Aarhus University
Zhe Zhang
Jens Chr. Skous Vej 2, 8000 Århus

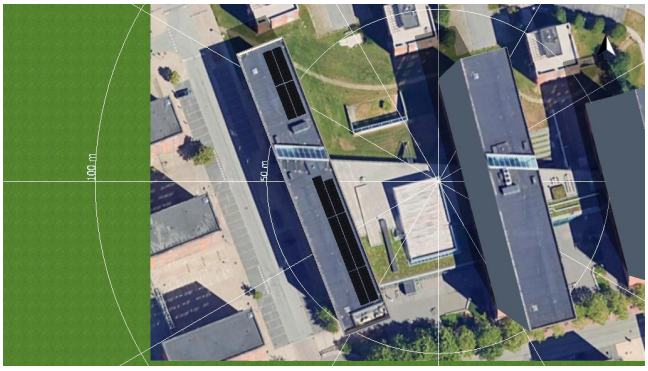
Customer No.: Aarhus University
Project Name: Jens Chr. Skous Vej 2, 8000
Offer no.: Universitetets Energifælleskab

25-06-2024

Your PV system

Address of Installation

Jens Chr. Skous Vej 2,
8000



Project Overview

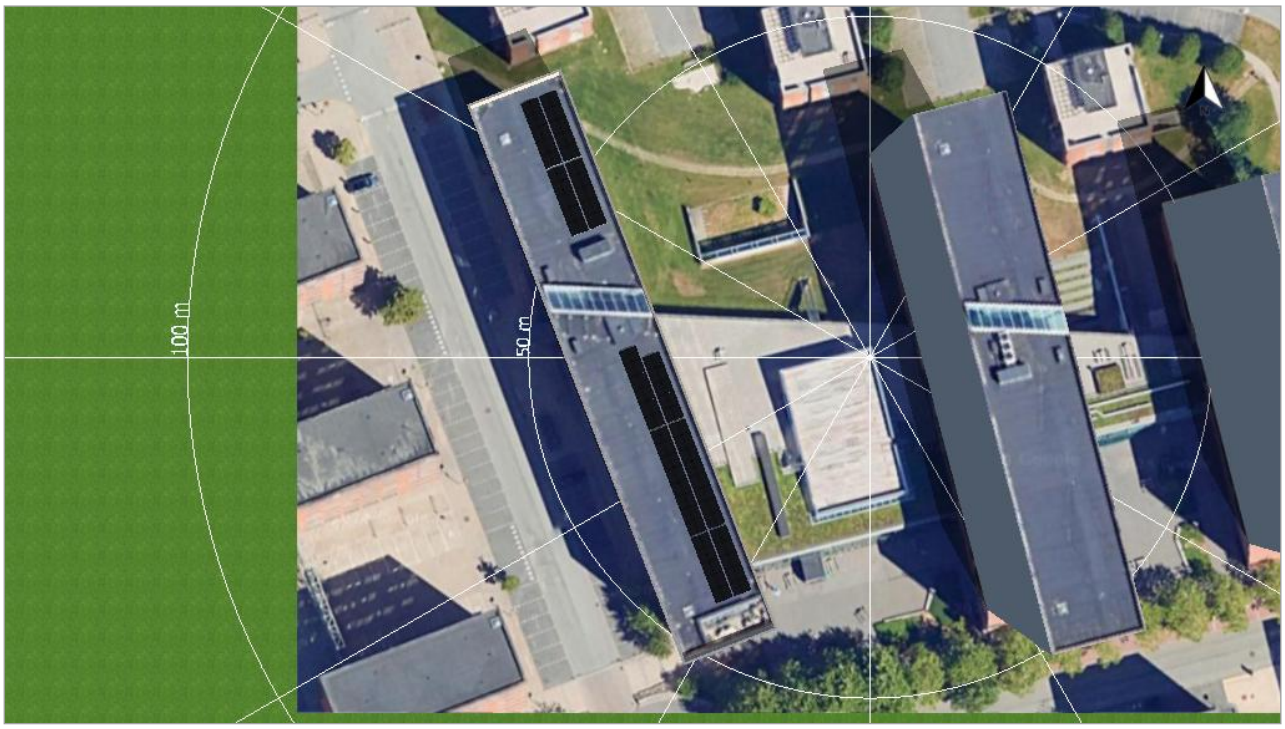


Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System

Climate Data	Aarhus, DNK (1996 - 2015)	
Values source	Meteonorm 8.1(i)	
PV Generator Output	49,02	kWp
PV Generator Surface	222,6	m²
Number of PV Modules	114	
Number of Inverters	1	

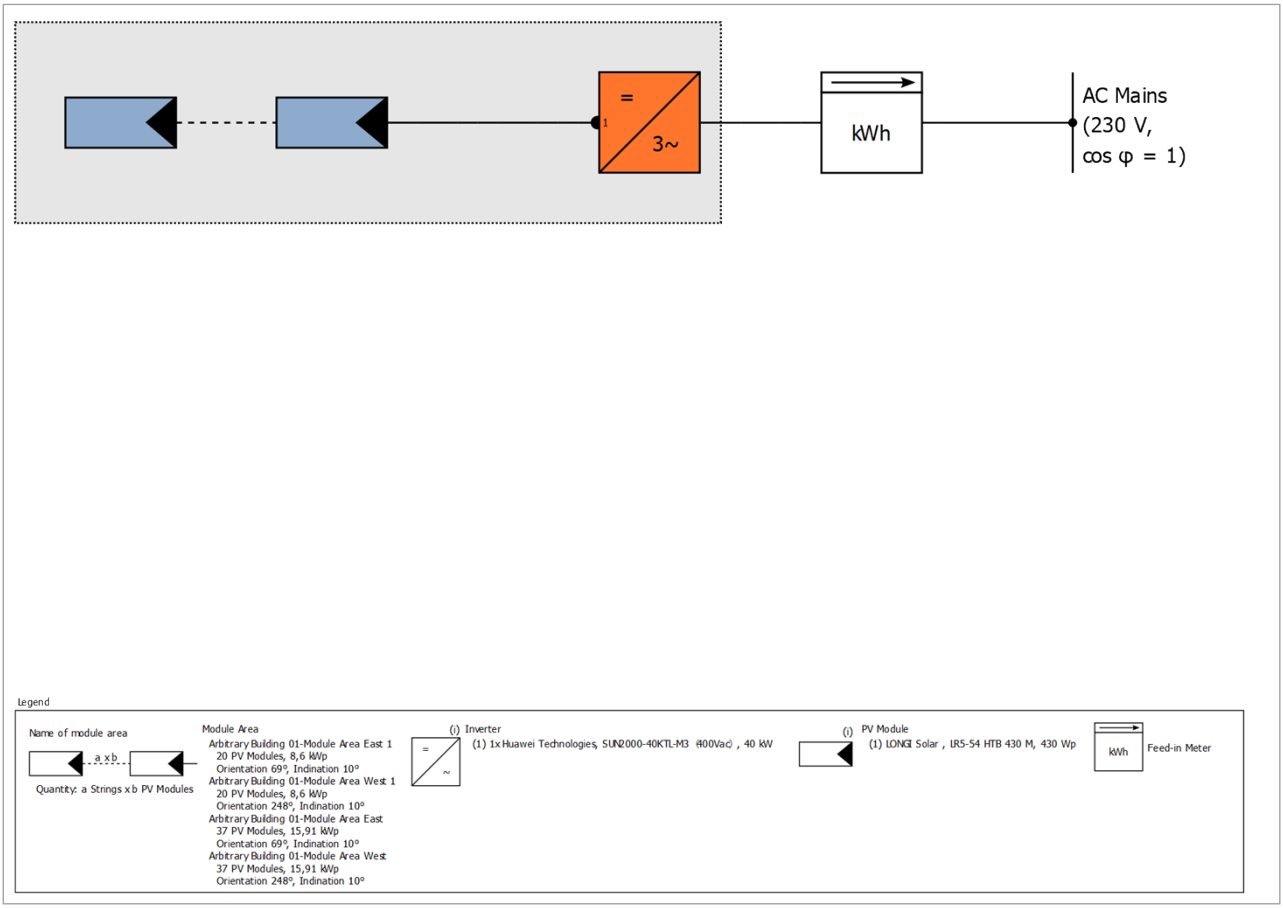


Figure: Schematic diagram

Production Forecast

Production Forecast		
PV Generator Output	49,02	kWp
Spec. Annual Yield	899,59	kWh/kWp
Performance Ratio (PR)	90,60	%
Yield Reduction due to Shading	7,3	%
Grid Export	44.122	kWh/Year
Grid Export in the first year (incl. module degradation)	44.053	kWh/Year
Standby Consumption (Inverter)	24	kWh/Year
CO_2 Emissions avoided	6.085	kg / year

Financial Analysis

Your Gain		
Total investment costs	73.530,00	kr.
Internal Rate of Return (IRR)	0,00	%
Amortization Period	More than 20	Years
Electricity Production Costs	0,0924	kr./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

Climate Data

Location	Aarhus, DNK (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

Module Areas

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

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

Name	Arbitrary Building 01-Module Area East 1	
PV Modules	20 x LR5-54 HTB 430 M (v3)	
Manufacturer	LONGI Solar	
Inclination	10	°
Orientation	East 69	°
Installation Type	Mounted - Roof	
PV Generator Surface	39,1	m²

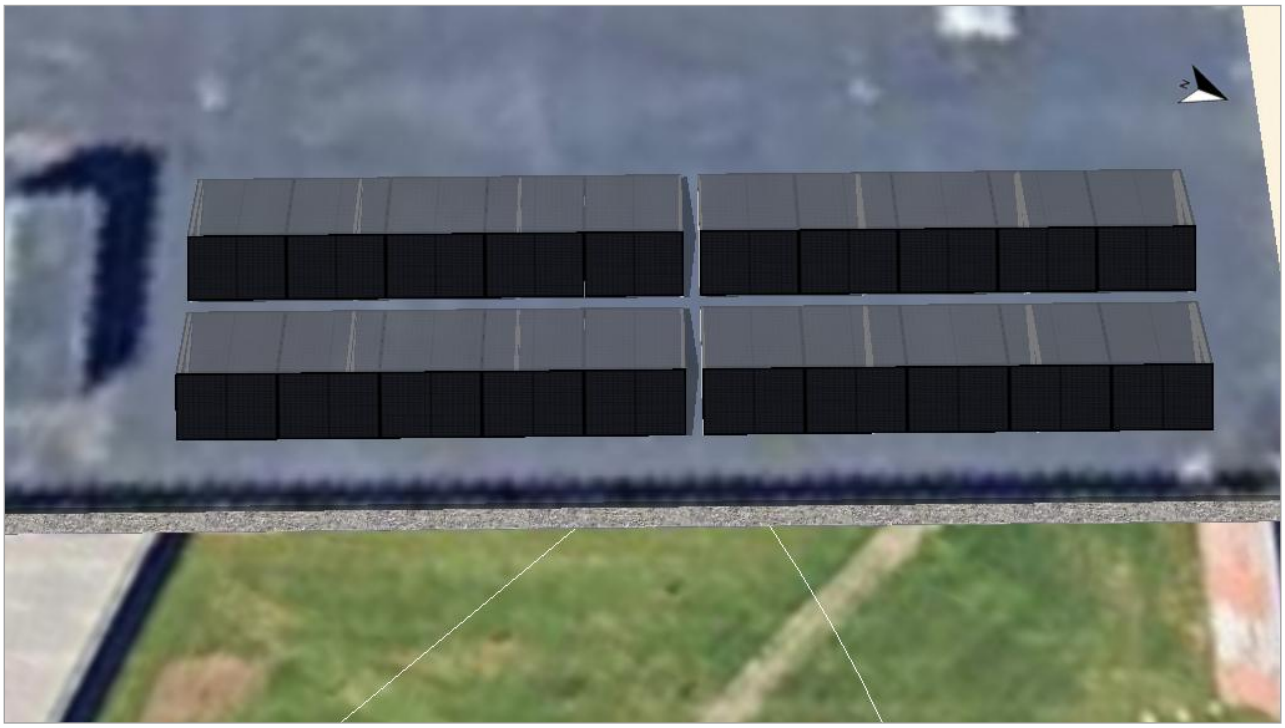


Figure: 1. Module Area - Arbitrary Building 01-Module Area East 1

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

Characteristic curve	Exponential
Remaining power (power output) after 1 year	98,5 %
Remaining power (power output) after 25 years	89 %

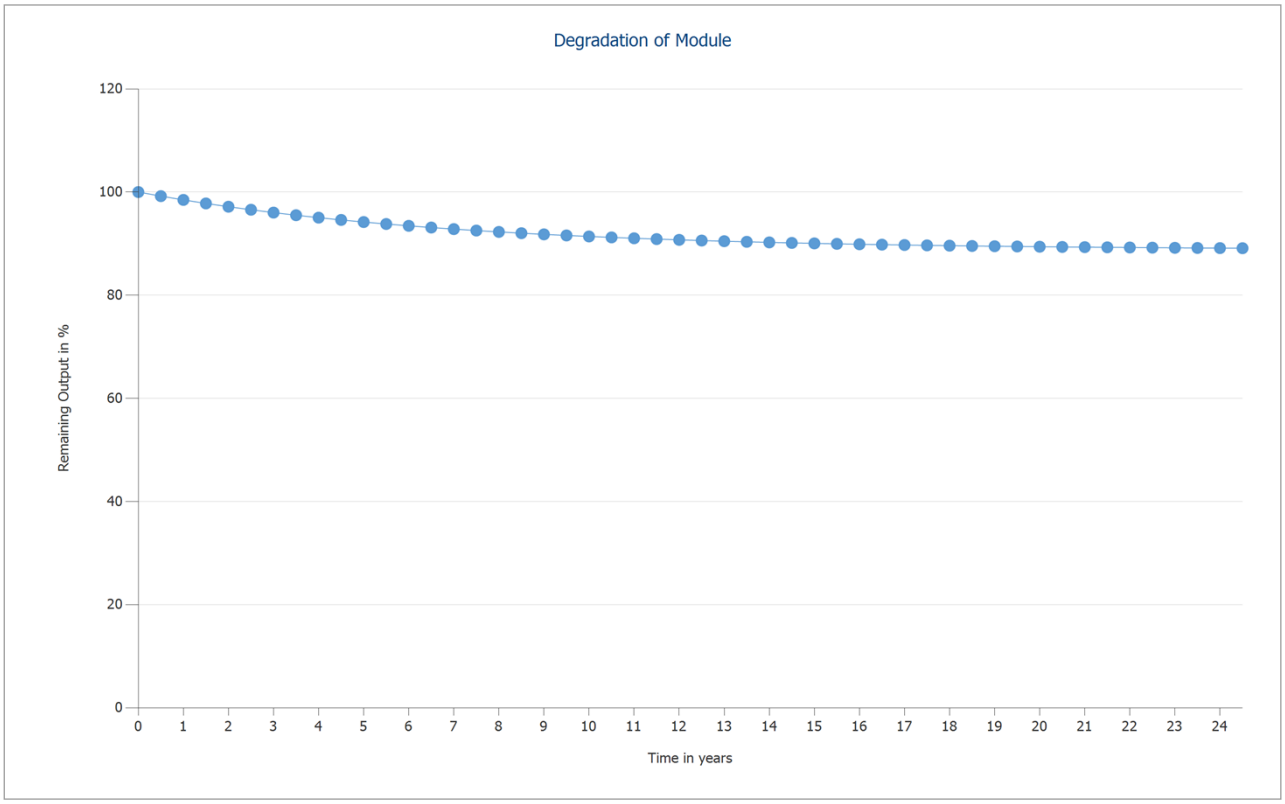


Figure: Degradation of Module, 1. Module Area - Arbitrary Building 01-Module Area East 1

2. Module Area - Arbitrary Building 01-Module Area West 1

PV Generator, 2. Module Area - Arbitrary Building 01-Module Area West 1

Name	Arbitrary Building 01-Module Area West 1
PV Modules	20 x LR5-54 HTB 430 M (v3)
Manufacturer	LONGI Solar
Inclination	10 °
Orientation	West 248 °
Installation Type	Mounted - Roof
PV Generator Surface	39,1 m²

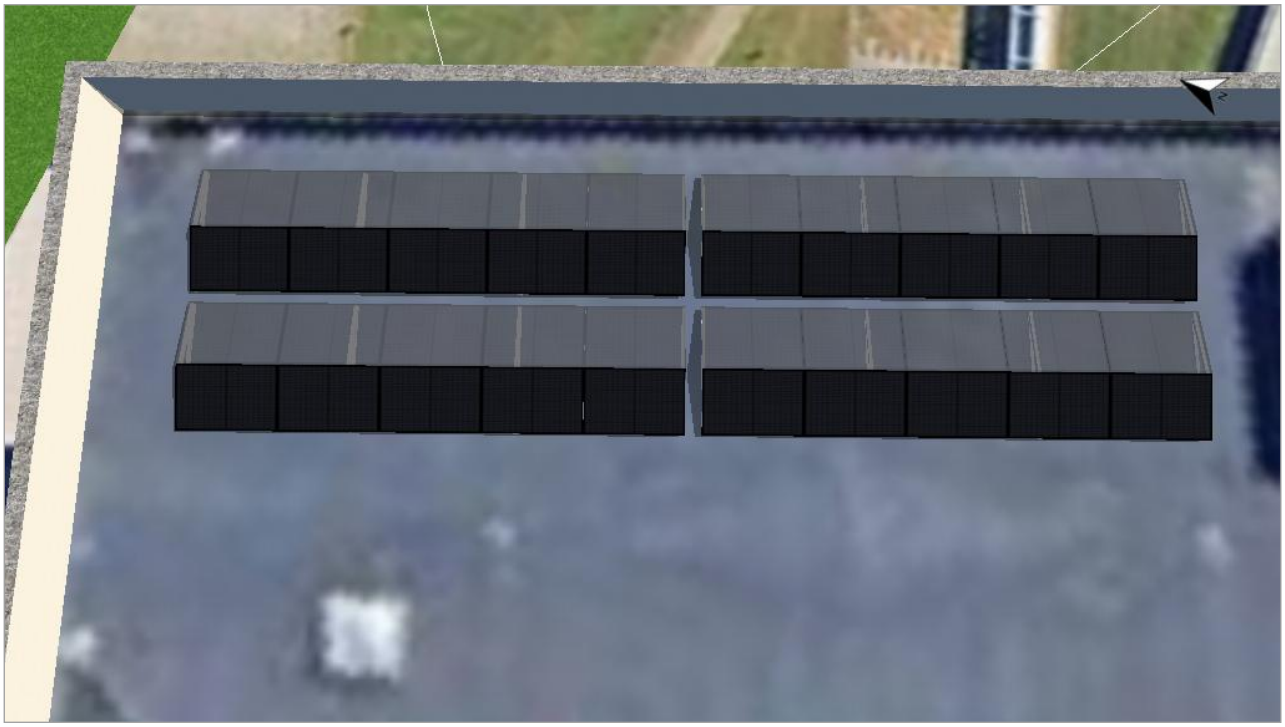


Figure: 2. Module Area - Arbitrary Building 01-Module Area West 1

Degradation of Module, 2. Module Area - Arbitrary Building 01-Module Area West 1

Characteristic curve	Linear (straight line)
Remaining power (power output) after 25 years	89 %

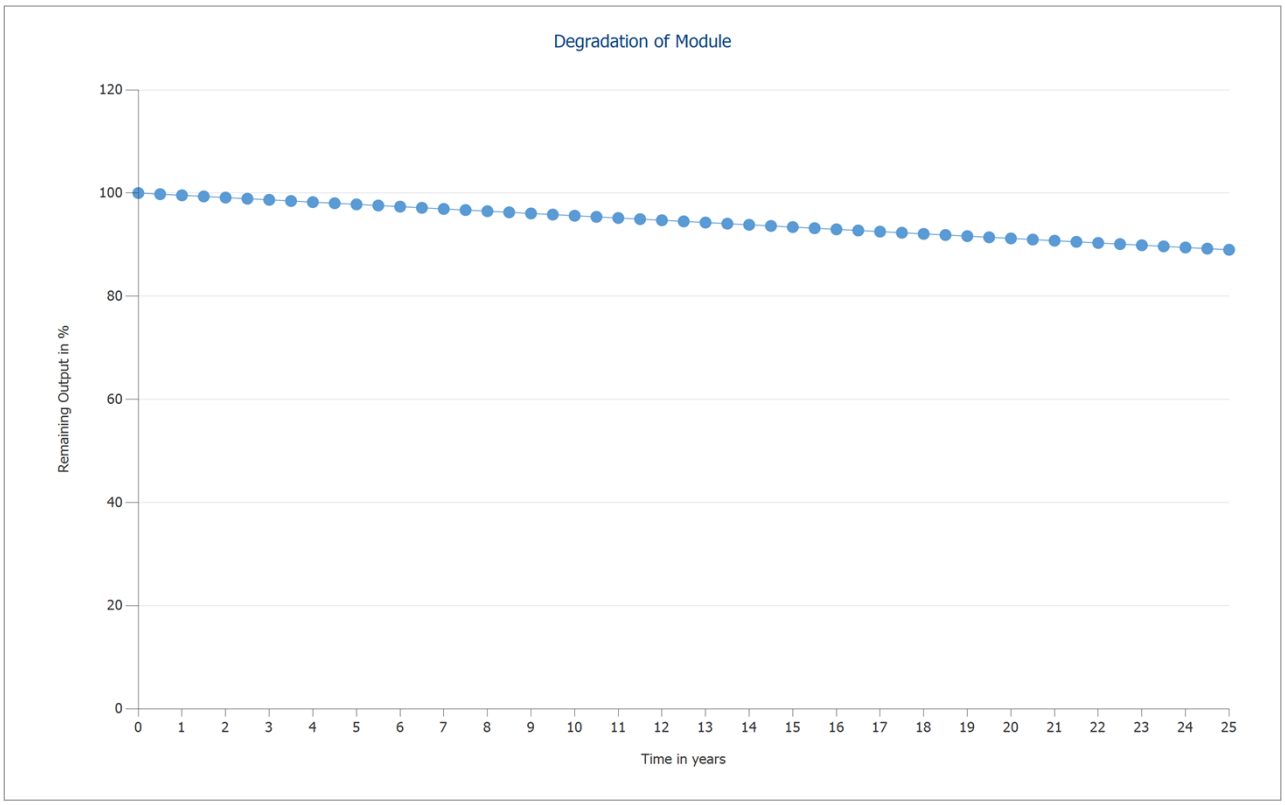


Figure: Degradation of Module, 2. Module Area - Arbitrary Building 01-Module Area West 1

3. Module Area - Arbitrary Building 01-Module Area East

PV Generator, 3. Module Area - Arbitrary Building 01-Module Area East

Name	Arbitrary Building 01-Module Area East	
PV Modules	37 x LR5-54 HTB 430 M (v3)	
Manufacturer	LONGI Solar	
Inclination	10	°
Orientation	East 69	°
Installation Type	Mounted - Roof	
PV Generator Surface	72,3	m²

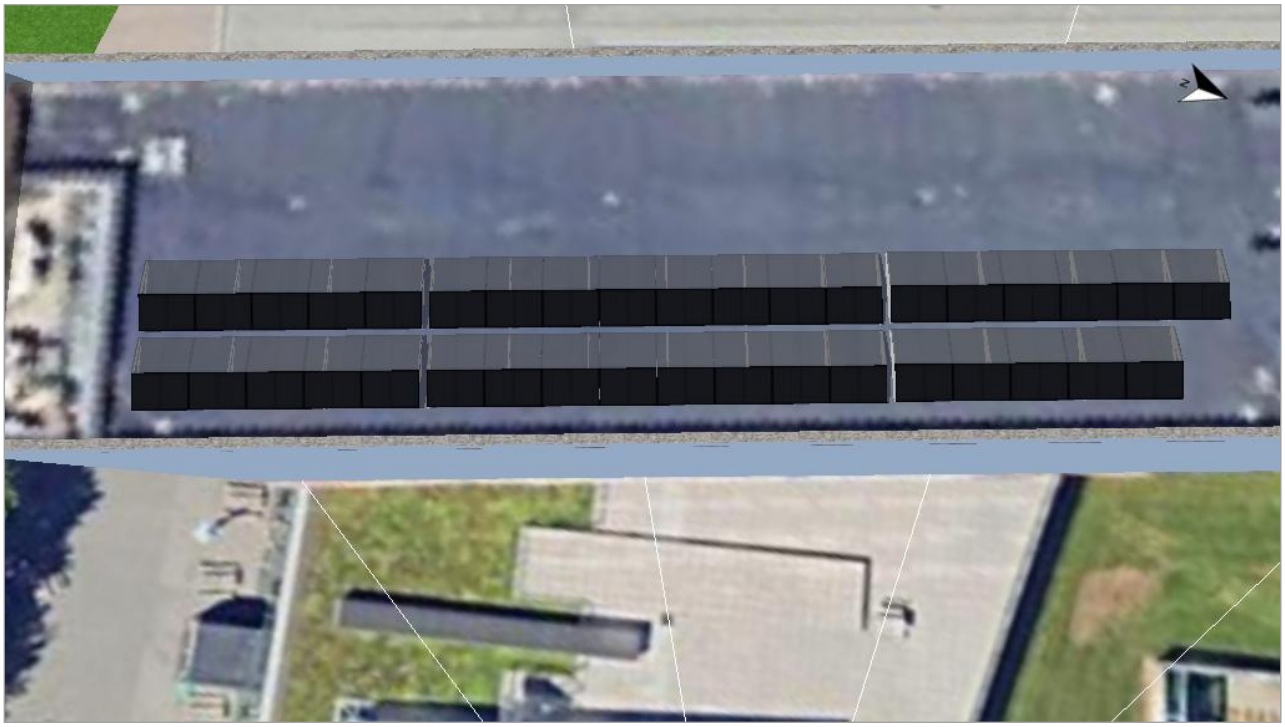


Figure: 3. Module Area - Arbitrary Building 01-Module Area East

Degradation of Module, 3. Module Area - Arbitrary Building 01-Module Area East

Characteristic curve	Linear (straight line)
Remaining power (power output) after 20 years	100 %

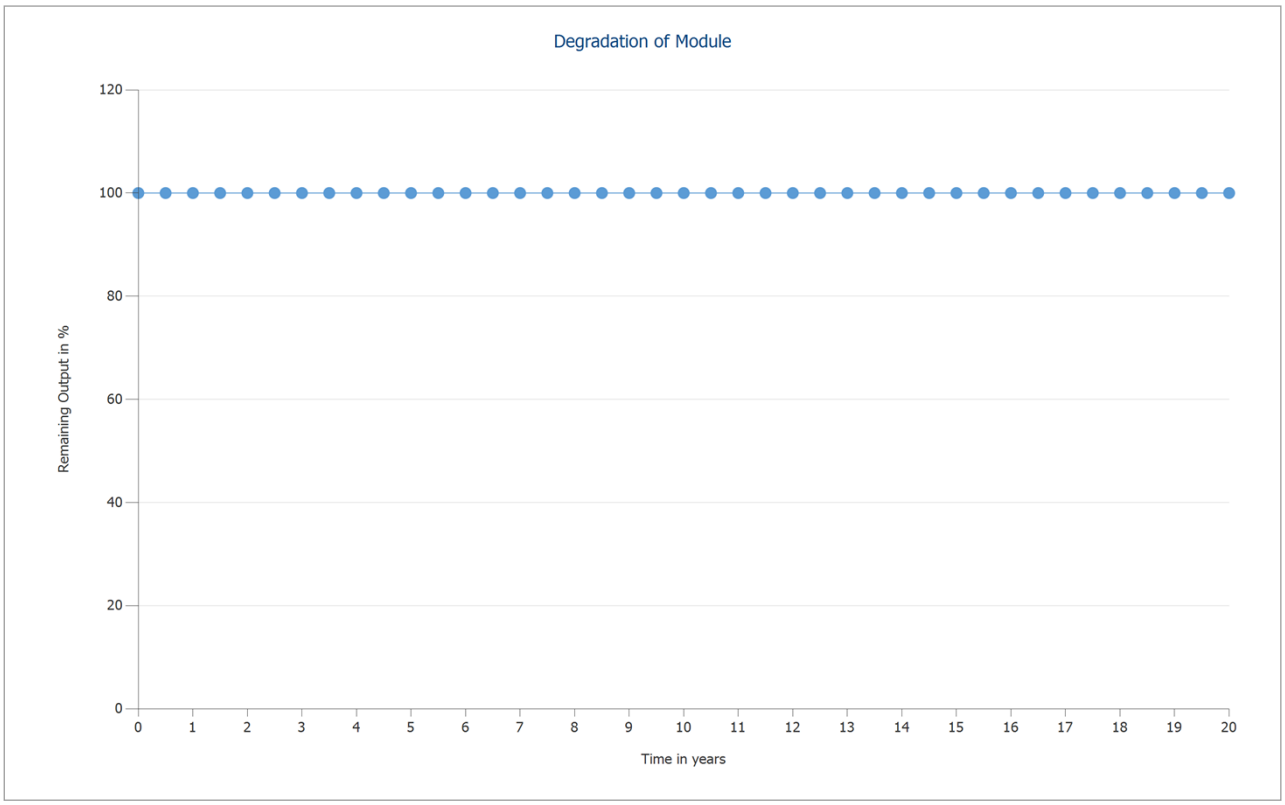


Figure: Degradation of Module, 3. Module Area - Arbitrary Building 01-Module Area East

4. Module Area - Arbitrary Building 01-Module Area West

PV Generator, 4. Module Area - Arbitrary Building 01-Module Area West

Name	Arbitrary Building 01-Module Area West	
PV Modules	37 x LR5-54 HTB 430 M (v3)	
Manufacturer	LONGI Solar	
Inclination	10	°
Orientation	West 248	°
Installation Type	Mounted - Roof	
PV Generator Surface	72,3	m²

Figure: 4. Module Area - Arbitrary Building 01-Module Area West

Degradation of Module, 4. Module Area - Arbitrary Building 01-Module Area West

Characteristic curve	Linear (straight line)
Remaining power (power output) after 20 years	100 %

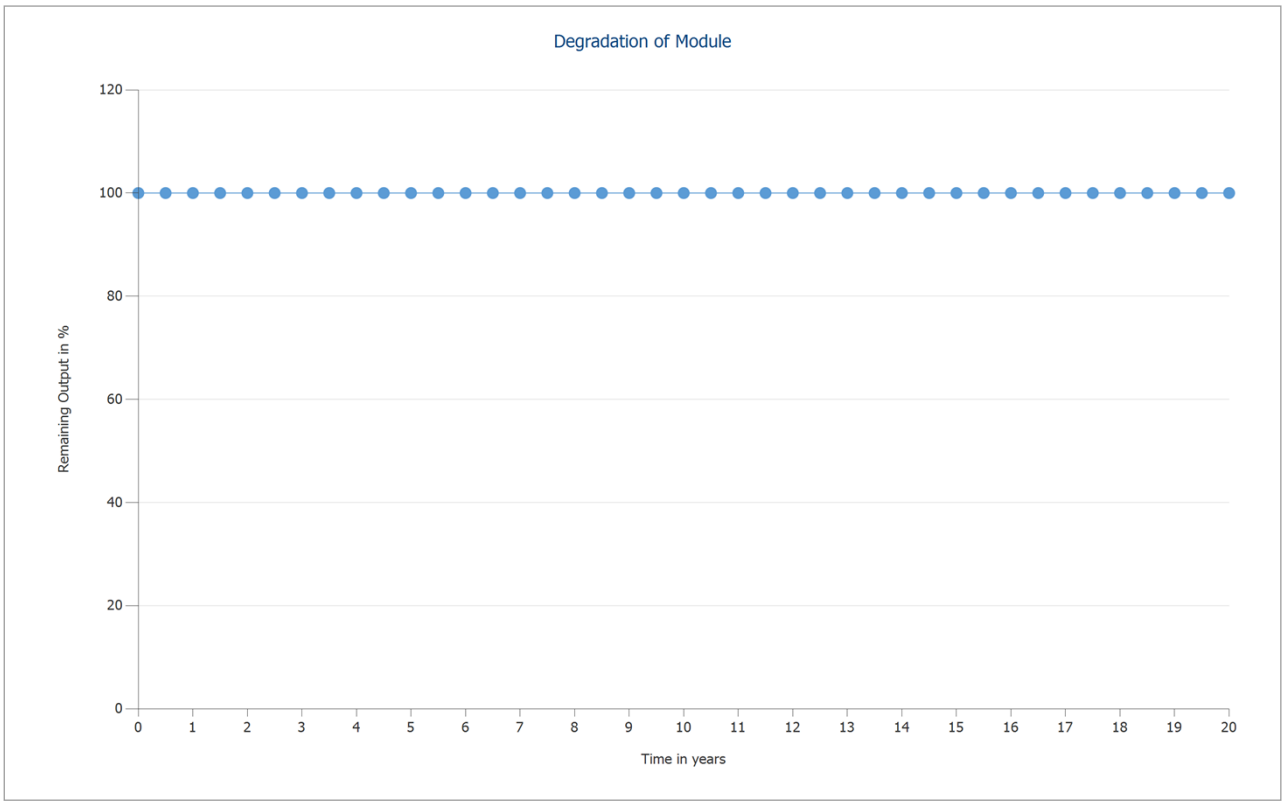


Figure: Degradation of Module, 4. Module Area - Arbitrary Building 01-Module Area West

Horizon Line, 3D Design

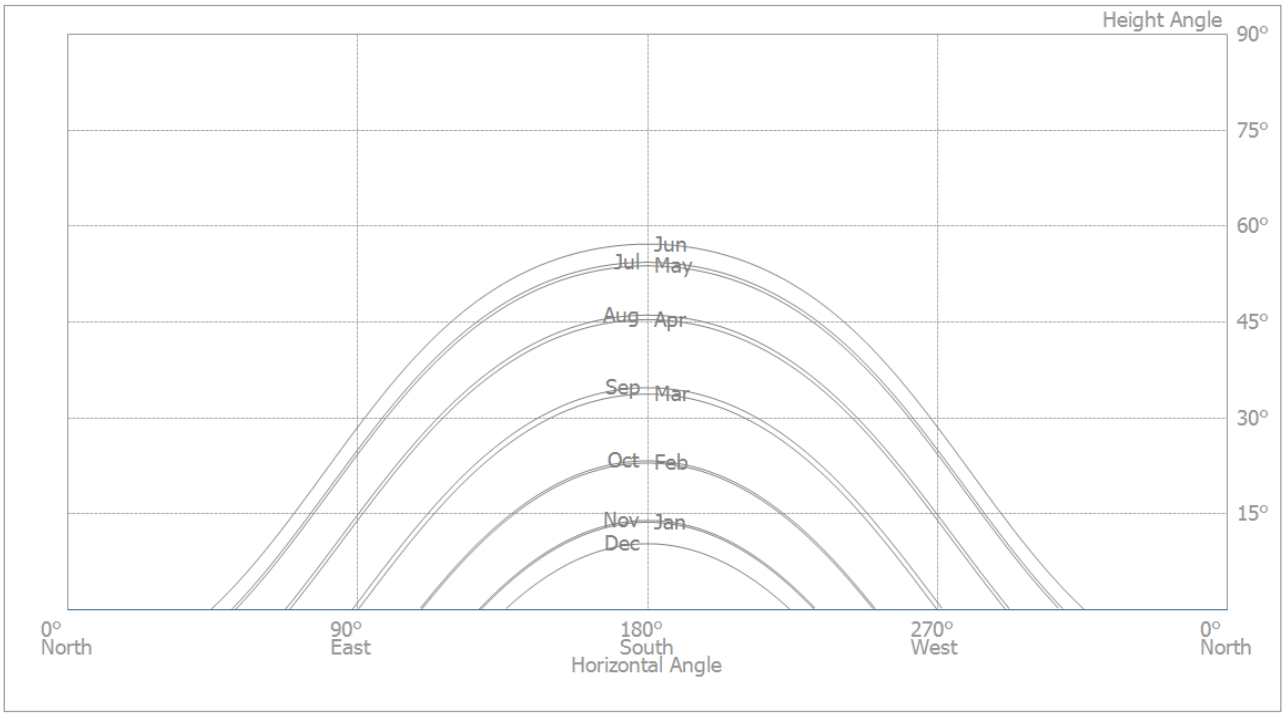


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Areas	Arbitrary Building 01-Module Area East 1 + Arbitrary Building 01-Module Area West 1 + Arbitrary Building 01-Module Area East + Arbitrary Building 01-Module Area West
Inverter 1	
Model	SUN2000-40KTL-M3（400Vac） (v3)
Manufacturer	Huawei Technologies
Quantity	1
Sizing Factor	122,5 %
Configuration	MPP 1:
	1 x 20
	MPP 2:
	1 x 20
	MPP 3:
	1 x 18 || 1 x 19
	MPP 4:
	1 x 18 || 1 x 19

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

PV Generator Output	49,02	kWp
Spec. Annual Yield	899,59	kWh/kWp
Performance Ratio (PR)	90,60	%
Yield Reduction due to Shading	7,3	%
Grid Export	44.122	kWh/Year
Grid Export in the first year (incl. module degradation)	44.053	kWh/Year
Standby Consumption (Inverter)	24	kWh/Year
CO_2 Emissions avoided	6.085	kg / year

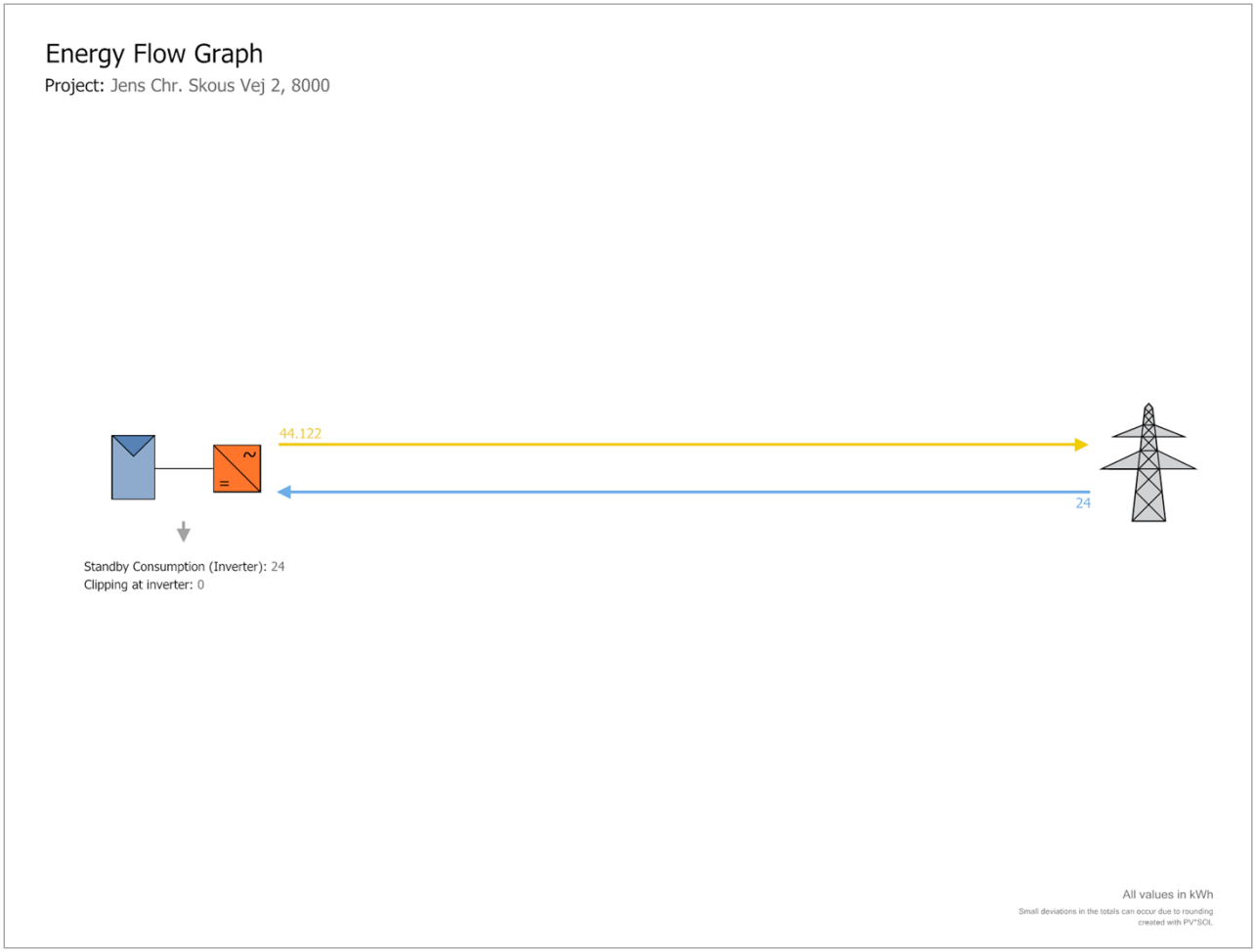


Figure: Energy flow

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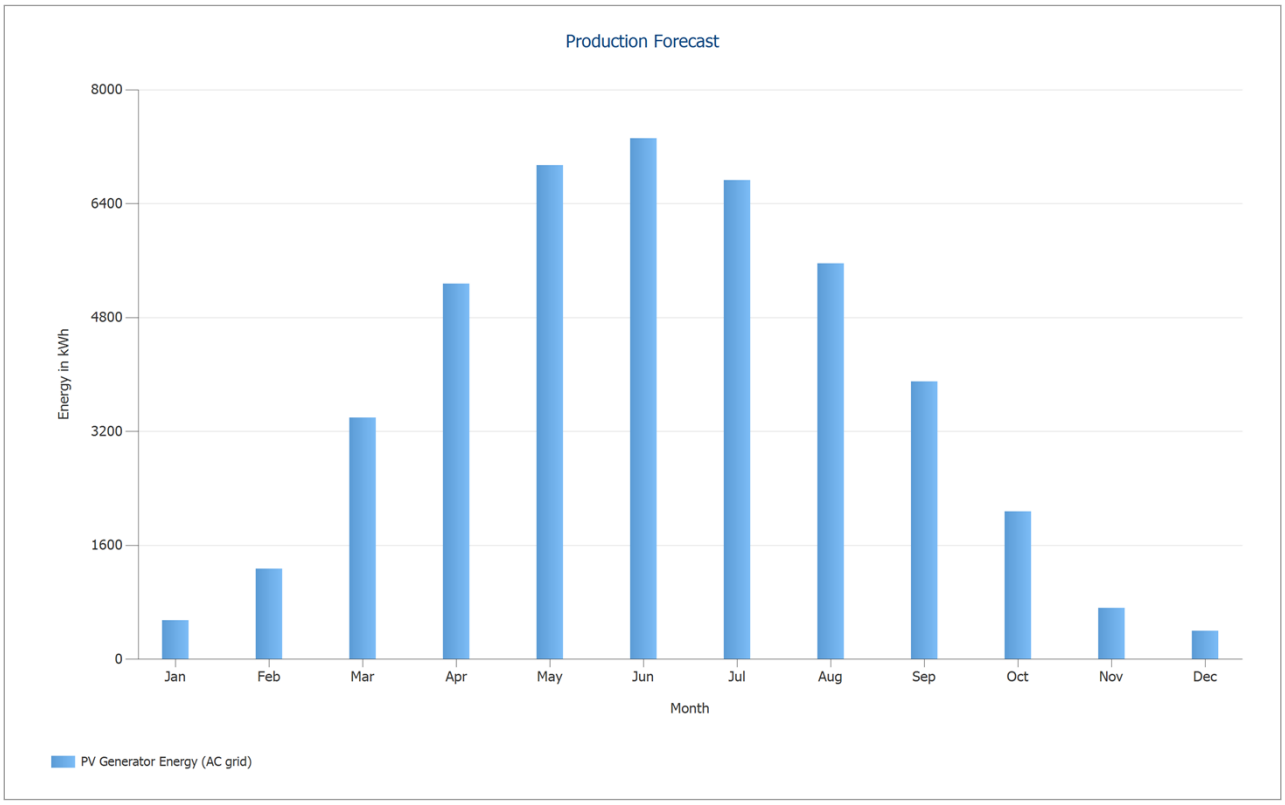

Figure: Production Forecast

Data Sheets

PV Module Data Sheet

PV Module: LR5-54 HTB 430 M (v3)

Manufacturer	LONGI Solar	
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	33,16	V
MPP Current	12,97	A
Open Circuit Voltage	39,43	V
Short-Circuit Current	14	A
Increase open circuit voltage before stabilisation	0	%
Nominal output	430	W
Fill Factor	77,91	%
Efficiency	22,02	%
I/V Part Load Characteristics		
Values source	Manufacturer/user-created	
Irradiance	200	W/m²
Voltage in MPP at Part Load	32,494	V
Current in MPP at Part Load	2,688	A
Open Circuit Voltage (Part Load)	37,258	V
Short Circuit Current at Part Load	2,8	A
Additional Parameters		
Temperature Coefficient of Voc	-90,7	mV/K
Temperature Coefficient of Isc	7	mA/K
Temperature Coefficient of Pmpp	-0,29	%/K
Incident Angle Modifier (IAM)	100	%
Maximum System Voltage	1500	V
Mechanical Data		
Width	1134	mm
Height	1722	mm
Depth	30	mm
Frame Width	11	mm
Weight	20,8	kg

Inverter Data Sheet

Inverter: SUN2000-40KTL-M3（400Vac） (v3)

Manufacturer	Huawei Technologies	
Available	Yes	
Electrical data - DC		
DC nominal output	44,72	kW
Max. DC Power	73,2	kW
Nom. DC Voltage	600	V
Max. Input Voltage	1100	V
Max. Input Current	104	A
Max. short circuit current	104	A
Number of DC Inlets	8	
Electrical data - AC		
AC Power Rating	40	kW
Max. AC Power	44	kVA
Nom. AC Voltage	230	V
Number of Phases	3	
With Transformer	No	
Electrical data - other		
Change in Efficiency when Input Voltage deviates from Rated Voltage	0,28	%/100V
Min. Feed-in Power	0	W
Standby Consumption	5,5	W
Night Consumption	5,5	W
MPP Tracker		
Output Range < 20% of Power Rating	99,97	%
Output Range > 20% of Power Rating	99,99	%
Count of MPP Trackers	4	
MPP Tracker 1-4		
Max. Input Current	26	A
Max. short circuit current	26	A
Max. Input Power	18,3	kW
Min. MPP Voltage	200	V
Max. MPP Voltage	1000	V

Plans and parts list

Circuit Diagram

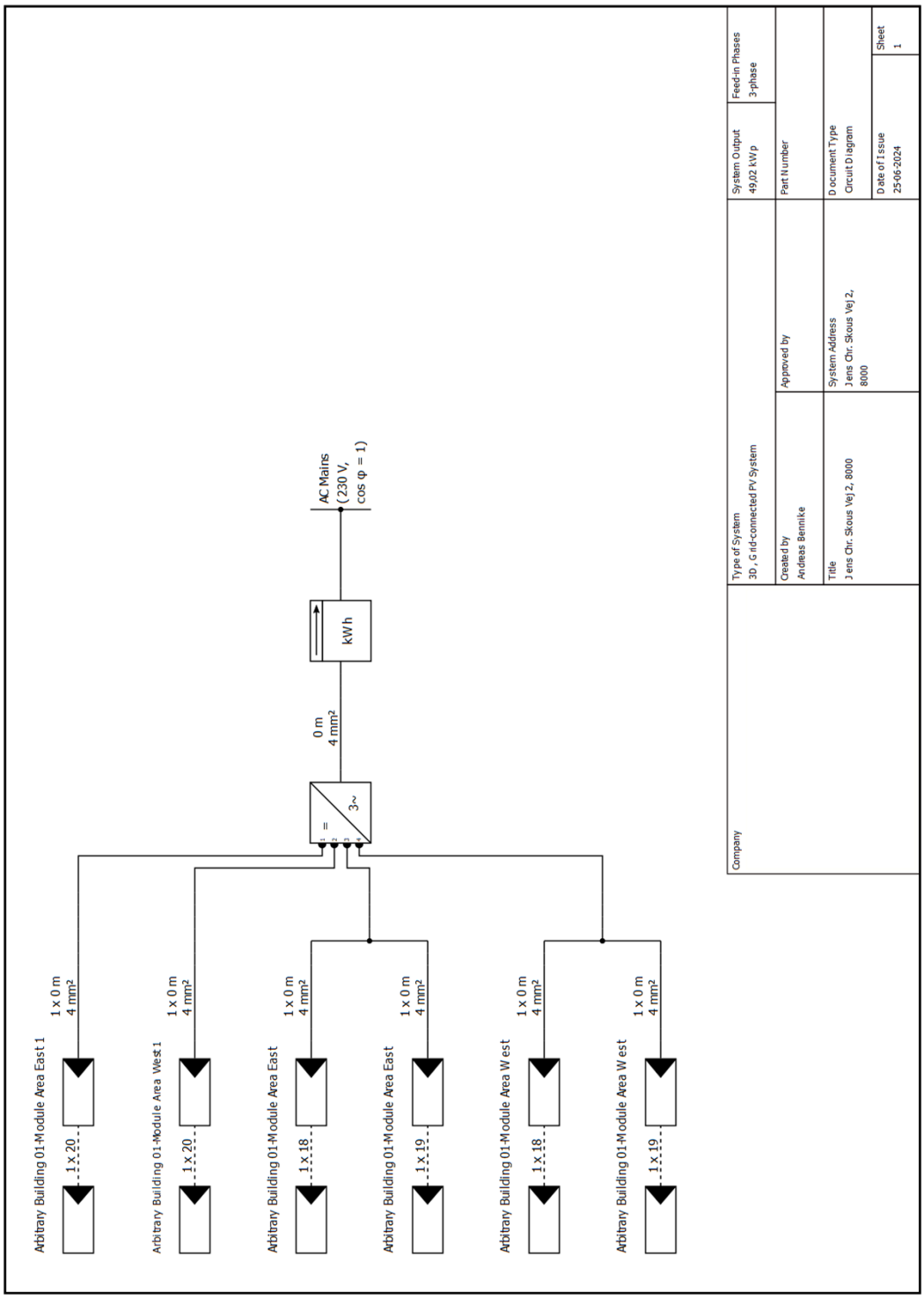

Figure: Circuit Diagram

Overview plan

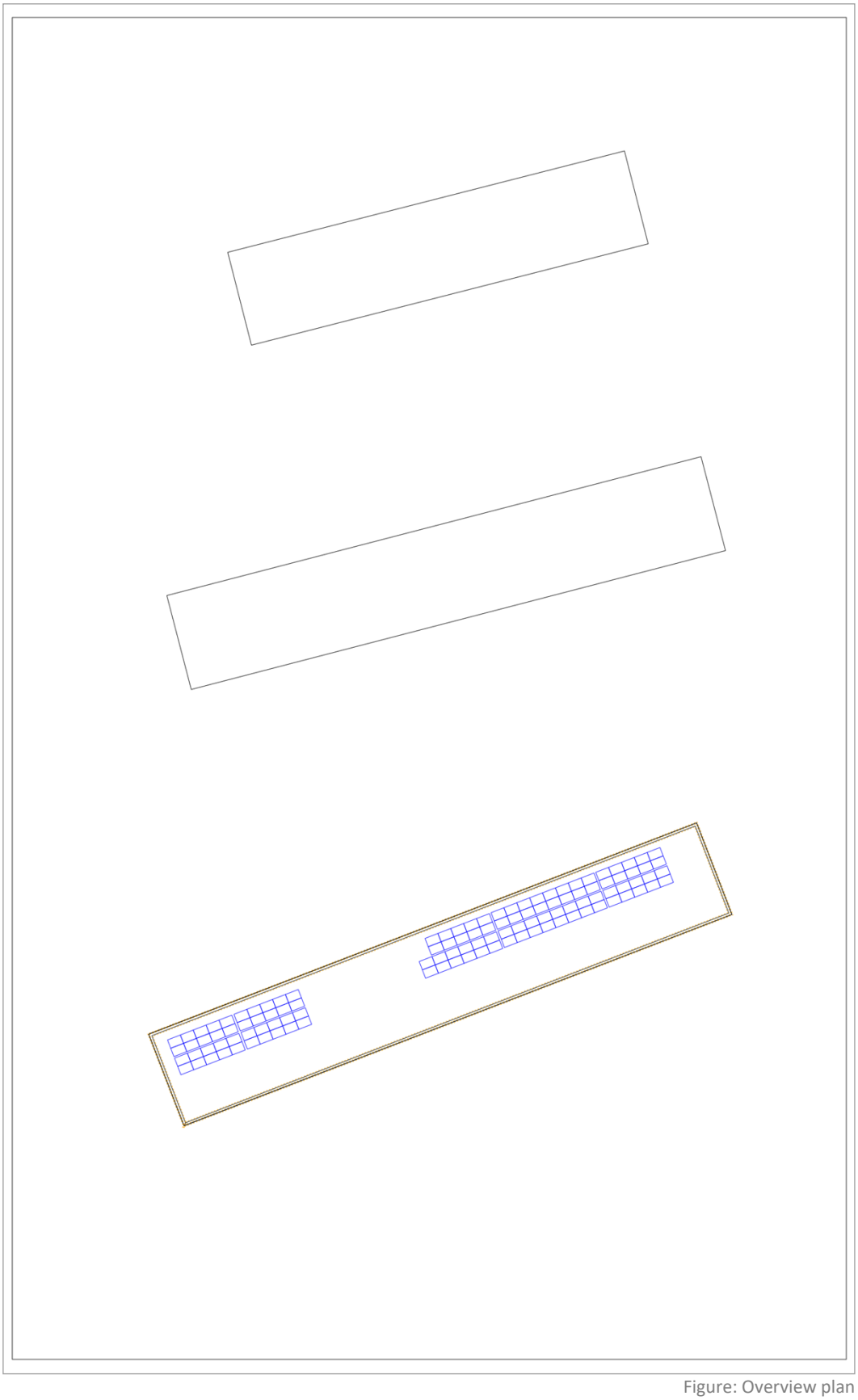

Figure: Overview plan

Dimensioning Plan

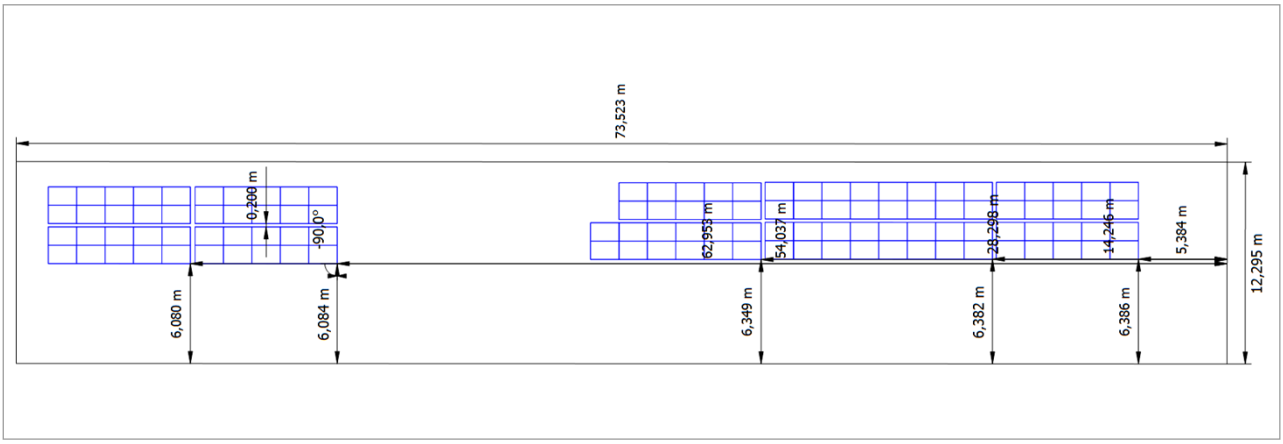

Figure: Arbitrary Building 01 - Mounting Surface South

String Plan

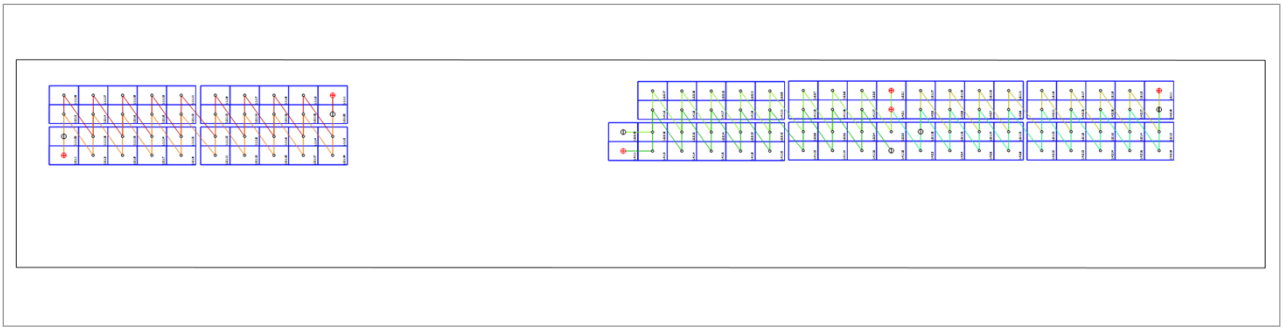

Figure: Arbitrary Building 01 - Mounting Surface South

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		LONGI Solar	LR5-54 HTB 430 M	114	Piece
2	Inverter		Huawei Technologies	SUN2000-40KTL-M3 （400Vac）	1	Piece
3	Components			Feed-in Meter	1	Piece

Screenshots, 3D Design

Shading

Figure: Screenshot01