



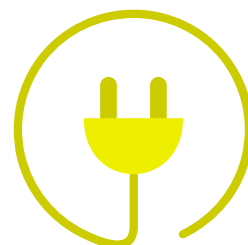
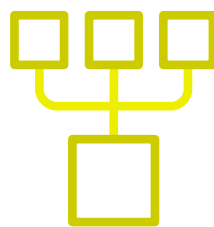
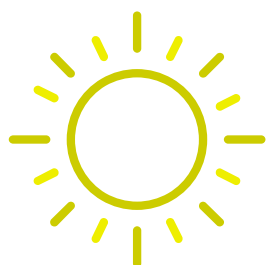
Sarah Saywell

Project Name: Tue Jan 09 2024

Address: Hill View, Stubton Road, Claypole, NG23 5BP

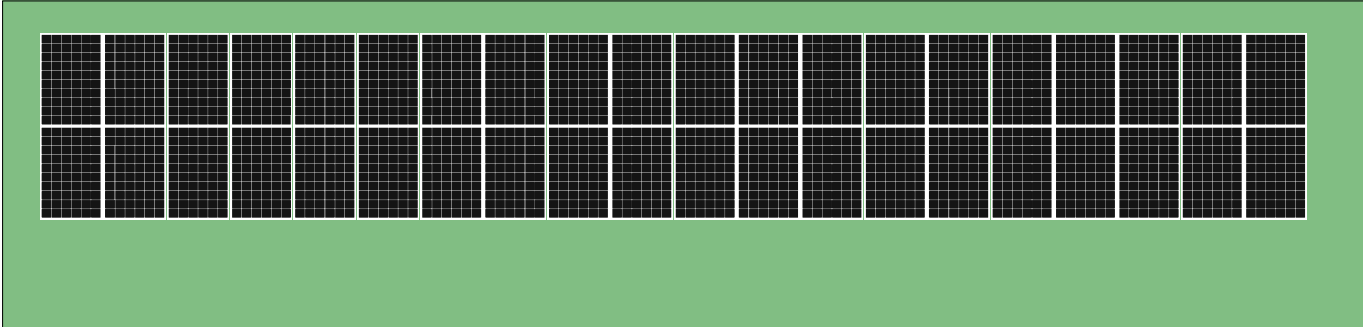
Date Created: 9th January 2024

Designer: Robert Vine


























Layout

Area 1



Component list

Item	Quantity
 JA Solar 435W Dual Glass N-Type (White Backsheet) solar panel	40
 SolaX X3 G4 15.0kW hybrid inverter	1
 Emlite EMP1 3ph Meter	1
 Label sheet	1
 AC isolator - IMO - 32A 4-pole	2
 SolaX Triple 5.8kWh LFP Battery (Master Console)	1
 SolaX Triple 5.8kWh LFP Battery (Slave Console)	2
 K&N DC isolator - KGD40-3	2
 Pair of MC4 connectors	8
 50m reel of 10mm ² solar cable	8
 Fastensol end clamp (30mm black)	8
 Fastensol mid clamp (30mm black)	76
 GSE Box base bottom	28
 GSE Box base side (left/right)	56
 GSE Box base side (front/back)	56

	GSE Box corner short	56
	GSE Box corner long	56
	GSE M6 screw & washer	1344
	GSE M6 nut for M6 screw	1344
	GSE M10 screw & washer	112
	GSE M10 nut for M10 screw	112
	Fastensol rail bolt M10	224
	GSE angle bracket (top)	56
	GSE angle bracket (bottom)	56
	Fastensol H rail splice	28
	Fastensol H rail 3300mm	29



Inverter checks

SolaX X3 G4 15.0kW hybrid

Panels

PV power **17400** Rated AC output **15000**

Input 1: 10 JA Solar 435W Dual Glass N-Type (White Backsheet) solar panels in 2 strings

Panels

Inverter

PV power	8700 W		
Open circuit voltage at -10° C	563 V	Max DC voltage	950 V
V_{mpp} at 40° C	421 V	V_{mpp} lower limit	180 V
V_{mpp} at -10° C	474 V	V_{mpp} upper limit	950 V
I_{mpp} at 40° C	20 A	Max DC input current	26 A

Max voltage

The open circuit voltage of the solar panels never exceeds the voltage limit of the inverter.



Max power point range

The maximum power point voltage of the solar panels is always above the lower limit of the inverter MPPT tracker. The maximum power point voltage of the solar panels is always below the upper limit of the inverter MPPT tracker.



Max Current

The maximum power point current of the solar panels is always below the maximum current for the inverter MPPT tracker.



Input 2: 10 JA Solar 435W Dual Glass N-Type (White Backsheet) solar panels in 2 strings

Panels		Inverter	
PV power	8700 W		
Open circuit voltage at -10° C	563 V	Max DC voltage	950 V
V _{mpp} at 40° C	421 V	V _{mpp} lower limit	180 V
V _{mpp} at -10° C	474 V	V _{mpp} upper limit	950 V
I _{mpp} at 40° C	20 A	Max DC input current	16 A

Max voltage

The open circuit voltage of the solar panels never exceeds the voltage limit of the inverter.



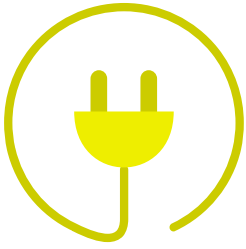
Max power point range

The maximum power point voltage of the solar panels is always above the lower limit of the inverter MPPT tracker. The maximum power point voltage of the solar panels is always below the upper limit of the inverter MPPT tracker.



Max Current





Electrical

SolaX X3 G4 15.0kW hybrid



AC Isolator

A AC isolator - IMO - 32A 4-pole has been specified for this input

Current

The rated isolator current (32A) is greater than the rated inverter current (24.1A)



Phases

The isolator is suitable for use on a three phase inverter.



Input 1



DC Isolator

A K&N DC isolator - KGD40-3 has been specified for this input

Current

The isolator is rated for a current of 40A, which is more than the expected maximum current of 21.28A.



Voltage

At 40A the isolator is rated for a voltage of 600V, which is more than the expected maximum voltage of 518V.



Cable

50m of 10mm² solar cable has been specified

Voltage drop

Voltage drop at maximum power point at 40°C will be around **3.66 V (0.87 percent)**



Input 2



DC Isolator

A K&N DC isolator - KGD40-3 has been specified for this input

Current

The isolator is rated for a current of 40A, which is more than the expected maximum current of 21.28A.



Voltage

At 40A the isolator is rated for a voltage of 600V, which is more than the expected maximum voltage of 518V.





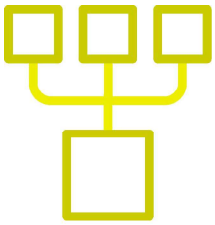
Cable

50m of 10mm² solar cable has been specified

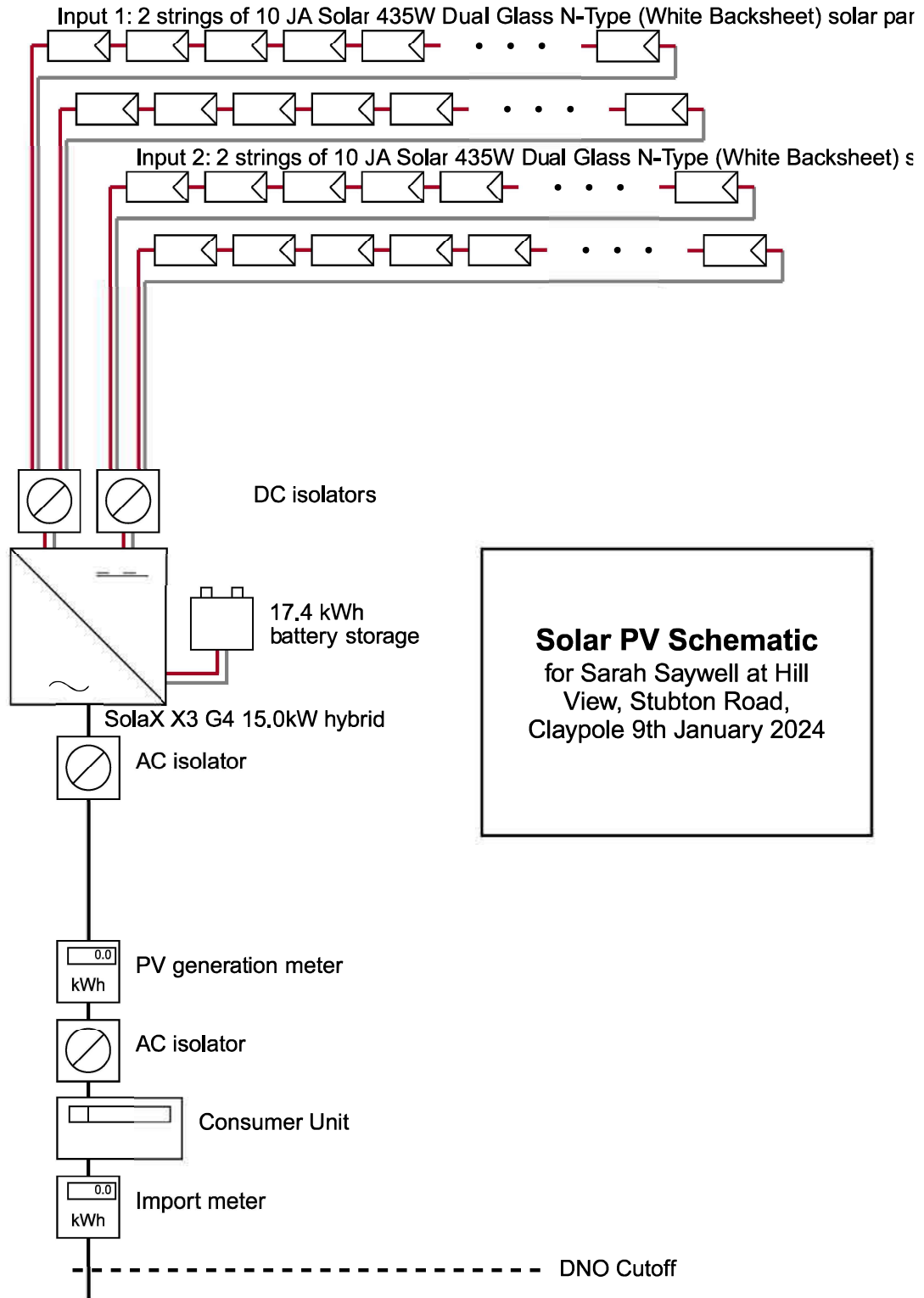
Voltage drop

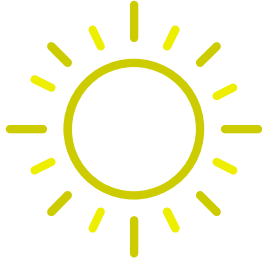
Voltage drop at maximum power point at 40°C will be around
3.66 V (0.87 percent)





Schematic diagram





Performance Estimate

Site details

Client

Sarah Saywell

Address

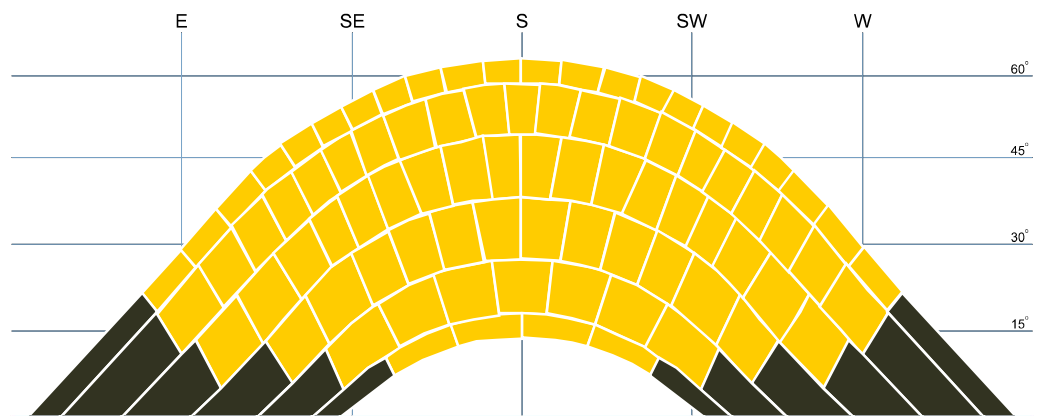
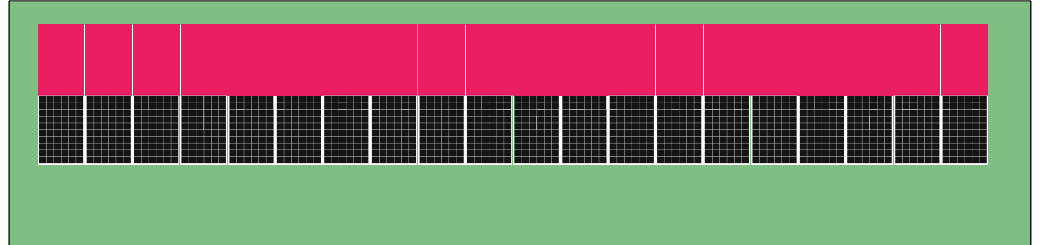
Hill View, Stubton Road, Claypole

The sunpath diagram shows the arcs of the sky that the sun passes through at different times of the day and year as yellow blocks. The shaded area indicates the horizon as seen from the location of the solar array. Where objects on the horizon are within 10m of the array, an added semi-circle is drawn to represent the increased shading. Blocks of the sky that are shaded by objects on the horizon are coloured red, and a shading factor is calculated from the number of red blocks. The performance of the solar array is calculated by multiplying the size of the array (kWp) by the shading factor (sf) and a site correction factor (kk), taken from tables which take account of the geographical location, orientation and inclination of the array.

Inverter 1

SolaX X3 G4 15.0kW hybrid

Input 1



A. Installation data

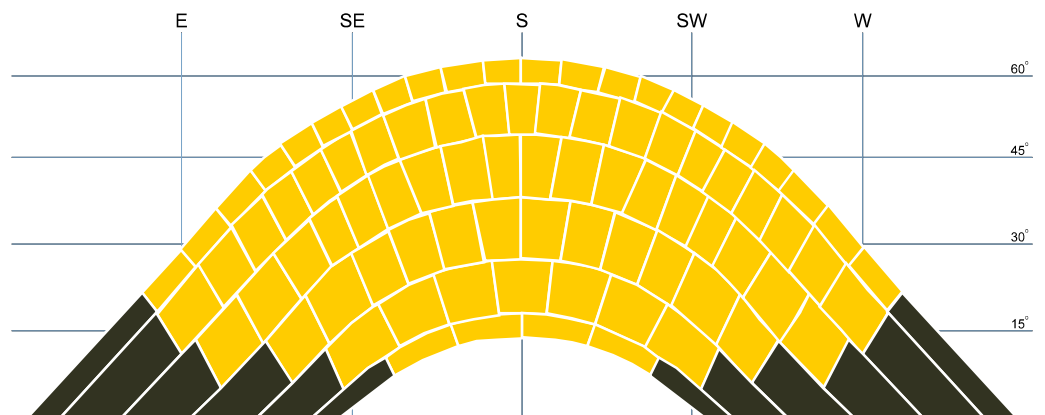
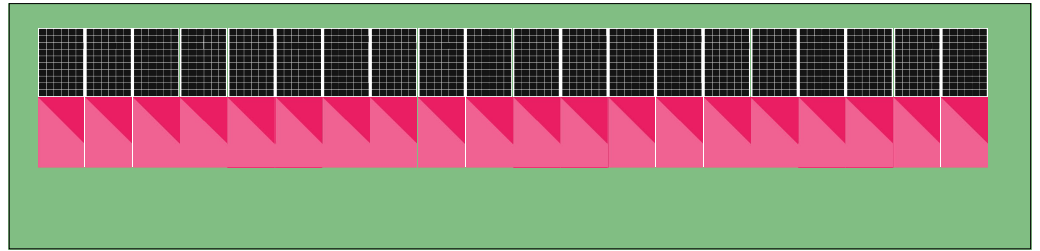
Installed capacity of PV system - kWp (stc)	8.700	kWp
Orientation of the PV system - degrees from South	0	°
Inclination of system - degrees from horizontal	30	°
Postcode region	11	



B. Performance calculations

kWh/kWp (Kk)	885	kWh/kWp
Shade factor (SF)	1.00	
Estimated output (kWp x Kk x SF)	7700	kWh

Input 2



A. Installation data

Installed capacity of PV system - kWp (stc)	8.700	kWp
Orientation of the PV system - degrees from South	0	°
Inclination of system - degrees from horizontal	30	°
Postcode region	11	



B. Performance calculations

kWh/kWp (Kk)	885	kWh/kWp
Shade factor (SF)	1.00	
Estimated output (kWp x Kk x SF)	7700	kWh

Performance Summary

A. Installation data		
Installed capacity of PV system - kWp (stc)	17.4	kWp
Orientation of the PV system - degrees from South	See individual inputs	
Inclination of system - degrees from horizontal	See individual inputs	
Postcode region	11	
B. Performance calculations		
kWh/kWp (Kk)	See individual inputs	
Shade factor (SF)	See individual inputs	
Estimated output (kWp x Kk x SF)	15400	kWh

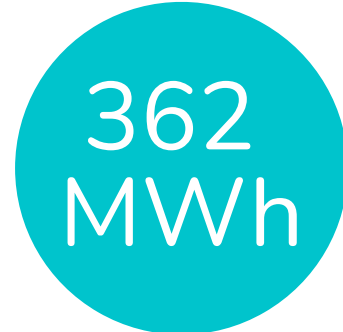
Important Note: The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the standard MCS procedure is given as guidance only for the first year of generation. It should not be considered as a guarantee of performance.



Financial

Generation

The system is expected to generate 15400 kWh per year initially, decreasing gradually as the solar cells degrade. Over the 25 year term of this financial projection the total generation is expected to be 361855 kWh, of which 289484 kWh will be consumed on site and 72371 kWh exported.



Payback

After adjusting projected costs and benefits for inflation, and applying a discount rate of 4%, the initial system cost of £23,929.98 is expected to be recouped after 6 years.



Net Present Value

The total present value of future benefits and costs, using a discount rate of 4% per year, is £80,955.43. The cost of the PV system is £23,929.98. The net present value of the project is therefore £57,025.45. A positive net present value is a good indication that the project is financially worthwhile.



IRR

The Internal Rate of Return is a useful measure for comparing the relative profitability of investments.



Disclaimer

Our financial model calculates the benefits of a solar PV installation (such as savings in electricity, or payments for exported electricity) and costs (the initial purchase cost, and any future maintenance costs if entered), over the projected lifespan of the system. Values are corrected for inflation, system degradation, and discount rate - a measure that accounts for the fact that a promise of a monetary sum in the distant future is usually considered less valuable than the promise of the same sum in the near future.

A model is only as accurate as the assumptions it makes. You should consider whether the values chosen are appropriate for your situation. There are many variables that dictate the financial return of a solar installation and we cannot forecast how they may change in the future. This financial projection shows a likely scenario for future financial returns. Actual returns may vary significantly from this forecast.

Assumptions

Inflation rate	2%
Cost of electricity	£0.32 /kWh <small>increases with inflation</small>
System size	17.4 kWp <small>degrades at 0.5% per year</small>
Discount rate	4%
Projection length	25 years

Income and savings

The projected income from the system over the project lifetime in payments for generated and exported electricity, along with electricity savings, are shown in the table and graph below.

These figures assume an inflation rate of 2 percent.

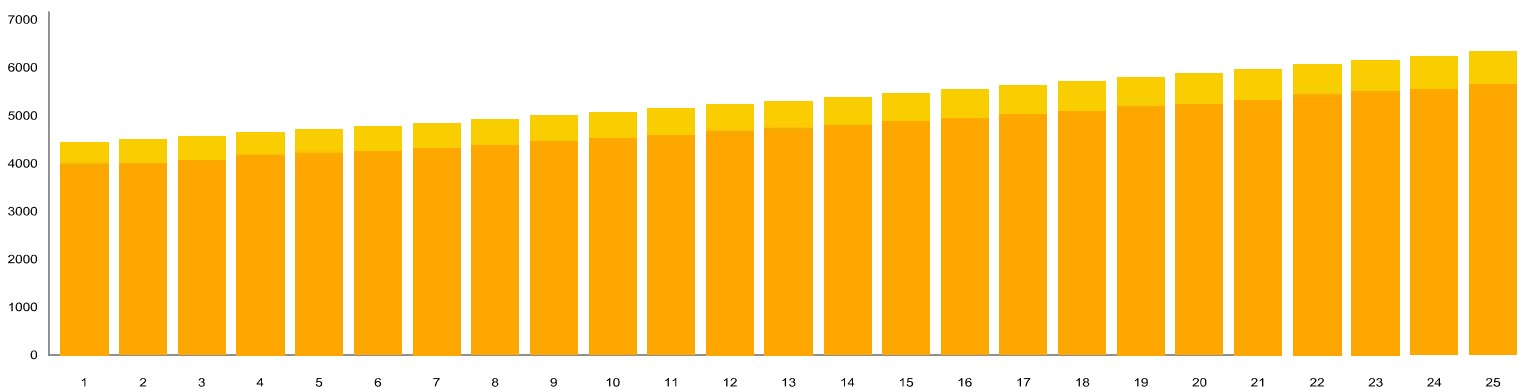
	Export payments	Electricity savings	Total
Year 1	465	3972	4437
Year 2	472	4031	4503
Year 3	479	4091	4571
Year 4	487	4152	4639
Year 5	494	4214	4708
Year 6	501	4277	4778
Year 7	509	4340	4849
Year 8	516	4405	4921
Year 9	524	4471	4995
Year 10	532	4537	5069
Year 11	540	4605	5145
Year 12	548	4674	5221
Year 13	556	4743	5299
Year 14	564	4814	5378
Year 15	573	4886	5458
Year 16	581	4958	5539
Year 17	590	5032	5622
Year 18	599	5107	5706
Year 19	607	5183	5791
Year 20	616	5261	5877
Year 21	626	5339	5965
Year 22	635	5419	6054
Year 23	644	5499	6144
Year 24	654	5581	6235
Year 25	664	5664	6328



Total Export Payments
over 25 years



Electricity savings
over 25 years



The bottom line

The table and graph below show the discounted costs for the project (including the initial capital required for the installation), against the total discounted benefits from income and savings on electricity bills.

The system pays for itself in 6 years.

	Discounted benefits	Cumulative benefits	Discounted costs	Cumulative costs	Cashflow
Year 1	4349	4349	0	23930	-19581
Year 2	4237	8585	0	23930	-15345
Year 3	4128	12713	0	23930	-11217
Year 4	4022	16735	0	23930	-7195
Year 5	3919	20654	0	23930	-3276
Year 6	3818	24472	0	23930	542
Year 7	3720	28191	0	23930	4261
Year 8	3624	31816	0	23930	7886
Year 9	3531	35347	0	23930	11417
Year 10	3440	38787	0	23930	14857
Year 11	3352	42139	0	23930	18209
Year 12	3266	45405	0	23930	21475
Year 13	3182	48586	0	23930	24657
Year 14	3100	51687	0	23930	27757
Year 15	3020	54707	0	23930	30777
Year 16	2943	57650	0	23930	33720
Year 17	2867	60517	0	23930	36587
Year 18	2794	63311	0	23930	39381
Year 19	2722	66032	0	23930	42102
Year 20	2652	68684	0	23930	44754
Year 21	2584	71268	0	23930	47338
Year 22	2517	73785	0	23930	49855
Year 23	2453	76238	0	23930	52308
Year 24	2390	78627	0	23930	54697
Year 25	2328	80955	0	23930	57025

