

PVsyst - Simulation report

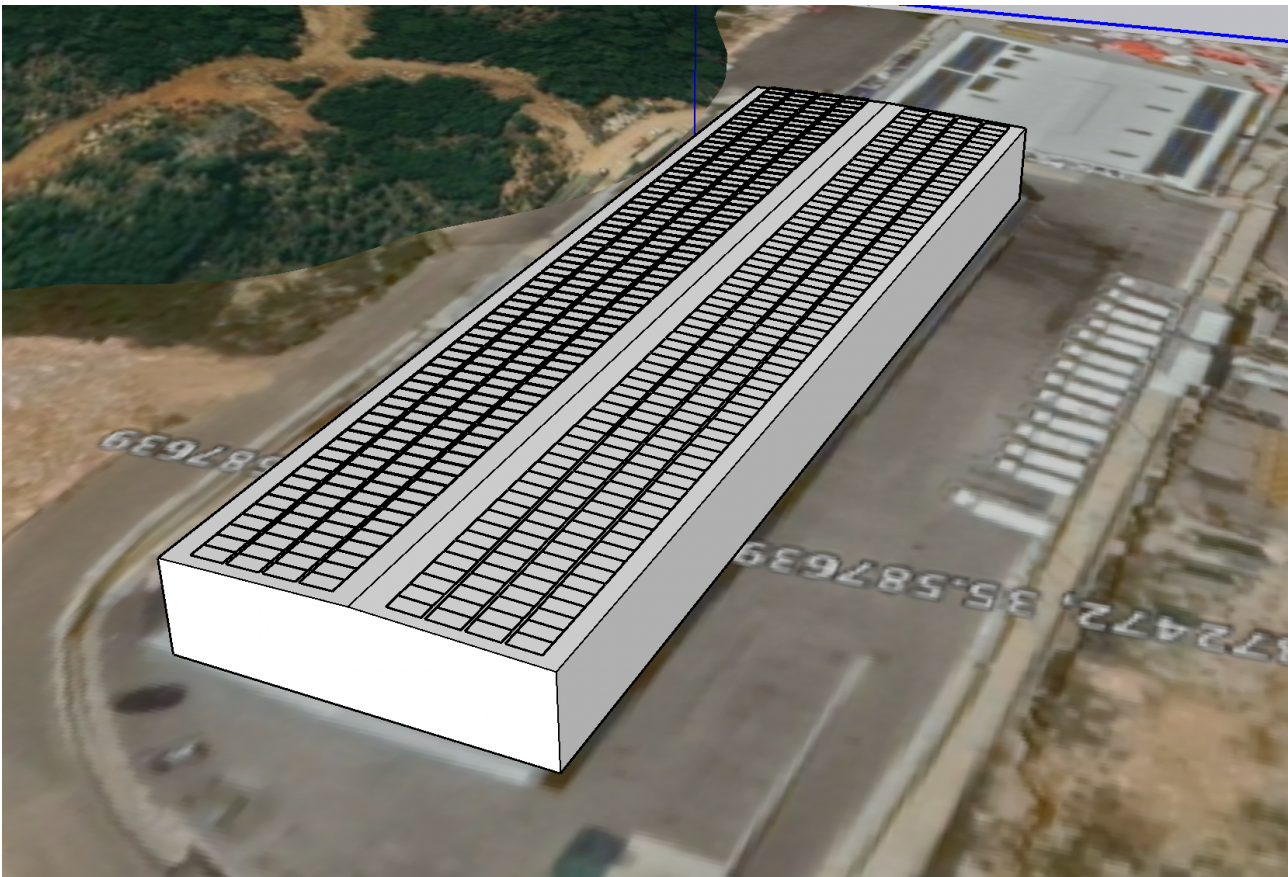
Grid-Connected System

Project: TargetFood

Variant: New simulation variant

System power: 347 kWp

Yatoun el Kharroubé - Lebanon



Client:



TARGET FOOD CO. SAL
تارغت فوود كومباني ش.م.ل

PdV

Signature

**PVsyst V7.2.11**

VC0, Simulation date:
08/07/22 12:24
with v7.2.11

Project summary**Geographical Site**

Yatoun el Kharroubé
Lebanon

Situation

Latitude 33.87 °N
Longitude 35.59 °E
Altitude 271 m
Time zone UTC+2

Project settings

Albedo 0.20

Meteo data

Yatoun el Kharroubé
Meteonorm 8.0 (1991-2010), Sat=100% - Synthetic

System summary**Grid-Connected System****PV Field Orientation**

Fixed planes 2 orientations
Tilts/azimuths 5 / -8 °
5 / 172 °

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

System information**PV Array**

Nb. of modules 522 units
Pnom total 347 kWp

Inverters

Nb. of units 2 units
Pnom total 350 kWac
Pnom ratio 0.992

Results summary

Produced Energy 538.8 MWh/year Specific production 1552 kWh/kWp/year Perf. Ratio PR 87.36 %

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General parameters**Grid-Connected System****Horizon**

Average Height 7.9 °

PV Field Orientation**Orientation**

Fixed planes 2 orientations
 Tilts/azimuths 5 / -8 °
 5 / 172 °

Sheds configuration

No 3D scene defined

Models used

Transposition Perez
 Diffuse Perez, Meteonorm
 Circumsolar separate

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

PV Array Characteristics**PV module**

Manufacturer Trina Solar

Model TSM-665DEG21C.20

(Original PVsyst database)

Unit Nom. Power 665 Wp

Number of PV modules 522 units

Nominal (STC) 347 kWp

Modules 18 Strings x 29 In series

At operating cond. (50°C)

Pmpp 317 kWp

U mpp 1002 V

I mpp 317 A

Total PV power

Nominal (STC) 347 kWp

Total 522 modules

Module area 1622 m²

Cell area 1519 m²

Inverter

Manufacturer Huawei Technologies

Model SUN2000-175KTL-H0

(Original PVsyst database)

Unit Nom. Power 175 kWac

Number of inverters 2 units

Total power 350 kWac

Operating voltage 600-1500 V

Max. power (=>25°C) 193 kWac

Pnom ratio (DC:AC) 0.99

Total inverter power

Total power 350 kWac

Number of inverters 2 units

Pnom ratio 0.99

Array losses**Thermal Loss factor**

Module temperature according to irradiance

Uc (const) 20.0 W/m²K

Uv (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 52 mΩ

Loss Fraction 1.5 % at STC

Module Quality Loss

Loss Fraction -0.8 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.999	0.994	0.969	0.929	0.830	0.589	0.000



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Horizon definition

Horizon from Meteonorm web service, lat=33.8725, lon=35.5876

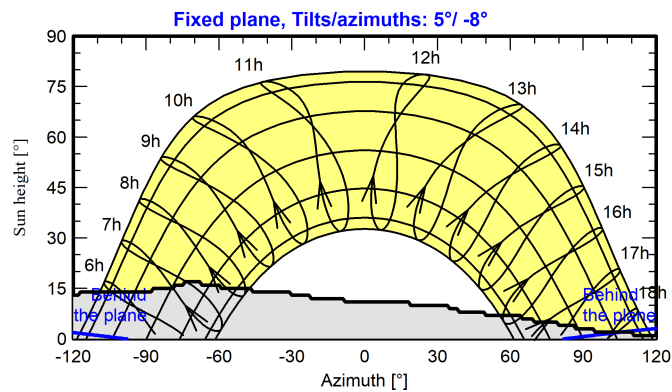
Average Height	7.9 °	Albedo Factor	0.89
Diffuse Factor	0.98	Albedo Fraction	100 %

Horizon profile

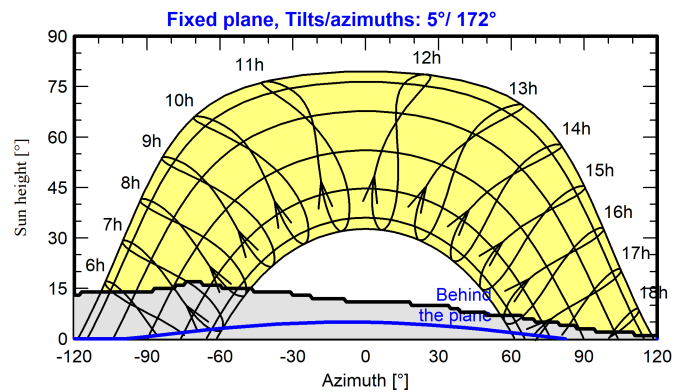
Azimuth [°]	-180	-177	-175	-170	-166	-165	-159	-158	-156	-145	-143	-140	-139	-132
Height [°]	0.0	0.0	2.0	2.0	3.0	4.0	4.0	5.0	5.0	6.0	8.0	8.0	9.0	9.0
Azimuth [°]	-130	-129	-126	-125	-121	-118	-117	-88	-87	-79	-75	-74	-68	-67
Height [°]	10.0	11.0	11.0	12.0	12.0	13.0	14.0	14.0	15.0	15.0	16.0	17.0	17.0	16.0
Azimuth [°]	-60	-59	-47	-31	-30	-23	-22	-9	18	19	34	35	38	49
Height [°]	16.0	15.0	15.0	14.0	13.0	13.0	12.0	12.0	11.0	10.0	10.0	9.0	9.0	8.0
Azimuth [°]	50	64	65	69	79	80	86	87	94	110	111	130	131	179
Height [°]	7.0	7.0	6.0	6.0	5.0	4.0	4.0	3.0	3.0	2.0	1.0	1.0	0.0	0.0

Sun Paths (Height / Azimuth diagram)

Orientation #1



Orientation #2





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Main results

System Production

Produced Energy

538.8 MWh/year

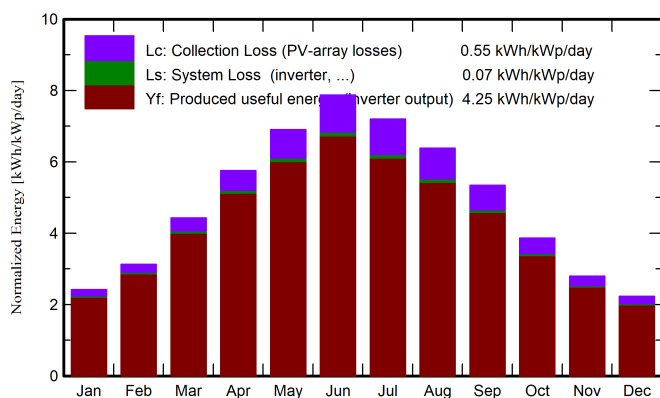
Specific production

1552 kWh/kWp/year

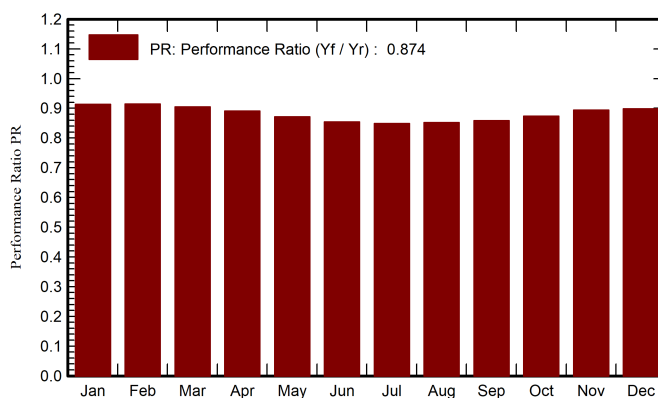
Performance Ratio PR

87.36 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	EArrMPP	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	MWh	MWh	ratio
January	83.2	35.72	12.81	75.0	71.8	24.15	24.15	0.913
February	94.0	48.48	13.28	87.7	84.7	28.27	28.27	0.915
March	143.5	66.82	15.58	137.1	134.0	43.75	43.75	0.905
April	177.1	75.40	17.81	172.6	169.4	54.22	54.22	0.891
May	215.9	80.17	21.26	214.1	210.7	65.81	65.81	0.871
June	236.4	66.31	24.04	236.2	232.6	71.25	71.25	0.855
July	224.2	75.15	26.64	223.1	219.4	66.87	66.87	0.849
August	201.3	71.04	27.44	197.8	194.6	59.47	59.47	0.852
September	167.3	54.51	25.72	160.3	156.6	48.55	48.55	0.858
October	127.8	54.05	23.04	119.8	115.7	36.93	36.93	0.874
November	92.0	40.63	18.44	83.8	80.5	26.42	26.42	0.894
December	77.6	33.16	14.68	69.0	65.4	21.87	21.87	0.899
Year	1840.4	701.43	20.10	1776.5	1735.3	547.58	547.58	0.874

Legends

GlobHor Global horizontal irradiation

DiffHor Horizontal diffuse irradiation

T_Amb Ambient Temperature

GlobInc Global incident in coll. plane

GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array

EArrMPP Array virtual energy at MPP

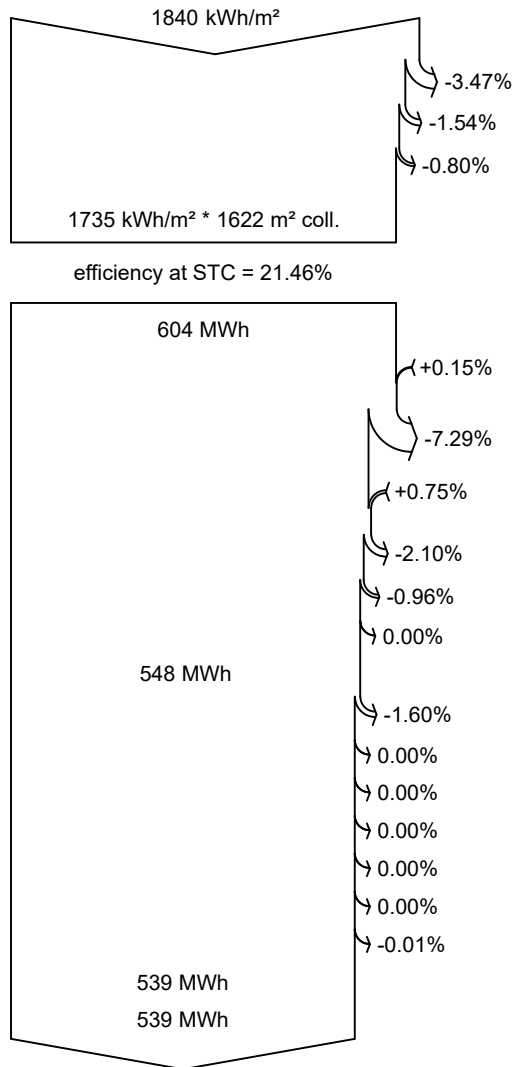
PR Performance Ratio



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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Far Shadings / Horizon

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

Mismatch loss, modules and strings

Ohmic wiring loss

Mixed orientation mismatch loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

Available Energy at Inverter Output

Energy injected into grid

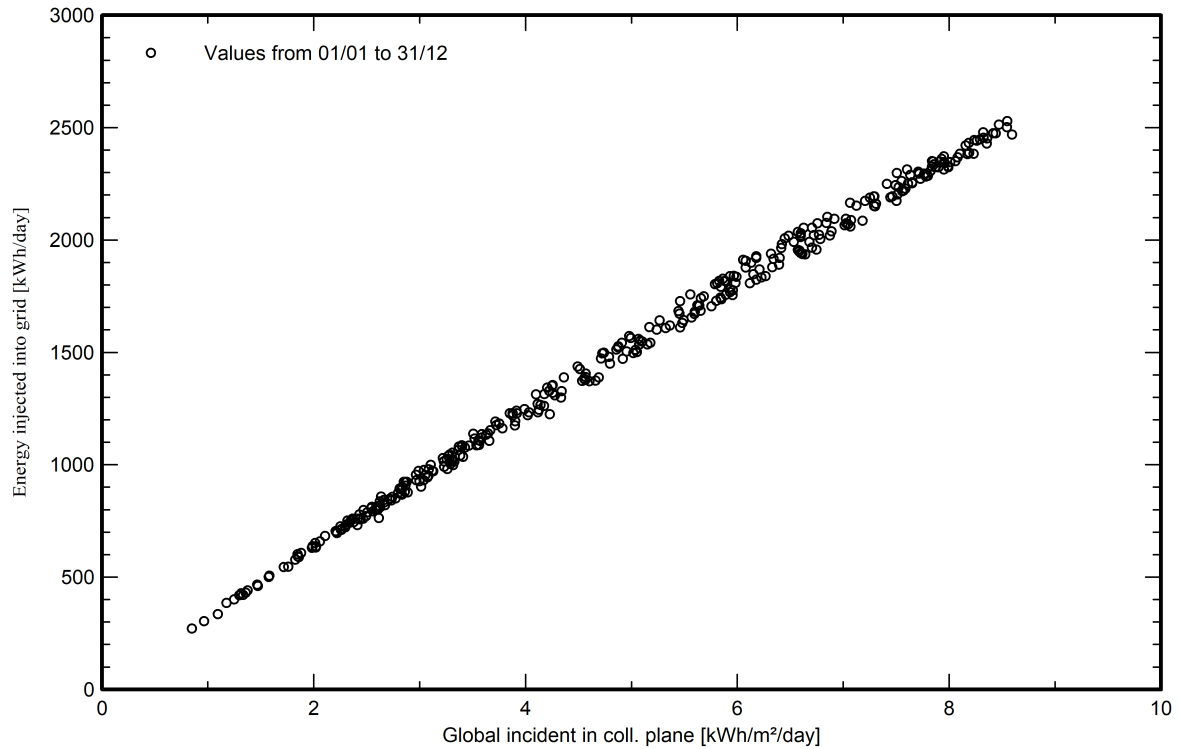


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Special graphs

Daily Input/Output diagram



System Output Power Distribution

