



Excel Electrical (Furness)Ltd
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Project Name: Example
Offer no.: Example

Example name
Example address
Example
Cumbria
Example Postcode

Example Date

Your PV system from Excel Electrical (Furness)Ltd

Address of Installation

Example address
Example
Cumbria
Example Postcode



Project Description:
Solar PV Installation

Example

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Project Overview

PV System

Grid-connected PV System with Electrical Appliances and Battery Systems

Climate Data	Blackpool Airport, GBR (1996 - 2015)
Values source	Meteonorm 8.1
PV Generator Output	7.38 kWp
PV Generator Surface	35.1 m ²
Number of PV Modules	18
Number of Inverters	1
No. of battery systems	1

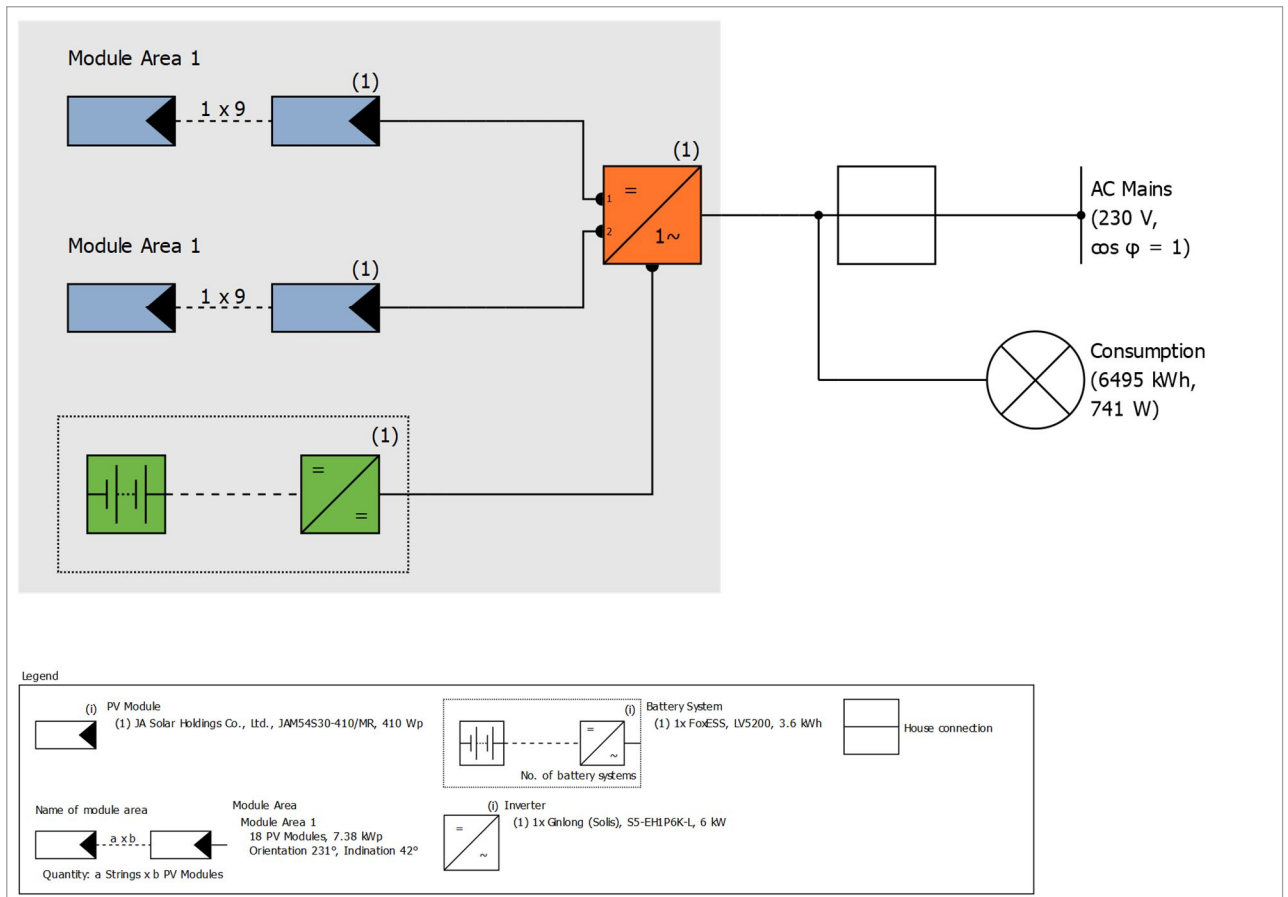


Figure: Schematic diagram

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Production Forecast

Production Forecast

PV Generator Output	7.38 kWp
Spec. Annual Yield	984.76 kWh/kWp
Performance Ratio (PR)	90.34 %
PV Generator Energy (AC grid) with battery	6,937 kWh/Year
Direct Own Use	3,237 kWh/Year
Down-regulation at Feed-in Point	0 kWh/Year
Grid Feed-in	3,702 kWh/Year
Own Power Consumption	46.6 %
CO ₂ Emissions avoided	3,096 kg / year
Level of Self-sufficiency	49.8 %

Financial Analysis

Your Gain

Total investment costs	12,415.68 £
Internal Rate of Return (IRR)	9.90 %
Amortization Period	11.0 Years
Electricity Production Costs	0.0786 £/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.



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Set-up of the System

Overview

System Data

Type of System	Grid-connected PV System with Electrical Appliances and Battery Systems
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Climate Data

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

Consumption

Total Consumption	6495 kWh
Load profile with constant load	995 kWh
New	5500 kWh
Load Peak	0.7 kW

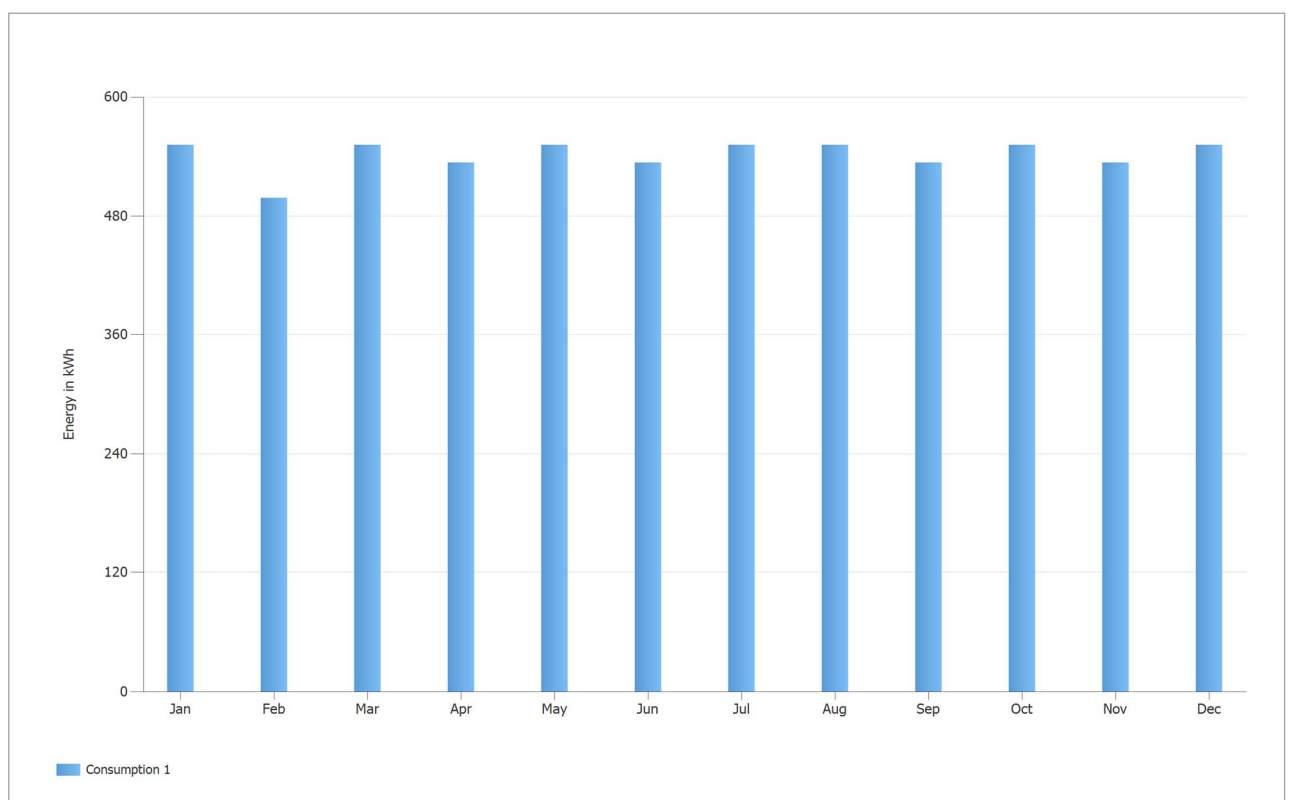


Figure: Consumption

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Module Areas

1. Module Area - Module Area 1

PV Generator, 1. Module Area - Module Area 1

Name	Module Area 1
PV Modules	18 x JAM54S30-410/MR (v3)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	42 °
Orientation	Southwest 231 °
Installation Type	Roof parallel
PV Generator Surface	35.1 m ²

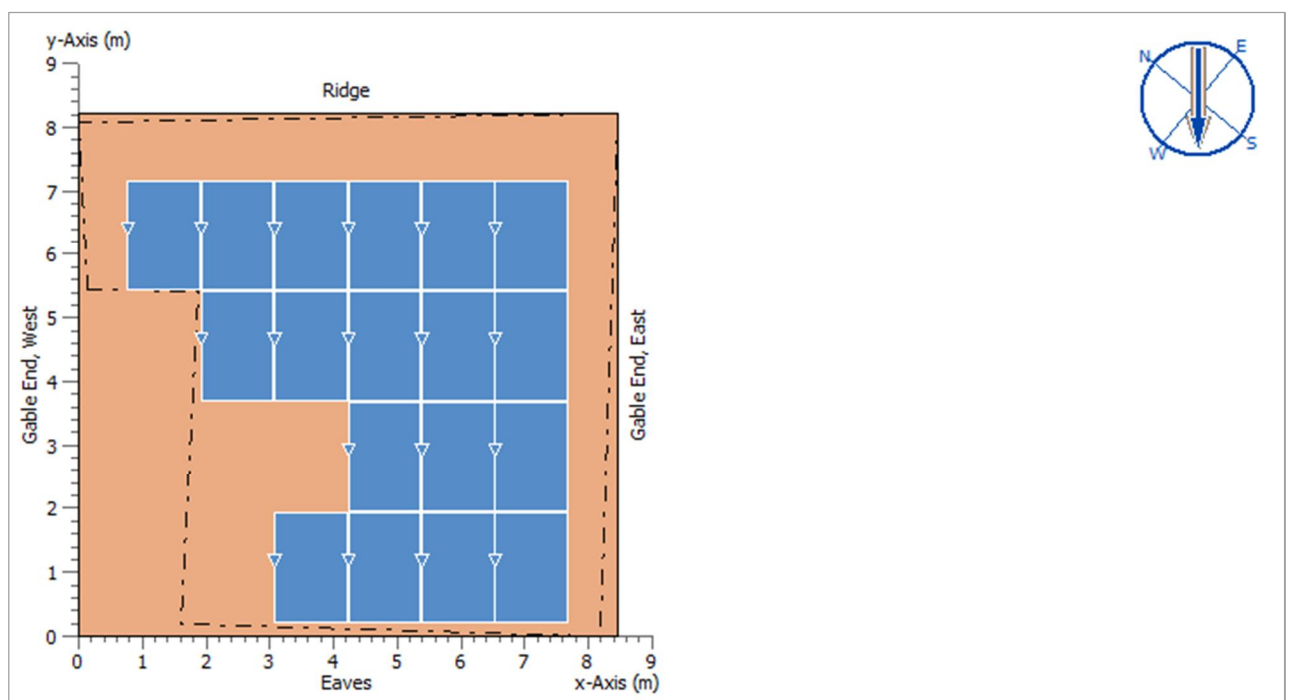


Figure: Roof View, 1. Module Area - Module Area 1

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Figure: Photo Preview, 1. Module Area - Module Area 1

Inverter configuration

Configuration 1

Module Area	Module Area 1
Inverter 1	
Model	S5-EH1P6K-L (v1)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	123 %
Configuration	MPP 1: 1 x 9 MPP 2: 1 x 9

AC Mains

AC Mains

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

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Battery Systems

Battery System

Model	LV5200
Manufacturer	FoxESS
Quantity	1
Battery Inverter	
Type of Coupling	DC intermediate circuit coupling
Nominal output	5.12 kW
Battery	
Manufacturer	FoxESS
Model	LV5200
Quantity	1
Battery Energy	5.2 kWh
Battery Type	Lithium iron phosphate

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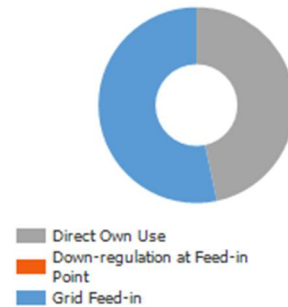
Simulation Results

Results Total System

PV System

PV Generator Output	7.38 kWp
Spec. Annual Yield	984.76 kWh/kWp
Performance Ratio (PR)	90.34 %
PV Generator Energy (AC grid) with battery	6,937 kWh/Year
Direct Own Use	3,237 kWh/Year
Down-regulation at Feed-in Point	0 kWh/Year
Grid Feed-in	3,702 kWh/Year
Own Power Consumption	46.6 %
CO ₂ Emissions avoided	3,096 kg / year

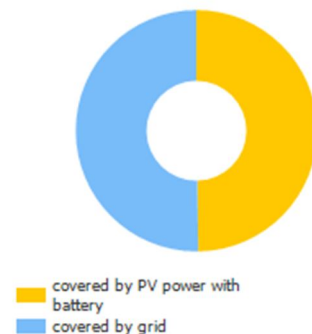
PV Generator Energy (AC grid) with battery



Appliances

Appliances	6,495 kWh/Year
Standby Consumption (Inverter)	9 kWh/Year
Total Consumption	6,504 kWh/Year
covered by PV power with battery	3,237 kWh/Year
covered by grid	3,267 kWh/Year
Solar Fraction	49.8 %

Total Consumption



Battery System

Charge at beginning	4 kWh
Battery Charge (PV System)	1,306 kWh/Year
Battery Energy for the Covering of Consumption	968 kWh/Year
Losses due to charging/discharging	302 kWh/Year
Losses in Battery	41 kWh/Year
Cycle Load	6.1 %
Service Life	16 Years

Level of Self-sufficiency

Total Consumption	6,504 kWh/Year
covered by grid	3,267 kWh/Year
Level of Self-sufficiency	49.8 %

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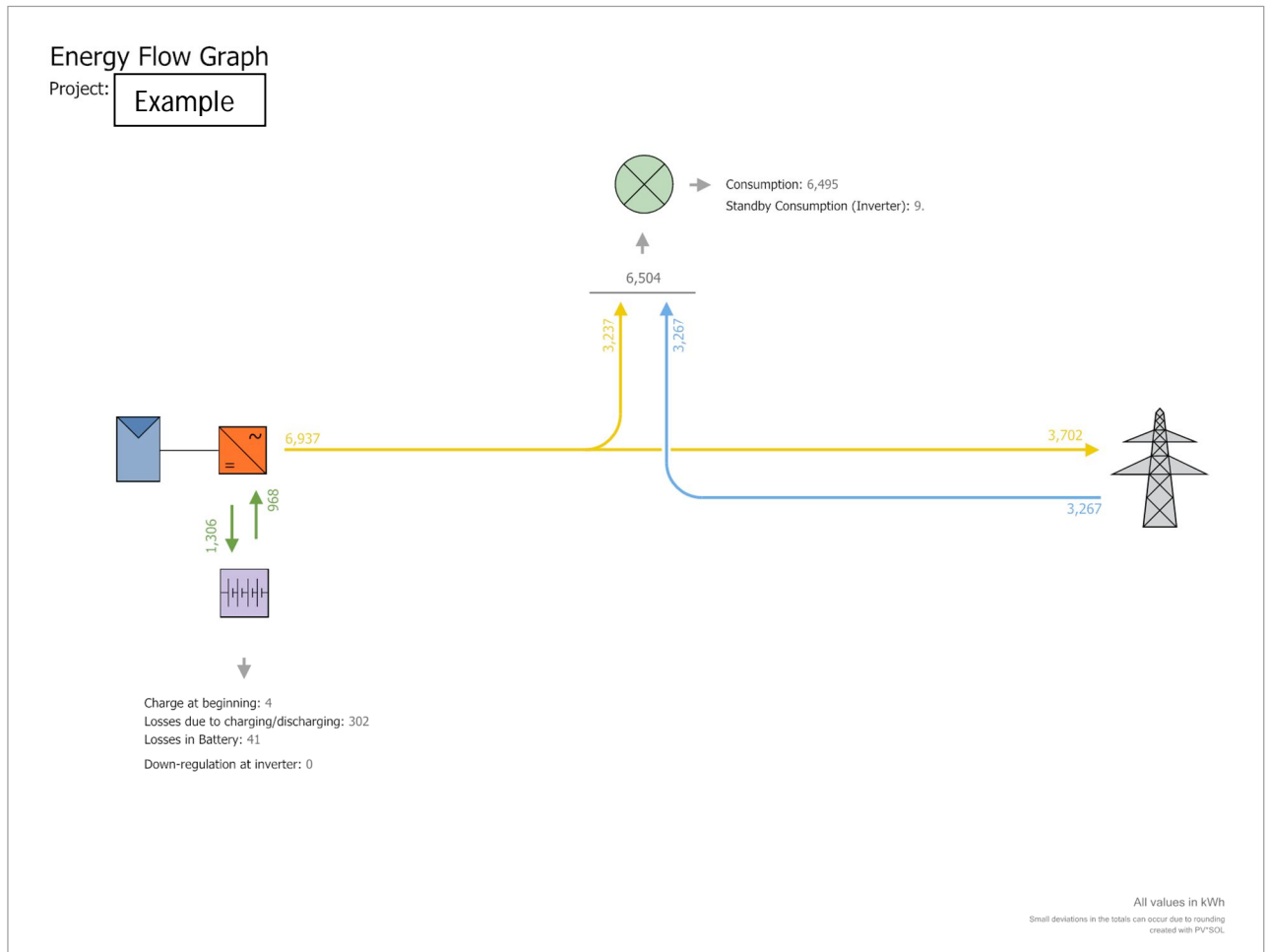


Figure: Energy flow

Example

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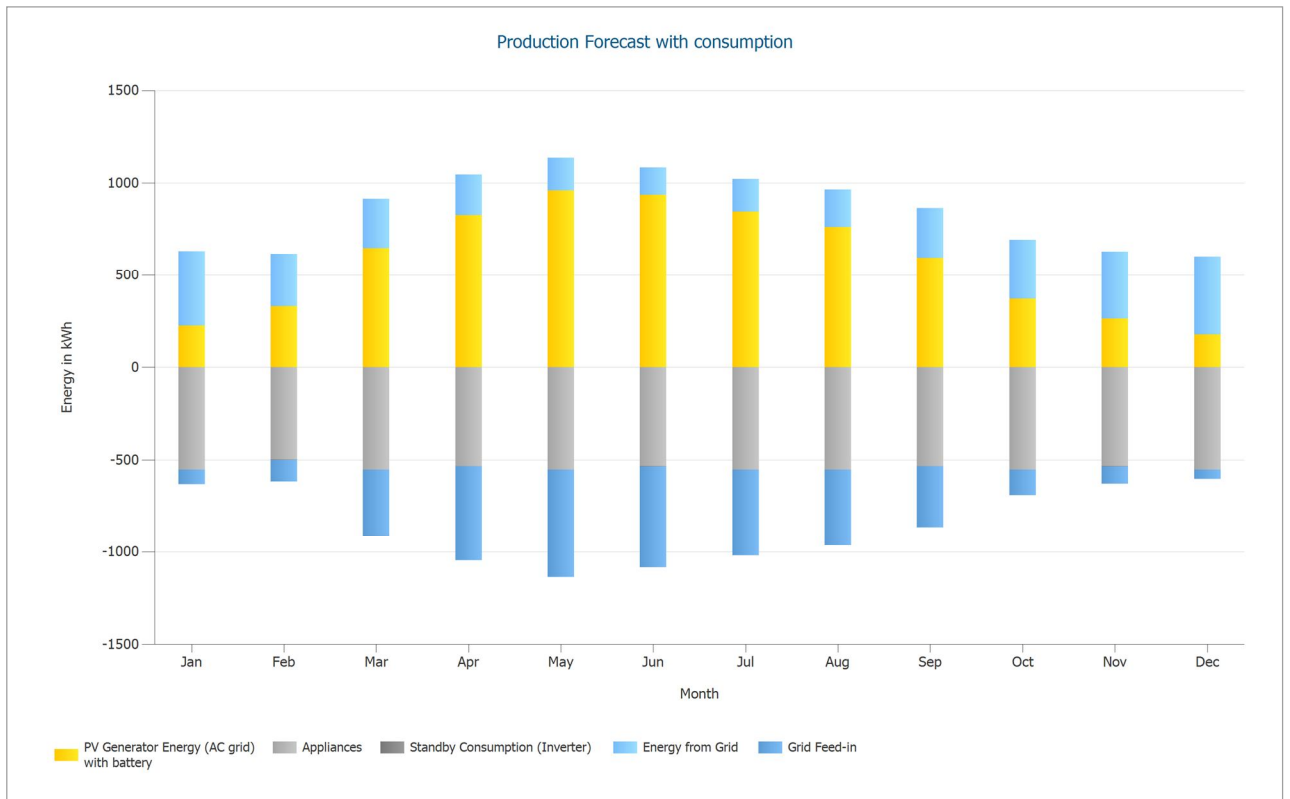


Figure: Production Forecast with consumption

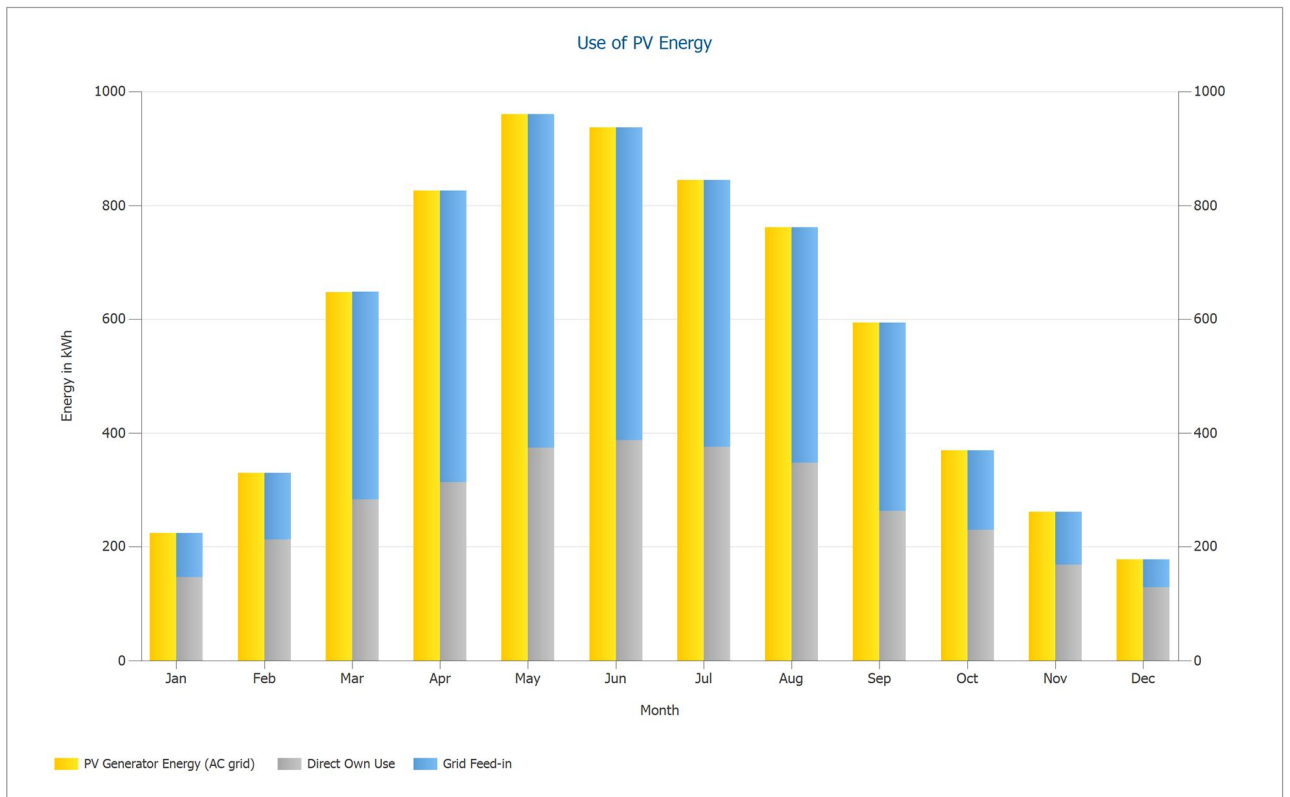


Figure: Use of PV Energy

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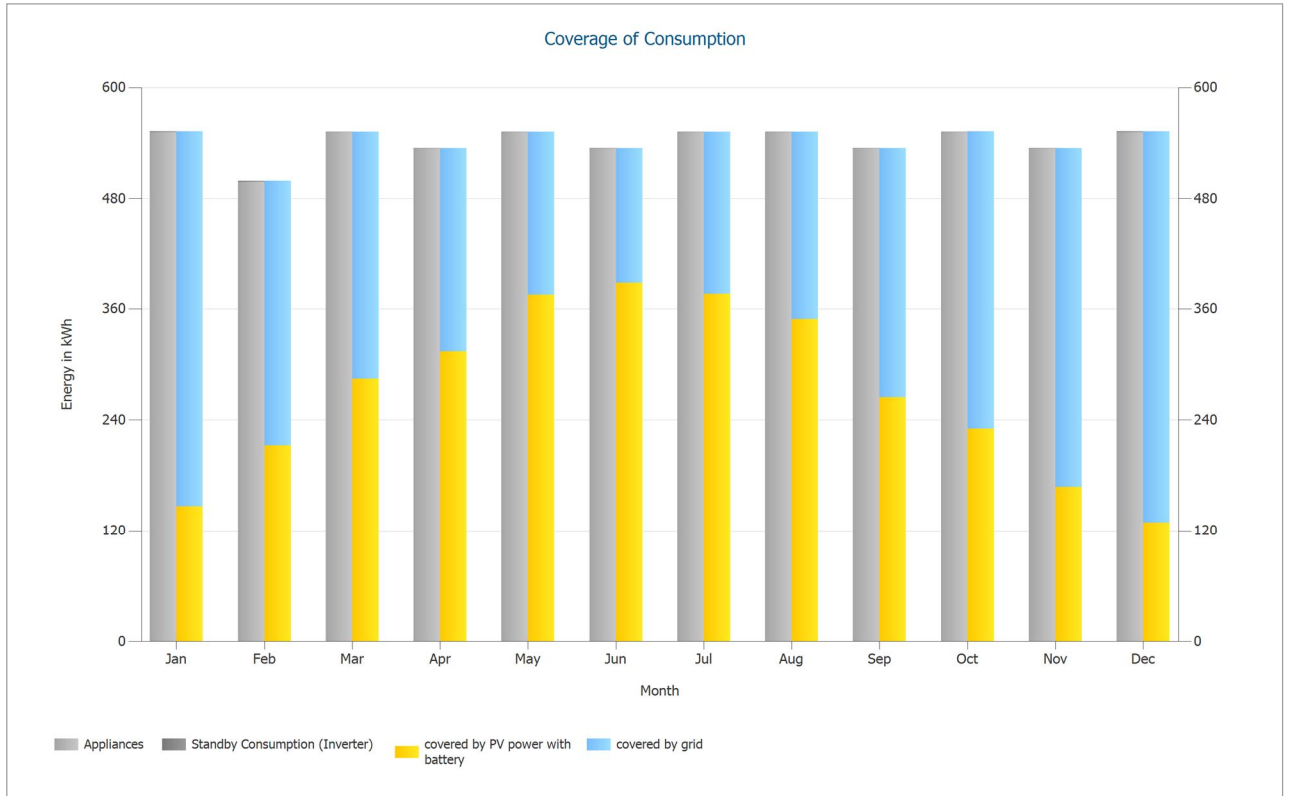


Figure: Coverage of Consumption

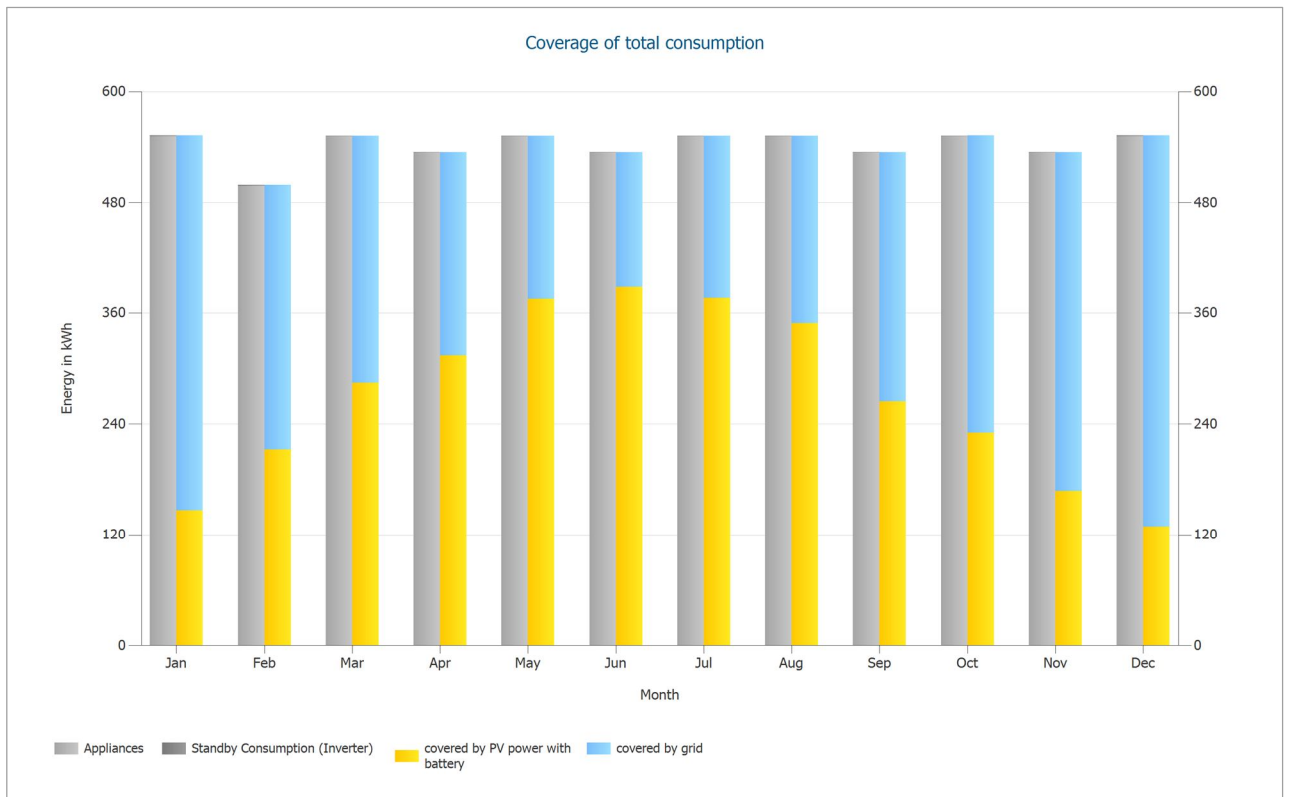


Figure: Coverage of total consumption

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Financial Analysis

Overview

System Data

Grid Feed-in in the first year (incl. module degradation)	3,571 kWh/Year
PV Generator Output	7.4 kWp
Start of Operation of the System	01/10/2022
Assessment Period	25 Years
Interest on Capital	1 %

Economic Parameters

Internal Rate of Return (IRR)	9.90 %
Accrued Cash Flow (Cash Balance)	25,085.95 £
Amortization Period	11.0 Years
Electricity Production Costs	0.0786 £/kWh

Payment Overview

Specific Investment Costs	1,682.34 £/kWp
Investment Costs	12,415.68 £
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	1,036.21 £/Year
EDF Energy (EDF Energy)	
Energy Price	0.3302 £/kWh
Inflation Rate for Energy Price	5 %/Year

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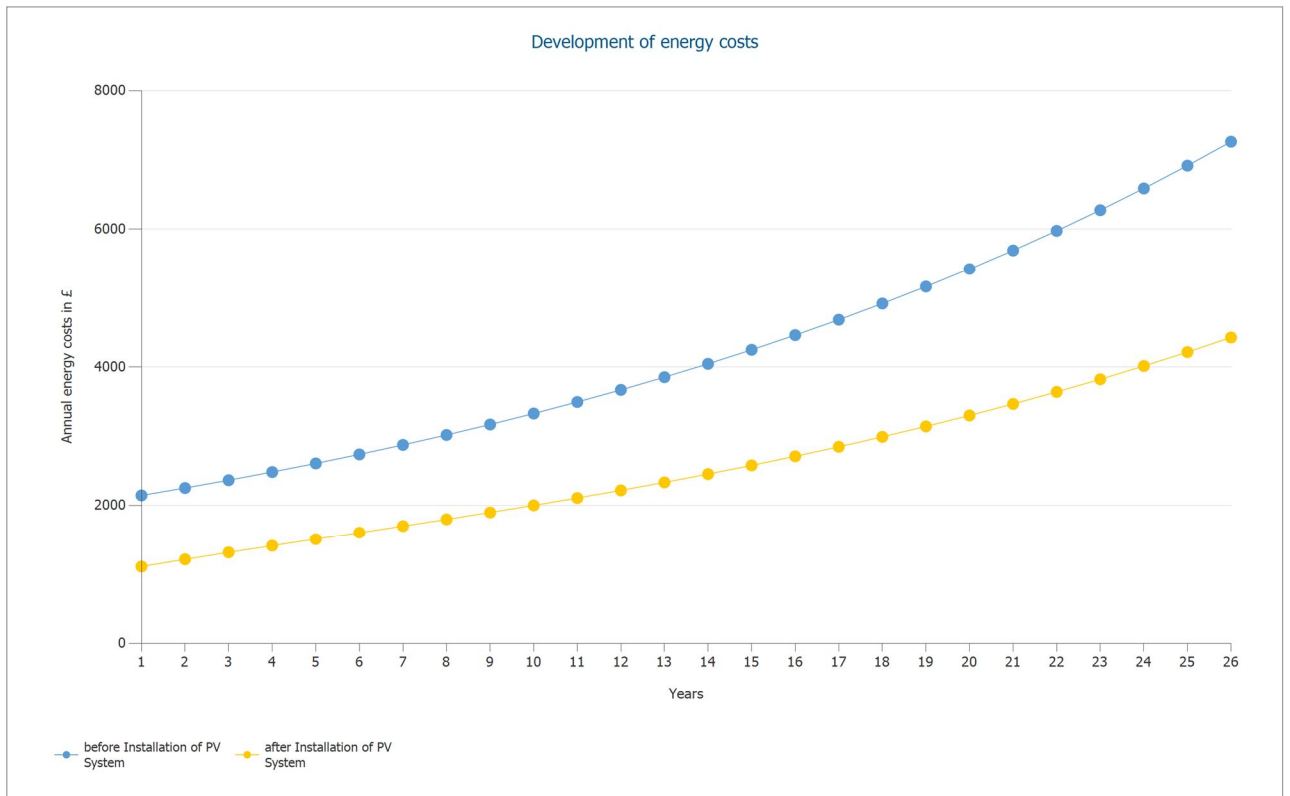


Figure: Development of energy costs

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Cash flow

Cash flow

	Year 1	Year 2	Year 3	Year 4	Year 5
Investments	-£12,415.68	£0.00	£0.00	£0.00	£0.00
Electricity Savings	£1,025.95	£1,018.20	£1,020.14	£1,030.10	£1,046.74
Annual Cash Flow	-£11,389.73	£1,018.20	£1,020.14	£1,030.10	£1,046.74
Accrued Cash Flow (Cash Balance)	-£11,389.73	-£10,371.54	-£9,351.40	-£8,321.30	-£7,274.56

Cash flow

	Year 6	Year 7	Year 8	Year 9	Year 10
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Electricity Savings	£1,069.04	£1,096.18	£1,127.54	£1,162.63	£1,201.09
Annual Cash Flow	£1,069.04	£1,096.18	£1,127.54	£1,162.63	£1,201.09
Accrued Cash Flow (Cash Balance)	-£6,205.52	-£5,109.35	-£3,981.81	-£2,819.18	-£1,618.09

Cash flow

	Year 11	Year 12	Year 13	Year 14	Year 15
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Electricity Savings	£1,242.64	£1,287.08	£1,334.27	£1,384.10	£1,436.54
Annual Cash Flow	£1,242.64	£1,287.08	£1,334.27	£1,384.10	£1,436.54
Accrued Cash Flow (Cash Balance)	-£375.45	£911.62	£2,245.89	£3,629.99	£5,066.53

Cash flow

	Year 16	Year 17	Year 18	Year 19	Year 20
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Electricity Savings	£1,491.54	£1,549.11	£1,609.27	£1,672.06	£1,737.54
Annual Cash Flow	£1,491.54	£1,549.11	£1,609.27	£1,672.06	£1,737.54
Accrued Cash Flow (Cash Balance)	£6,558.07	£8,107.18	£9,716.46	£11,388.52	£13,126.06

Cash flow

	Year 21	Year 22	Year 23	Year 24	Year 25
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Electricity Savings	£1,805.76	£1,876.80	£1,950.76	£2,027.72	£2,107.79
Annual Cash Flow	£1,805.76	£1,876.80	£1,950.76	£2,027.72	£2,107.79
Accrued Cash Flow (Cash Balance)	£14,931.81	£16,808.61	£18,759.37	£20,787.08	£22,894.87

Cash flow

	Year 26
Investments	£0.00
Electricity Savings	£2,191.08
Annual Cash Flow	£2,191.08
Accrued Cash Flow (Cash Balance)	£25,085.95

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

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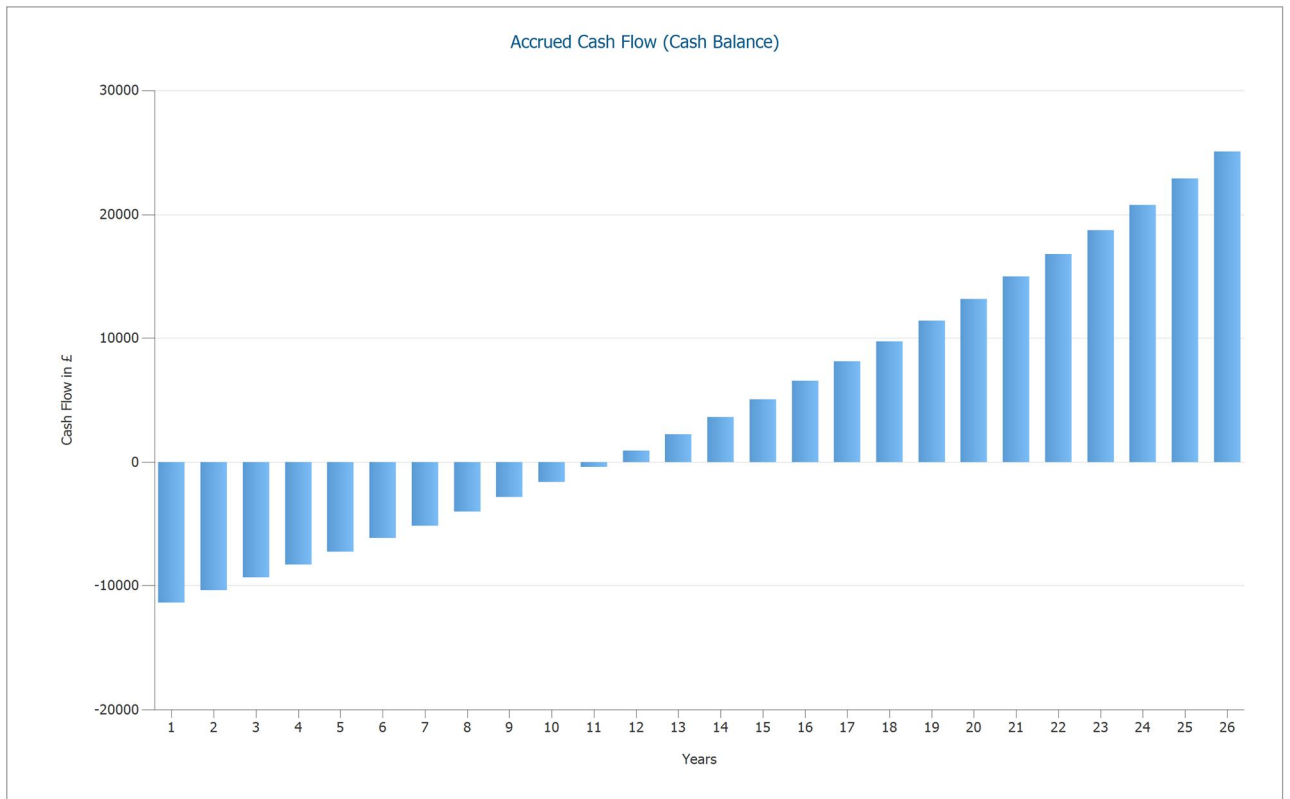


Figure: Accrued Cash Flow (Cash Balance)

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Data Sheets

PV Module Data Sheet

PV Module: JAM54S30-410/MR (v3)

Manufacturer	JA Solar Holdings Co., Ltd.
Available	Yes
Electrical Data	
Cell Type	Si monocrystalline
Half-cell module	Yes
Cell Count	108
Number of Bypass Diodes	3
Loss voltage per bypass diode	1 V
Integrated power optimizer	No
Only Transformer Inverters suitable	No
I/V Characteristics at STC	
MPP Voltage	31.45 V
MPP Current	13.04 A
Open Circuit Voltage	37.32 V
Short-Circuit Current	13.95 A
Increase open circuit voltage before stabilisation	0 %
Nominal output	410 W
Fill Factor	78.77 %
Efficiency	21 %
I/V Part Load Characteristics	
Values source	Manufacturer/user-created
Irradiance	200 W/m ²
Voltage in MPP at Part Load	30.3 V
Current in MPP at Part Load	2.66 A
Open Circuit Voltage (Part Load)	35.1 V
Short Circuit Current at Part Load	2.79 A
Additional Parameters	
Temperature Coefficient of Voc	-102.6 mV/K
Temperature Coefficient of Isc	6.3 mA/K
Temperature Coefficient of Pmpp	-0.35 %/K
Incident Angle Modifier (IAM)	98 %
Maximum System Voltage	1500 V
Mechanical Data	
Width	1134 mm
Height	1722 mm
Depth	30 mm
Frame Width	30 mm
Weight	21.5 kg

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Inverter Data Sheet

Inverter: S5-EH1P6K-L (v1)

Manufacturer	Ginlong (Solis)
Available	Yes
Electrical data - DC	
DC nominal output	5 kW
Max. DC Power	8 kW
Nom. DC Voltage	330 V
Max. Input Voltage	600 V
Max. Input Current	30 A
Number of DC Inlets	2
Electrical data - AC	
AC Power Rating	6 kW
Max. AC Power	6 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 %/100V
Min. Feed-in Power	2 W
Standby Consumption	10 W
Night Consumption	1 W
MPP Tracker	
Output Range < 20% of Power Rating	99.5 %
Output Range > 20% of Power Rating	99.9 %
Count of MPP Trackers	2
MPP Tracker 1-2	
Max. Input Current	15 A
Max. Input Power	6 kW
Min. MPP Voltage	90 V
Max. MPP Voltage	520 V

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Battery System Data Sheet

Battery System: LV5200 (v4)

Manufacturer	FoxESS
Available	Yes

Battery Inverter

Nominal output	5.12 kW
Maximum Charging Power	5.12 kW
Maximum Discharge Power	5.12 kW
Type of Coupling	DC intermediate circuit coupling

Battery

Manufacturer Battery	FoxESS
Model	LV5200 (v2)
Quantity	1
DC Battery System Voltage	51.2 V
Usable Battery Energy	4.68 kWh
Capacity at t=10h	100 Ah

Battery Data Sheet

Battery: LV5200 (v2)

Manufacturer	FoxESS
Available	Yes

Electrical Data

Battery Type	Lithium iron phosphate
Cell voltage	3.2 V
No. of Cells in Series	16
Nom. Voltage	51.2 V
Number of Battery Strings	1
Internal Resistance	10 mΩ
Self-Discharge	1.5 %/Month
Service Life in Charge-discharge Cycles (DoD = 40 %)	11200

Mechanical Data

Length	207 mm
Width	342 mm
Height	600 mm
Weight	49 kg

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Plans and parts list

Photo from Photo Plan



Figure: Photo Preview, 1. Module Area - Module Area 1