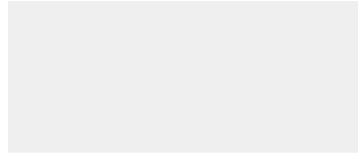


**VEESLA UAB**

Galinės g. 8, Galinė, Avižienių sen., Vilniaus r.  
14247  
Lietuva



2023-07-05

## Your PV system from VEESLA UAB

### Address of Installation

Kaimiško gatvė, Miežiškiai, Panevėžys



## Project Overview



Figure: Overview Image, 3D Design

## PV System

### 3D, Grid-connected PV System

Climate Data	Panevežys, LTU (1996 - 2015)
Values source	Meteonorm 8.1(i)
PV Generator Output	34,03 kWp
PV Generator Surface	160,1 m <sup>2</sup>
Number of PV Modules	82
Number of Inverters	1

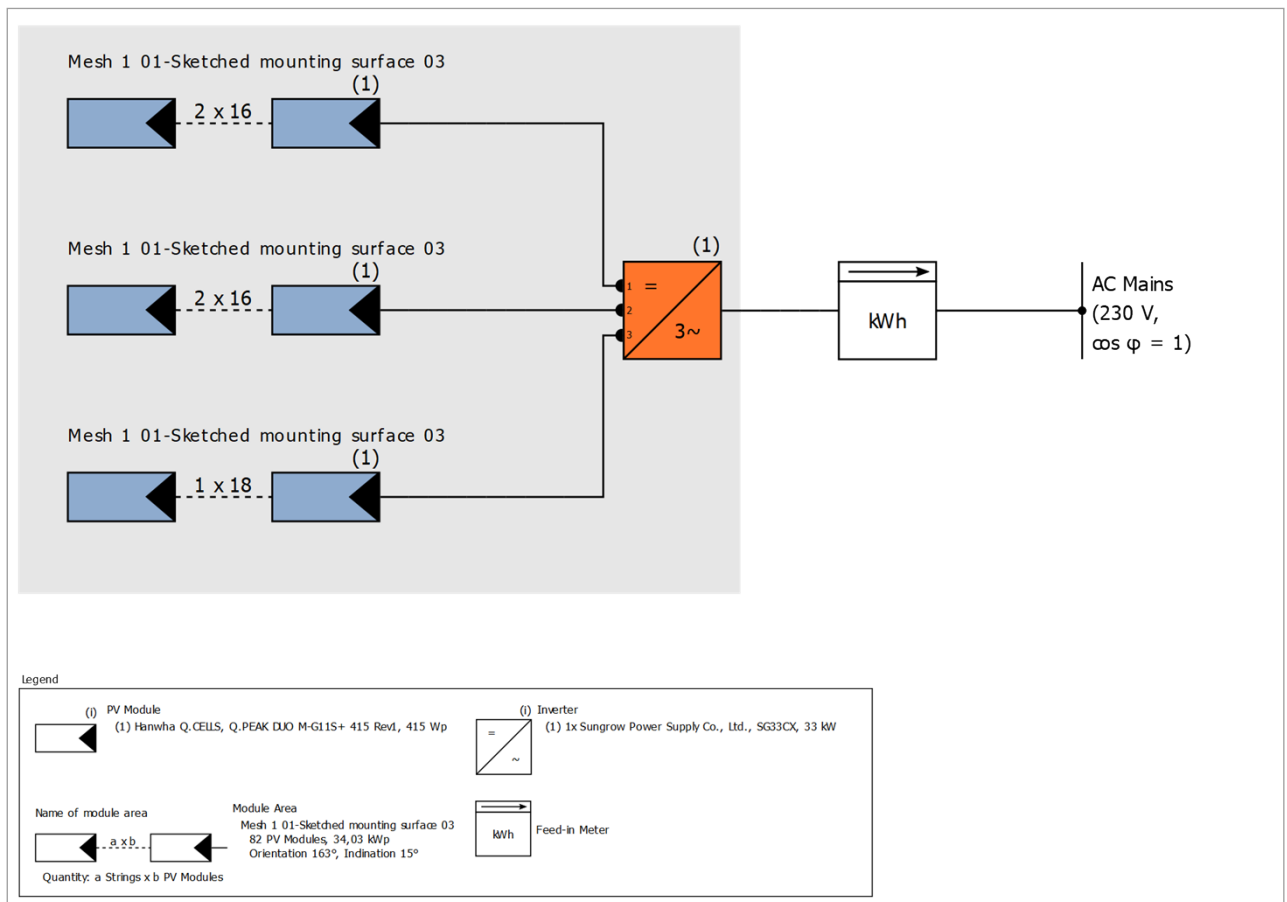


Figure: Schematic diagram

## Production Forecast

### Production Forecast

PV Generator Output	34,03 kWp
Spec. Annual Yield	1 019,84 kWh/kWp
Performance Ratio (PR)	91,18 %
Yield Reduction due to Shading	1,9 %
Grid Export	34 714 kWh/Year
Grid Export in the first year (incl. module degradation)	34 714 kWh/Year
Standby Consumption (Inverter)	9 kWh/Year
CO <sub>2</sub> Emissions avoided	16 311 kg / year

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	Panevežys, LTU (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 - Mesh 1 01-Sketched mounting surface 03

#### PV Generator, 1. Module Area - Mesh 1 01-Sketched mounting surface 03

Name	Mesh 1 01-Sketched mounting surface 03
PV Modules	82 x Q.PEAK DUO M-G11S+ 415 Rev1 (v1)
Manufacturer	Hanwha Q.CELLS
Inclination	15 °
Orientation	South 163 °
Installation Type	Mounted - Roof
PV Generator Surface	160,1 m <sup>2</sup>



Figure: 1. Module Area - Mesh 1 01-Sketched mounting surface 03

## Horizon Line, 3D Design

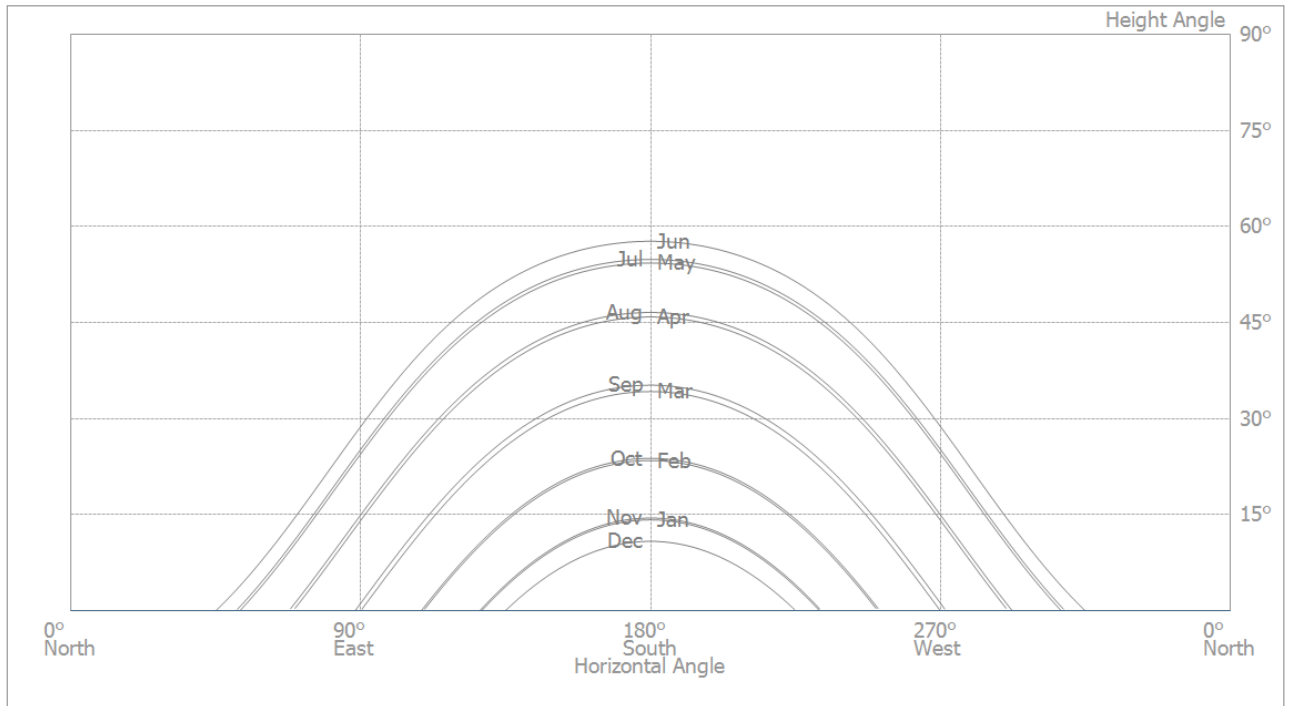


Figure: Horizon (3D Design)

## Inverter configuration

### Configuration 1

Module Area	Mesh 1 01-Sketched mounting surface 03
Inverter 1	
Model	SG33CX (v2)
Manufacturer	Sungrow Power Supply Co., Ltd.
Quantity	1
Sizing Factor	103,1 %
Configuration	MPP 1: 2 x 16 MPP 2: 2 x 16 MPP 3: 1 x 18

## AC Mains

### AC Mains

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

# Simulation Results

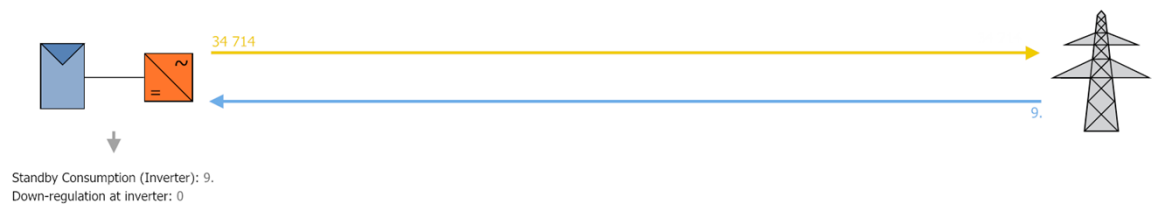
## Results Total System

### PV System

PV Generator Output	34,03 kWp
Spec. Annual Yield	1 019,84 kWh/kWp
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### Energy Flow Graph

Project: Miško urédija



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

Figure: Energy flow

# PV System Energy Balance

## PV System Energy Balance

<b>Global radiation - horizontal</b>	<b>1 021,20 kWh/m<sup>2</sup></b>	
Deviation from standard spectrum	-10,21 kWh/m <sup>2</sup>	-1,00 %
Ground Reflection (Albedo)	3,44 kWh/m <sup>2</sup>	0,34 %
Orientation and inclination of the module surface	103,65 kWh/m <sup>2</sup>	10,22 %
Module-independent shading	0,00 kWh/m <sup>2</sup>	0,00 %
Reflection on the Module Interface	0,00 kWh/m <sup>2</sup>	0,00 %
<b>Global Radiation at the Module</b>	<b>1 118,09 kWh/m<sup>2</sup></b>	
	1 118,09 kWh/m <sup>2</sup>	
	x 160,125 m <sup>2</sup>	
	= 179 033,96 kWh	
<b>Global PV Radiation</b>	<b>179 033,96 kWh</b>	
Soiling	0,00 kWh	0,00 %
STC Conversion (Rated Efficiency of Module 21,26 %)	-140 972,78 kWh	-78,74 %
<b>Rated PV Energy</b>	<b>38 061,18 kWh</b>	
Module-specific Partial Shading	-467,85 kWh	-1,23 %
Low-light performance	-778,65 kWh	-2,07 %
Deviation from the nominal module temperature	-267,92 kWh	-0,73 %
Diodes	-30,56 kWh	-0,08 %
Mismatch (Manufacturer Information)	-730,32 kWh	-2,00 %
Mismatch (Configuration/Shading)	-172,92 kWh	-0,48 %
<b>PV Energy (DC) without inverter down-regulation</b>	<b>35 612,94 kWh</b>	
Failing to reach the DC start output	0,00 kWh	0,00 %
Down-regulation on account of the MPP Voltage Range	-0,05 kWh	0,00 %
Down-regulation on account of the max. DC Current	-1,69 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	0,00 kWh	0,00 %
MPP Matching	-4,48 kWh	-0,01 %
<b>PV energy (DC)</b>	<b>35 606,72 kWh</b>	
<b>Energy at the Inverter Input</b>	<b>35 606,72 kWh</b>	
Input voltage deviates from rated voltage	-3,60 kWh	-0,01 %
DC/AC Conversion	-889,43 kWh	-2,50 %
Standby Consumption (Inverter)	-8,57 kWh	-0,02 %
Total Cable Losses	0,00 kWh	0,00 %
<b>PV energy (AC) minus standby use</b>	<b>34 705,12 kWh</b>	
<b>PV Generator Energy (AC grid)</b>	<b>34 713,70 kWh</b>	

# Data Sheets

## PV Module Data Sheet

PV Module: Q.PEAK DUO M-G11S+ 415 Rev1 (v1)

Manufacturer	Hanwha Q.CELLS
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	31,05 V
MPP Current	13,37 A
Open Circuit Voltage	37,14 V
Short-Circuit Current	13,99 A
Increase open circuit voltage before stabilisation	0 %
Nominal output	415 W
Fill Factor	79,9 %
Efficiency	21,26 %

### I/V Part Load Characteristics

Values source	Manufacturer/user-created
Irradiance	200 W/m <sup>2</sup>
Voltage in MPP at Part Load	29,84 V
Current in MPP at Part Load	2,671 A
Open Circuit Voltage (Part Load)	34,72 V
Short Circuit Current at Part Load	2,8 A

### Additional Parameters

Temperature Coefficient of Voc	-100,1 mV/K
Temperature Coefficient of Isc	5,6 mA/K
Temperature Coefficient of Pmpp	-0,34 %/K
Incident Angle Modifier (IAM)	100 %
Maximum System Voltage	1000 V

### Mechanical Data

Width	1134 mm
Height	1722 mm
Depth	30 mm
Frame Width	13 mm
Weight	21,1 kg

## Inverter Data Sheet

Inverter: SG33CX (v2)

Manufacturer	Sungrow Power Supply Co., Ltd.
Available	Yes
<b>Electrical data - DC</b>	
DC nominal output	33 kW
Max. DC Power	49,5 kW
Nom. DC Voltage	585 V
Max. Input Voltage	1100 V
Max. Input Current	78 A
Max. short circuit current	78 A
Number of DC Inlets	6
<b>Electrical data - AC</b>	
AC Power Rating	33 kW
Max. AC Power	36,3 kVA
Number of Phases	3
With Transformer	No
<b>Electrical data - other</b>	
Change in Efficiency when Input Voltage deviates from Rated Voltage	0,02 %/100V
Min. Feed-in Power	2 W
Standby Consumption	2 W
Night Consumption	2 W
<b>MPP Tracker</b>	
Output Range < 20% of Power Rating	99,9 %
Output Range > 20% of Power Rating	100 %
Count of MPP Trackers	3
<b>MPP Tracker 1-3</b>	
Max. Input Current	26 A
Max. short circuit current	26 A
Max. Input Power	22,1 kW
Min. MPP Voltage	200 V
Max. MPP Voltage	1000 V

# Plans and parts list

## Circuit Diagram

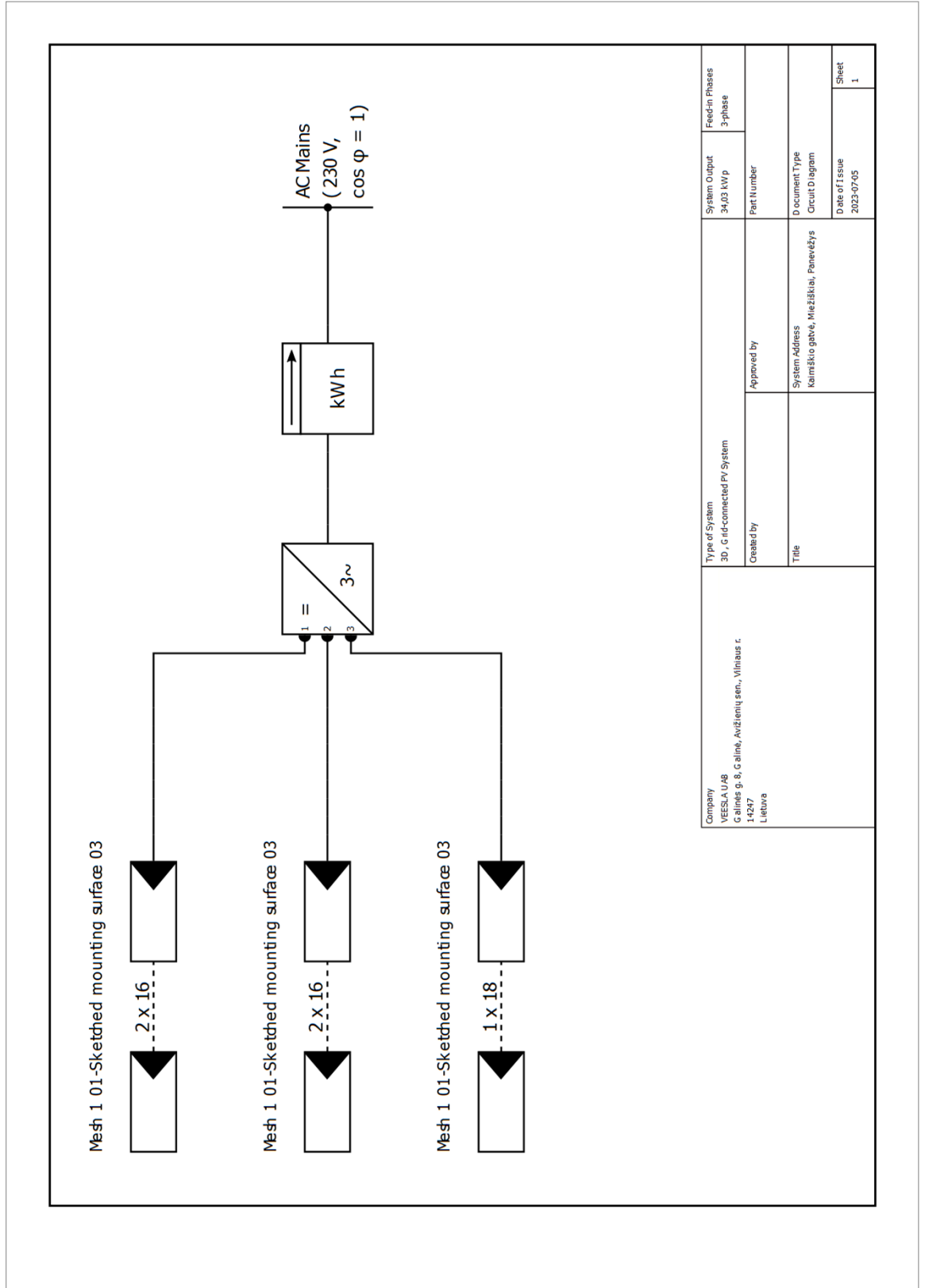


Figure: Circuit Diagram

## Overview plan

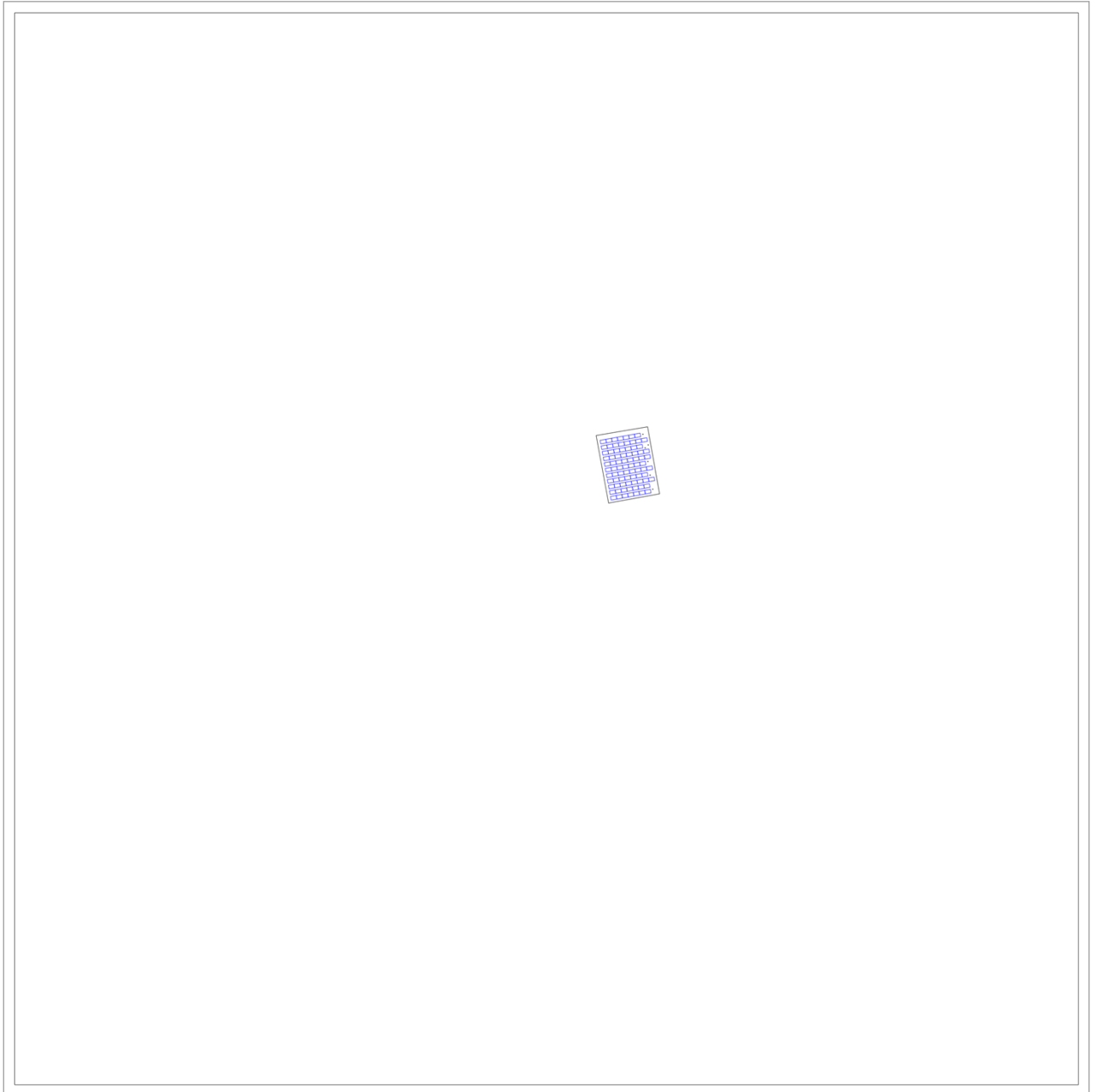


Figure: Overview plan

## Parts list

### Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Hanwha Q.CELLS	Q.PEAK DUO M-G11S+ 415 Rev1	82	Piece
2	Inverter		Sungrow Power Supply Co., Ltd.	SG33CX	1	Piece
3	Components			Feed-in Meter	1	Piece

# Screenshots, 3D Design Environment

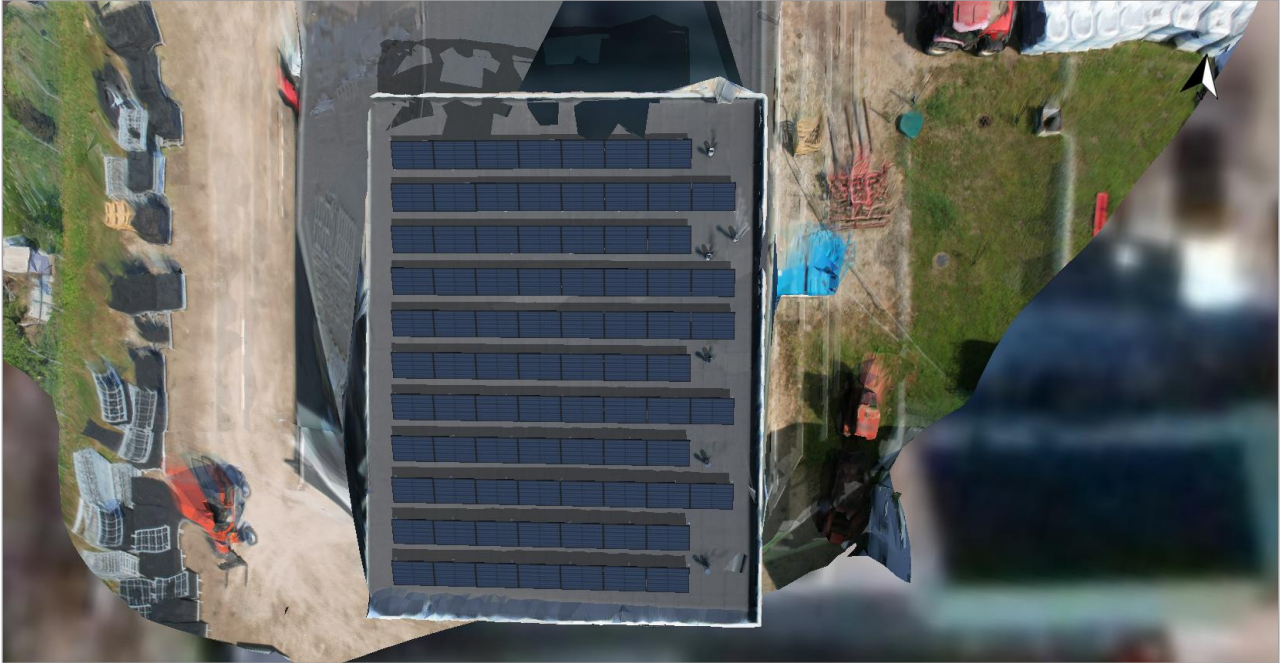


Figure: Screenshot03



Figure: pietus



Figure: Screenshot05

## Configuration



Figure: Screenshot01

# Shading

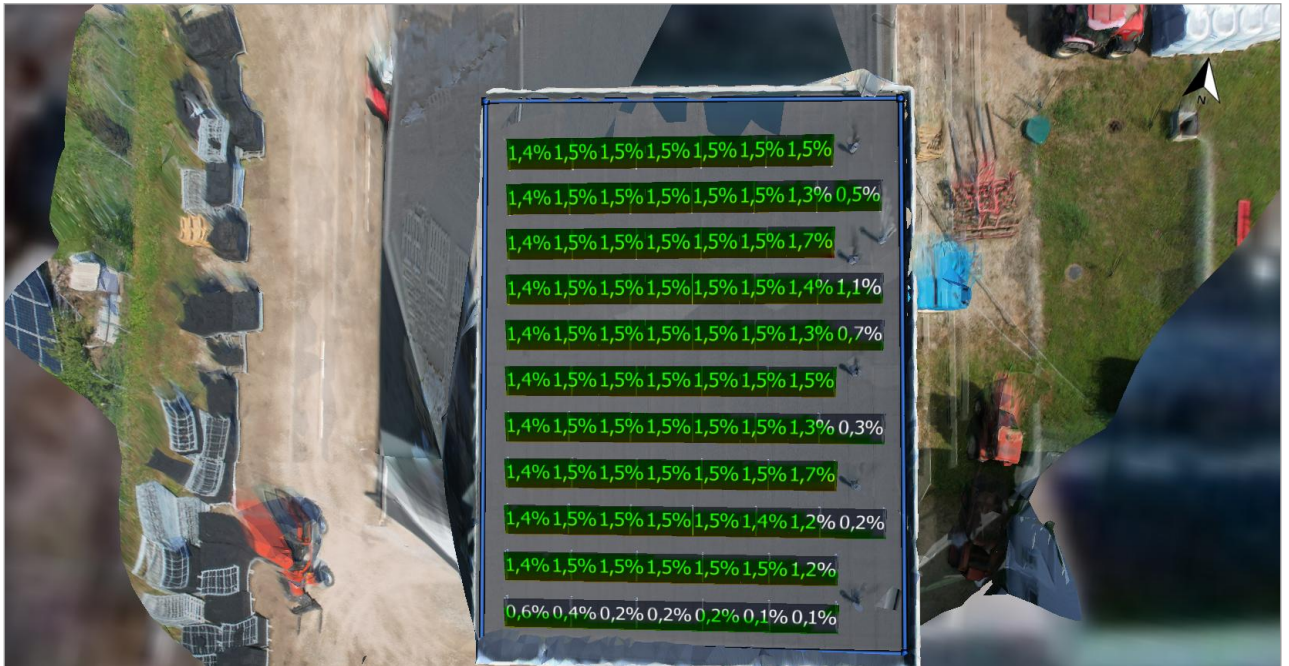


Figure: Screenshot02