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Uzinelor 90

Republica Moldova

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Project Name: RED Nord Balti

03.02.2023

Your PV system from SC Habsev GRUP SRL

Address of Installation

Republica Moldova, MD-3100,
m. Bălți, str. Ștefan cel Mare, 180 "A"



Project Overview



Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System

Climate Data	Bal?i Municipality, MDA (1991 - 2010)
PV Generator Output	300,3 kWp
PV Generator Surface	1 434,6 m ²
Number of PV Modules	660
Number of Inverters	6

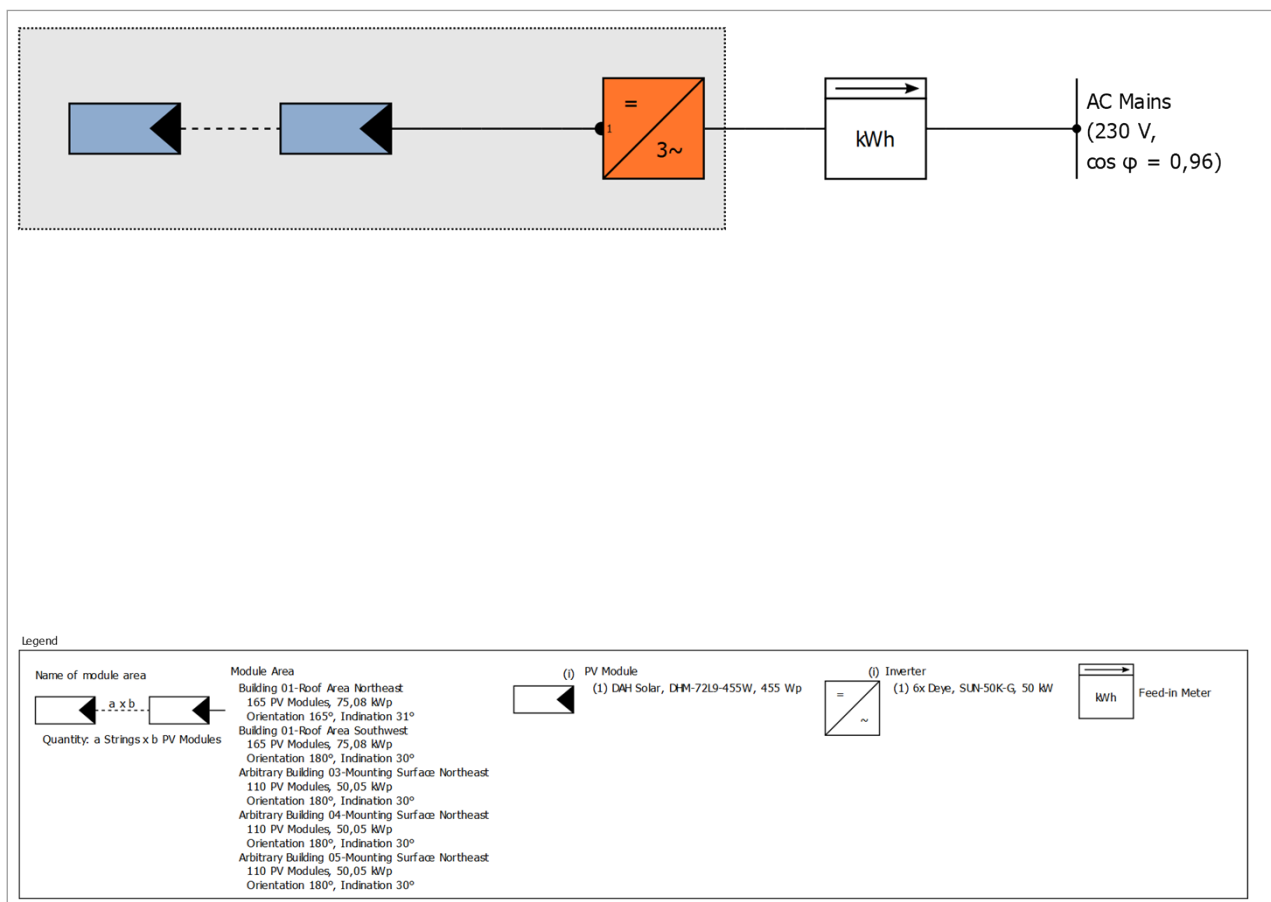


Figure: Schematic diagram

The yield

The yield

PV Generator Energy (AC grid)	313 445 kWh
Grid Feed-in	313 445 kWh
Down-regulation at Feed-in Point	0 kWh
Own Power Consumption	0,0 %
Solar Fraction	0,0 %
Spec. Annual Yield	1 043,59 kWh/kWp
Performance Ratio (PR)	75,5 %
Yield Reduction due to Shading	1,9 %/Year
CO ₂ Emissions avoided	147 293 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
Start of Operation	02.09.2022

Climate Data

Location	Bălți Municipality, MDA (1991 - 2010)
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 - Building 01-Roof Area Northeast

PV Generator, 1. Module Area - Building 01-Roof Area Northeast

Name	Building 01-Roof Area Northeast
PV Modules	165 x DHM-72L9-455W (v1)
Manufacturer	DAH Solar
Inclination	31 °
Orientation	South 165 °
Installation Type	Mounted - Roof
PV Generator Surface	358,6 m ²

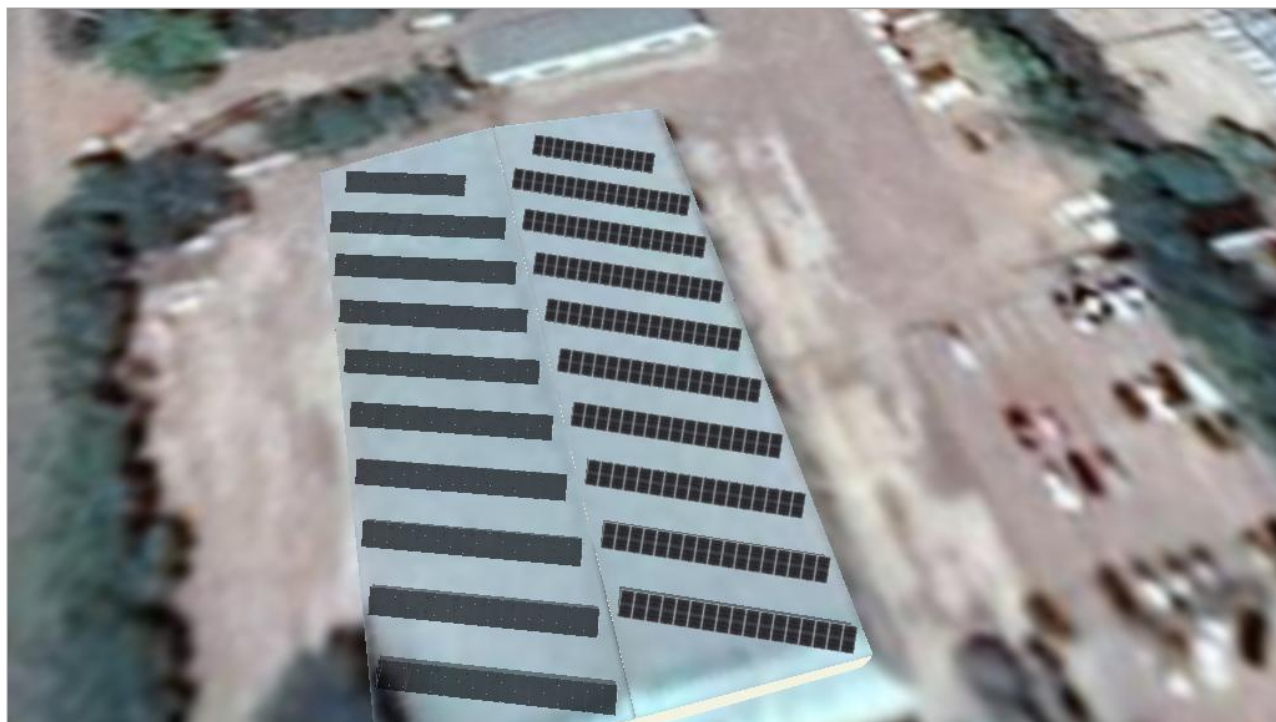


Figure: 1. Module Area - Building 01-Roof Area Northeast

2. Module Area - Building 01-Roof Area Southwest

PV Generator, 2. Module Area - Building 01-Roof Area Southwest

Name	Building 01-Roof Area Southwest
PV Modules	165 x DHM-72L9-455W (v1)
Manufacturer	DAH Solar
Inclination	30 °
Orientation	South 180 °
Installation Type	Mounted - Roof
PV Generator Surface	358,6 m ²

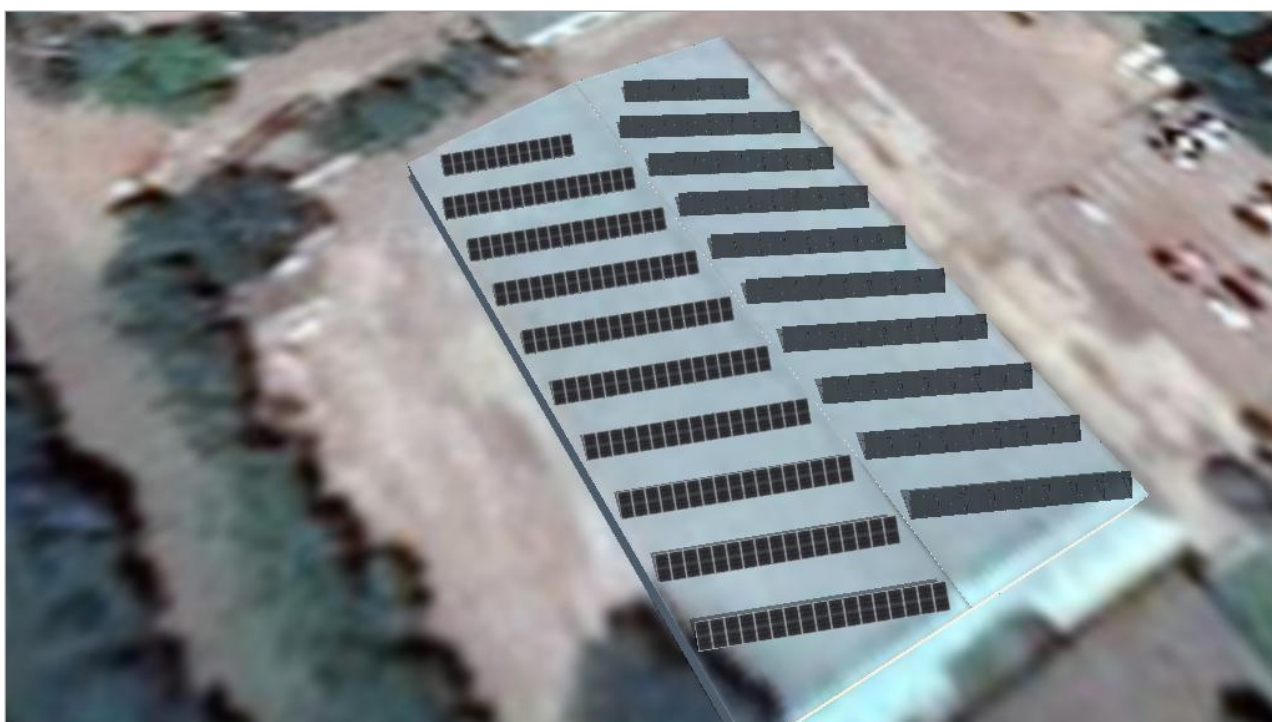


Figure: 2. Module Area - Building 01-Roof Area Southwest

3. Module Area - Arbitrary Building 03-Mounting Surface Northeast

PV Generator, 3. Module Area - Arbitrary Building 03-Mounting Surface Northeast

Name	Arbitrary Building 03-Mounting Surface Northeast
PV Modules	110 x DHM-72L9-455W (v1)
Manufacturer	DAH Solar
Inclination	30 °
Orientation	South 180 °
Installation Type	Mounted - Roof
PV Generator Surface	239,1 m ²

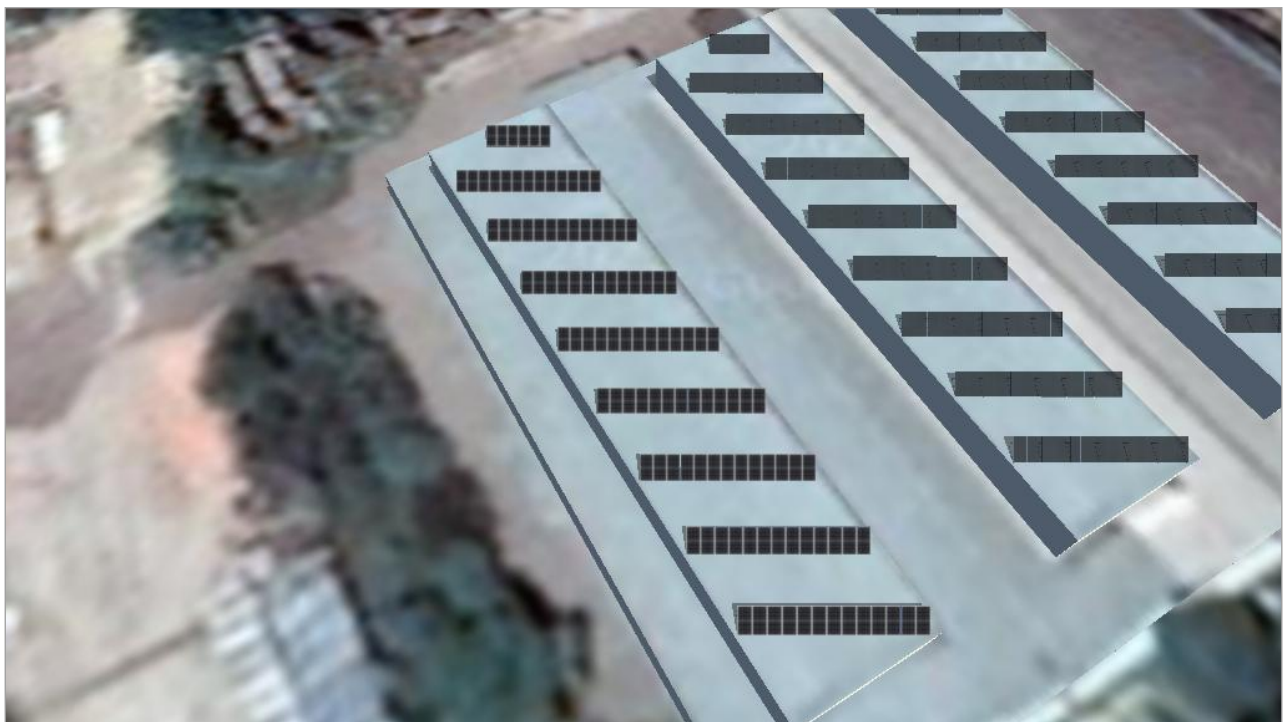


Figure: 3. Module Area - Arbitrary Building 03-Mounting Surface Northeast

4. Module Area - Arbitrary Building 04-Mounting Surface Northeast

PV Generator, 4. Module Area - Arbitrary Building 04-Mounting Surface Northeast

Name	Arbitrary Building 04-Mounting Surface Northeast
PV Modules	110 x DHM-72L9-455W (v1)
Manufacturer	DAH Solar
Inclination	30 °
Orientation	South 180 °
Installation Type	Mounted - Roof
PV Generator Surface	239,1 m ²



Figure: 4. Module Area - Arbitrary Building 04-Mounting Surface Northeast

5. Module Area - Arbitrary Building 05-Mounting Surface Northeast

PV Generator, 5. Module Area - Arbitrary Building 05-Mounting Surface Northeast

Name	Arbitrary Building 05-Mounting Surface Northeast
PV Modules	110 x DHM-72L9-455W (v1)
Manufacturer	DAH Solar
Inclination	30 °
Orientation	South 180 °
Installation Type	Mounted - Roof
PV Generator Surface	239,1 m ²

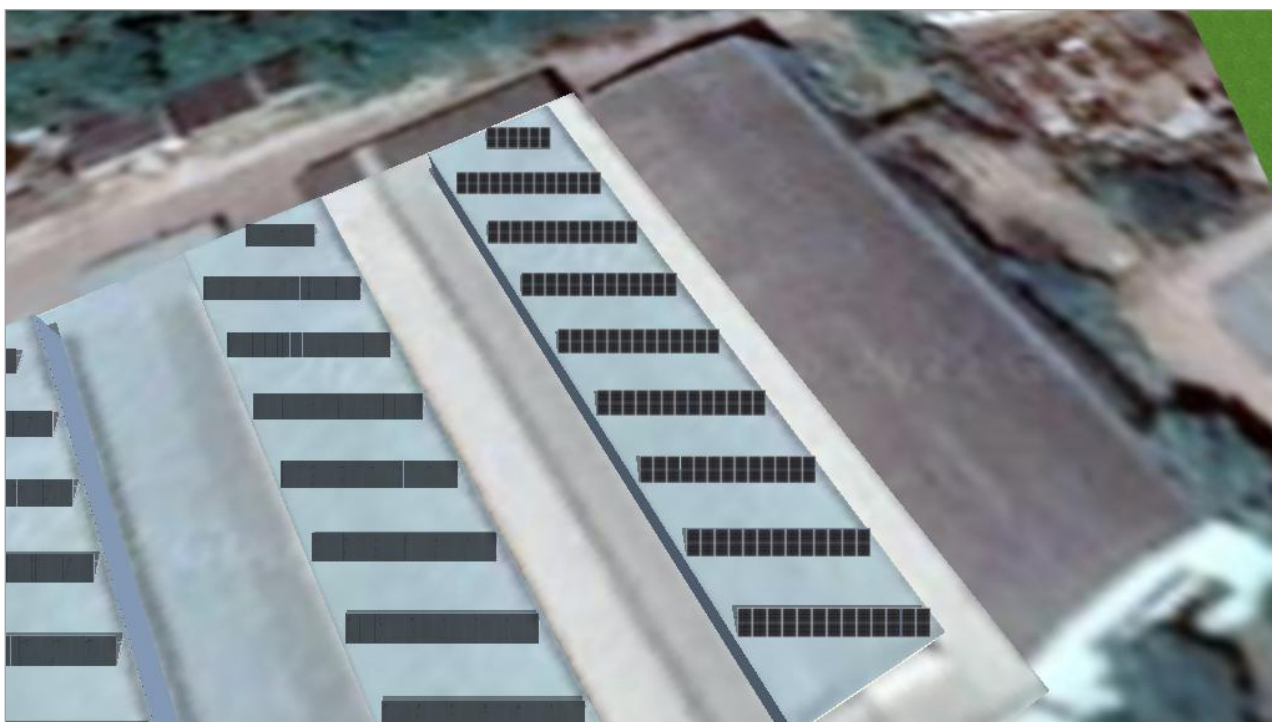


Figure: 5. Module Area - Arbitrary Building 05-Mounting Surface Northeast

Horizon Line, 3D Design

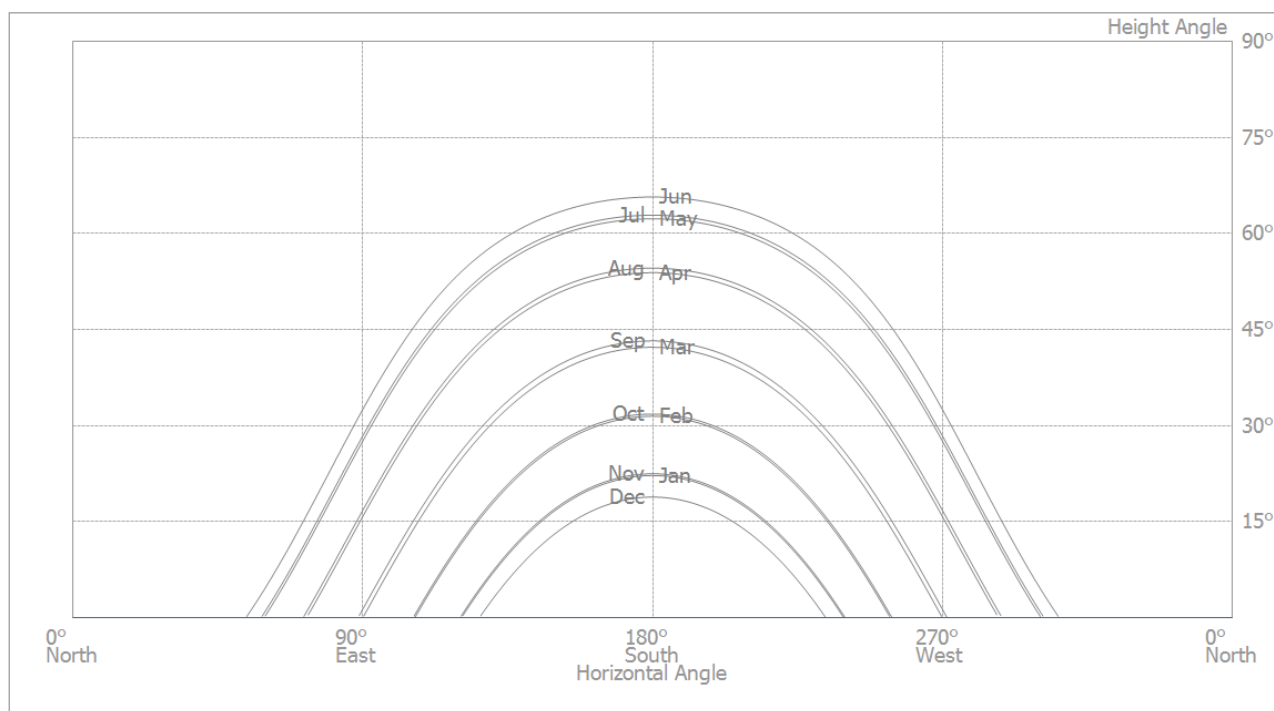


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Areas	Building 01-Roof Area Northeast + Building 01-Roof Area Southwest
Inverter 1	
Model	SUN-50K-G (v1)
Manufacturer	Deye
Quantity	3
Sizing Factor	100,1 %
Configuration	MPP 1: 3 x 14
	MPP 2: 3 x 14
	MPP 3: 1 x 13
	MPP 4: 1 x 13

Configuration 2

Module Area	Arbitrary Building 03-Mounting Surface Northeast
Inverter 1	
Model	SUN-50K-G (v1)
Manufacturer	Deye
Quantity	1
Sizing Factor	100,1 %
Configuration	MPP 1: 2 x 15
	MPP 2: 2 x 14
	MPP 3: 2 x 13
	MPP 4: 2 x 13

Configuration 3

Module Area	Arbitrary Building 04-Mounting Surface Northeast
Inverter 1	
Model	SUN-50K-G (v1)
Manufacturer	Deye
Quantity	1
Sizing Factor	100,1 %
Configuration	MPP 1: 2 x 15
	MPP 2: 2 x 14
	MPP 3: 2 x 13
	MPP 4: 2 x 13

Configuration 4

Module Area	Arbitrary Building 05-Mounting Surface Northeast
Inverter 1	
Model	SUN-50K-G (v1)
Manufacturer	Deye
Quantity	1
Sizing Factor	100,1 %
Configuration	MPP 1: 2 x 15
	MPP 2: 2 x 14
	MPP 3: 2 x 13
	MPP 4: 2 x 13

AC Mains

AC Mains

Number of Phases	3
Mains Voltage (1-phase)	230 V
Displacement Power Factor (cos phi)	+/- 0,96

Simulation Results

Results Total System

PV System

PV Generator Output	300,3 kWp
Spec. Annual Yield	1 043,59 kWh/kWp
Performance Ratio (PR)	75,5 %
Yield Reduction due to Shading	1,9 %/Year
Grid Feed-in	313 445 kWh/Year
Grid Feed-in in the first year (incl. module degradation)	313 247 kWh/Year
Standby Consumption (Inverter)	56 kWh/Year
CO ₂ Emissions avoided	147 293 kg / year

Energy Flow Graph

Project: RED Nord Balti



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

Figure: Energy Flow Graph

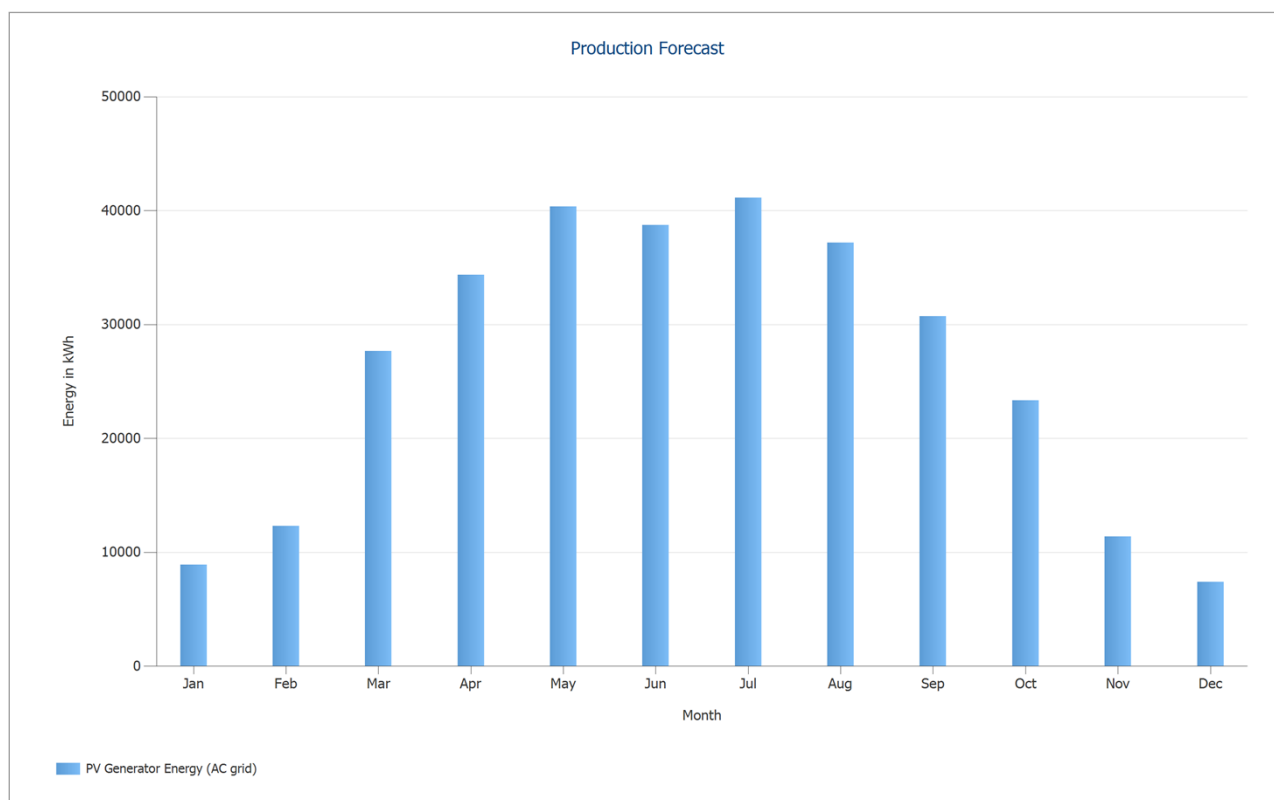


Figure: Production Forecast

Results per Module Area

Building 01-Roof Area Northeast

PV Generator Output	75,08 kWp
PV Generator Surface	358,64 m ²
Global Radiation at the Module	1363,21 kWh/m ²
Global Radiation on Module without reflection	1375,83 kWh/m ²
Performance Ratio (PR)	73,89 %
PV Generator Energy (AC grid)	76342,81 kWh/Year
Spec. Annual Yield	1016,89 kWh/kWp

Building 01-Roof Area Southwest

PV Generator Output	75,08 kWp
PV Generator Surface	358,64 m ²
Global Radiation at the Module	1372,28 kWh/m ²
Global Radiation on Module without reflection	1384,76 kWh/m ²
Performance Ratio (PR)	75,66 %
PV Generator Energy (AC grid)	78680,09 kWh/Year
Spec. Annual Yield	1048,02 kWh/kWp

Arbitrary Building 03-Mounting Surface Northeast

PV Generator Output	50,05 kWp
PV Generator Surface	239,09 m ²
Global Radiation at the Module	1372,28 kWh/m ²
Global Radiation on Module without reflection	1384,76 kWh/m ²
Performance Ratio (PR)	76,18 %
PV Generator Energy (AC grid)	52819,31 kWh/Year
Spec. Annual Yield	1055,33 kWh/kWp

Arbitrary Building 04-Mounting Surface Northeast

PV Generator Output	50,05 kWp
PV Generator Surface	239,09 m ²
Global Radiation at the Module	1372,28 kWh/m ²
Global Radiation on Module without reflection	1384,76 kWh/m ²
Performance Ratio (PR)	76,16 %
PV Generator Energy (AC grid)	52804,68 kWh/Year
Spec. Annual Yield	1055,04 kWh/kWp

Arbitrary Building 05-Mounting Surface Northeast

PV Generator Output	50,05 kWp
PV Generator Surface	239,09 m ²
Global Radiation at the Module	1372,28 kWh/m ²
Global Radiation on Module without reflection	1384,76 kWh/m ²
Performance Ratio (PR)	76,15 %
PV Generator Energy (AC grid)	52797,79 kWh/Year
Spec. Annual Yield	1054,90 kWh/kWp

Financial Analysis

Overview

System Data

Grid Feed-in in the first year (incl. module degradation)	313 247 kWh/Year
PV Generator Output	300,3 kWp
Start of Operation of the System	02.09.2022
Assessment Period	10 Years
Interest on Capital	1 %

Economic Parameters

Return on Assets	20,03 %
Accrued Cash Flow (Cash Balance)	7 245 796,27 Lei
Amortization Period	4,4 Years
Electricity Production Costs	1,59 Lei/kWh

Payment Overview

Specific Investment Costs	17 182,82 Lei/kWp
Investment Costs	5 160 000,00 Lei
One-off Payments	0,00 Lei
Incoming Subsidies	0,00 Lei
Annual Costs	0,00 Lei/Year
Other Revenue or Savings	0,00 Lei/Year

Remuneration and Savings

Total Payment from Utility in First Year	1 202 863,06 Lei/Year
Moldova (Copy) - Red Nord	
Validity	02.09.2022 - 01.09.2032
Specific feed-in / export Remuneration	3,84 Lei/kWh
Feed-in / Export Tariff	1 202 863,06 Lei/Year

Cash flow

Cashflow Table

	Year 1	Year 2	Year 3	Year 4	Year 5
Investments	-5 160 000,00 Lei	0,00 Lei	0,00 Lei	0,00 Lei	0,00 Lei
Feed-in / Export Tariff	1 187 061,58 Lei	1 177 981,99 Lei	1 165 150,58 Lei	1 152 457,78 Lei	1 139 902,10 Lei
Annual Cash Flow	-3 972 938,42 Lei	1 177 981,99 Lei	1 165 150,58 Lei	1 152 457,78 Lei	1 139 902,10 Lei
Accrued Cash Flow (Cash Balance)	-3 972 938,42 Lei	-2 794 956,43 Lei	-1 629 805,84 Lei	-477 348,07 Lei	662 554,03 Lei

	Year 6	Year 7	Year 8	Year 9	Year 10
Investments	0,00 Lei	0,00 Lei	0,00 Lei	0,00 Lei	0,00 Lei
Feed-in / Export Tariff	1 127 482,07 Lei	1 115 196,24 Lei	1 103 043,17 Lei	1 091 021,43 Lei	1 079 129,61 Lei
Annual Cash Flow	1 127 482,07 Lei	1 115 196,24 Lei	1 103 043,17 Lei	1 091 021,43 Lei	1 079 129,61 Lei
Accrued Cash Flow (Cash Balance)	1 790 036,10 Lei	2 905 232,34 Lei	4 008 275,51 Lei	5 099 296,94 Lei	6 178 426,55 Lei

	Year 11
Investments	0,00 Lei
Feed-in / Export Tariff	1 067 369,73 Lei
Annual Cash Flow	1 067 369,73 Lei
Accrued Cash Flow (Cash Balance)	7 245 796,27 Lei

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

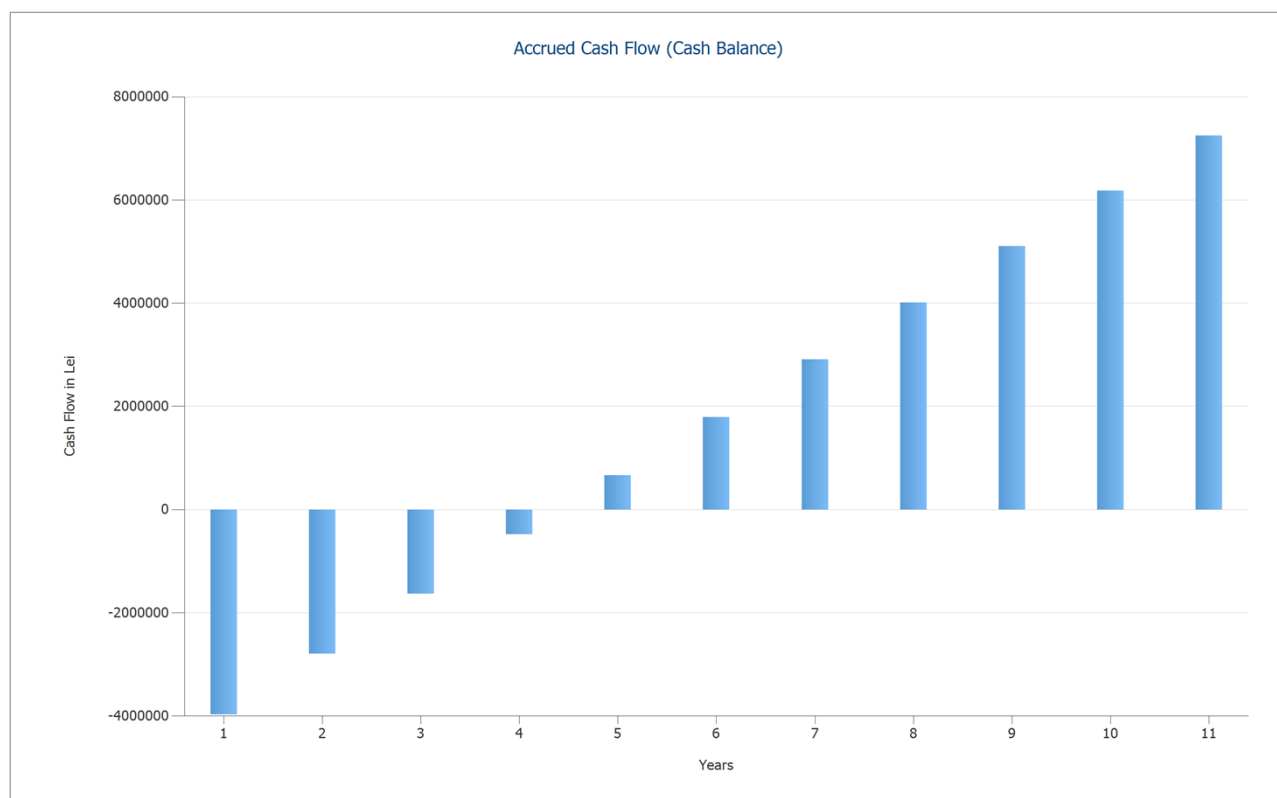


Figure: Accrued Cash Flow (Cash Balance)

Plans and parts list

Circuit Diagram

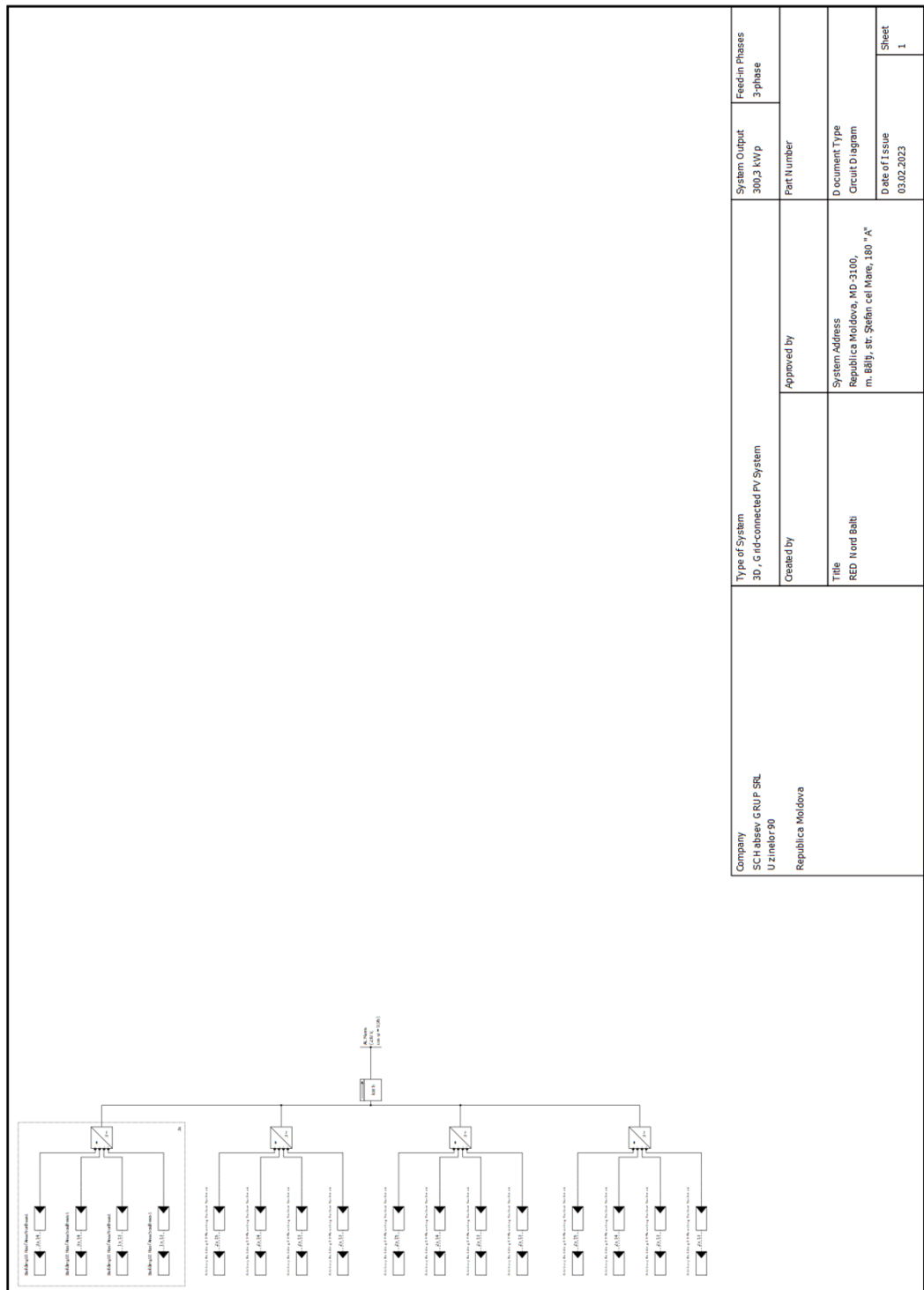


Figure: Circuit Diagram

Dimensioning Plan

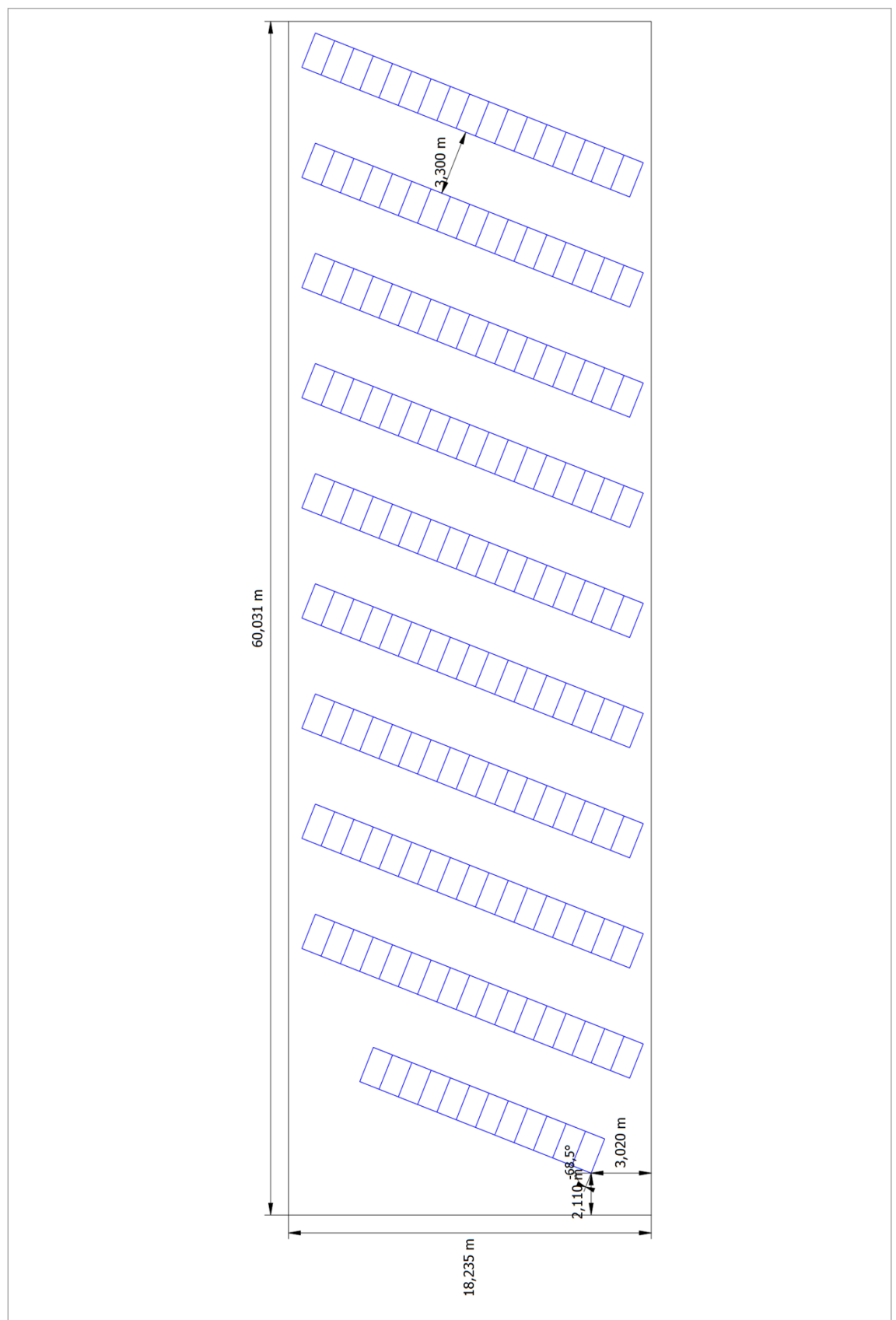


Figure: Building 01-Roof Area Southwest

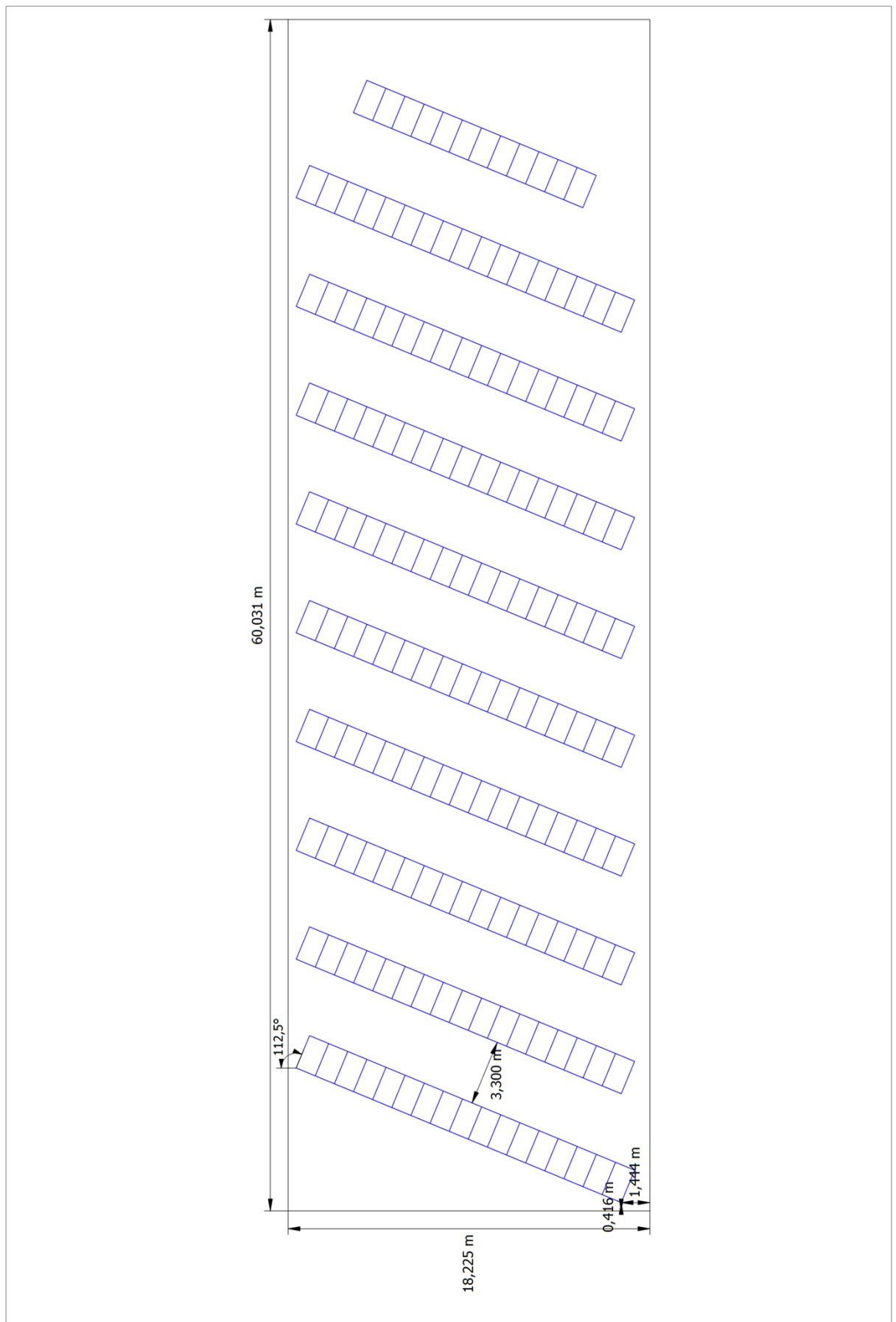


Figure: Building 01-Roof Area Northeast

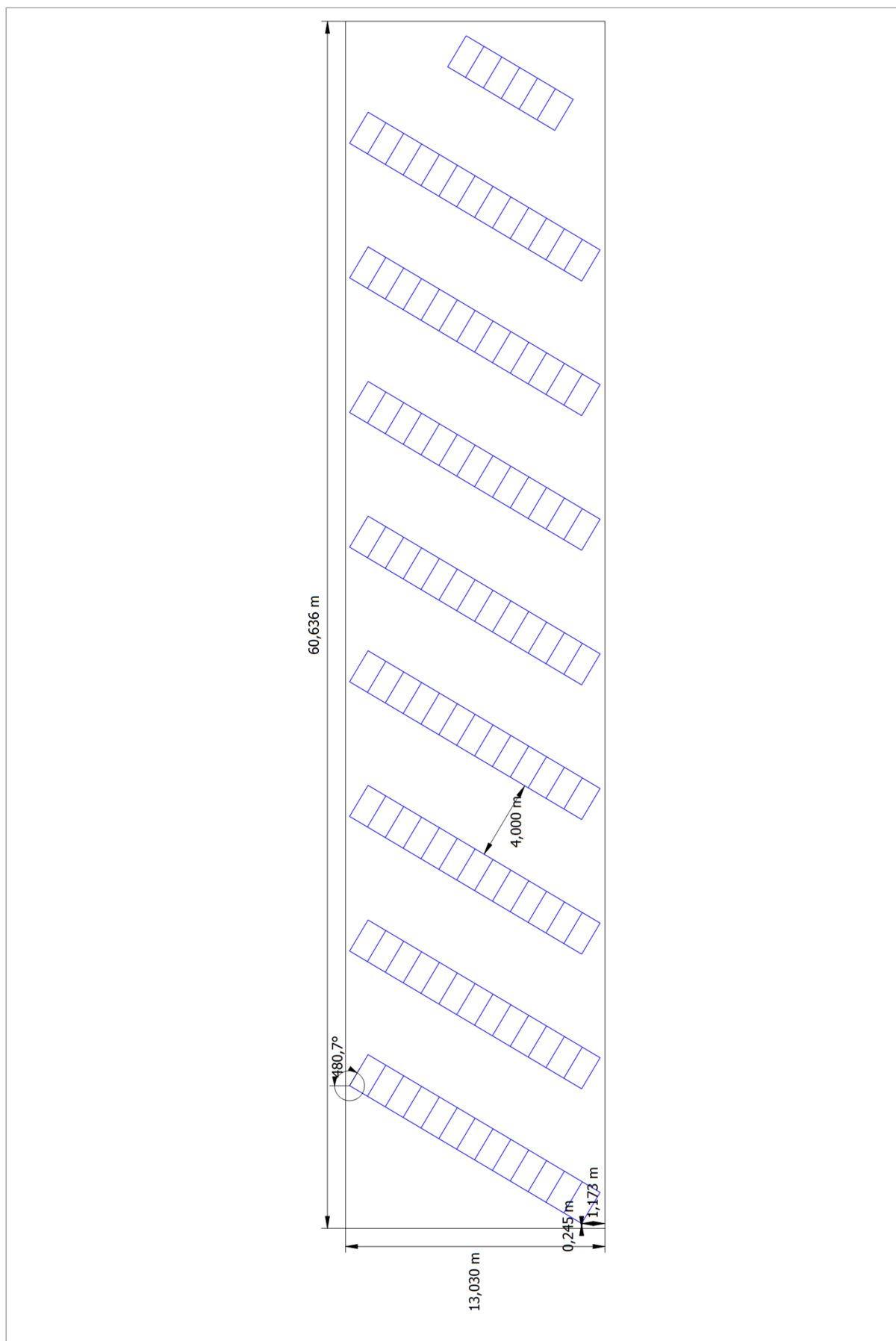


Figure: Arbitrary Building 04-Mounting Surface Northeast

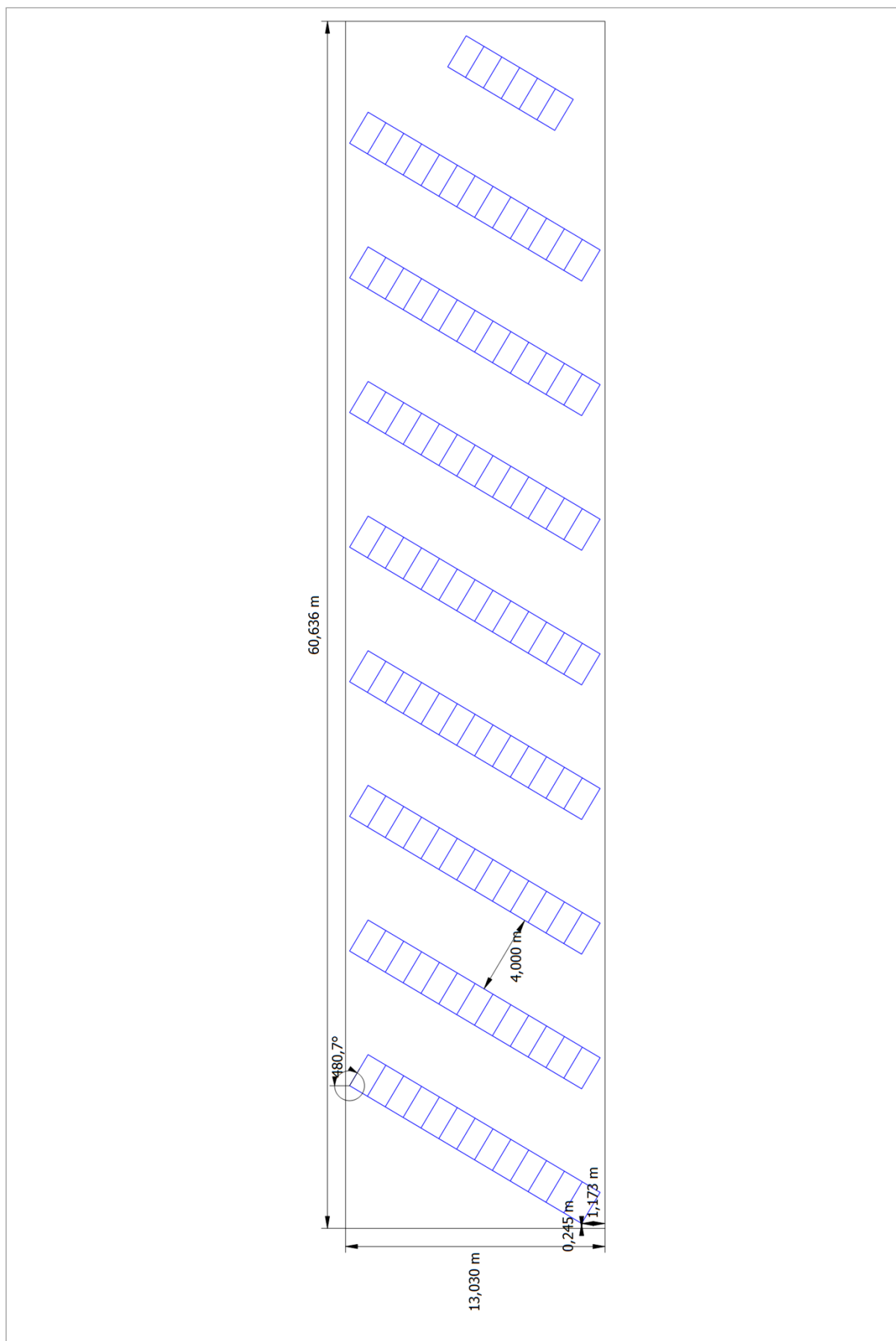


Figure: Arbitrary Building 05-Mounting Surface Northeast

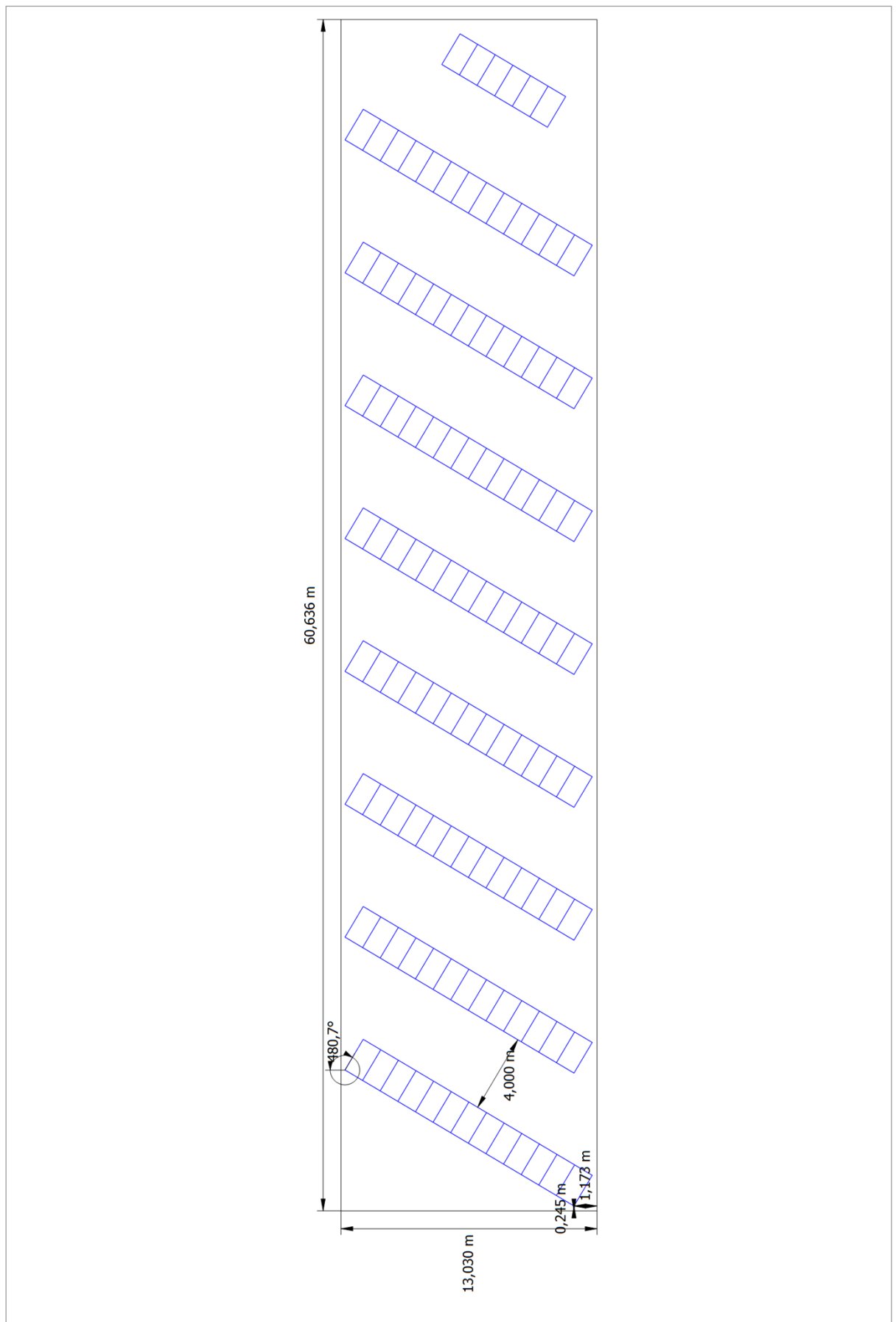


Figure: Arbitrary Building 03-Mounting Surface Northeast

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		DAH Solar	DHM-72L9-455W	660	Piece
2	Inverter		Deye	SUN-50K-G	6	Piece
3	Components			Feed-in Meter	1	Piece