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September 1, 2020

Peter Stevenson

Bristol, CT 06010

MEMORANDUM: Meadow Solar (Rocky Hill) Landfill Solar Project Energy Production Model

Dear Mr. Stevenson

Durak Evrim Ercan, P.E. has performed a solar energy production analysis for the Meadow Solar Project (Rocky Hill) - Interconnection Address: 9 Meadow Road, Rocky Hill, CT 06067. The model's primary reference was Meadow Properties LLC 4,000kW AC Max, PV System Design, Rev.0, Dated 10/04/2019.

We produced this energy estimate with solar modeling software PVsyst V7.0.5(rev.17251). The solar module used in the model was the Trina TSM-DE14H-(II)-380 module as specified by the builder. The PAN data file for this module was supplied by the manufacturer. The inverter used to simulate the system was a Sungrow SG125 KVA unit. Since the OND data file for this inverter was not available at the time of simulation, the inverter was manually modeled using the manufacturer specification sheet.

The site geometry was derived from the site plan including row-to-row spacing, rack tilt angle, general layout, module string wiring, and inverter string loading and power factor. Weather data was provided by an Meteonorm TMY file.

Professional Engineer's finding regarding this study that are the subject of the certification does not constitute and express or implied warranty or guarantee. Annual production results are based on preliminary assumptions and system modeling software parameters. Professional Engineer is certifying the estimated production of the system.

Based on the assumptions given in the system modeling software, Rocky Hill Landfill Solar project systems model yielded the following estimated P50 production result for the first year:

Year 1 @ Point of Interconnection (1.0pf)	**8,258 MWh/Year**

Other annual production probability results are listed at the production probability section of the report.

Sincerely,
Durak Evrim Ercan, P.E.

09/01/2020
STATE OF CONNECTICUT
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Adobe Acrobat version: 2020.012.20043

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Grid-Connected System: Simulation parameters

Project : Rocky Hill Landfill Project

Geographical Site	Rocky Hill	Country	United States
Situation	Latitude 41.67° N	Longitude	-72.65° W
Time defined as	Legal Time Time zone UT-5	Altitude	16 m
Monthly albedo values			

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Albedo	0.30	0.20	0.20	0.15	0.00	0.00	0.00	0.00	0.00	0.15	0.20	0.30

Meteo data: Rocky Hill Meteonorm 7.3 (1991-2005), Sat=2% - Synthetic

Simulation variant : Interconnection Application

Simulation date 25/07/20 19h50

Simulation parameters	System type	**Sheds on ground**		
Collector Plane Orientation	Tilt	25°	Azimuth	0°
Sheds configuration	Nb. of sheds	3657	Identical arrays	
	Sheds spacing	6.00 m	Collector width	2.00 m
Shading limit angle	Limit profile angle	11.4°	Ground Cov. Ratio (GCR)	33.3%
Models used	Transposition	Perez	Diffuse	Perez, Meteonorm
			Circumsolar	separate
Horizon	Free Horizon			
Near Shadings	Linear shadings			
User's needs :	Unlimited load (grid)			

PV Array Characteristics

PV module	Si-mono	Model	**TSM-DE14H (II)-380**	
Original PVsyst database		Manufacturer	Trina Solar	
Number of PV modules		In series	26 modules	In parallel 608 strings
Total number of PV modules		nb. modules	15808	Unit Nom. Power 380 Wp
Array global power		Nominal (STC)	**6007 kWp**	At operating cond. 5460 kWp (50°C)
Array operating characteristics (50°C)		U mpp	940 V	I mpp 5810 A
Total area		Module area	**31363 m²**	Cell area 27544 m²
Inverter		Model	**Sungrow SG125**	
Custom parameters definition		Manufacturer	Sungrow	
Characteristics		Unit Nom. Power	**125 kWac**	Oper. Voltage 860-1450 V
Inverter pack		Total power	**4000 kWac**	Pnom ratio 1.50
		Nb. of inverters	32 units	
Total		Total power	**4000 kWac**	Pnom ratio 1.50

PV Array loss factors

Thermal Loss factor	Uc (const)	29.0 W/m²K	Uv (wind)	0.0 W/m²K / m/s
Wiring Ohmic Loss	Global array res.	2.7 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	0.10 %

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Grid-Connected System: Simulation parameters

Incidence effect (IAM): Fresnel AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.870	0.816	0.681	0.440	0.000

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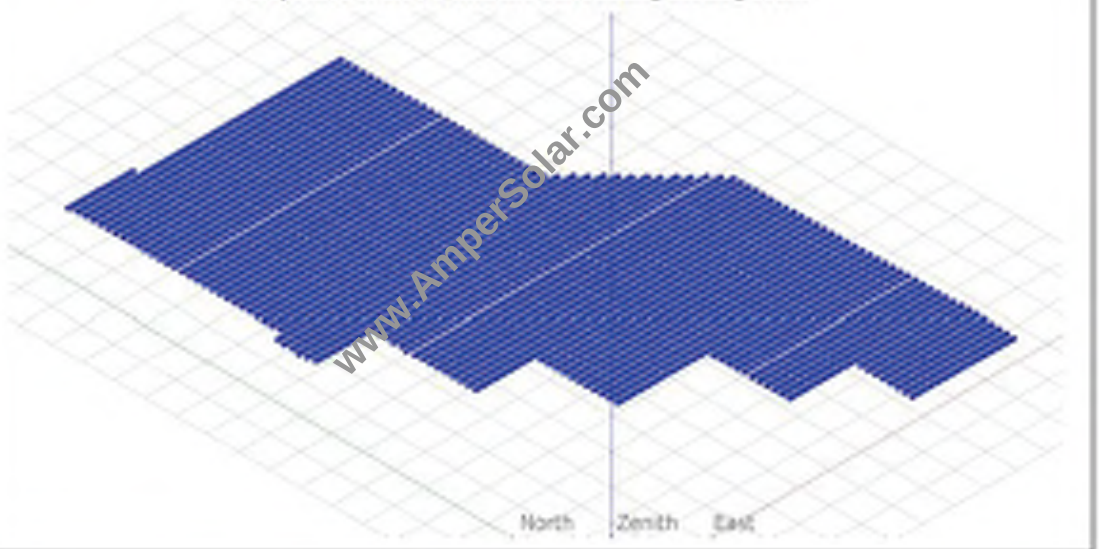
Grid-Connected System: Near shading definition

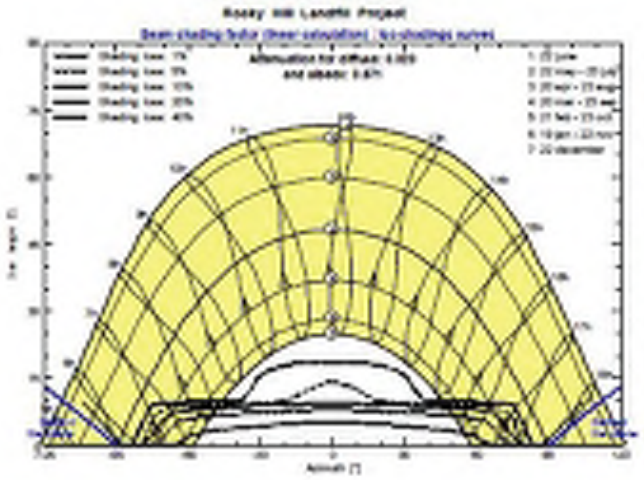
Project : Rocky Hill Landfill Project
Simulation variant : Interconnection Application

Main system parameters	System type	**Sheds on ground**		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	25°	azimuth	0°
PV modules	Model	TSM-DE14H-(II)-380	Pnom	380 Wp
PV Array	Nb. of modules	15808	Pnom total	6007 kWp
Inverter	Model	Sungrow SG125	Pnom	125 kW ac
Inverter pack	Nb. of units	32.0	Pnom total	4000 kW ac
User's needs	Unlimited load (grid)			

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram



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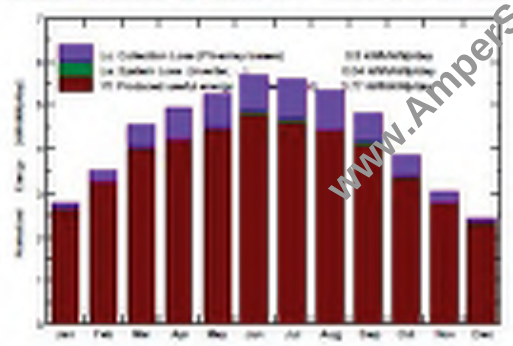
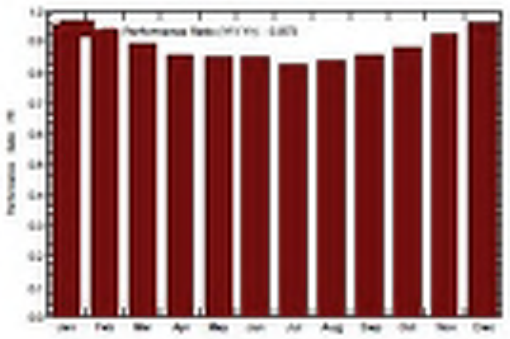
Grid-Connected System: Main results

Project : Rocky Hill Landfill Project
Simulation variant : Interconnection Application

Main system parameters	System type	**Sheds on ground**			
Near Shadings	Linear shadings				
PV Field Orientation	tilt	25°	azimuth	0°	
PV modules	Model	TSM-DE14H-(II)-380	Pnom	380 Wp	
PV Array	Nb. of modules	15808	Pnom total	6007 kWp	
Inverter	Model	Sungrow SG125	Pnom	125 kW ac	
Inverter pack	Nb. of units	32.0	Pnom total	4000 kW ac	
User's needs	Unlimited load (grid)				

Main simulation results					
System Production	Produced Energy	8258 MWh/year	Specific prod.	1375 kWh/kWp/year	
	Performance Ratio PR	87.33 %			
Investment	Global	0.00 EUR	Specific	0.00 EUR/Wp	
Yearly cost	Annuities	0.00 EUR/yr	Running Costs	0.00 EUR/yr	
LCOE		0.00 EUR/kWh	Payback period	Unprofitable	





Interconnection Application
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR ratio
January	56.5	26.61	-2.68	86.2	83.6	498.1	492.6	0.951
February	72.4	36.16	-1.32	98.3	95.3	558.2	552.4	0.936
March	116.1	57.56	3.46	140.4	136.2	758.3	750.1	0.889
April	137.3	68.80	10.10	148.0	143.0	768.2	760.7	0.855
May	164.4	84.42	15.36	163.3	158.2	841.9	832.0	0.848
June	175.6	96.12	20.47	179.2	165.1	862.5	873.2	0.853
July	177.7	85.29	23.36	173.9	169.0	875.8	865.1	0.828
August	156.0	76.62	23.14	164.8	160.3	835.5	825.2	0.834
September	125.0	60.96	18.46	144.2	140.0	752.2	743.7	0.859
October	88.9	36.42	11.93	118.8	115.5	633.9	626.2	0.879
November	60.5	29.00	6.94	90.9	88.0	508.6	504.1	0.923
December	47.2	24.13	0.41	75.3	72.8	436.0	434.2	0.960
Year	1378.3	683.10	10.87	1594.2	1527.1	8354.2	8258.3	0.873

Legends: GlobHor Global horizontal irradiation; DiffHor Horizontal diffuse irradiation; T_Amb T amb.; 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

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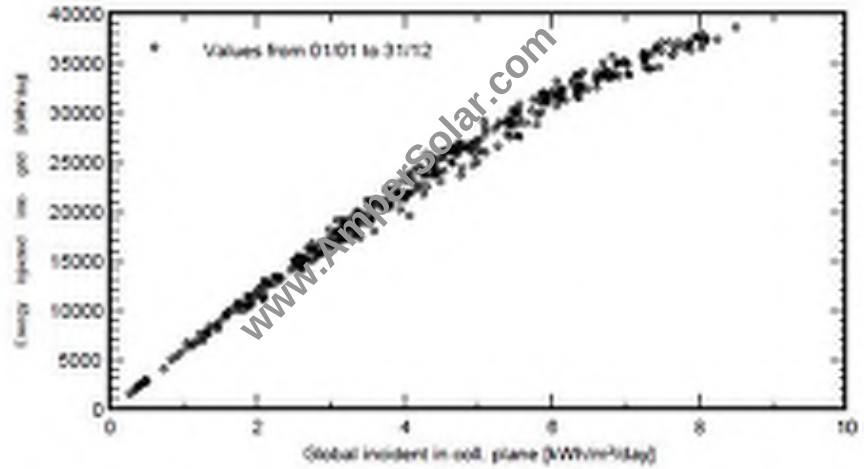
Grid-Connected System: Special graphs

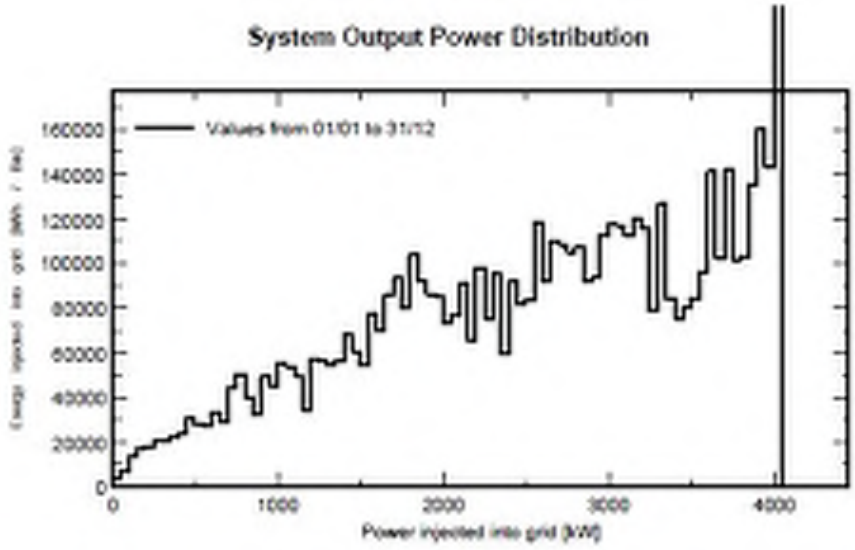
Project : Rocky Hill Landfill Project
Simulation variant : Interconnection Application

Main system parameters	System type	**Sheds on ground**		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	25°	azimuth	0°
PV modules	Model	TSM-DE14H-(II)-380	Pnom	380 Wp
PV Array	Nb. of modules	15808	Pnom total	6007 kWp
Inverter	Model	Sungrow SG125	Pnom	125 kW ac
Inverter pack	Nb. of units	32.0	Pnom total	4000 kW ac
User's needs	Unlimited load (grid)			

Daily Input/Output diagram



System Output Power Distribution



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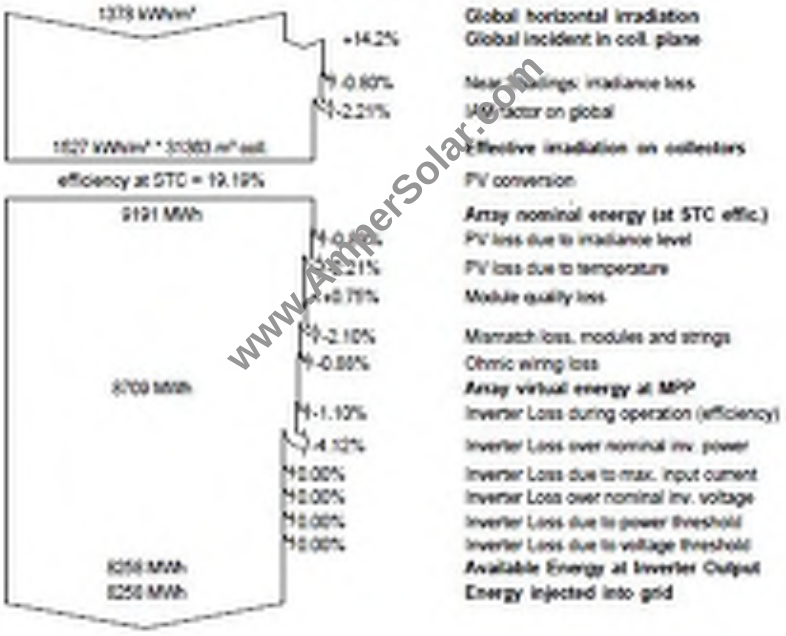
Grid-Connected System: Loss diagram

Project : Rocky Hill Landfill Project
Simulation variant : Interconnection Application

Main system parameters	System type	Sheds on ground		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	25°	azimuth	0°
PV modules	Model	TSM-DE14H-(II)-380	Pnom	380 Wp
PV Array	Nb. of modules	15808	Pnom total	6007 kWp
Inverter	Model	Sungrow SG125	Pnom	125 kW ac
Inverter pack	Nb. of units	32.0	Pnom total	4000 kW ac
User's needs	Unlimited load (grid)			

Loss diagram over the whole year



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Grid-Connected System: P50 - P90 evaluation

Project : Rocky Hill Landfill Project
Simulation variant : Interconnection Application

Main system parameters	System type	**Sheds on ground**		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	25°	azimuth	0°
PV modules	Model	TSM-DE14H-(II)-380	Pnom	380 Wp
PV Array	Nb. of modules	15808	Pnom total	6007 kWp
Inverter	Model	Sungrow SG125	Pnom	125 kW ac
Inverter pack	Nb. of units	32.0	Pnom total	4000 kW ac
User's needs	Unlimited load (grid)			

Evaluation of the Production probability forecast

The probability distribution of the system production forecast for different years is mainly dependent on the meteo data used for the simulation, and depends on the following choices:

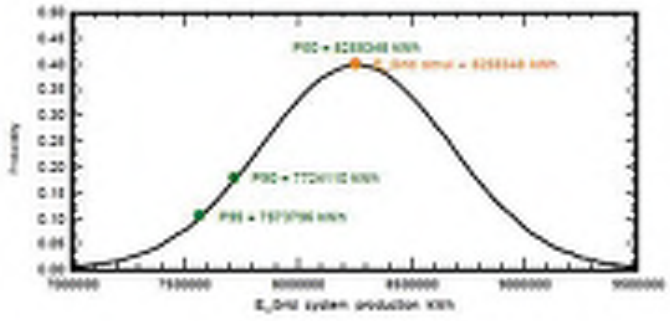
Meteo data source		Meteonorm 7.3 (1991-2005), Sat=2%
Meteo data	Kind	TMY, multi-year
Specified Deviation	Climate change	0.0 %
Year-to-year variability	Variance	1.7 %

The probability distribution variance is also depending on some system parameters uncertainties

Specified Deviation	PV module modelling/parameters	1.0 %	
	Inverter efficiency uncertainty	0.5 %	
	Soiling and mismatch uncertainties	1.0 %	
	Degradation uncertainty	1.0 %	
Global variability (meteo + system)	Variance	5.0 %	(quadratic sum)

Annual production probability	Variability	417 MWh
	P50	8258 MWh
	P90	7724 MWh
	P95	7574 MWh

Probability distribution



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Grid-Connected System: CO2 Balance

Project : Rocky Hill Landfill Project
Simulation variant : Interconnection Application

Main system parameters	System type	**Sheds on ground**			
Near Shadings	Linear shadings				
PV Field Orientation	tilt	25°	azimuth	0°	
PV modules	Model	TSM-DE14H-(II)-380	Pnom	380 Wp	
PV Array	Nb. of modules	15808	Pnom total	6007 kWp	
Inverter	Model	Sungrow SG125	Pnom	125 kW ac	
Inverter pack	Nb. of units	32.0	Pnom total	4000 kW ac	
User's needs	Unlimited load (grid)				

Generated emissions	Total:	10856.26 tCO2		
	Source:	Detailed calculation from table below:		
Replaced Emissions	Total:	138812.2 tCO2		
	System production:	8258.35 MWh/yr	Lifetime:	30 years
			Annual degradation:	1.0%
	Grid Lifecycle Emissions:	528 gCO2/kWh		
	Source:	IEA List	Country:	United States
CO2 Emission Balance	Total:	102645.0 tCO2		

System Lifecycle Emissions Details:

Item	Modules	Supports	Inverters
LCE	1713 kg(CO2)/kWp	3.52 kg(CO2)/kg	349 kg(CO2)/
Quantity	6007 kWp	158080 kg	32.0
Subtotal [kgCO2]	10286378	556720	11165