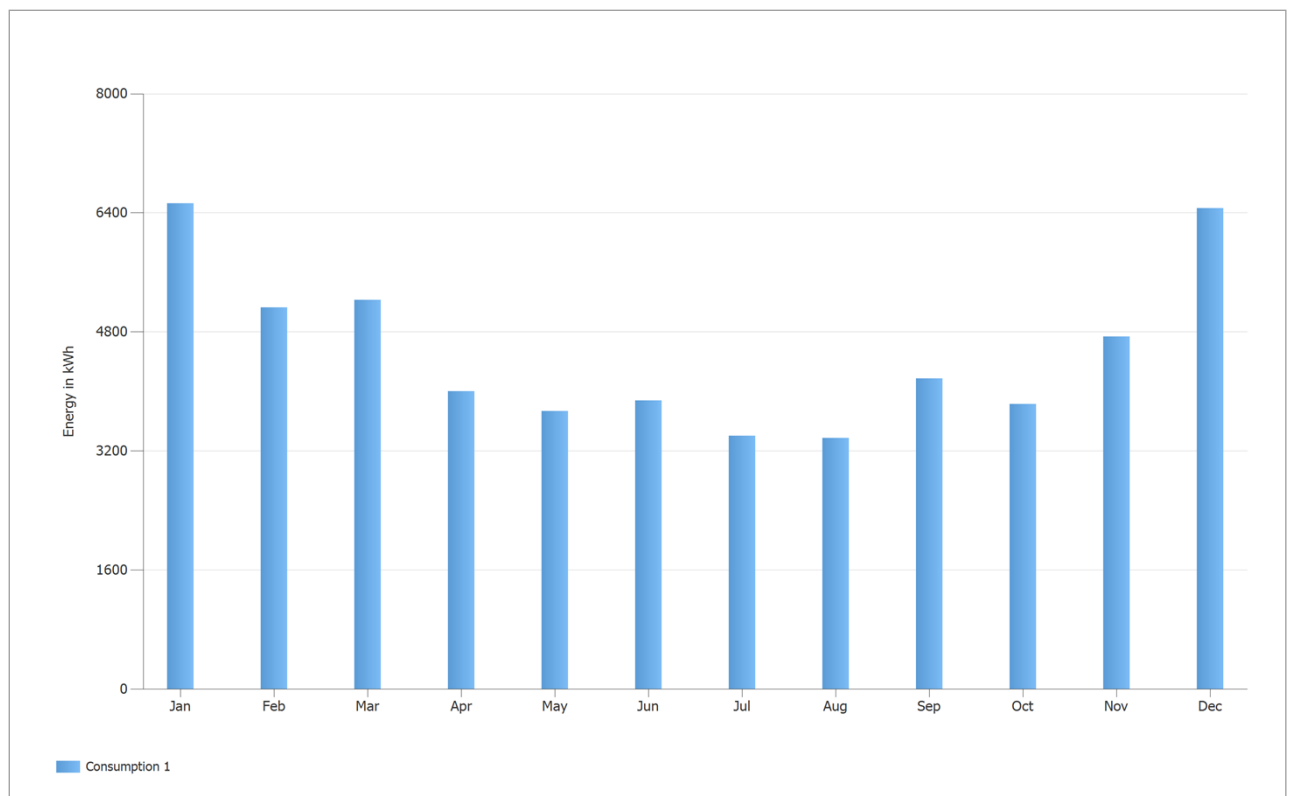


Figure: Consumption

Module Areas

1. Module Area - TQ

PV Generator, 1. Module Area - TQ

Name	TQ
PV Modules	46 x Nova 545mp144 (v4)
Manufacturer	Example
Inclination	10 °
Orientation	Southeast 154 °
Installation Type	Mounted - Roof
PV Generator Surface	118.8 m ²

Inverter configuration

Configuration 1

Module Area	TQ
Inverter 1	
Model	S5-GC25K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	100.3 %
Configuration	MPP 1: 2 x 12
	MPP 2: 2 x 11
	MPP 3: not allocated

AC Mains

AC Mains

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

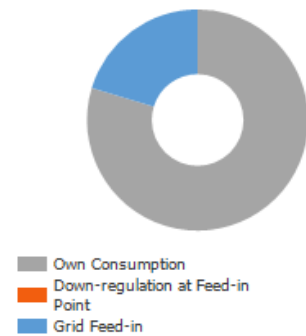
Simulation Results

Results Total System

PV System

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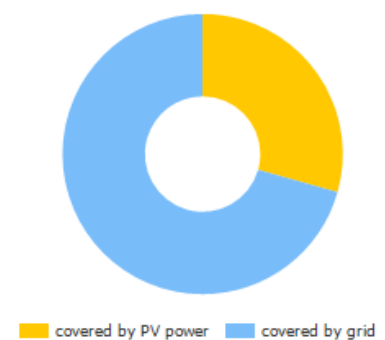
PV Generator Energy (AC grid)



Appliances

Appliances	54,473 kWh/Year
Standby Consumption (Inverter)	16 kWh/Year
Total Consumption	54,489 kWh/Year
covered by PV power	16,009 kWh/Year
covered by grid	38,480 kWh/Year
Solar Fraction	29.4 %

Total Consumption

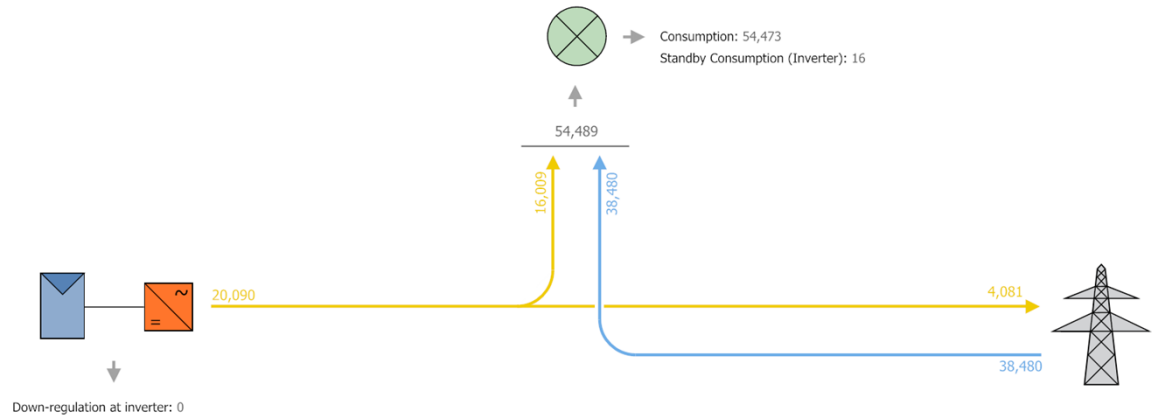


Level of Self-sufficiency

Total Consumption	54,489 kWh/Year
covered by grid	38,480 kWh/Year
Level of Self-sufficiency	29.4 %

Energy Flow Graph

Project: Xaverian College



All values in kWh
Small deviations in the totals can occur due to rounding
created with PV*SOL

Figure: Energy flow

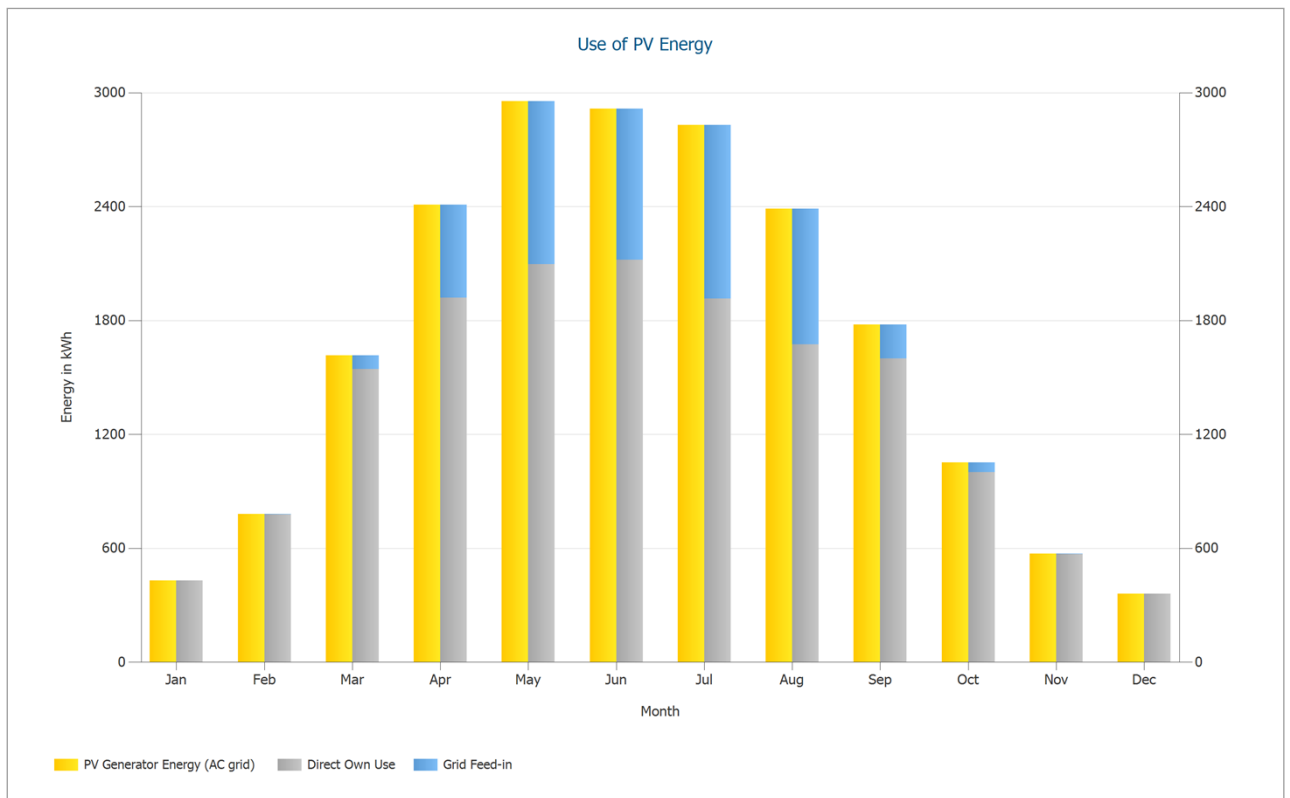


Figure: Use of PV Energy

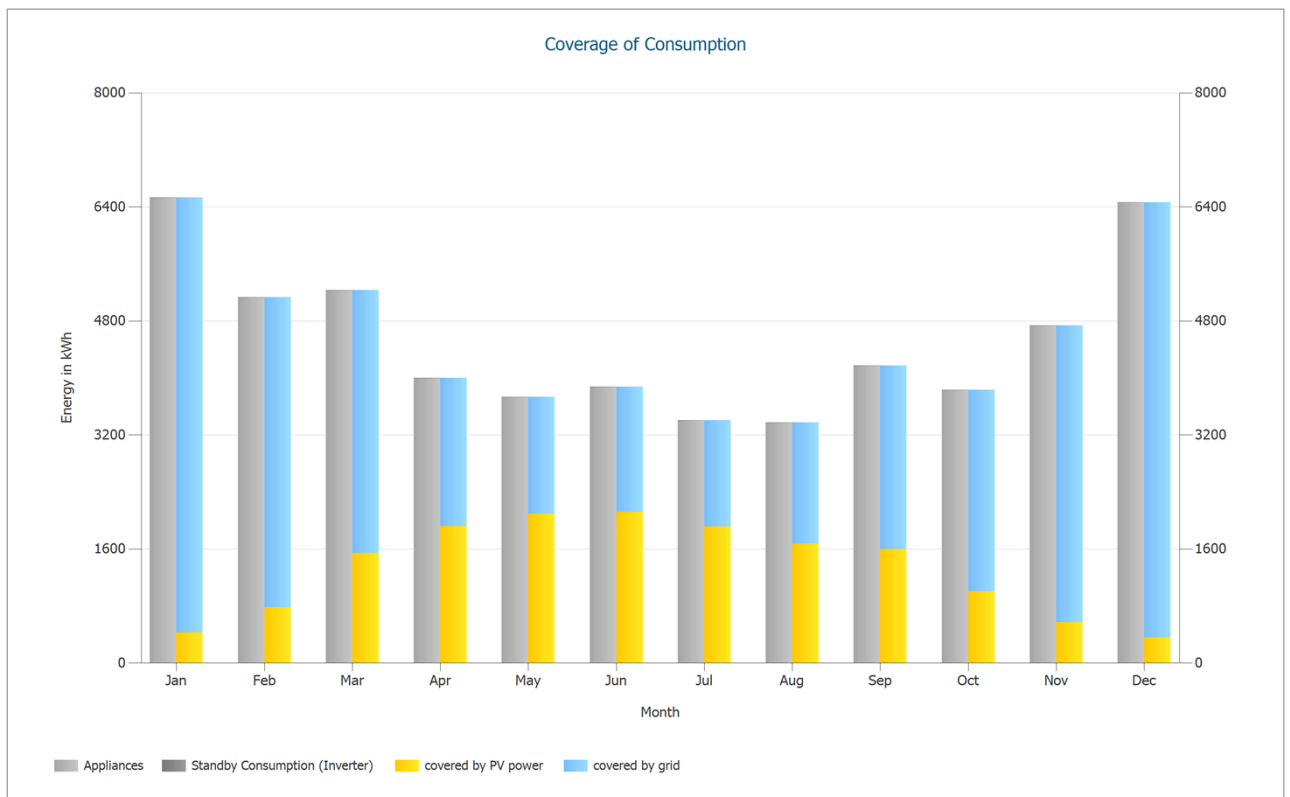


Figure: Coverage of Consumption

Financial Analysis

Overview

System Data

Grid Feed-in in the first year (incl. module degradation)	3,950 kWh/Year
PV Generator Output	25.1 kWp
Start of Operation of the System	19/12/2023
Assessment Period	20 Years
Interest on Capital	1 %

Economic Parameters

Internal Rate of Return (IRR)	8.72 %
Accrued Cash Flow (Cash Balance)	35,759.42 £
Amortization Period	10.3 Years
Electricity Production Costs	0.136 £/kWh

Payment Overview

Specific Investment Costs	1,368.48 £/kWp
Investment Costs	34,307.84 £
One-off Payments	0.00 £
Incoming Subsidies	0.00 £
Annual Costs	686.16 £/Year
Other Revenue or Savings	0.00 £/Year

Remuneration and Savings

Total Payment from Utility in First Year	197.49 £/Year
First year savings	4,049.62 £/Year

X College (Example)

Energy Price Tariff period 1	0.2617 £/kWh
Saving Tariff period 1	4,101.49 £/Year
Energy Price Tariff period 2	0.1957 £/kWh
Saving Tariff period 2	62.69 £/Year
Inflation Rate for Energy Price	3 %/Year

Remuneration of Electricity sold to Third Party

Price of Electricity sold to Third Party	0.05 £/kWh
Remuneration of Electricity sold to Third Party	197.49 £/Year

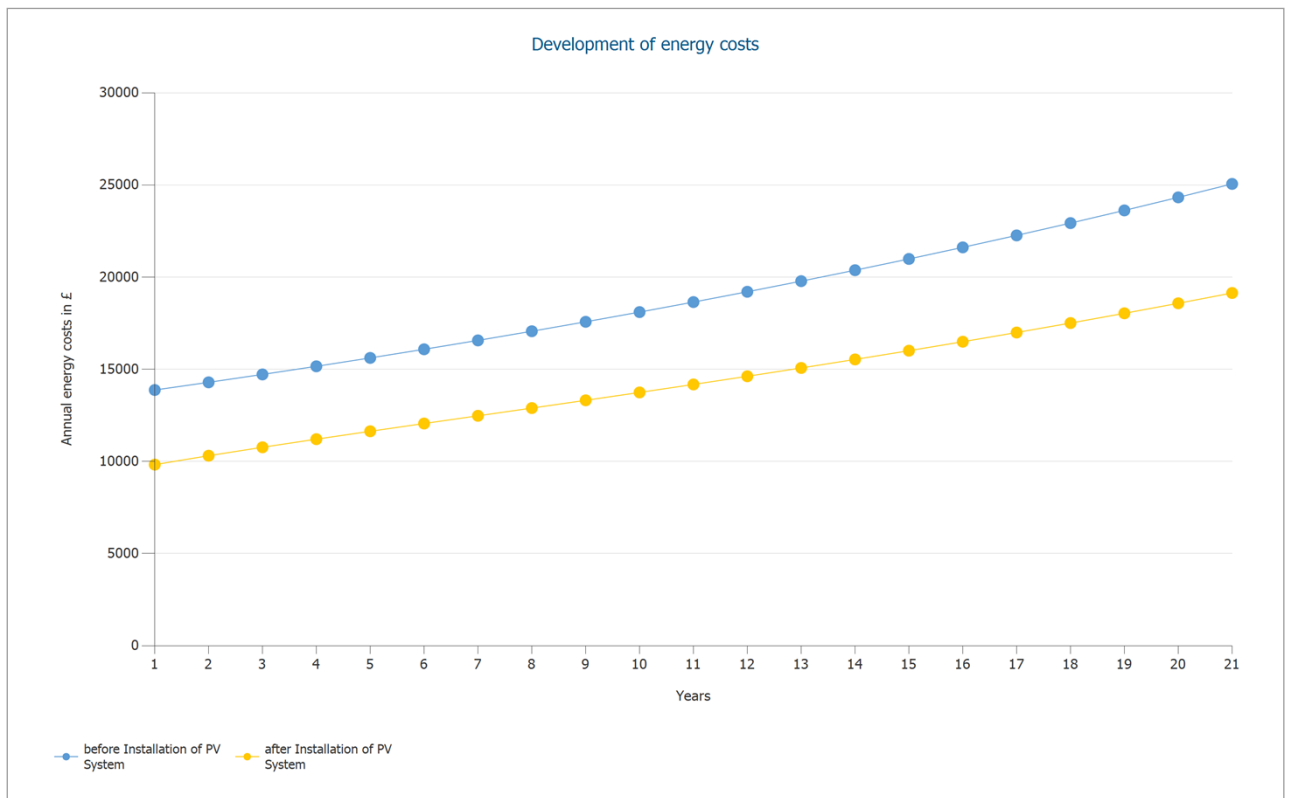


Figure: Development of energy costs

Cash flow

Cash flow

	Year 1	Year 2	Year 3	Year 4	Year 5
Investments	-£34,307.84	£0.00	£0.00	£0.00	£0.00
Operating costs	-£679.36	-£686.09	-£692.88	-£699.74	-£706.67
Feed-in / Export Tariff	£195.53	£184.98	£176.64	£169.97	£164.57
Electricity Savings	£3,945.43	£3,903.18	£3,835.93	£3,799.42	£3,787.14
Annual Cash Flow	-£30,846.24	£3,402.07	£3,319.69	£3,269.65	£3,245.04
Accrued Cash Flow (Cash Balance)	-£30,846.24	-£27,444.17	-£24,124.49	-£20,854.84	-£17,609.80

Cash flow

	Year 6	Year 7	Year 8	Year 9	Year 10
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Operating costs	-£713.67	-£720.73	-£727.87	-£735.08	-£742.35
Feed-in / Export Tariff	£160.13	£156.42	£153.27	£150.54	£148.14
Electricity Savings	£3,794.03	£3,816.17	£3,850.50	£3,894.66	£3,946.82
Annual Cash Flow	£3,240.50	£3,251.86	£3,275.91	£3,310.13	£3,352.60
Accrued Cash Flow (Cash Balance)	-£14,369.30	-£11,117.44	-£7,841.53	-£4,531.40	-£1,178.79

Cash flow

	Year 11	Year 12	Year 13	Year 14	Year 15
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Operating costs	-£749.70	-£757.13	-£764.62	-£772.19	-£779.84
Feed-in / Export Tariff	£145.98	£144.01	£142.19	£140.49	£138.87
Electricity Savings	£4,005.54	£4,069.74	£4,138.57	£4,211.37	£4,287.64
Annual Cash Flow	£3,401.82	£3,456.63	£3,516.14	£3,579.66	£3,646.67
Accrued Cash Flow (Cash Balance)	£2,223.03	£5,679.66	£9,195.80	£12,775.46	£16,422.13

Cash flow

	Year 16	Year 17	Year 18	Year 19	Year 20
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Operating costs	-£787.56	-£795.36	-£803.23	-£811.19	-£819.22
Feed-in / Export Tariff	£137.33	£135.84	£134.40	£132.99	£131.62
Electricity Savings	£4,367.00	£4,449.16	£4,533.91	£4,621.07	£4,710.55
Annual Cash Flow	£3,716.76	£3,789.64	£3,865.07	£3,942.88	£4,022.95
Accrued Cash Flow (Cash Balance)	£20,138.89	£23,928.53	£27,793.59	£31,736.47	£35,759.42

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

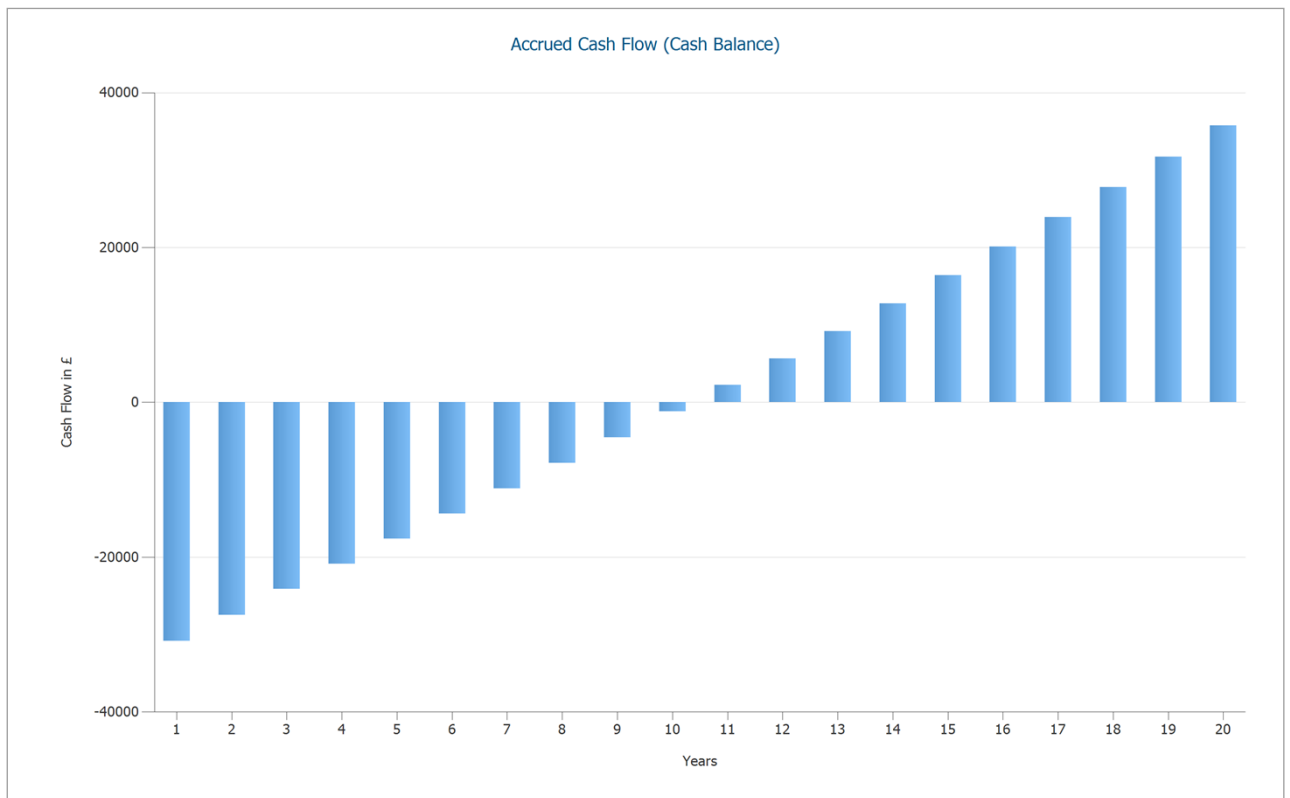


Figure: Accrued Cash Flow (Cash Balance)

Plans and parts list

Circuit Diagram

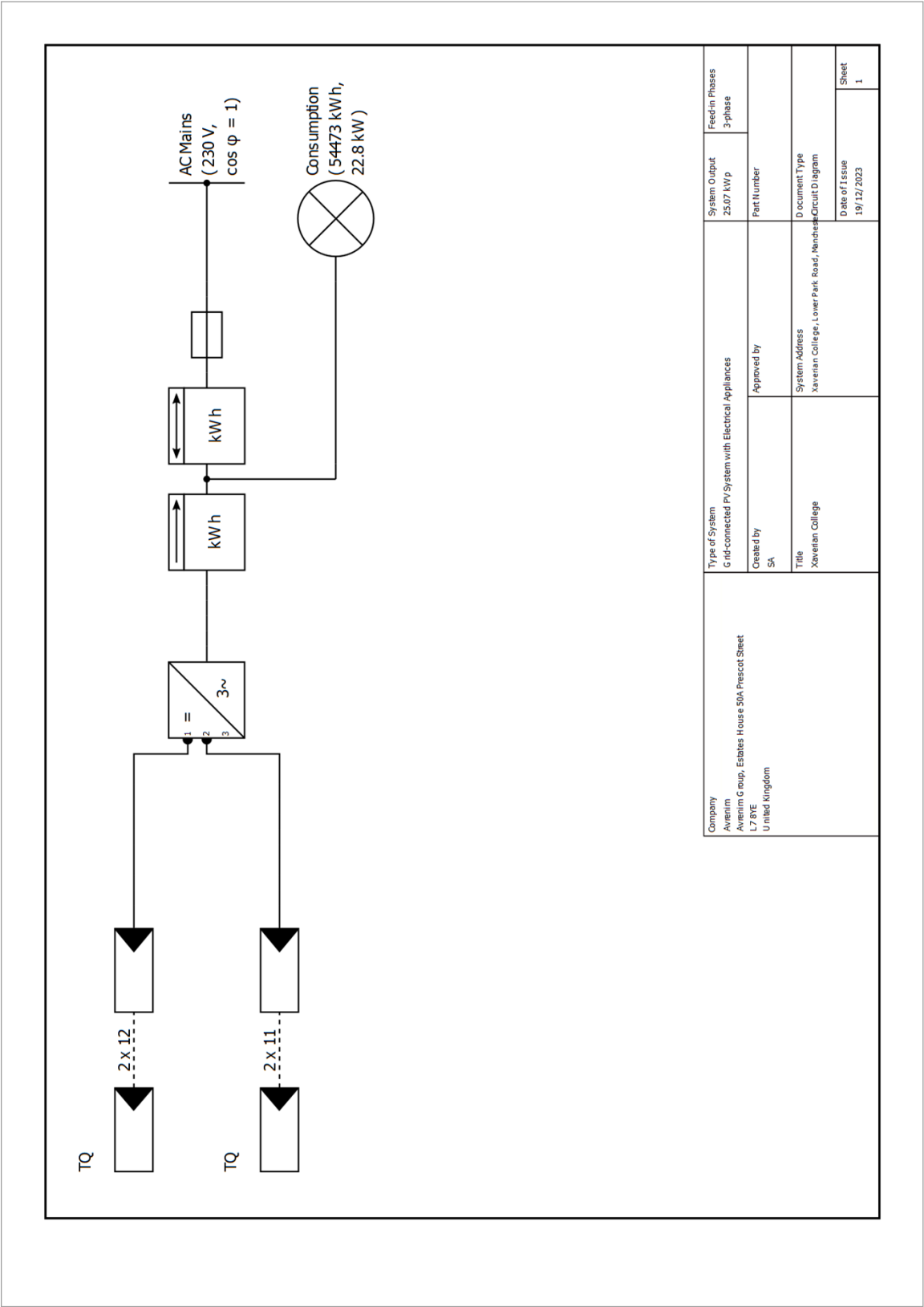


Figure: Circuit Diagram

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Example	Nova 545mp144	46	Piece
2	Inverter		Ginlong (Solis)	S5-GC25K	1	Piece
3	Components			Feed-in Meter	1	Piece
4	Components			Bidirectional Meter	1	Piece
5	Components			Fuse	1	Piece