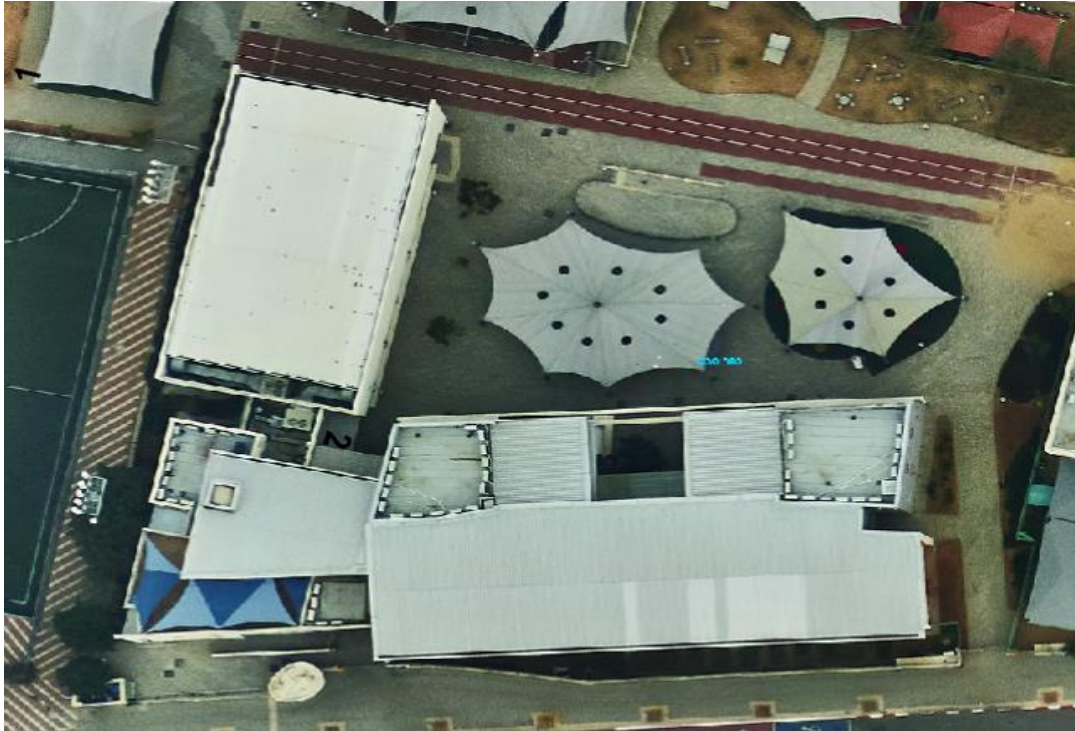


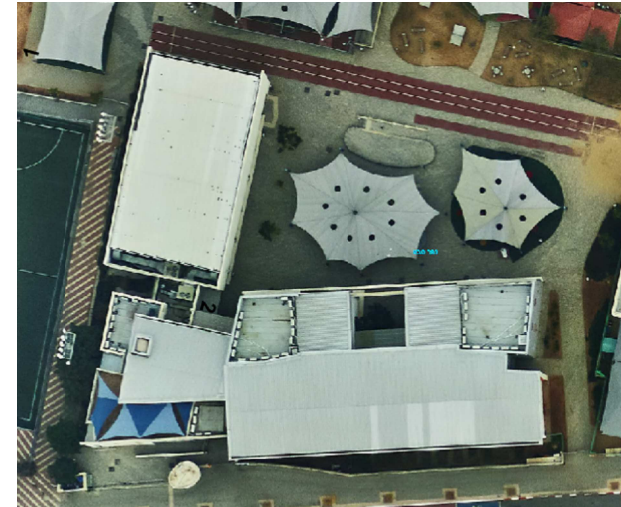
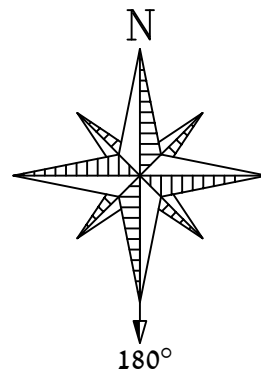
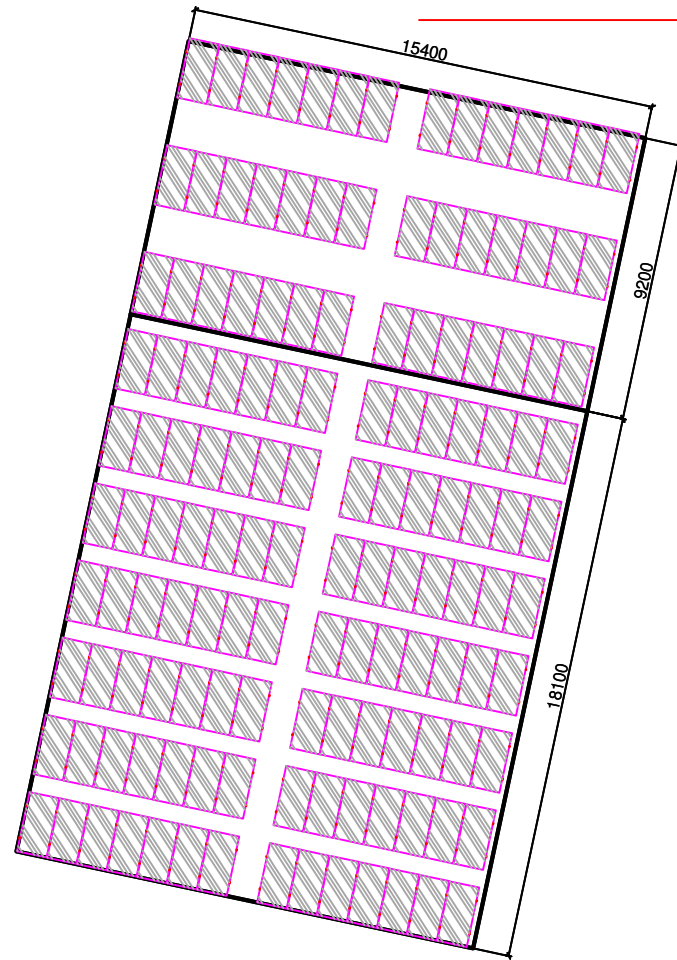
בה"ס דבורה עומר - כפר סבא

מערכת סולארית תעריפית – 136.8 Kw



- DvoraOmer- -E-D-001 – הצבת פאנלים
- DvoraOmer- -E-D-002 – תכנית קונסטרוקצייה
- DvoraOmer- -E-D-003 – תכנית קושרות
- DvoraOmer- -E-D-004 – תכנית חיווט פאנלים וכבילה
- DvoraOmer- -E-D-005 – תכנית הצבת ממירים
- DvoraOmer- -E-D-006 – שרטוטי רגלים
- DvoraOmer- -E-D-007 – תכנית חד קווית השמלית
- DvoraOmer- -E-D-008 – תכנית חד קווית הארקות
- DvoraOmer- -E-C-002 – סימולציית Pvsyst
- DvoraOmer- -E-C-003 – חישוב הפסדי הולכה DC
- DvoraOmer- -E-C-004 – חישוב הפסדי הולכה AC
- DvoraOmer- -E-C-005 – בדיקות מתחים DC אופגריד
- DvoraOmer- -E-C-006 – בדיקות מתחים DC אונגריד
- DvoraOmer- -E-C-007 – בדיקות מתחים AC אונגריד
- DvoraOmer- -E-C-008 – בדיקות קבלה אופגריד
- DvoraOmer- -E-C-009 – בדיקות קבלה אונגריד

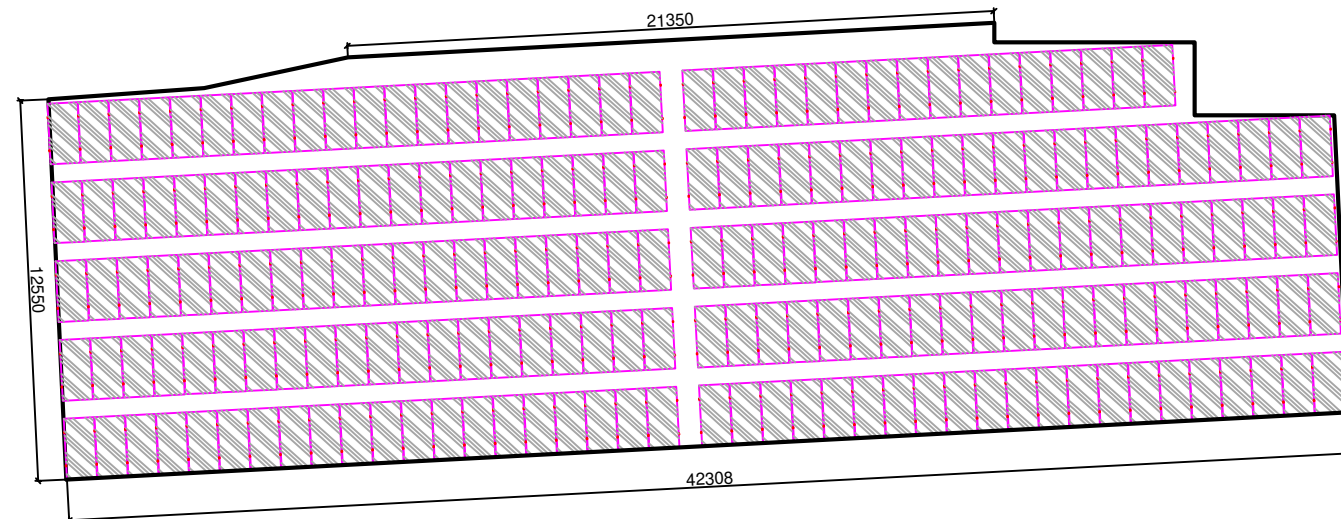
Marlog- Layout Desgin



בהס דברה עמר כפר סבא - חלוקה לסטרינגים/ממירים

136.80%	AC/DC Ratio	100	הספק כללי AC(KW) :	400	הספק פאנל בודד(W)	
		136.8	הספק כללי DC(KW) :	342	מ"ס פאנלים כללי :	
AC/DC	הספק AC	הספק DC	פאנלים בסטרינג	מ"ס סטרינג	סוג ממיר (kW)	ממיר
132.00%	60	79.2	18	11	SMA-60	1
144.00%	40	57.6	18	8	SMA-60-40	2
136.80%	100	136.8				

סה"כ כמות פנלים:



יש לבצע כל עבודה לפי הנחיות ממונה הבטיחות

מיקום לוחות חשמל יוכל להשתנות בהתאם לתוואי חיבור ללוח מוזן

	תכנית הצבת פאנלים		תאור:	שם תכנית:	תאריך:	השינוי:	גרסה:	פרטי פנלים		פרטי ממירים		
	מקום ההתקנה: כפר סבא		שם הקו: בהס דבורה עומר	DvoraOmer-E-D-001			P1	נתונים:	פרטים:	כמות:	נתונים:	פרטים:
	חתימה:		תאריך:				P2	JINKO	יצרן:	2	SMA	יצרן:
	גודל דף:		תכנון:				P3	400w	דגם:	1	SMA-60	דגם א:
	גרסה:		אישר:				P4	342	כמות:	1	SMA 60-40	דגם ב:
P0	A3	אריק בר				P5	15 deg	הטייה:			דגם ג:	
							192 deg	אזימוט:			דגם ד:	
							136.8 kWp	הספק כולל:		100 kW	הספק כולל:	

Grid-Connected System: Simulation parameters

Project : **DvoraOmer**

Geographical Site	Kefar Sava	Country	Israel	
Situation	Latitude	32.19° N	Longitude	34.95° E
Time defined as	Legal Time	Time zone UT+2	Altitude	43 m
	Albedo	0.20		
Meteo data:	Kefar Sava	Meteonorm 7.2 (1990-2004), Sat=100% - Synthetic		

Simulation variant : **DvoraOmer**

Simulation date 20/01/20 14h46

Simulation parameters	System type	Sheds on a building	
2 orientations	tilts/azimuths	15°/12° and 15°/-3°	
Sheds configuration	Nb. of sheds	17	
	Sheds spacing	Collector width	2.00 m
Shading limit angle	Limit profile angle	Ground cov. Ratio (GCR)	72.9 %
Models used	Transposition	Perez	Diffuse Perez, Meteonorm
Horizon	Free Horizon		
Near Shadings	According to strings	Electrical effect	100 %
User's needs :	Unlimited load (grid)		
Grid power limitation	Active Power	100 kW	Pnom ratio 1.440

PV Arrays Characteristics (2 kinds of array defined)

PV module	Si-mono	Model	JKM 400M-72H	
Custom parameters definition	Manufacturer	Jinkosolar		
Sub-array "Sub-array #1"	Orientation	#1	Tilt/Azimuth	15°/12°
Number of PV modules	In series	18 modules	In parallel	8 strings
Total number of PV modules	Nb. modules	144	Unit Nom. Power	400 Wp
Array global power	Nominal (STC)	57.6 kWp	At operating cond.	53.0 kWp (50°C)
Array operating characteristics (50°C)	U mpp	702 V	I mpp	76 A
Sub-array "Sub-array #2"	Orientation	#2	Tilt/Azimuth	15°/-3°
Number of PV modules	In series	18 modules	In parallel	12 strings
Total number of PV modules	Nb. modules	216	Unit Nom. Power	400 Wp
Array global power	Nominal (STC)	86.4 kWp	At operating cond.	79.5 kWp (50°C)
Array operating characteristics (50°C)	U mpp	702 V	I mpp	113 A
Total Arrays global power	Nominal (STC)	144 kWp	Total	360 modules
	Module area	724 m²	Cell area	653 m ²

Inverter	Model	Sunny Tripower 60-10		
Original PVsyst database	Manufacturer	SMA		
Characteristics	Operating Voltage	570-800 V	Unit Nom. Power	60.0 kWac
Sub-array "Sub-array #1"	Nb. of inverters	1 units	Total Power	60 kWac
			Pnom ratio	0.96
Sub-array "Sub-array #2"	Nb. of inverters	1 units	Total Power	60 kWac
			Pnom ratio	1.44
Total	Nb. of inverters	2	Total Power	120 kWac

Grid-Connected System: Simulation parameters

PV Array loss factors

Array Soiling Losses		Loss Fraction	3.0 %
Thermal Loss factor	Uc (const) 17.0 W/m ² K	Uv (wind)	0.0 W/m ² K / m/s
Wiring Ohmic Loss	Array#1	Loss Fraction	1.0 % at STC
	Array#2	Loss Fraction	1.0 % at STC
	Global	Loss Fraction	1.0 % at STC
LID - Light Induced Degradation		Loss Fraction	2.0 %
Module Quality Loss		Loss Fraction	-0.8 %
Module Mismatch Losses		Loss Fraction	1.0 % at MPP
Strings Mismatch loss		Loss Fraction	0.10 %
Incidence effect, ASHRAE parametrization	IAM = 1 - bo (1/cos i - 1)	bo Param.	0.05

System loss factors

Wires: 3x95.0 mm ²	57 m	Loss Fraction	1.0 % at STC
-------------------------------	------	---------------	--------------

Grid-Connected System: Near shading definition

Project : DvoraOmer

Simulation variant : DvoraOmer

Main system parameters

System type **Sheds on a building**

Near Shadings

PV Field Orientation

PV modules

PV Array

Inverter

Inverter pack

User's needs

According to strings

2 orientations

Model

Nb. of modules

Model

Nb. of units

Unlimited load (grid)

Electrical effect 100 %

Tilt/Azimuth = 15°/12° and 15°/-3°

JKM 400M-72H

360

Sunny Tripower 60-10

2.0

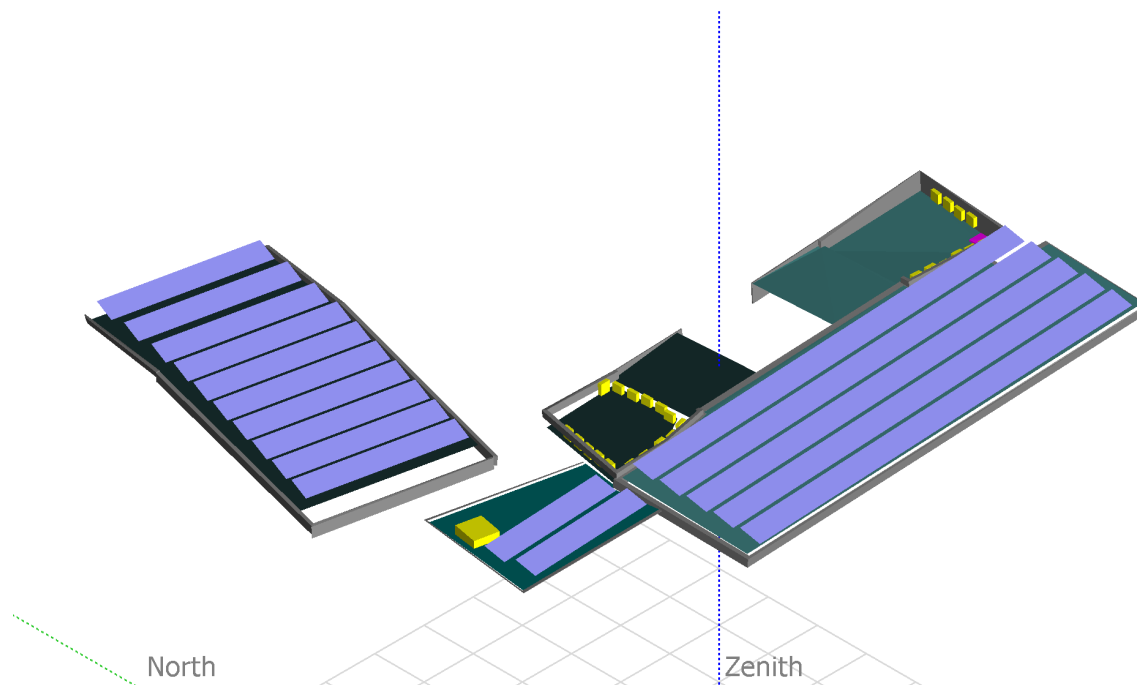
Pnom 400 Wp

Pnom total **144 kWp**

Pnom 60.0 kW ac

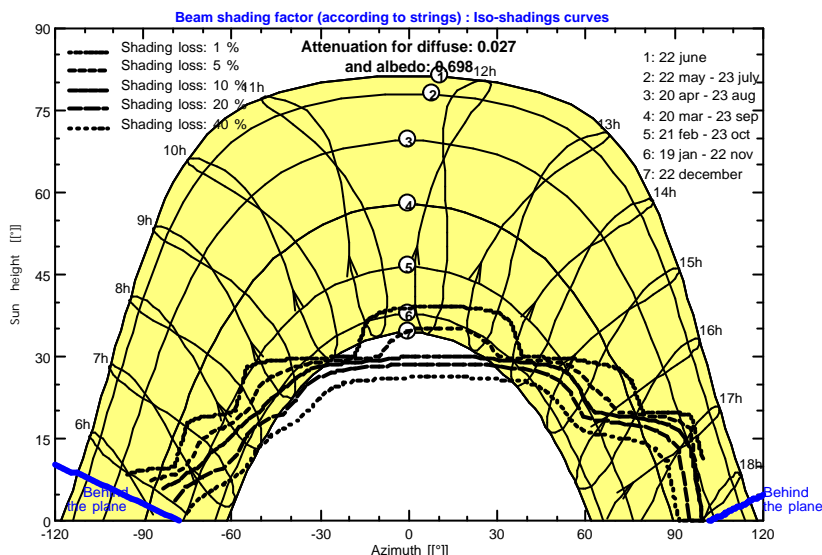
Pnom total **120 kW ac**

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

DvoraOmer



Grid-Connected System: Main results

Project : DvoraOmer
Simulation variant : DvoraOmer

Main system parameters

System type **Sheds on a building**

Near Shadings

According to strings Electrical effect 100 %

PV Field Orientation

2 orientations Tilt/Azimuth = 15°/12° and 15°/-3°

PV modules

Model JKM 400M-72H Pnom 400 Wp

PV Array

Nb. of modules 360 Pnom total **144 kWp**

Inverter

Model Sunny Tripower 60-10 Pnom 60.0 kW ac

Inverter pack

Nb. of units 2.0 Pnom total **120 kW ac**

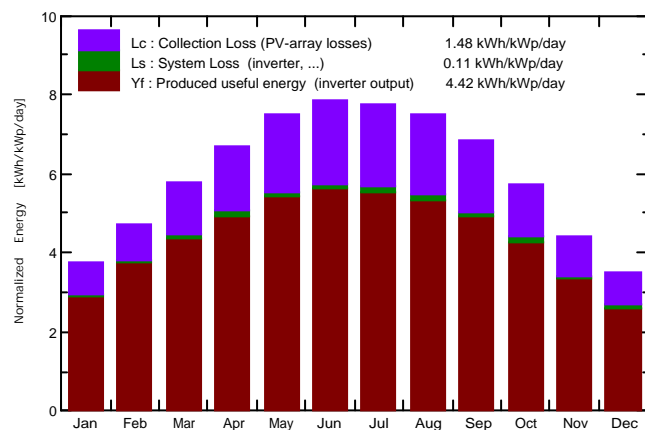
User's needs

Unlimited load (grid)

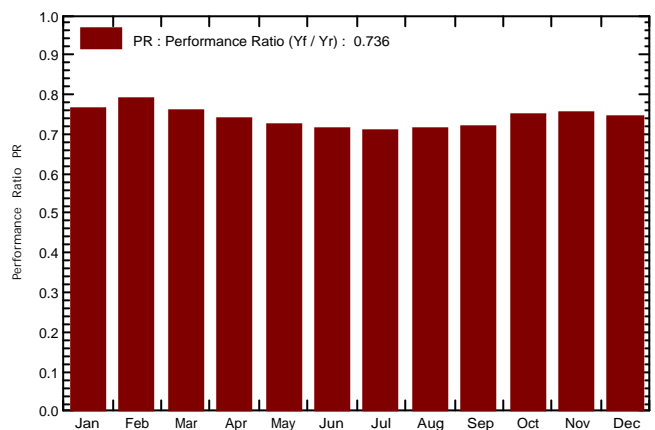
Main simulation results

System Production **Produced Energy 232.2 MWh/year** Specific prod. 1612 kWh/kWp/year
 Performance Ratio PR **73.55 %**

Normalized productions (per installed kWp): Nominal power 144 kWp



Performance Ratio PR



DvoraOmer

Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	PR
January	92.1	35.95	13.02	117.0	108.0	13.20	12.88	0.764
February	110.8	45.88	13.71	132.7	123.2	15.45	15.08	0.789
March	159.8	54.33	16.34	178.8	167.1	20.03	19.53	0.759
April	190.0	65.86	19.21	200.2	187.2	21.92	21.37	0.741
May	232.8	65.16	22.41	232.0	216.9	24.80	24.18	0.724
June	241.8	59.25	25.15	235.7	220.5	24.85	24.24	0.714
July	244.0	60.77	27.63	240.4	225.0	25.26	24.64	0.712
August	224.7	57.72	27.93	232.0	217.5	24.39	23.80	0.712
September	186.4	45.74	26.06	204.6	191.8	21.71	21.18	0.719
October	149.5	44.60	23.67	177.4	165.7	19.63	19.16	0.750
November	104.9	36.41	18.89	132.3	122.7	14.77	14.42	0.757
December	84.6	36.83	15.08	108.9	100.1	11.99	11.70	0.747
Year	2021.3	608.49	20.80	2192.0	2045.8	237.99	232.17	0.736

Legends: GlobHor Horizontal global 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
 E_Grid Energy injected into grid
 PR Performance Ratio

Grid-Connected System: Loss diagram

Project : DvoraOmer

Simulation variant : DvoraOmer

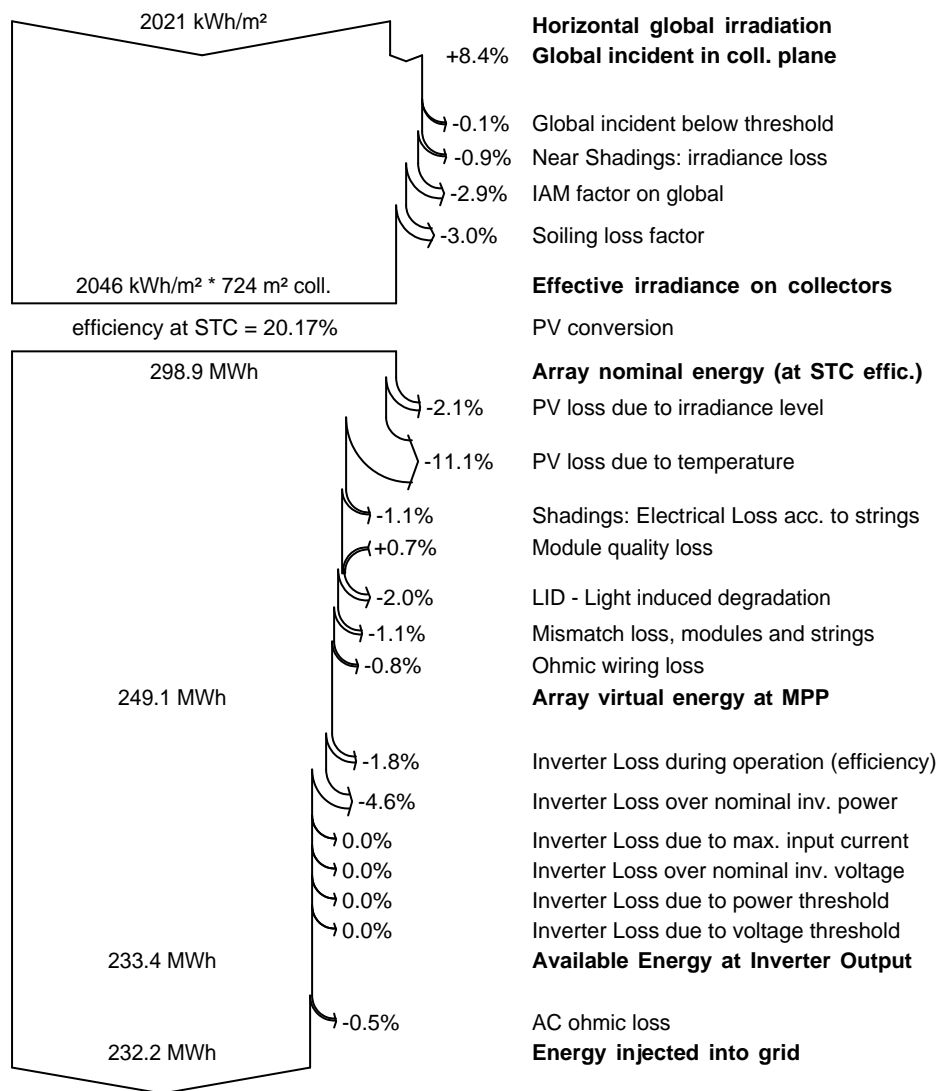
Main system parameters

System type **Sheds on a building**

Near Shadings

According to strings	Electrical effect	100 %
PV Field Orientation	2 orientations	Tilt/Azimuth = 15°/12° and 15°/-3°
PV modules	Model	JKM 400M-72H
PV Array	Nb. of modules	360
Inverter	Model	Sunny Tripower 60-10
Inverter pack	Nb. of units	2.0
User's needs	Unlimited load (grid)	
	Pnom	400 Wp
	Pnom total	144 kWp
	Pnom	60.0 kW ac
	Pnom total	120 kW ac

Loss diagram over the whole year

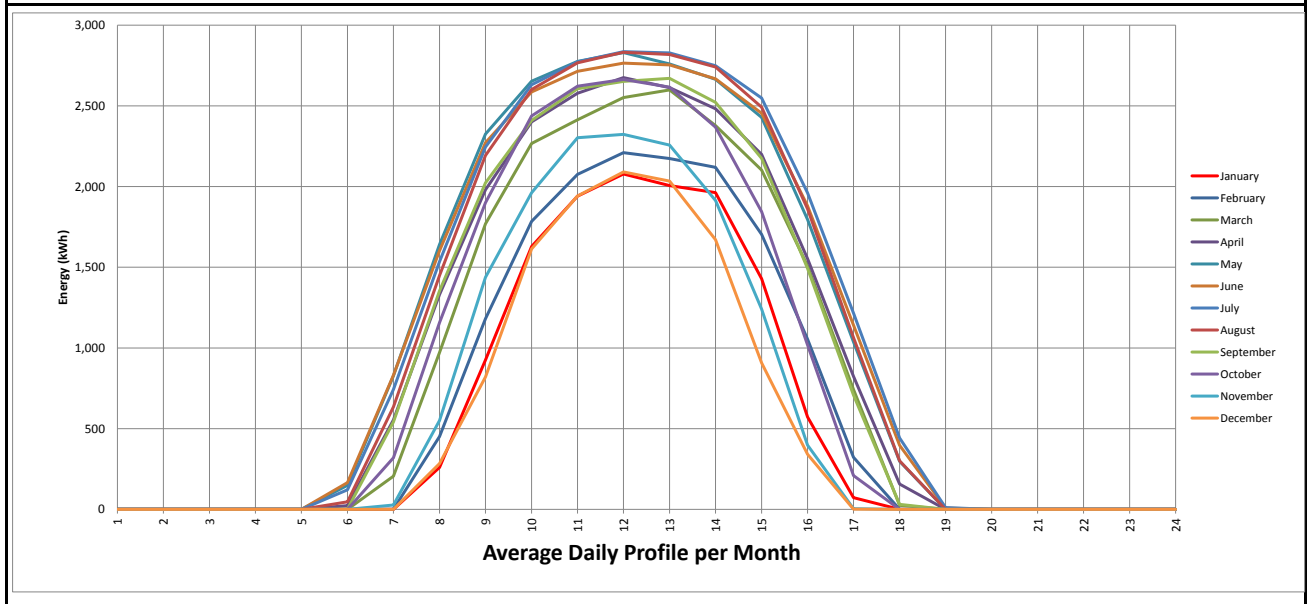


משב ייצור בה"ס דבורה עומר - כפר סבא

שנתי - קוט"ש	שנתי ש	תעריף פסגה	ק"צ 45	חורף 45	מעבר 45	תעריף גבע	ק"צ 45	חורף 45	מעבר 45	תעריף שפל	ק"צ 45	חורף 45	מעבר 45	שנתי ש	שנתי - קוט"ש
232,170	104,477	קוט"ש	11,087	10,709	5,794	6,784	5,266	8,790	9,617	10,883	10,907	9,533	8,620	6,487	104,477
232,170	232,170	קוט"ש	6.44%	6.44%	16.61%	16.61%	10.89%	33.94%	35,459	33.94%	78,799	15.09%	15,764	15.09%	35,031
12,667	11,242	19-יולי	3,071	3,655	5,679	12,620	14,445	11,499	3,326	1,417	2,316	1,995	4,433	5,700	5,059
56	251	19-ינוי	1,497	1,264	1,760	3,912	3,969	5,199	1,872	1,455	1,954	982	2,182	4,389	9,753
13,058	15,750	19-מרץ	1,264	1,760	1,786	3,912	3,969	5,199	1,872	1,455	1,954	982	2,182	4,389	9,753
15,483	16,109	19-אפר	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-מאי	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-יוני	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-יולי	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-אוג	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-ספט	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-אוק	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-נוב	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-דצמ	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-ינוי	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-פבר	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-מרץ	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-אפר	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-מאי	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-יוני	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-יולי	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-אוג	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-ספט	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-אוק	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
14,357	9,614	19-נוב	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
9,614	9,753	19-דצמ	1,617	2,339	1,116	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480

Average Daily Profile	12	11	10	9	8	7	6	5	4	3	2	1	MONTH
Hour of day	31	30	31	30	31	31	30	31	30	31	28	31	Hour of day
0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0	0	0	0	0	0	0	0	0	0	0	0	1
0.000	0	0	0	0	0	0	0	0	0	0	0	0	2
0.000	0	0	0	0	0	0	0	0	0	0	0	0	3
0.000	0	0	0	0	0	0	0	0	0	0	0	0	4
1.384	0	0	0	1	46	121	166	149	23	0	0	0	5
12.832	0	27	319	542	634	743	831	827	555	205	1	0	6
34.481	283	551	1,158	1,353	1,449	1,535	1,603	1,641	1,331	972	451	260	7
57.727	820	1,438	1,900	2,023	2,193	2,245	2,272	2,325	1,980	1,769	1,181	925	8
73.897	1,614	1,961	2,438	2,410	2,601	2,631	2,586	2,653	2,401	2,267	1,784	1,629	9
80.844	1,941	2,303	2,622	2,606	2,766	2,773	2,714	2,775	2,578	2,414	2,075	1,941	10
83.579	2,091	2,323	2,664	2,651	2,832	2,836	2,765	2,830	2,675	2,552	2,210	2,078	11
82.547	2,034	2,257	2,616	2,671	2,819	2,828	2,754	2,760	2,613	2,599	2,174	2,006	12
77.365	1,671	1,914	2,368	2,522	2,740	2,749	2,667	2,665	2,482	2,378	2,119	1,962	13
64.453	907	1,241	1,844	2,175	2,492	2,548	2,454	2,428	2,199	2,103	1,704	1,429	14
42.291	341	397	1,019	1,492	1,861	1,961	1,880	1,796	1,553	1,508	1,055	573	15
20.117	1	4	209	708	1,064	1,216	1,142	1,037	825	743	322	72	16
4.514	0	0	0	31	300	442	396	297	156	25	0	0	17
0.052	0	0	0	0	0	11	8	0	0	0	0	0	18
0.000	0	0	0	0	0	0	0	0	0	0	0	0	19
0.000	0	0	0	0	0	0	0	0	0	0	0	0	20
0.000	0	0	0	0	0	0	0	0	0	0	0	0	21
0.000	0	0	0	0	0	0	0	0	0	0	0	0	22
0.000	0	0	0	0	0	0	0	0	0	0	0	0	23
0.000	0	0	0	0	0	0	0	0	0	0	0	0	24

MWh **232.17**



בה"ס דבורה עומר - כפר סבא

סיכום פרופיל שעתו משוקלל

PR	Kwh/Kwp/year		תמורה - ש"ח	מחיר חשמל ממוצע ש"ח לקילוואט		תפוקה שנתית - MWh/year	
73.55%	1,612		104,477	0.45		232	
PR	GlobInc	KWh/KWp	הכנסה	MWh	חודש	הנחות יסוד	
76.41%	117.02	89.41	5,794	12.88	ינואר	2	גג אסכורית
78.92%	132.66	104.69	6,784	15.08	פברואר	15°	זווית כלפי האופק
75.87%	178.79	135.65	8,790	19.53	מרץ	190°	אזימוט מבנה
74.12%	200.24	148.42	9,617	21.37	אפריל	360	פאנלים - JINKO 400
72.38%	232.04	167.94	10,883	24.18	מאי	2	ממירים - SMA
71.41%	235.70	168.32	10,907	24.24	יוני	100	הספק מותקן AC
71.16%	240.42	171.09	11,087	24.64	יולי	144.00	הספק מותקן DC
71.23%	232.03	165.26	10,709	23.80	אוגוסט	144.00%	יחס ביצוע AC/DC
71.90%	204.59	147.11	9,533	21.18	ספטמבר	232	Mwh/year
74.99%	177.39	133.03	8,620	19.16	אוקטובר	1,612	Kwh/Kwp/year
75.68%	132.28	100.11	6,487	14.42	נובמבר	73.55%	PR
74.66%	108.85	81.27	5,266	11.70	דצמבר	0.45	מחיר חשמל ממוצע ש"ח לקילוואט
73.55%	2,192.00	1,612.29	104,477	232.17	סה"כ		