

Offer no.: York Way

16/04/2019

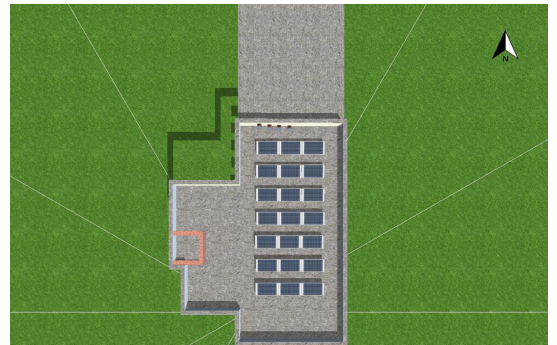
Documentation - York Way

Customer Details

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Project Data

Project Name	
Offer no.	York Way
Project Designer	Leah Robson
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Project Overview

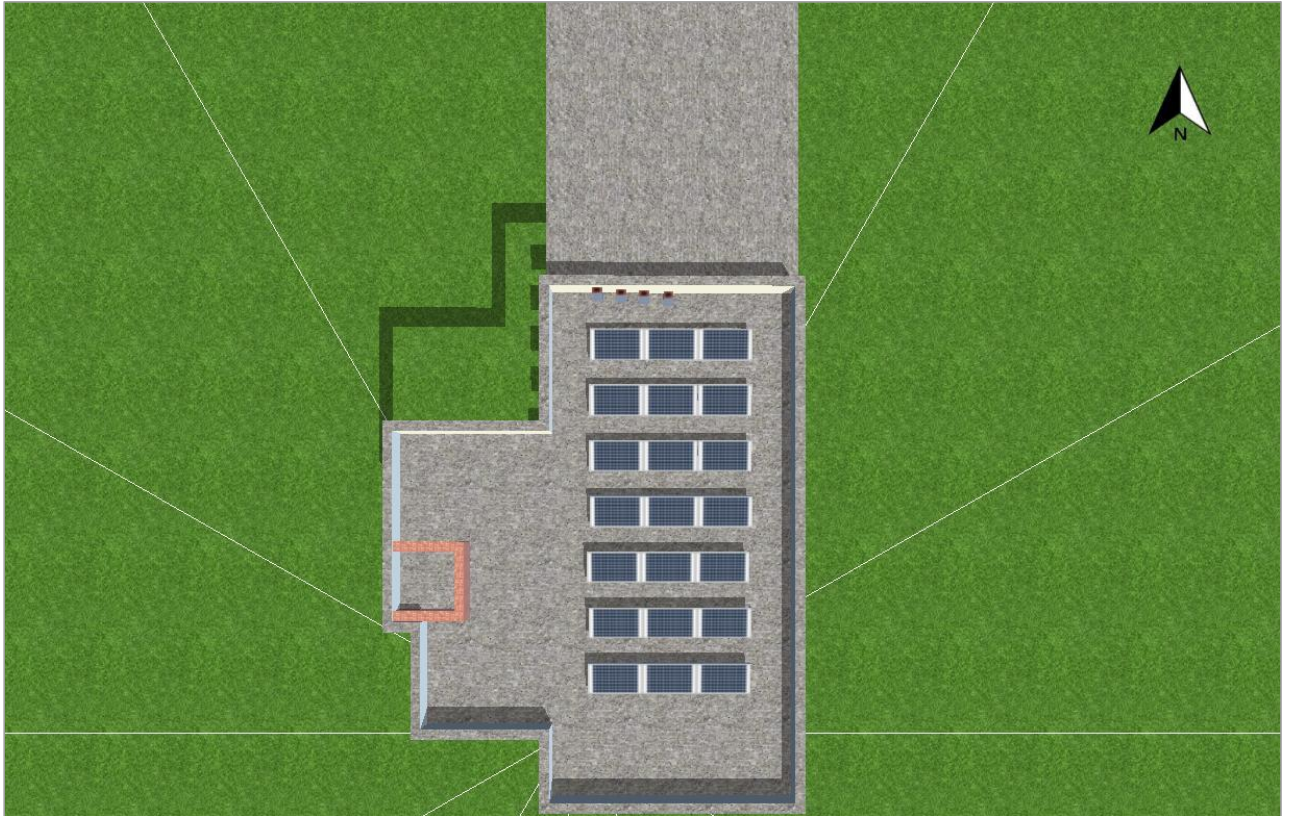


Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System

Climate Data	London Weather C., GBR (1991 - 2010)
PV Generator Output	6.83 kWp
PV Generator Surface	34.9 m ²
Number of PV Modules	21
Number of Inverters	1

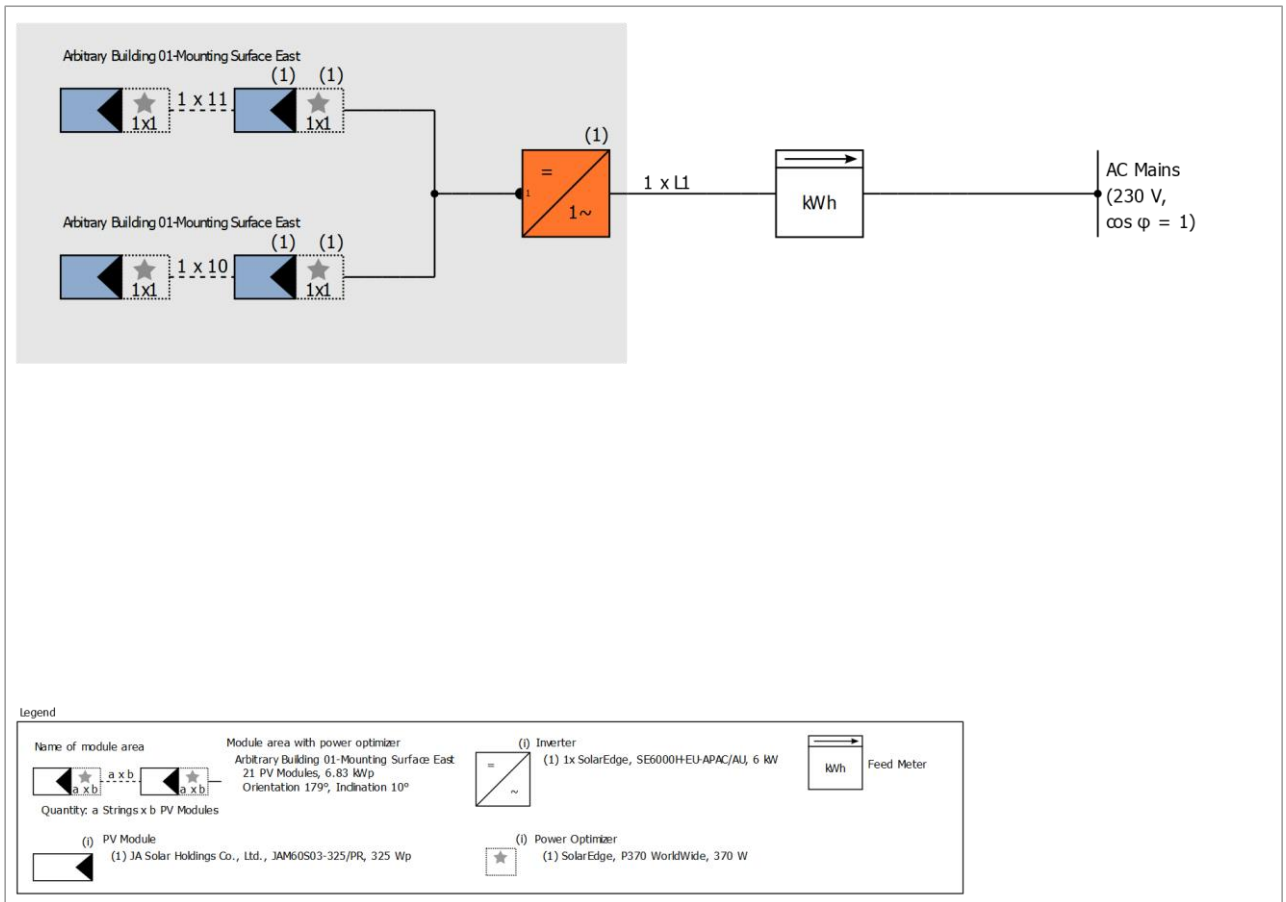


Figure: Schematic diagram

The yield

The yield

PV Generator Energy (AC grid)	5,710 kWh
Grid Feed-in	5,710 kWh
Down-regulation at Feed-in Point	0 kWh
Own Power Consumption	0.0 %
Solar Fraction	0.0 %
Spec. Annual Yield	836.60 kWh/kWp
Performance Ratio (PR)	82.2 %
Yield Reduction due to Shading	11.5 %/year
CO ₂ Emissions avoided	3,426 kg / year

Financial Analysis

Your Gain

Total investment costs	8,190.00 £
Return on Assets	0.00 %
Amortization Period	More than 25 Years
Electricity Production Costs	0.09 £/kWh
Energy Balance/Feed-in Concept	Full 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
Start of Operation	12/04/2019

Climate Data

Location	London Weather C., GBR (1991 - 2010)
Resolution of the data	1 h
Simulation model used:	
- Diffuse Irradiation onto Horizontal Plane	Hofmann
- Irradiance onto tilted surface	Hay & Davies

Module Areas

1. Module Area - Arbitrary Building 01-Mounting Surface East

PV Generator, 1. Module Area - Arbitrary Building 01-Mounting Surface East

Name	Arbitrary Building 01-Mounting Surface East
PV Modules	21 x JAM60S03-325/PR
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	South 179 °
Installation Type	Mounted - Roof
PV Generator Surface	34.9 m ²

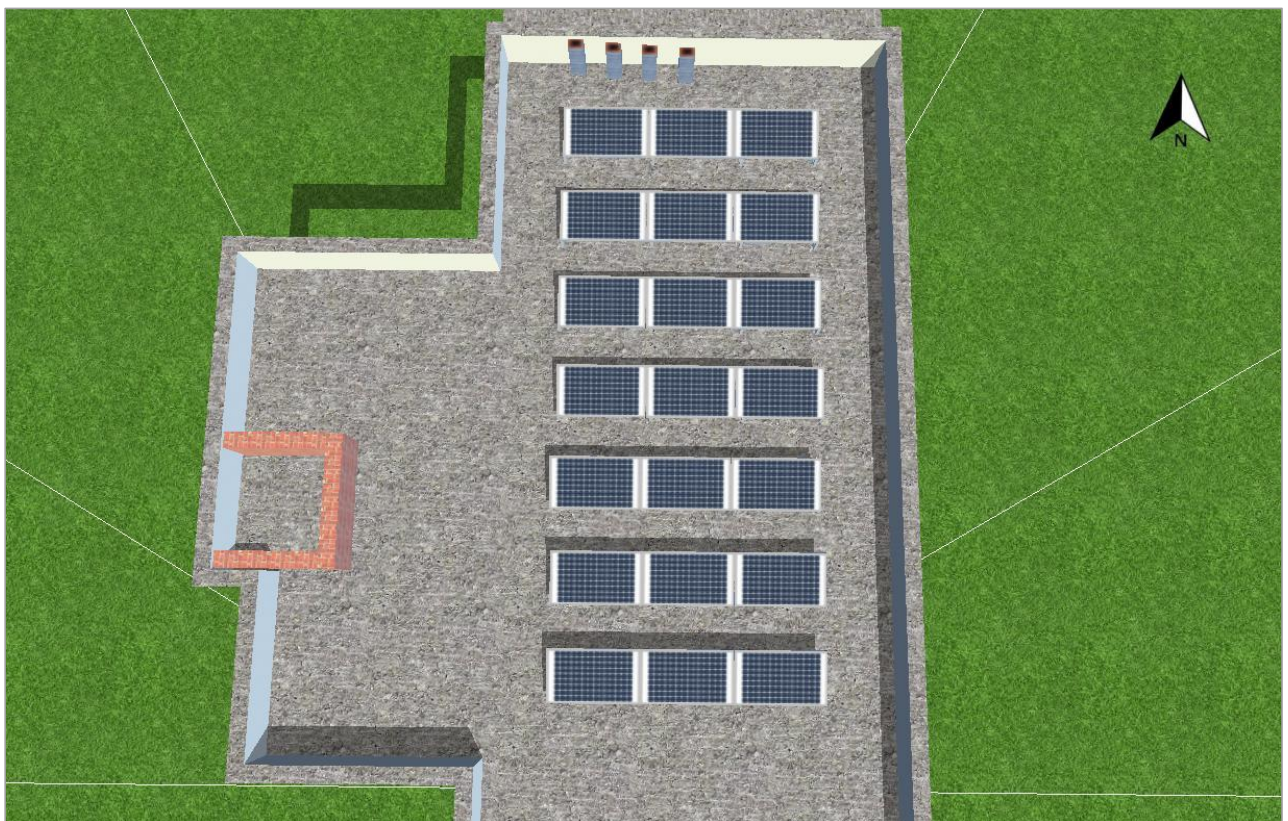


Figure: 1. Module Area - Arbitrary Building 01-Mounting Surface East

Degradation of Module, 1. Module Area - Arbitrary Building 01-Mounting Surface East

Remaining power (power output) after 20 years

100 %

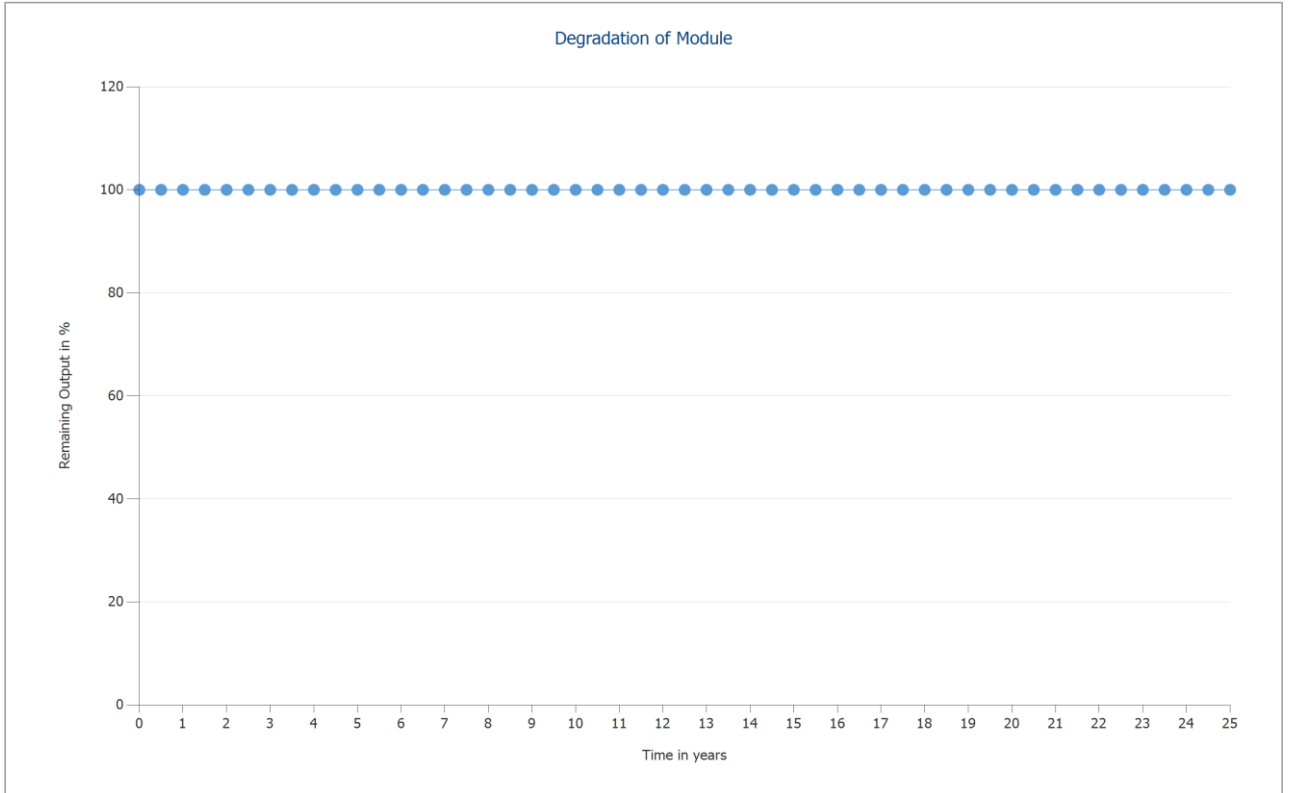


Figure: Degradation of Module, 1. Module Area - Arbitrary Building 01-Mounting Surface East

Horizon Line, 3D Design

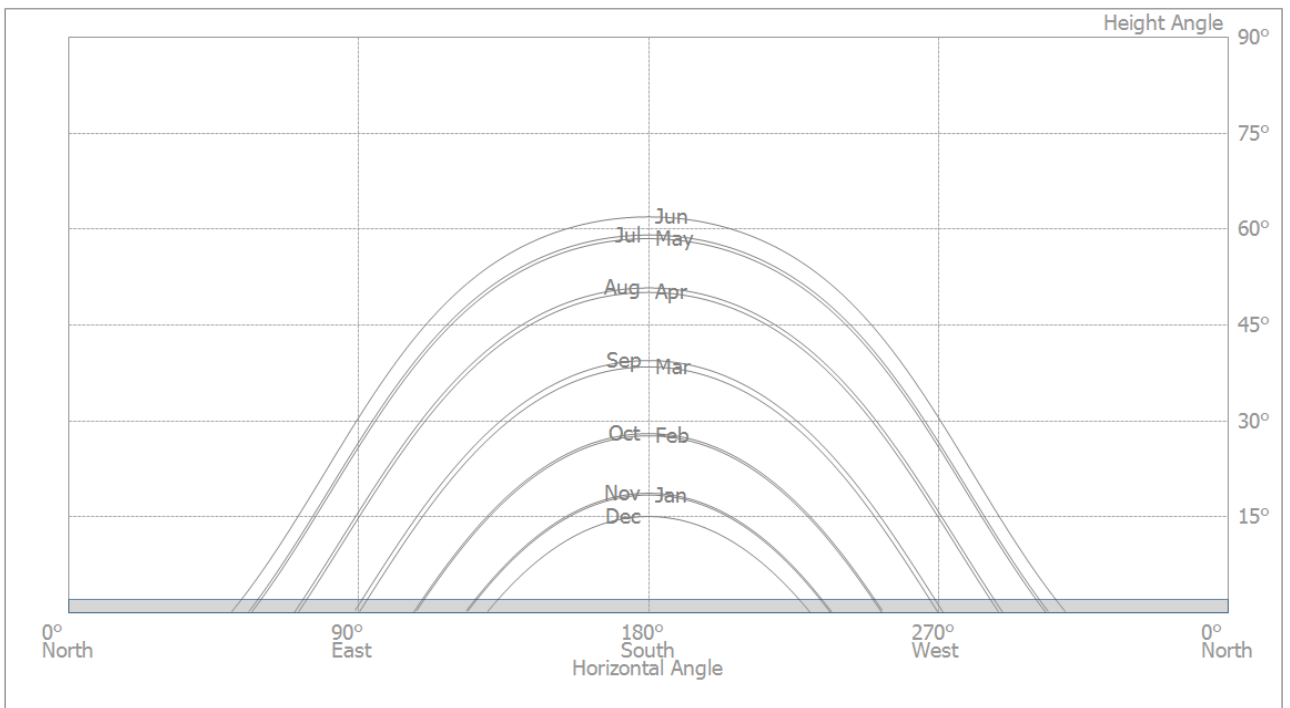


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Area	Arbitrary Building 01-Mounting Surface East
Inverter 1	
Manufacturer	SolarEdge
Model	SE6000H-EU-APAC/AU
Quantity	1
Sizing Factor	113.8 %
Configuration	MPP 1: 1 x 11☆[1 x 1] 1 x 10☆[1 x 1]
Power Optimizer 1	
Manufacturer	SolarEdge
Model	P370 WorldWide
Quantity	21

AC Mains

AC Mains

Number of Phases	3
Mains Voltage (1-phase)	230 V
Displacement Power Factor (cos phi)	+/- 1

Simulation Results

Results Total System

PV System

PV Generator Output	6.8 kWp
Spec. Annual Yield	836.60 kWh/kWp
Performance Ratio (PR)	82.2 %
Yield Reduction due to Shading	11.5 %/year
Grid Feed-in	5,710 kWh/year
Grid Feed-in in the first year (incl. module degradation)	5,710 kWh/year
Standby Consumption (Inverter)	11 kWh/year
CO ₂ Emissions avoided	3,426 kg / year

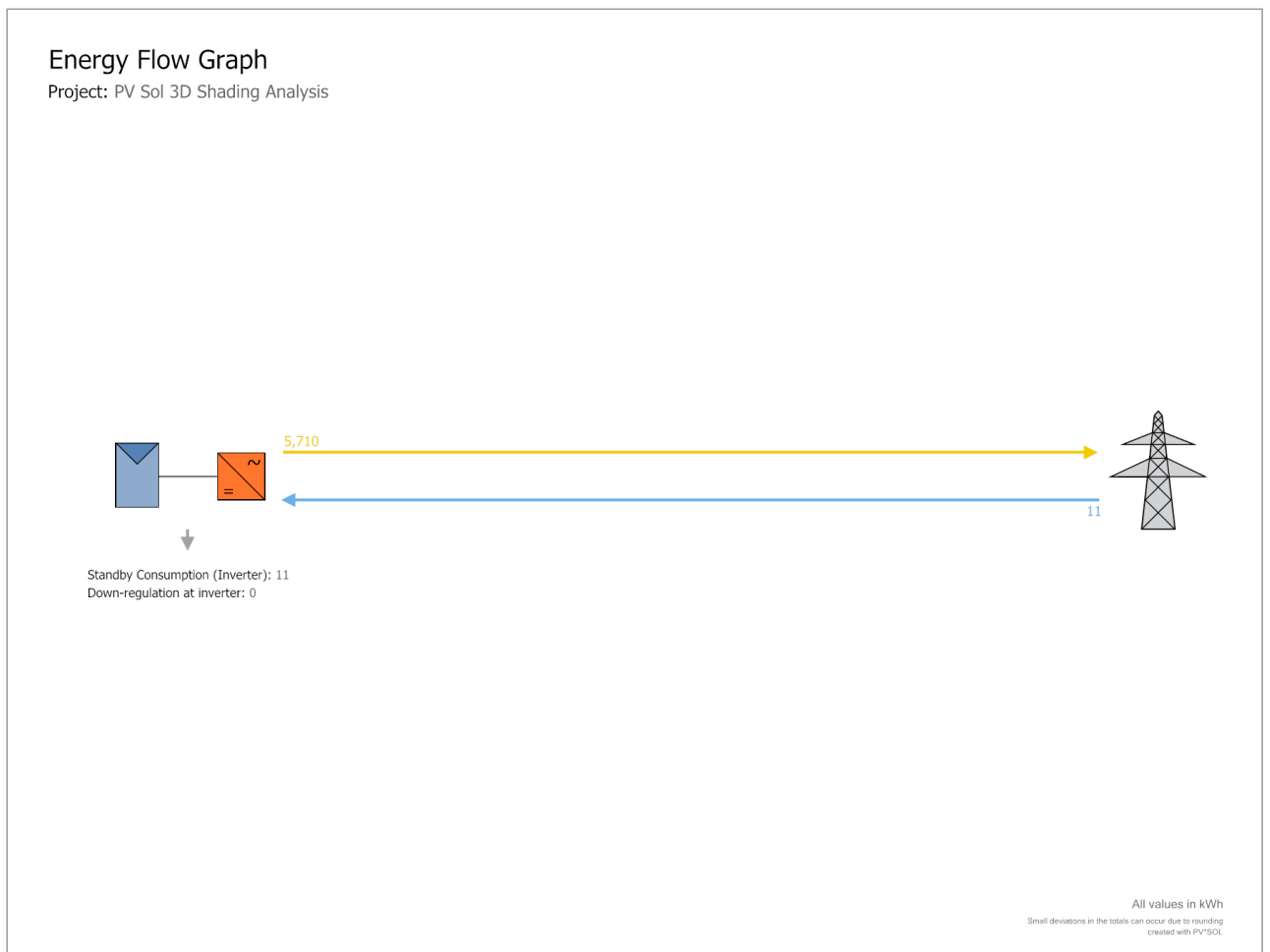


Figure: Energy Flow Graph

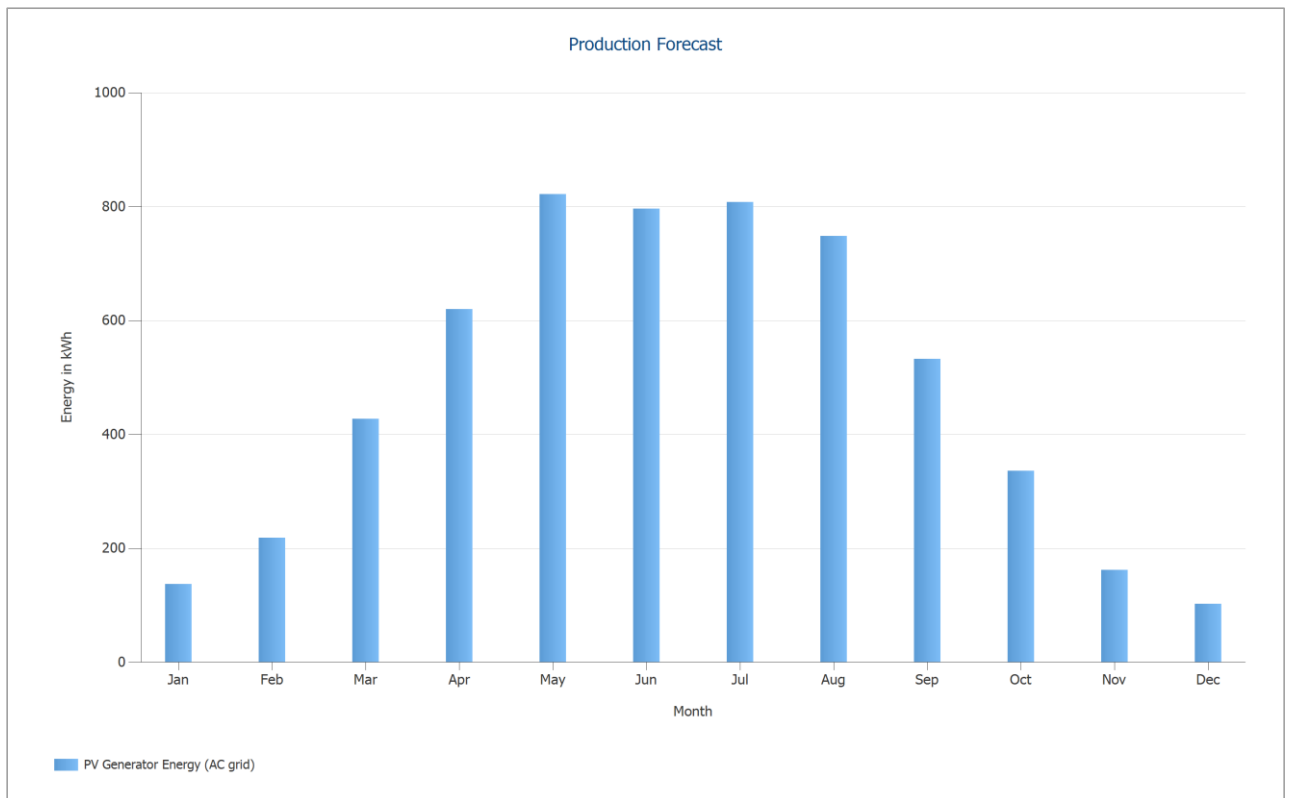


Figure: Production Forecast

PV System Energy Balance

PV System Energy Balance

Global radiation - horizontal	974.99 kWh/m²	
Deviation from standard spectrum	-9.75 kWh/m ²	-1.00 %
Ground Reflection (Albedo)	1.47 kWh/m ²	0.15 %
Orientation and inclination of the module surface	68.68 kWh/m ²	7.10 %
Module-independent shading	-17.86 kWh/m ²	-1.72 %
Reflection on the Module Interface	-24.55 kWh/m ²	-2.41 %
Global Radiation at the Module	992.97 kWh/m²	
	992.97 kWh/m ²	
	x 34.92 m ²	
	= 34,675.21 kWh	
Global PV Radiation	34,675.21 kWh	
Soiling	0.00 kWh	0.00 %
STC Conversion (Rated Efficiency of Module 19.55 %)	-27,896.99 kWh	-80.45 %
Rated PV Energy	6,778.22 kWh	
Module-specific Partial Shading	-628.22 kWh	-9.27 %
Low-light performance	-91.36 kWh	-1.49 %
Deviation from the nominal module temperature	-76.69 kWh	-1.27 %
Diodes	-5.26 kWh	-0.09 %
Mismatch (Manufacturer Information)	0.00 kWh	0.00 %
Mismatch (Configuration/Shading)	0.00 kWh	0.00 %
Power optimizer (DC conversion/down-regulation)	-63.89 kWh	-1.07 %
PV Energy (DC) without inverter down-regulation	5,912.79 kWh	
Failing to reach the DC start output	0.00 kWh	0.00 %
Down-regulation on account of the MPP Voltage Range	-7.84 kWh	-0.13 %
Down-regulation on account of the max. DC Current	0.00 kWh	0.00 %
Down-regulation on account of the max. DC Power	0.00 kWh	0.00 %
Down-regulation on account of the max. AC Power/cos phi	-0.10 kWh	0.00 %
MPP Matching	0.00 kWh	0.00 %
PV energy (DC)	5,904.85 kWh	
Energy at the Inverter Input	5,904.85 kWh	
Input voltage deviates from rated voltage	0.00 kWh	0.00 %
DC/AC Conversion	-166.36 kWh	-2.82 %
Standby Consumption (Inverter)	-10.74 kWh	-0.19 %
Total Cable Losses	-28.75 kWh	-0.50 %
PV energy (AC) minus standby use	5,699.01 kWh	
Grid Feed-in	5,709.80 kWh	

Data Sheets

PV Module Data Sheet

PV Module: JAM60S03-325/PR

Manufacturer	JA Solar Holdings Co., Ltd.
Available	Yes

Electrical Data

Cell Type	Si monocrystalline
Only Transformer Inverters suitable	No
Number of Cells	120
Number of Bypass Diodes	3

Mechanical Data

Width	991 mm
Height	1678 mm
Depth	35 mm
Frame Width	35 mm
Weight	18.5 kg
Framed	No

I/V Characteristics at STC

MPP Voltage	33.65 V
MPP Current	9.66 A
Nominal output	325 W
Open Circuit Voltage	40.56 V
Short-Circuit Current	10.22 A
Increase open circuit voltage before stabilisation	0 %

I/V Part Load Characteristics

Values source	Manufacturer/user-created
Irradiance	200 W/m ²
Voltage in MPP at Part Load	32.8 V
Current in MPP at Part Load	1.966 A
Open Circuit Voltage (Part Load)	36.98 V
Short Circuit Current at Part Load	2.16 A

Further

Voltage Coefficient	-117.22 mV/K
Electricity Coefficient	5.21 mA/K
Output Coefficient	-0.36 %/K
Incident Angle Modifier	98 %
Maximum System Voltage	1000 V
Spec. Heat Capacity	920 J/(kg*K)
Absorption Coefficient	70 %
Emissions Coefficient	85 %

Inverter Data Sheet

Inverter: SE6000H-EU-APAC/AU

Manufacturer	SolarEdge
Available	Yes
Electrical Data	
DC nominal output	9.3 kW
AC Power Rating	6 kW
Max. DC Power	9.3 kW
Max. AC Power	6 kVA
Standby Consumption	2.5 W
Night Consumption	2.5 W
Feed-in from	0 W
Max. Input Current	16.5 A
Max. Input Voltage	480 V
Nom. DC Voltage	380 V
Number of Feed-in Phases	1
Number of DC Inlets	1
With Transformer	No
Change in Efficiency when Input Voltage deviates from Rated Voltage	0 %/100V
MPP Tracker	
Output Range < 20% of Power Rating	100 %
Output Range > 20% of Power Rating	100 %
No. of MPP Trackers	1
Max. Input Current per MPP Tracker	16.5 A
Max. Input Power per MPP Tracker	9.3 kW
Min. MPP Voltage	380 V
Max. MPP Voltage	380 V

Plans

Circuit Diagram

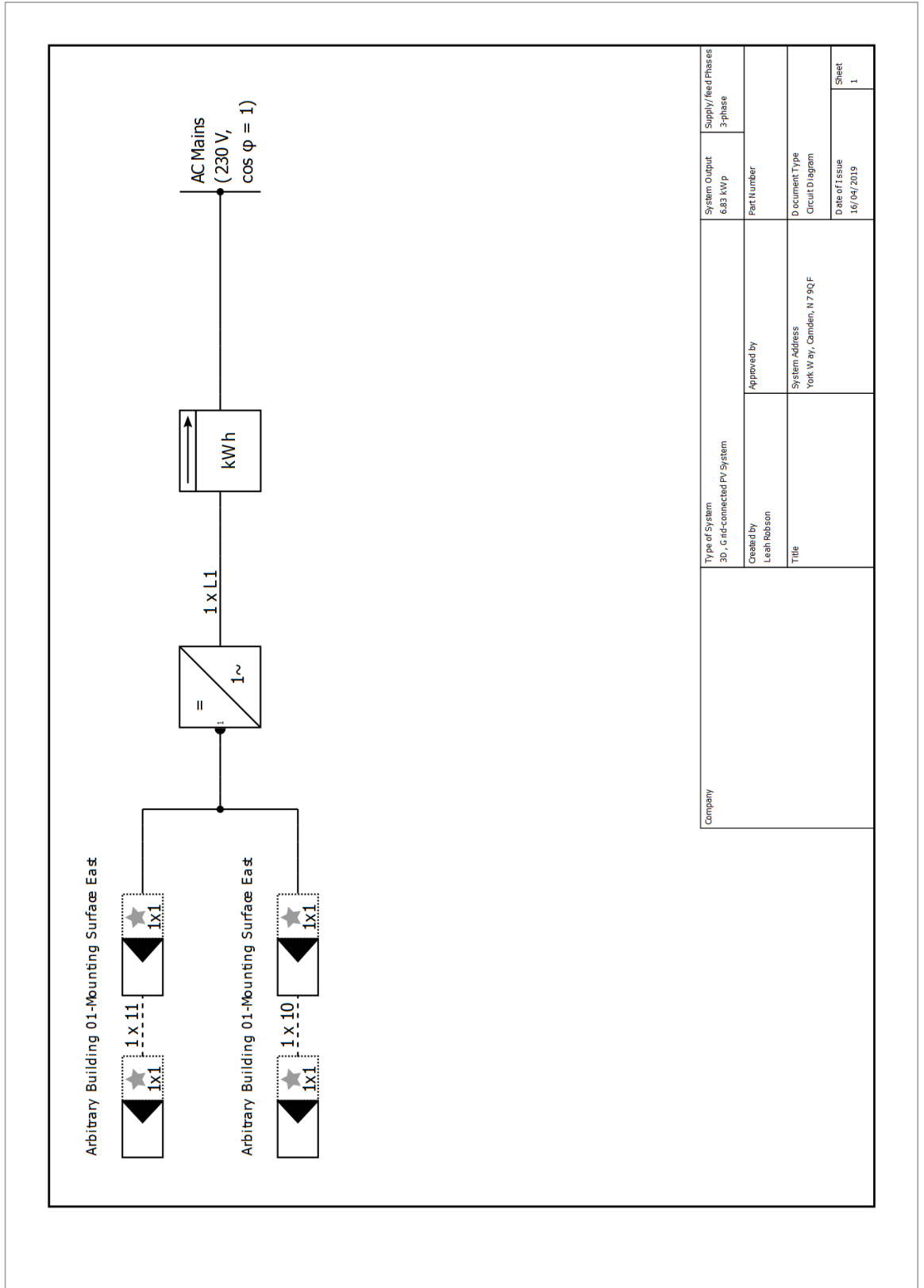


Figure: Circuit Diagram

Dimensioning Plan

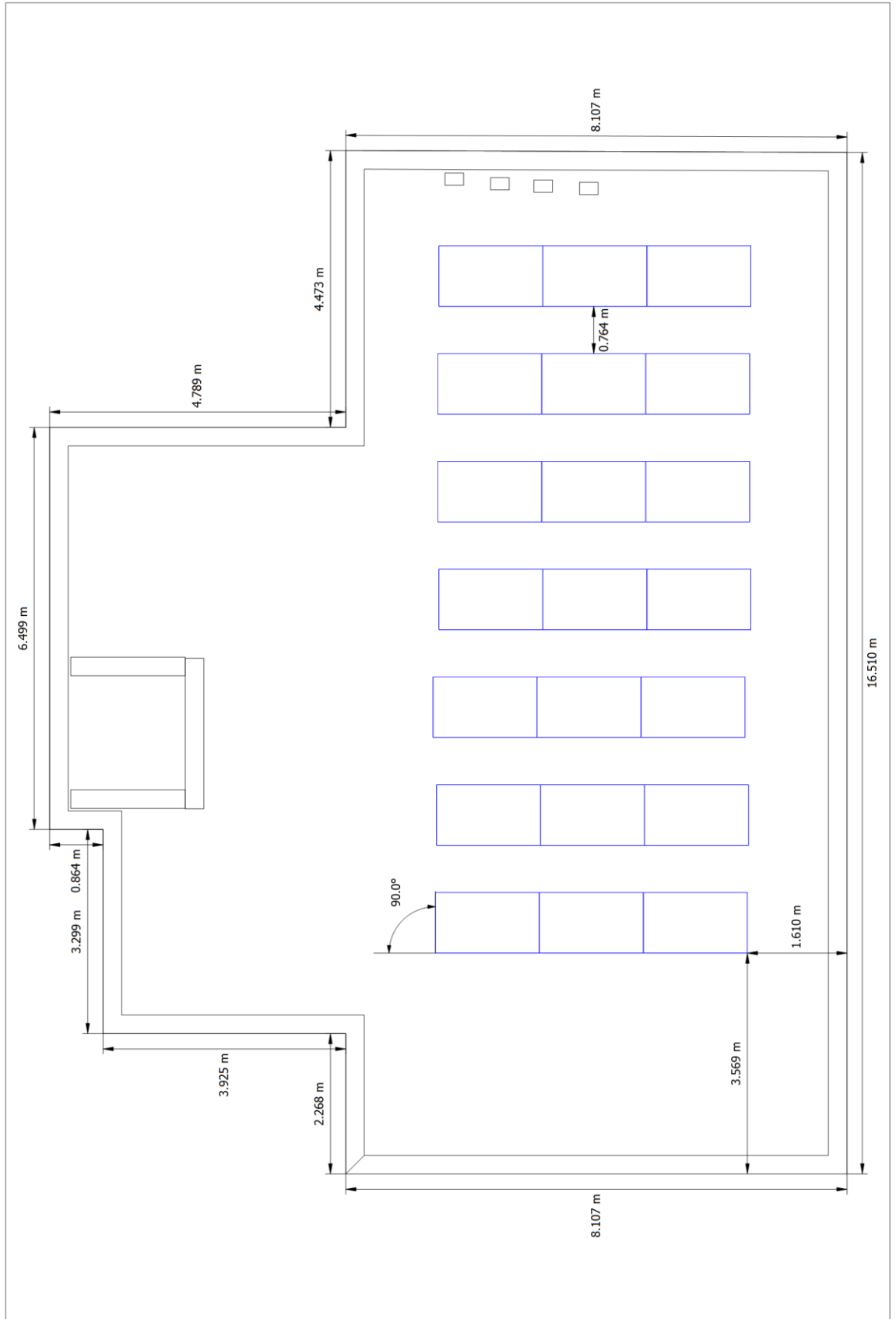


Figure: Arbitrary Building 01-Mounting Surface East