



Responsible
Chafik
Jan.Kleine-Wiskott@renusol.com

Project report: FS10 UK

5/15/2015

Impressum

Renusol GmbH | Piccoloministr. 2
D-51063 Köln

T: +49 (0)221 788 70 70
E: info@renusol.com
W: www.renusol.com

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Geschäftsführer: Stefan Liedtke

Contents

Location and customer data	2	-	2
Project Location - Google map Google Maps	3	-	3
Roof data	4	-	4
PV-Modules	5	-	5
Racking Parameter	6	-	7
Position	8	-	8
Installation Instructions	9	-	9
Static CAD	10	-	10
Elevation Parameter Additional Info	11	-	11
Resulting surface stresses	12	-	12
Resulting surface stresses Bereiche	13	-	13
Material list	14	-	14
Polysun	15	-	15
PV module data	16	-	17
Consumer profile	18	-	18
Horizont	19	-	19
Earning rates	20	-	20
CO2 Savings - Annual Sum	21	-	21
Radiation	22	-	22
Output - Charts	23	-	25

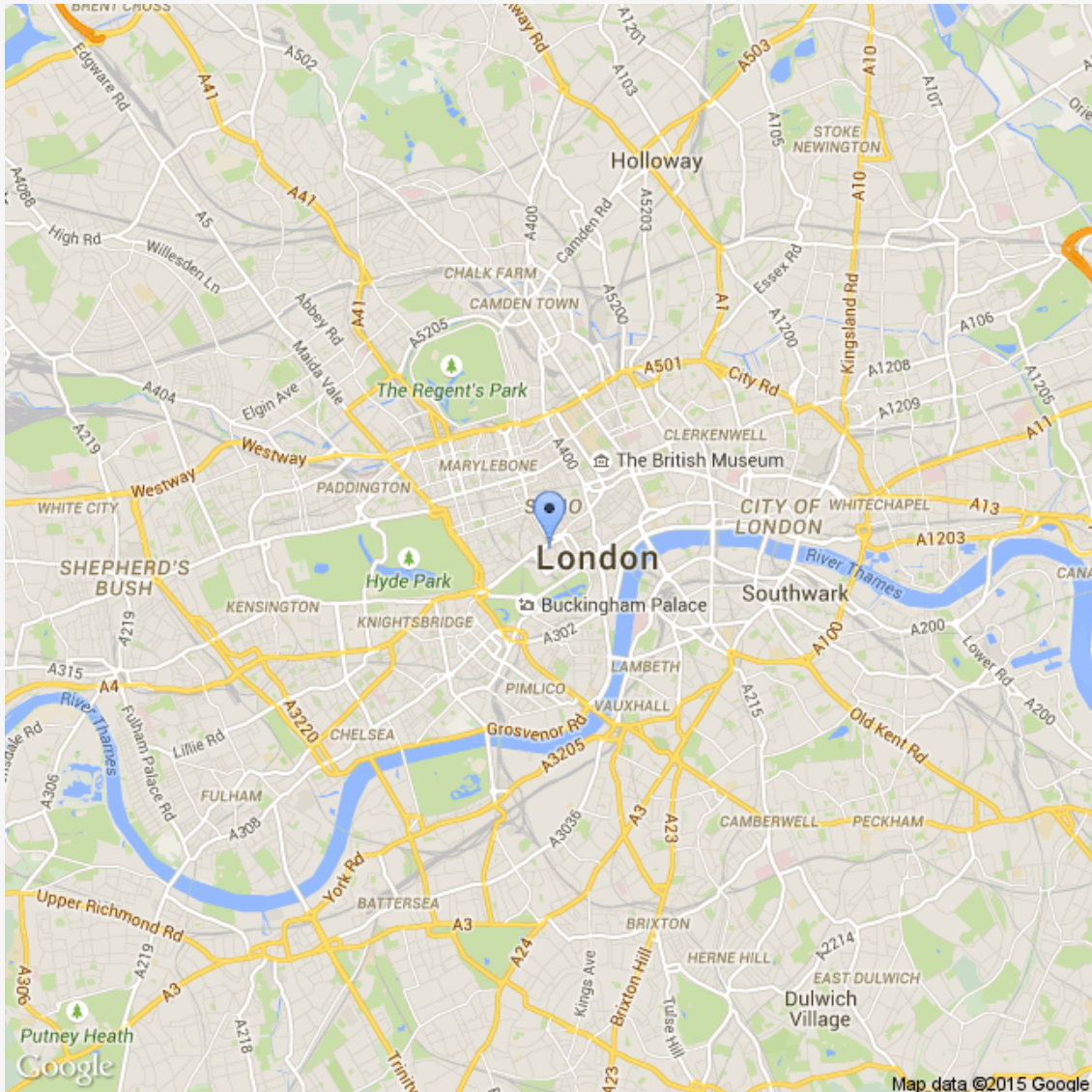
Master data

Project Name	FS10_UK
Comment	Intersolar (100Mod, 25kWp)
Planing Responsible	Chafik
System Size [kWp]	25.00
Amount Modules	100
Modul Surface [m ²]	160.85

Project Address

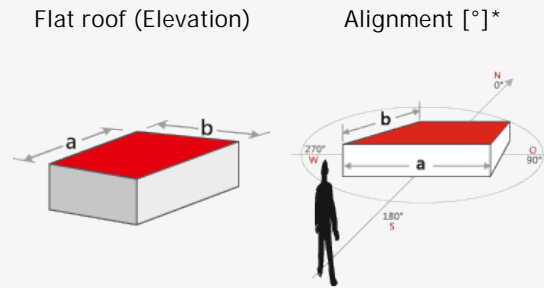
Name	FS10 United Kingdom
Company	
Street Address	Jermyn Street 35-36
Postal code	
City	London
Phone	
Email	
Notes	
Country	United Kingdom
Latitude	51.5083
Longitude	-0.13733
Altitude	28

Project Location - Google map



Roof [FS10_UK]

Length a [m]*	14.5
Width b [m]	20.5
Building height h [m]	10
Slope of roof [°]	0
Roofing	Foil Roof
Product Type:	FS10
Alignment [°]	180
Parapet height [mm]:	500
Parapet width [mm]:	300
Snow load [kN/m²]* (si=μi*sk)	0.29



Additional info Snow

Elevation altitude [m]:	28
Slope of roof [°]:	0
Snow load zone	Zone 3

Wind load [kN/m²]	0.6
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Additional info Wind

Elevation altitude [m]:	28
Building height h [m]*	10
Wind zone (see wind zone map)	Zone 1
Terrain categories	3

All loads are calculated according to the Eurocode 1 Part 1-3 and Part 1-4. The wind and snow loads are evaluated considering the national annex of the Eurocode. According to the national annex, the user has to check this wind- and snow loads with the responsible municipal office. The structural calculation is based on the Eurocode 0, 1, 3 and 9.

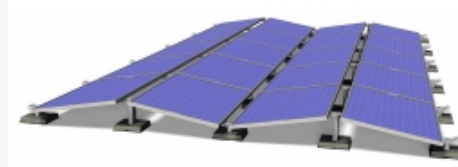
PV-Modules [FS10_UK]

Manufacturer:	Canadian Solar Inc.
Name	CS6P-250PE
Width [mm]:	982
Height [mm]:	1638
Gauge [mm]:	40
Framing:	Aluminium
Weight (kg)	20
Nominal Power [Watt]:	250
Module Type:	Polycrystalline
Temperatur coefficient [%/°C]:	-0.42
Efficiency STC:	0.155
Output voltage IMPP - 500 W /m²:	0
Output voltage VMPP - 500 W/m²:	0
Output voltage IMPP - 100 W /m²:	0
Output voltage VMPP - 100 W/m²:	0
Output current MPP - STC (A):	8.3
Output voltage MPP - STC [V]:	30.1
Short circuit current [A]:	8.87
Open circuit voltage [V]:	37.2
Temperatur coefficient Power [%/K]:	0.08
Temperatur coefficient Voltage [%/K]:	-0.35
Max. System voltage EU:	1000
Galvanic seperation required:	No

Racking Parameter [FS10_UK]


Bracket tilt α [°]:	10
Distance between elevation rack rows [mm]:	200
Friction Constant μ	0.5

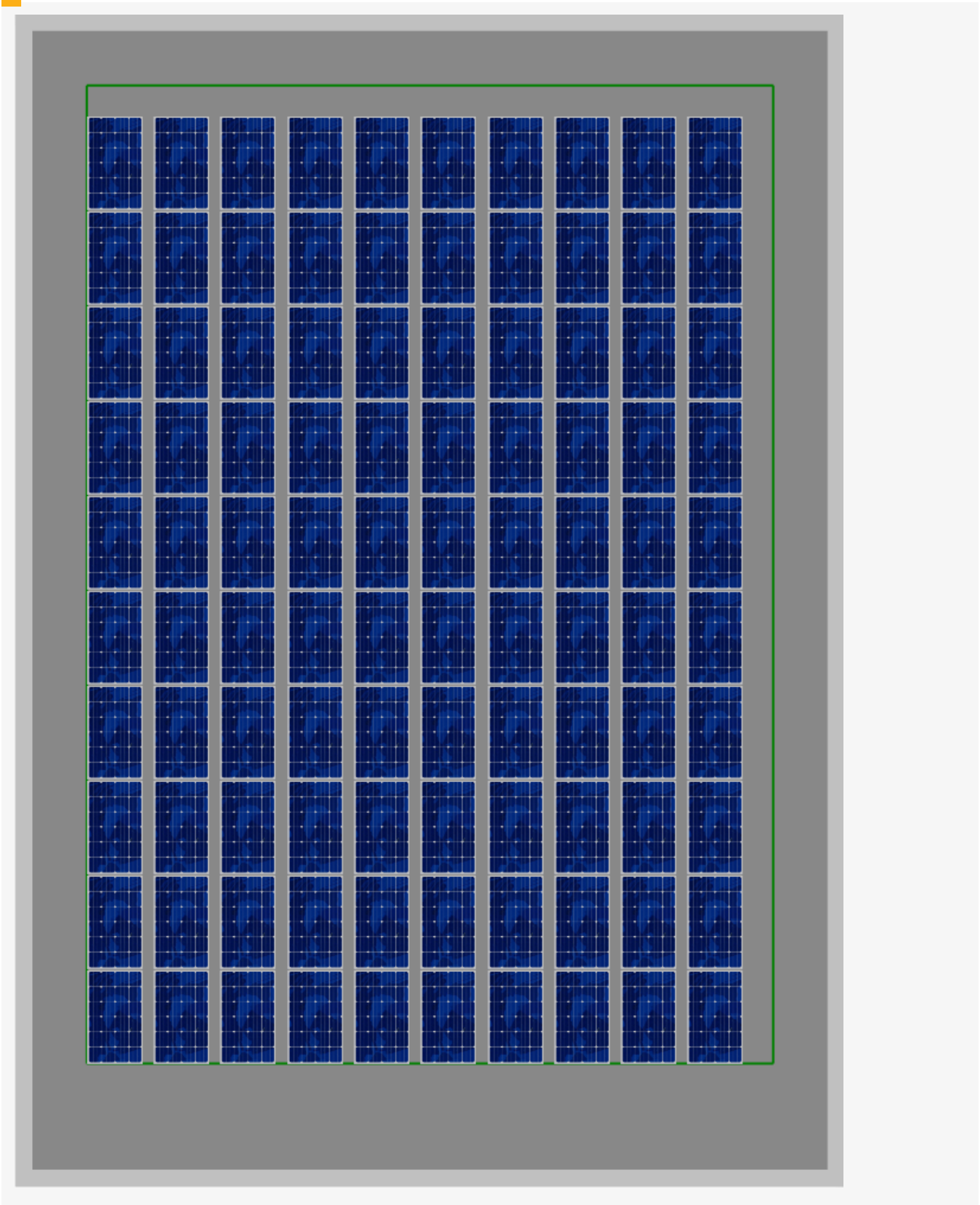
The calculated friction coefficient is based on the TPO product Sika TrocalRV-s with a friction coefficient of at least 0.83 and Bitumen with a friction coefficient of at least 0.4 according to the Test results from the protection pad manufacturer BSW www.berleburger.com. Document: Coefficient of static friction test, Test results, Date 03.17.2014.



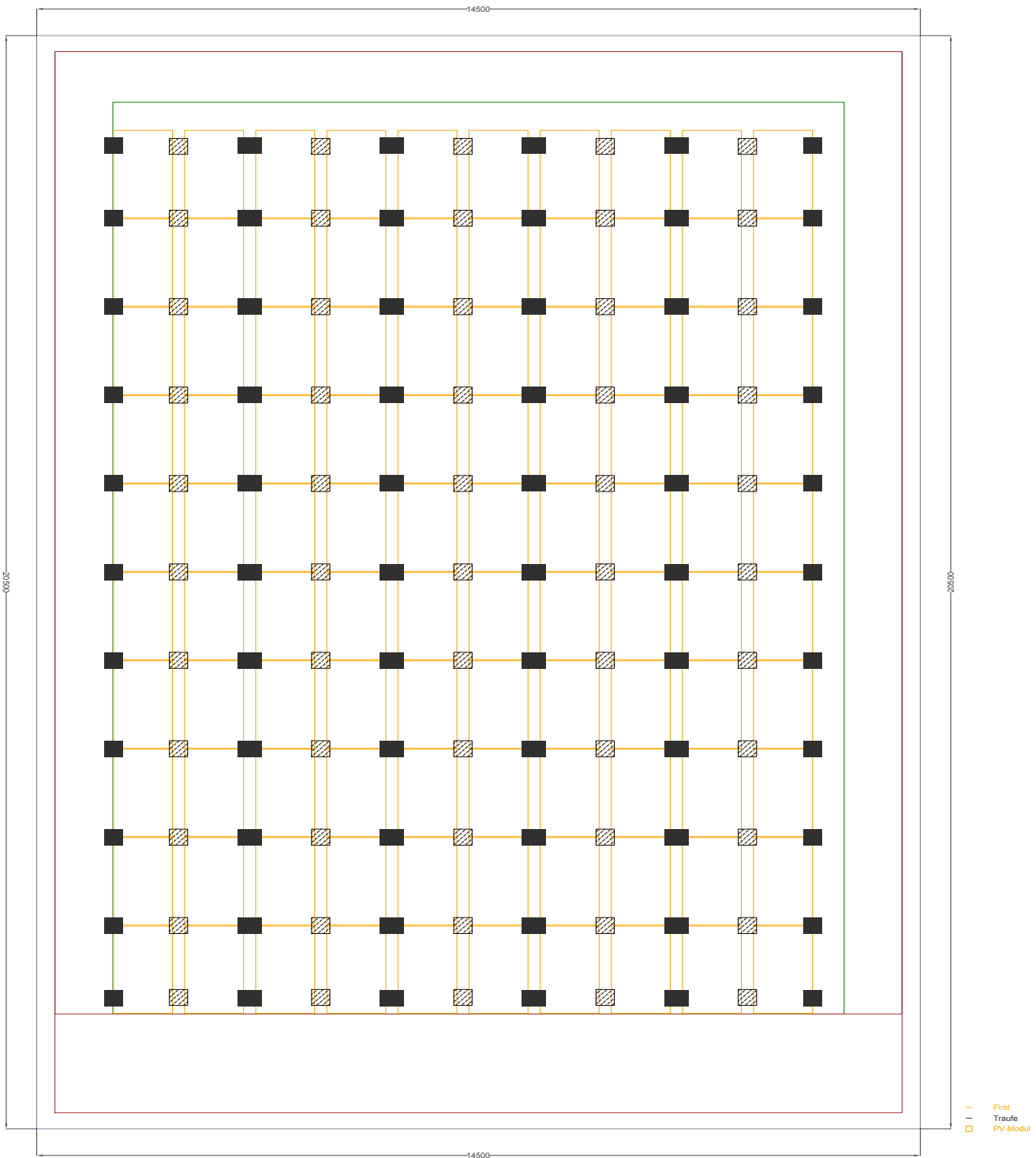
Module layout plan [FS10_UK]

Horizontal starting point (left bottom mm):	10
Vertical starting point (left bottom in mm):	10

 Position



Installation Instructions



Project Name	FS10_UK	Planing Responsible	Chafik	Copyright by:	Renusol
Street Address	Jermyn Street 35-36	Generated date	5/15/2015	PV-Modul:	CS6P-250PE
Postal code					
City	London				
Country	Vereinigtes Königreich				

Static information: Ballasting

BΣ 12kg GΣ 44kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 12kg GΣ 44kg
BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg
BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg
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BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg
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BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 0kg GΣ 31kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg
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BΣ 12kg GΣ 44kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 6kg GΣ 33kg	BΣ 12kg GΣ 44kg

GΣ System weight module + rack [kg/module]
 BΣ Additionally required ballast [kg/module]
 □ Lead
 □ Erection Objects
 □ PV-Modul

Project Name Street Address Postal code City Country	FS10_UK Jermyn Street 35-36 London Vereinigtes Königreich	Planing Responsible Generated date	Chafik 5/15/2015	Copyright by: PV-Modul:	Renusol CS6P-250PE
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Racking Parameter

Safety against Uplift	1.5
Safety against Shift	1.5
Safety for Weight	0.9
Amount Stones:	0
System surface area [m ²]	182.38
Dachfläche [m ²]	297.25
Total weight ballasting [kg]	0.00
Weight Module/Rack [kg]	3413.70
Total System weight [kg]	3413.70
Flächenbelastung über Systemfläche [kg/m ²]	18.718
Flächenbelastung über Dachfläche [kg/m ²]	11.484

Resulting surface stresses

M,K	= 0,15 kN/m ²	
g _{Upright}	= g _M · cos(α)	0.15
g _{Parallel}	= g _M · sin(α)	0
S _{Upright}	= s _i · cos(α) ²	0.29
S _{Parallel}	= s _i · sin(α) · cos(α)	0
Y _{G,sup}	= 1,35	
Y _{G,inf}	= 0,90	
Y _{Q,sup}	= 1,50	
Y _{Q,inf}	= 0,00	
ψ _{Wind}	= 0,60	
ψ _{Snow}	= 0,50	
S _{d,1}	= 1,35 · g _M + 1,5 · s + 1,5 · 0,6 · W _D	
S _{d,2}	= 1,35 · g _M + 1,5 · W _D + 1,5 · 0,5 · s	
S _{d,3}	= 0,9 · g _M + 1,5 · W _S	
S _{d,5}	= 1,0 · g _M + 2.3 · s	

Resulting surface stresses
Area F

Cpe Wake:	-2	Max. Wake [kN/m ²]:	1.665
Cpe Force:	0	Max. Force [kN/m ²]:	0.638

LK 1 (Sd,1)		LK 2 (Sd,2)		LK 3 (Sd,3)	
Upright [kN/m ²]:	0.638	Upright [kN/m ²]:	0.42	Upright [kN/m ²]:	-1.665
Parallel [kN/m ²]:	0	Parallel [kN/m ²]:	0	Parallel [kN/m ²]:	0
Combined [kN/m ²]:	0.638	Combined [kN/m ²]:	0.42	Combined [kN/m ²]:	1.665
Resulting angle°:	0	Resulting angle°:	0	Resulting angle°:	180

Area G

Cpe Wake:	-0.9	Max. Wake [kN/m ²]:	0.675
Cpe Force:	0	Max. Force [kN/m ²]:	0.638

LK 1 (Sd,1)		LK 2 (Sd,2)		LK 3 (Sd,3)	
Upright [kN/m ²]:	0.638	Upright [kN/m ²]:	0.42	Upright [kN/m ²]:	-0.675
Parallel [kN/m ²]:	0	Parallel [kN/m ²]:	0	Parallel [kN/m ²]:	0
Combined [kN/m ²]:	0.638	Combined [kN/m ²]:	0.42	Combined [kN/m ²]:	0.675
Resulting angle°:	0	Resulting angle°:	0	Resulting angle°:	180

Area H

Cpe Wake:	-0.7	Max. Wake [kN/m ²]:	0.495
Cpe Force:	0	Max. Force [kN/m ²]:	0.638

LK 1 (Sd,1)		LK 2 (Sd,2)		LK 3 (Sd,3)	
Upright [kN/m ²]:	0.638	Upright [kN/m ²]:	0.42	Upright [kN/m ²]:	-0.495
Parallel [kN/m ²]:	0	Parallel [kN/m ²]:	0	Parallel [kN/m ²]:	0
Combined [kN/m ²]:	0.638	Combined [kN/m ²]:	0.42	Combined [kN/m ²]:	0.495
Resulting angle°:	0	Resulting angle°:	0	Resulting angle°:	180

Material list

ANo	Description	Add. Info.	Pck	Total Nr.	Total weigth (kg)	Length (mm)	Total length (mm)	Total price
R500302	FS Betonfuß	FS Betonfuß	1	121	1278.365	0	0	
R500310	BSM Betonfuß Aluminium	BSM Betonfuß Aluminium	1	121	1.21	0	0	
R520001	FS10 First (SET)	FS10 First (SET)	1	55	74.36	0	0	
R520002	FS10Traufe (SET)	FS10Traufe (SET)	1	66	59.73	0	0	
R900054	U-Scheibe M8	U-Scheibe M8	1	200	0	0	0	
R900057	6kt. Sicherheitsmutter M8	6kt. Sicherheitsmutter M8	1	200	0	0	0	
					1413.67		0	

Sunny Tripower STP 10000TL-20

SMA Solar Technology			
Manufacturer	AG	Degree of Efficiency 10%	0.00 %
Max Power DC (kW)	10250	Degree of Efficiency 50%	0.00 %
Nominal Power AC (kVA)	10000	Degree of Efficiency 100%	0.00 %
Min. MPP Voltage (V)	370	String fuse	False
Max. MPP Voltage (V)	800	Amount Phases	3
Max DC (V)	1000	Amount MPP-Tracker	1
Max. Electricity DC (I)	18	Tracker Type 2: Amount MPP-Tracker	1
Min. Voltage AC (V)	160		
Max Voltage AC (V)	280		

Inverter Control Panel 1

- 1 x Sunny Tripower STP 10000TL-20 [82%]

Inverter Control Panel 2

- 1 x Sunny Tripower STP 10000TL-20 [82%]

Inverter an strings layout Control Panel 1

No	Inverter	Input	Amount Strings	Module/String
1.	Sunny Tripower STP 10000TL-20	A	2	16
		B	1	18

Inverter an strings layout Control Panel 2

No	Inverter	Input	Amount Strings	Module/String
2.	Sunny Tripower STP 10000TL-20	A	2	16
		B	1	18

1. Generatorfield Details

1. Sunny Tripower STP 10000TL-20

Component	Check	Value	Limit value
Inverter	Min AC Voltage	230 V	160 V
Inverter	Max. AC-Voltage	230 V	280 V
Inverter	Max. Input Power 22 °C	9730 W	0 W
Input A			
Inverter	Max. Input Voltage -1 °C	650 V	1000 V
Inverter	Min. MPP voltage 57 °C	427 V	370 V
Inverter	Max. MPP voltage -1 °C	526 V	800 V
Inverter	NominalInverterDcVoltageDeviation 48 °C	23 %	0 %
Inverter	Max. input current 57 °C	17 A	18 A
PV modules	Max. system voltage -1 °C	650 V	1000 V
Input B			
Inverter	Max. Input Voltage -1 °C	732 V	1000 V
Inverter	Min. MPP voltage 57 °C	481 V	370 V
Inverter	Max. MPP voltage -1 °C	592 V	800 V
Inverter	NominalInverterDcVoltageDeviation 48 °C	14 %	0 %
Inverter	Max. input current 57 °C	9 A	10 A
PV modules	Max. system voltage -1 °C	732 V	1000 V

2. Generatorfield Details

2. Sunny Tripower STP 10000TL-20

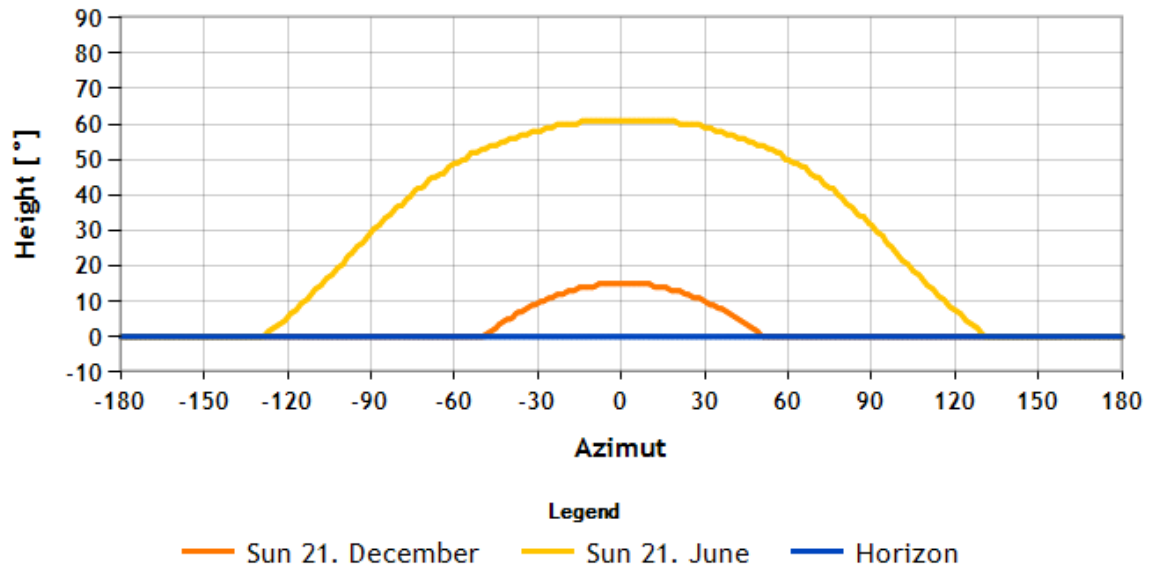
Component	Check	Value	Limit value
Inverter	Min AC Voltage	230 V	160 V
Inverter	Max. AC-Voltage	230 V	280 V
Inverter	Max. Input Power 22 °C	11128 W	0 W
Input A			
Inverter	Max. Input Voltage -1 °C	650 V	1000 V
Inverter	Min. MPP voltage 61 °C	420 V	370 V
Inverter	Max. MPP voltage -1 °C	526 V	800 V
Inverter	NominalInverterDcVoltageDeviation 50 °C	24 %	0 %
Inverter	Max. input current 61 °C	17 A	18 A
PV modules	Max. system voltage -1 °C	650 V	1000 V
Input B			
Inverter	Max. Input Voltage -1 °C	732 V	1000 V
Inverter	Min. MPP voltage 61 °C	473 V	370 V
Inverter	Max. MPP voltage -1 °C	592 V	800 V
Inverter	NominalInverterDcVoltageDeviation 50 °C	14 %	0 %

Inverter	Max. input current 61 °C	9 A	10 A
PV modules	Max. system voltage -1 °C	732 V	1000 V

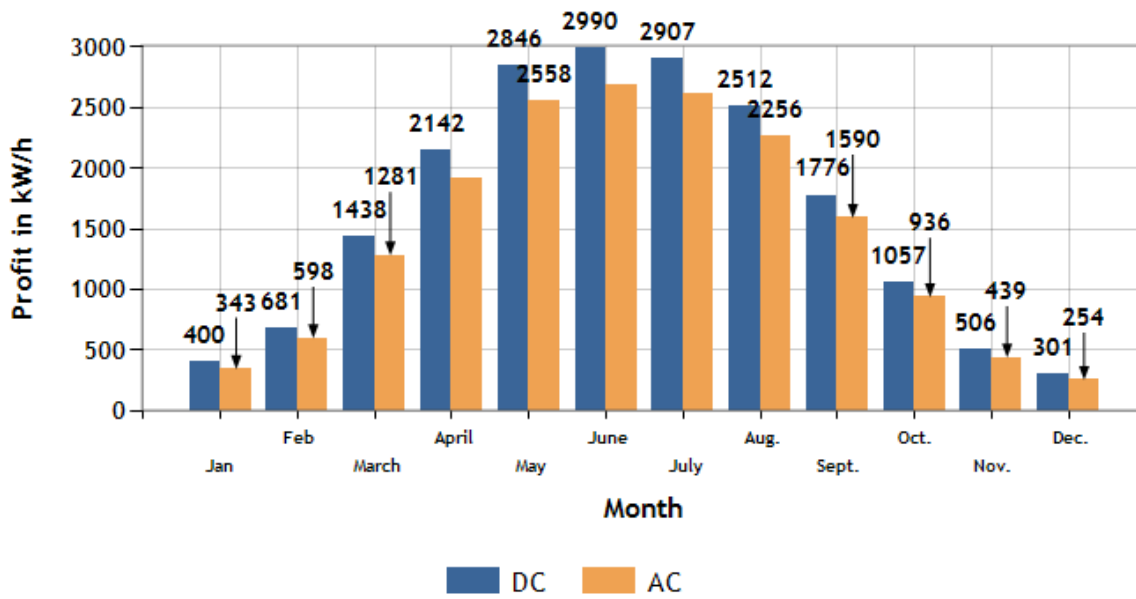
Polysun simulation parameters

Max. phase load unbalance [kW]	4.6
Pollution [%]	2
Degradation [%]	0.5
Cos phi	1

Sun and horizon gradient



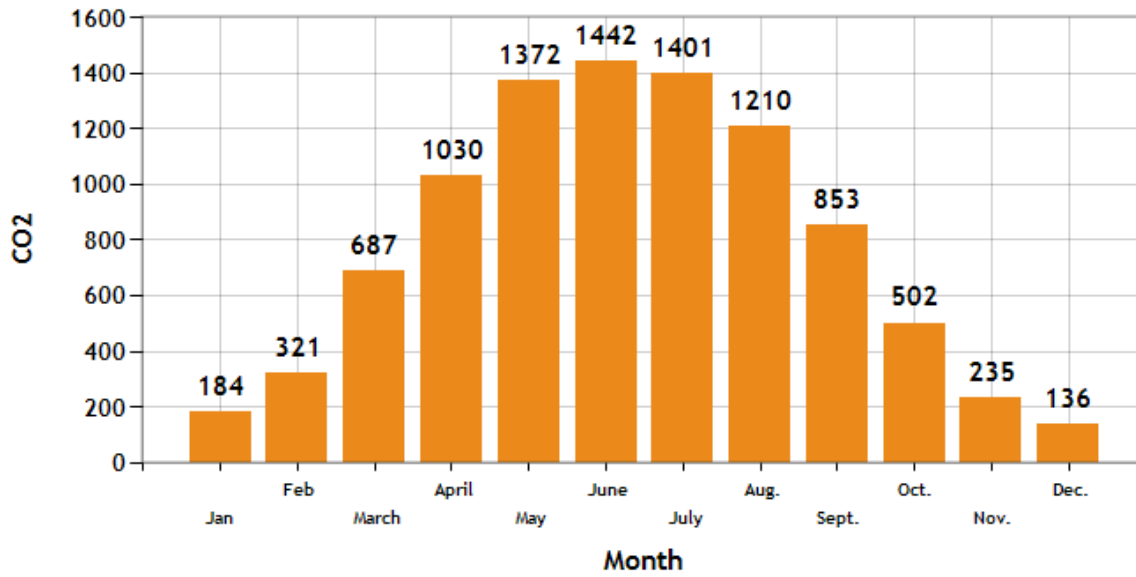
Profit Photovoltaik



Earning rates

Month	Profit DC in kW/h	Profit AC in kW/h
January	400	343
February	681	598
March	1438	1281
April	2142	1921
May	2846	2558
June	2990	2688
July	2907	2612
August	2512	2256
September	1776	1590
October	1057	936
November	506	439
December	301	254
Annual Return	19557	17476

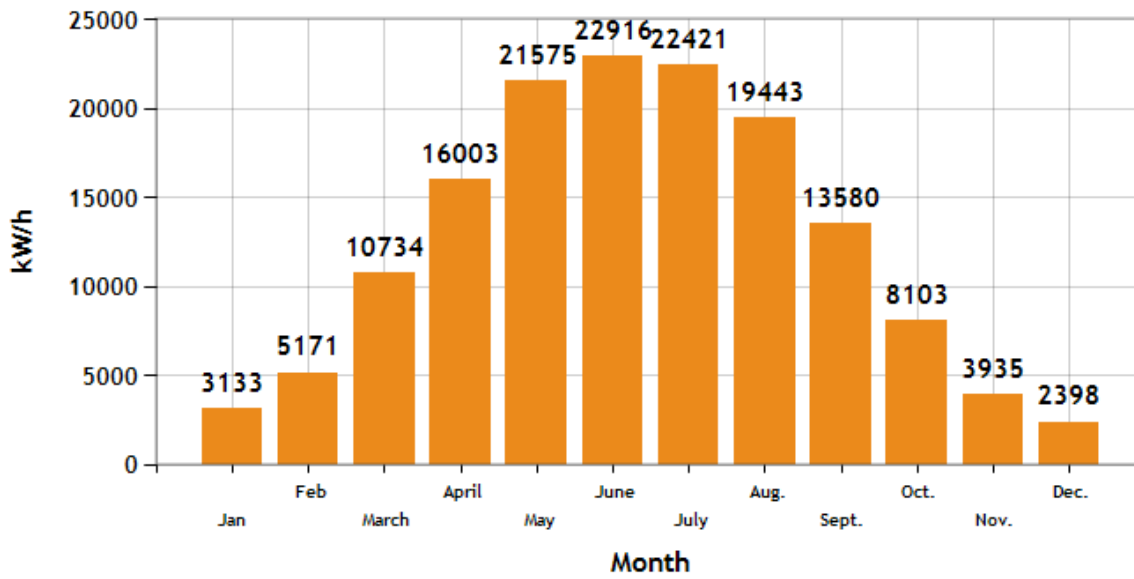
CO2 savings 9374 kg



Records

Month	CO2 Savings (kg)
January	184
February	321
March	687
April	1030
May	1372
June	1442
July	1401
August	1210
September	853
October	502
November	235
December	136
Sum	9374

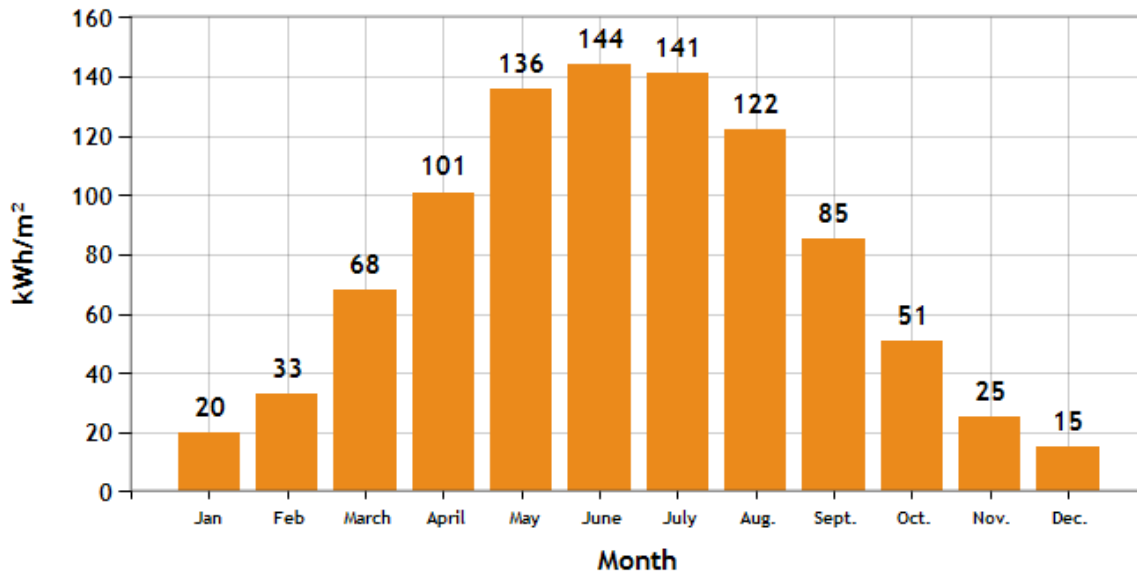
Radiation onto module area 149413 kWh



■ Irradiance at module level

Month	kW/h
January	3133
February	5171
March	10734
April	16003
May	21575
June	22916
July	22421
August	19443
September	13580
October	8103
November	3935
December	2398
Annual irradiation	149413

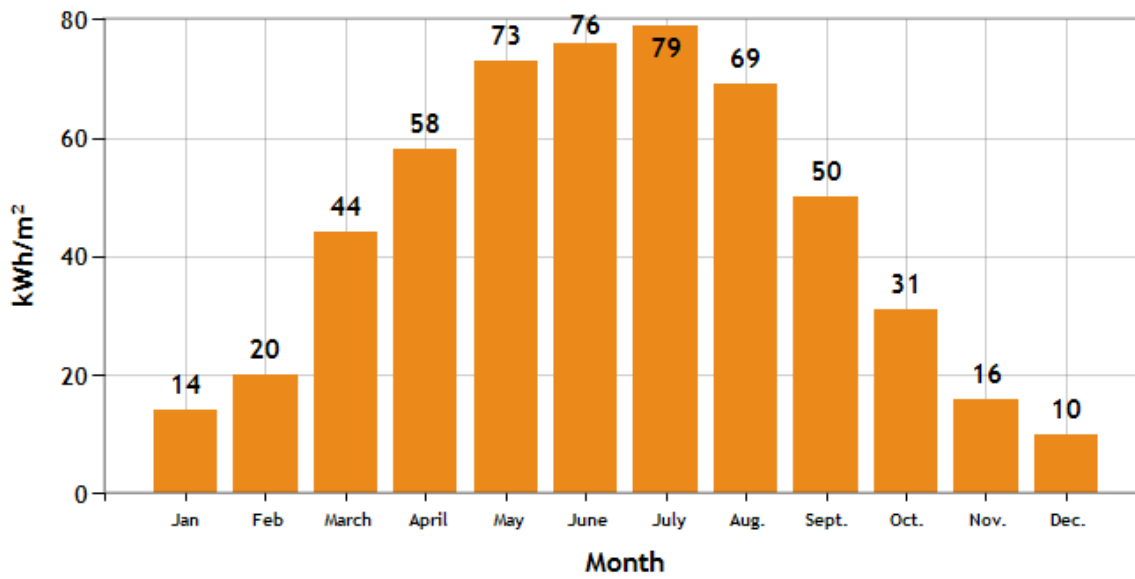
Global irradiation, annual sum 939 kWh/m²



Records

Month	
January	20
February	33
March	68
April	101
May	136
June	144
July	141
August	122
September	85
October	51
November	25
December	15
Yearly	939

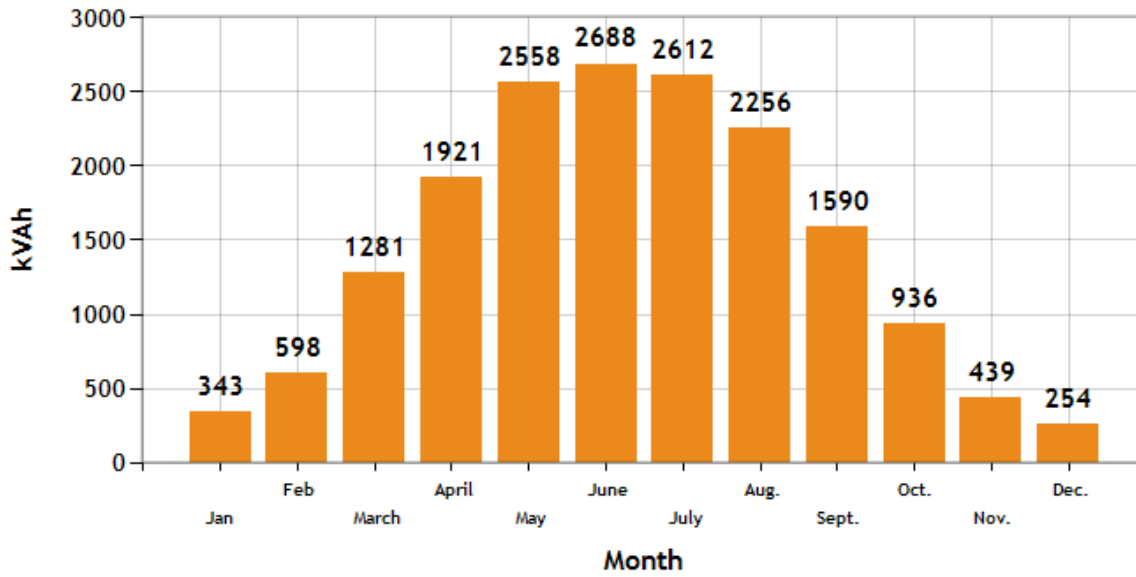
Diffuse irradiation, annual sum 541 kWh/m²



Records

Month	
January	14
February	20
March	44
April	58
May	73
June	76
July	79
August	69
September	50
October	31
November	16
December	10
Yearly	541

Apparent energy 17476 kVAh



Records

Month	
January	343
February	598
March	1281
April	1921
May	2558
June	2688
July	2612
August	2256
September	1590
October	936
November	439
December	254
Yearly	17476