ECONOMIC REPORT

FOR THE CONSTRUCTION OF

A PHOTOVOLTAIC SYSTEM OF 343,2 kWp

NAMED

Photovoltaic system SolarLands

SITE IN THE TOWN OF

Alacant

A-79

03114 - Alicante

CUSTOMER:

John Smith SolarLands

Alcant

A-79 03114 - Spain

DATE

25/10/2017

THE TECHNICAL

Black Joe
Sun Power Ltd

Economic analysis

Analysis of the economic conditions for the installation of a system producing electricity through photovoltaic conversion named Photovoltaic system SolarLands to be installed in the town of Alacant for a nominal power of 343,2 kWp and energy delivered to the network the first year of 490.119,2 kWh.

Cost analysis

The costs for the construction of the plant are listed below:

Code	Description	M.U.	Q.ty	Price €	VAT %	Amount €
	Photovoltaic modules					
MFV4356	Modulo CS6P-260P	cad	1320	230,00	21,00	367.356,00
	Inverter					
INV1339	Inverter PVI-110.0-TL	cad	3	8.800,00	21,00	31.944,00
	Cables					
PIRFG21M21 1x4 BU	FG21M21 1x4 red	LM	1320	15,00	21,00	23.958,00
PIRFG21M21 1x4 BK	FG21M21 1x4 black	LM	1320	15,00	21,00	23.958,00
PIR20009750	FG7R 0.6/1 kV - 1X6	LM	5898.18	145,00	21,00	1.034.836,00
PIR20009813	FG7R 0.6/1 kV - 1X70	LM	426.14	1.269,00	21,00	654.334,00
PIR20009814	FG7R 0.6/1 kV - 1X95	LM	43.38	1.679,00	21,00	8.813,00
PIR20009819	FG7R 0.6/1 kV - 1X185	LM	101.16	3.101,00	21,00	379.573,00
	Circuit-breakers					
3NC10382	BASE FUS. CIL.BIPOL.<32A 10X38 (MIN.8PZ)	PCE	66	2.942,00	21,00	234.948,00
3NW60054	FUS. CIL.EXTR.12A/600V 10X38 (MIN.10PZ)	PCE	132	1.678,00	21,00	26.801,00
5TE1210	SEZION. SOTTOCAR. 2P 100A 690VCA 5UM	PCE	6	9.517,00	21,00	69.093,00
1SDA051247R1RC21	T3N 250 TMD250-2500 3P F F MTD	PCE	3	7.622,00	21,00	276.679,00
ABB1SDA060206R1	T6H 630 TMA 630-6300 3P F F	PCE	1	233.475,00	21,00	282.505,00
ABB1SDA060249R1	T6H 630 PR222DS/P-LSIG IN=630 3P F F	PCE	1	285.201,00	21,00	345.093,00
	Surge protection devices					
DEH952517	Limit. sovr. per imp. FV con unità di manovra c.c. 3 grad. tele	PCE	6	3.124,00	21,00	226.802,00
SNRA9L16558	Limit. sovrat. MC IT iPRD65r 3P 20kA riport. estr. T2	cad	1	4.685,00	21,00	56.689,00
	Electrical system and support structures					
	Manpower for plant installation and activation	h	940	42,00	21,00	477.708,00
	Support structures in galvanized steel for modules on ground	n	72	1.800,00	21,00	156.816,00
	Support structures in galvanized steel for modules on roof	n	12	1.350,00	21,00	19.602,00
	Design and testing					
	Electrical system design	n	1	16.500,00	21,00	19.965,00
	Testing and certification	n	1	4.000,00	21,00	4.840,00
	Total					4.722.313,00

Summary (VAT not included)

Total for the modules supply:	€ 303.600,00
Total for the inverter supply:	€ 26.400,00
Rest of the supply, installation and design:	€ 3.030.021,00
Total cost of the plant:	**€ 572.109,36**
Specific cost:	**€/kWp 1.666,99**

To the initial construction costs are added the cost of annual maintenance fees and extraordinary:

Annual costs

Description	%	Amount €
All risk insurance	0,8	4.576,87
Maintenance and cleaning	0,7	4.004,77
Total		8.581,64

Extraordinary costs

Description	Year	Amount €
Maintenance inverter	10	18.000,00
Special maintenance facility	10	25.000,00
Total		43.000,00

Energy Income and prices

Rated power:	343,2 kWp
Type of realization:	Ground-mounted

Financing

Banking financing as table:

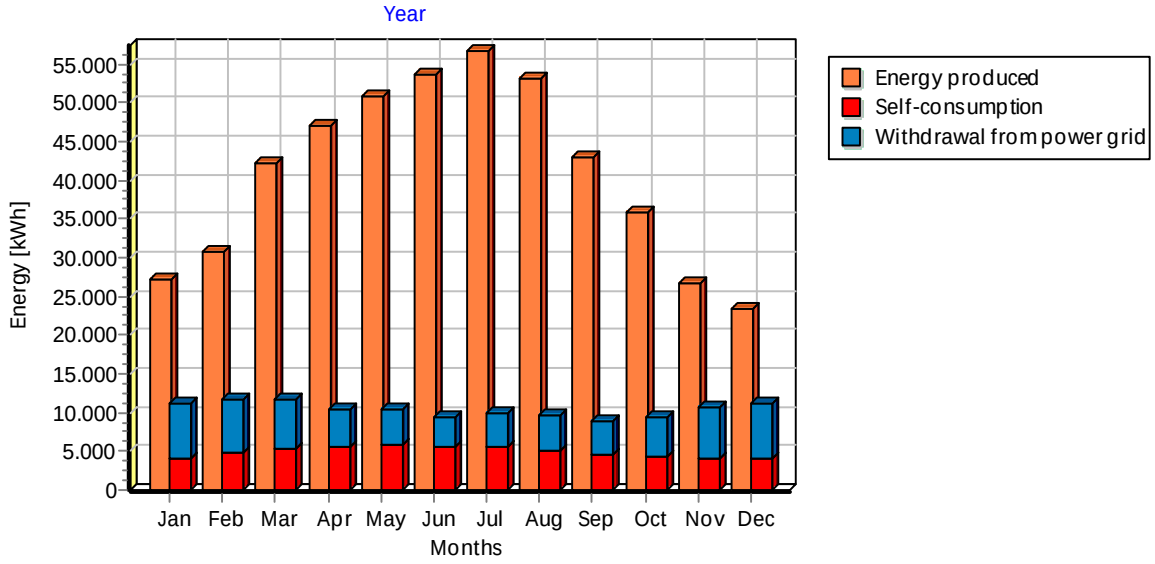
Amortization period (years):	10
Rate:	Monthly
Starting pay date:	01/01/2018
Annual interest rate:	3,5 %
Percentage of amount financed:	30 %
Costs:	€ 8.000,00
Amount financed:	€ 171.632,81
Rate amount:	**€ 1.697,21**
Total after 10 years:	**€ 203.665,20**

Unit power consumption

Annual Unit power consumption:	124.452 kWh
Contemporary consumption of energy produced:	58.860,3 kWh
Put in energy:	431.258,9 kWh
Withdrawn energy:	65.591,7 kWh

Load profile:

Description	Consumption [kWh]	Power [W]
January	4.999,7	0
February	4.999,7	0
March	4.999,7	0
April	4.500	0
May	4.499,7	0
June	4.000,3	0
July	4.499,7	0
August	4.499,7	0
September	3.499,9	0
October	3.999,7	0
November	4.500	0
Dicember	4.999,7	0
Lamps	3.654	1.400
January	5.800,2	0
February	6.500,3	0
March	6.300,2	0
April	5.700,2	0
May	5.499,6	0
June	5.199,8	0
July	4.999,7	0
August	4.800,3	0
September	5.099,8	0
October	5.199,8	0
November	5.800,3	0
Dicember	5.899,9	0


Year
Energy [kWh]
55.000
50.000
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Months
Energy produced
Self-consumption
Withdrawal from power grid

Financial return

The simulation of the economic performance of the system in the period of calculation is made considering the following parameters:

Annual plant degradation due to aging:	0,8 %
Annual inflation rate:	2 %
Annual energy variation rate:	2 %
Active interest rate:	1 %
Passive interest rate:	-

Return on investment made by the PV system:

Contemporary consumption of energy produced:	58.860,3 kWh
End date Analysis:	31/12/2047
Incentive:	€ 0,00
Consumption saving:	€ 476.127,47
Active interest:	€ 206.801,71
Other income:	€ 0,00
Revenue from the sale of energy not consumed:	€ 1.677.874,35
Annual costs to deduct:	€ 594.805,85
Total:	**€ 1.765.997,68**
Equity capital:	€ 411.847,15
Cumulative cash flow:	**€ 1.357.521,13**
Extraordinary costs:	€ 43.000,00
Repayment period (years):	12
Amount after 30 years:	€ 1.765.997,68
Compound rate of return:	4,972 %
Discount rate:	4 %
NPV:	€ 650.215,21
IRR:	10,31 %

In the calculation of second and subsequent years are considered the coefficient of degradation of the system, the inflation rate and the rate of active return of the accumulated capital.

Details of the calculations to December 31 2018:

Incentive:

Energy produced:	490.119,1 kWh *
Incentive rate:	0,000 € =
	0,00 €
Total:	0,00 €

Saving consumptions:

Energy consumed:	58.860,3 kWh *
Self-consumption rate:	0,2014 €/kWh =
Total:	11.854,46 €

Revenue from energy sale:

Energy produced:	490.119,1 kWh –
Energy consumed:	58.860,3 kWh =
Energy injected into the power grid:	431.258,8 kWh +
Losses increasing:	0% =
Total energy paid:	431.258,8 kWh
Revenue from energy sale:	
1 kWh <= E <= 3 kWh	3 kWh *
	0,22 € +
E > 3 kWh	431.255,8 kWh *
	0,11 € =
Total energy return:	48.301,32 € =
Total:	48.301,32 €

Annual costs:

Annual costs:	8.581,64 € +
Financing payment:	20.366,52 € =
Total:	28.948,16 €

Economic analysis table for the period of observation:

Year	2018	2019	2020	2021	2022
Energy produced [kWh]	490.119,1	486.198,4	483.357,7	478.356,3	474.435,6
Simult. consumption of prod. energy. [kWh]	58.860,3	58.830,3	58.976,9	58.767,6	58.725,0
Inputs [€]	60.155,78	61.201,59	62.429,26	63.370,37	64.489,74
Savings from self-consump. [€]	11.854,46	12.083,74	12.355,66	12.558,64	12.802,05
Energy sale [€]	48.301,32	48.805,77	49.440,71	49.847,49	50.384,48
Incentive [€]	0,00	0,00	0,00	0,00	0,00
Active interest [€]	0,00	312,08	632,89	964,24	1.303,21
Outputs [€]	28.948,16	29.119,79	29.294,86	29.473,43	29.655,56
Annual costs [€]	8.581,64	8.753,27	8.928,34	9.106,91	9.289,04
Extraordinary costs [€]	0,00	0,00	0,00	0,00	0,00
Overdraft cash interest expense [€]	0,00	0,00	0,00	0,00	0,00
Financing payment [€]	20.366,52	20.366,52	20.366,52	20.366,52	20.366,52
Interest contribution [€]	5.774,55	5.255,55	4.718,10	4.161,54	3.585,17
Equity contribution [€]	14.591,97	15.110,97	15.648,42	16.204,98	16.781,35
Cash flow [€]	31.207,62	32.081,80	33.134,40	33.896,94	34.834,18
Cumulative cash flow [€]	-377.268,93	-345.187,13	-312.052,73	-278.155,79	-243.321,61
Own amount [€]	408.476,55	408.476,55	408.476,55	408.476,55	408.476,55
Future value [€]	31.207,62	63.289,42	96.423,82	130.320,76	165.154,94
Compound return rate [%]	-92,360	-60,638	-38,198	-24,844	-16,566
NPV [€]	-378.469,22	-348.807,80	-319.351,43	-290.376,19	-261.745,03
IRR [%]	-92,36	-67,90	-47,70	-33,67	-23,87

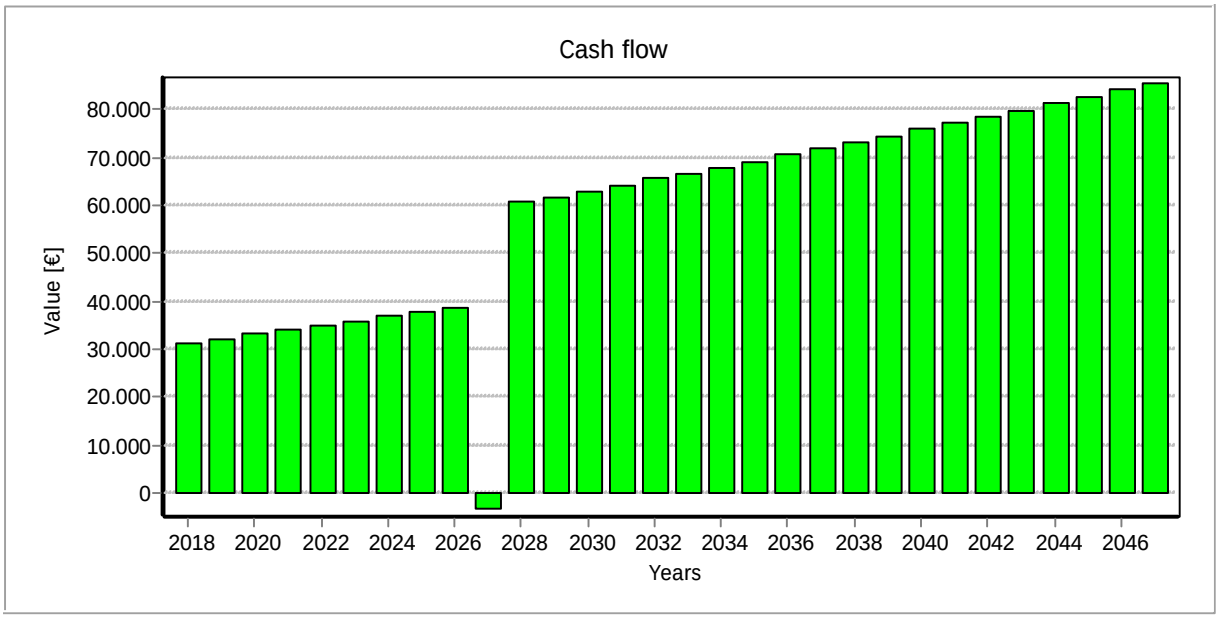
Year	2023	2024	2025	2026	2027
Energy produced [kWh]	470.514,4	467.638,9	462.672,3	458.751,6	454.830,6
Simult. consumption of prod. energy. [kWh]	58.691,0	58.833,1	58.629,8	58.593,0	58.556,1
Inputs [€]	65.606,17	66.903,33	67.899,24	69.077,95	70.251,77
Savings from self-consump. [€]	13.052,88	13.343,35	13.561,07	13.822,09	14.088,60
Energy sale [€]	50.901,74	51.550,78	51.960,25	52.501,19	53.021,93
Incentive [€]	0,00	0,00	0,00	0,00	0,00
Active interest [€]	1.651,55	2.009,20	2.377,92	2.754,67	3.141,24
Outputs [€]	29.841,34	30.030,84	30.224,13	30.421,28	73.622,37
Annual costs [€]	9.474,82	9.664,32	9.857,61	10.054,76	10.255,85
Extraordinary costs [€]	0,00	0,00	0,00	0,00	43.000,00
Overdraft cash interest expense [€]	0,00	0,00	0,00	0,00	0,00
Financing payment [€]	20.366,52	20.366,52	20.366,52	20.366,52	20.366,52
Interest contribution [€]	2.988,31	2.370,22	1.730,15	1.067,31	380,90
Equity contribution [€]	17.378,21	17.996,30	18.636,37	19.299,21	19.985,62
Cash flow [€]	35.764,83	36.872,49	37.675,11	38.656,67	-3.370,60
Cumulative cash flow [€]	-207.556,78	-170.684,29	-133.009,18	-94.352,51	-97.723,11
Own amount [€]	408.476,55	408.476,55	408.476,55	408.476,55	411.847,15
Future value [€]	200.919,77	237.792,26	275.467,37	314.124,04	310.753,44
Compound return rate [%]	-11,153	-7,438	-4,805	-2,876	-2,777
NPV [€]	-233.479,57	-205.459,50	-177.930,67	-150.771,01	-2.277,06
IRR [%]	-16,86	-11,69	-7,80	-4,80	-5,04

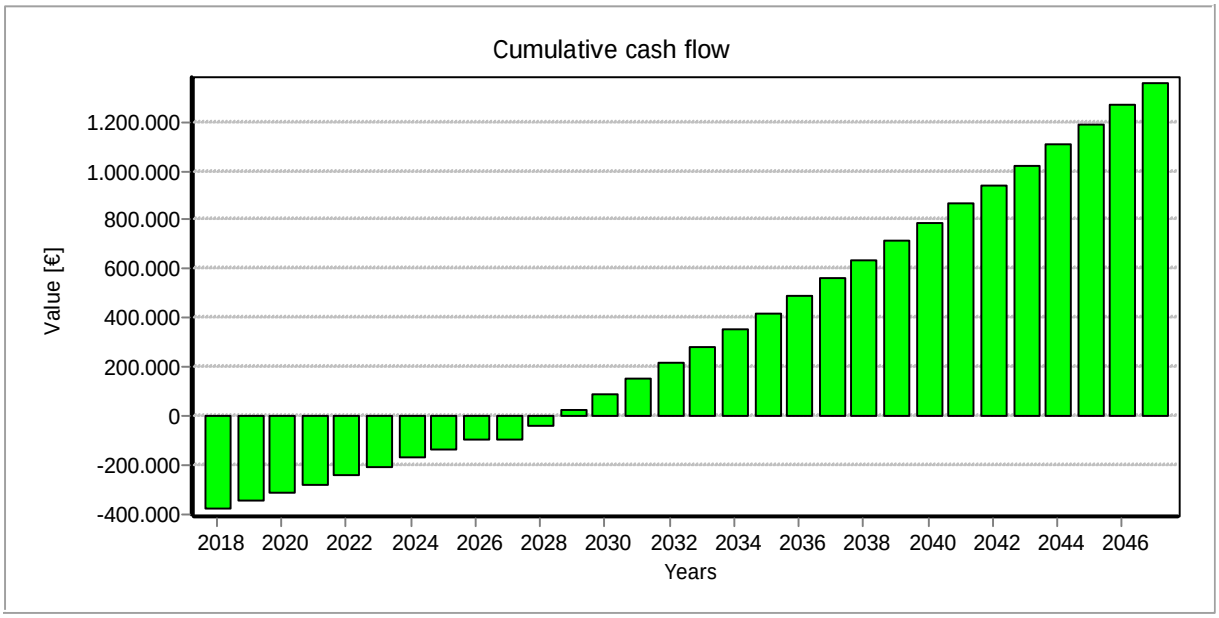
Year	2028	2029	2030	2031	2032
Energy produced [kWh]	451.919,8	446.988,6	443.067,7	439.146,9	436.201,0
Simult. consumption of prod. energy. [kWh]	58.661,8	58.482,2	58.446,2	58.408,5	58.547,9
Inputs [€]	71.183,27	72.433,35	73.870,38	75.303,18	76.934,40
Savings from self-consump. [€]	14.395,61	14.638,09	14.921,31	15.209,57	15.550,32
Energy sale [€]	53.680,13	54.080,50	54.616,68	55.131,35	55.779,80
Incentive [€]	0,00	0,00	0,00	0,00	0,00
Active interest [€]	3.107,53	3.714,76	4.332,39	4.962,26	5.604,28
Outputs [€]	10.460,97	10.670,19	10.883,59	11.101,27	11.323,29
Annual costs [€]	10.460,97	10.670,19	10.883,59	11.101,27	11.323,29
Extraordinary costs [€]	0,00	0,00	0,00	0,00	0,00
Overdraft cash interest expense [€]	0,00	0,00	0,00	0,00	0,00
Financing payment [€]	0,00	0,00	0,00	0,00	0,00
Interest contribution [€]	0,00	0,00	0,00	0,00	0,00
Equity contribution [€]	0,00	0,00	0,00	0,00	0,00
Cash flow [€]	60.722,30	61.763,16	62.986,79	64.201,91	65.611,11
Cumulative cash flow [€]	-37.000,81	24.762,35	87.749,14	151.951,05	217.562,16
Own amount [€]	411.847,15	411.847,15	411.847,15	411.847,15	411.847,15
Future value [€]	371.475,74	433.238,90	496.225,69	560.427,60	626.038,71
Compound return rate [%]	-0,934	0,423	1,444	2,225	2,831
NPV [€]	37.166,99	75.744,08	113.572,31	150.647,32	187.078,84
IRR [%]	-1,53	0,85	2,62	3,99	5,08

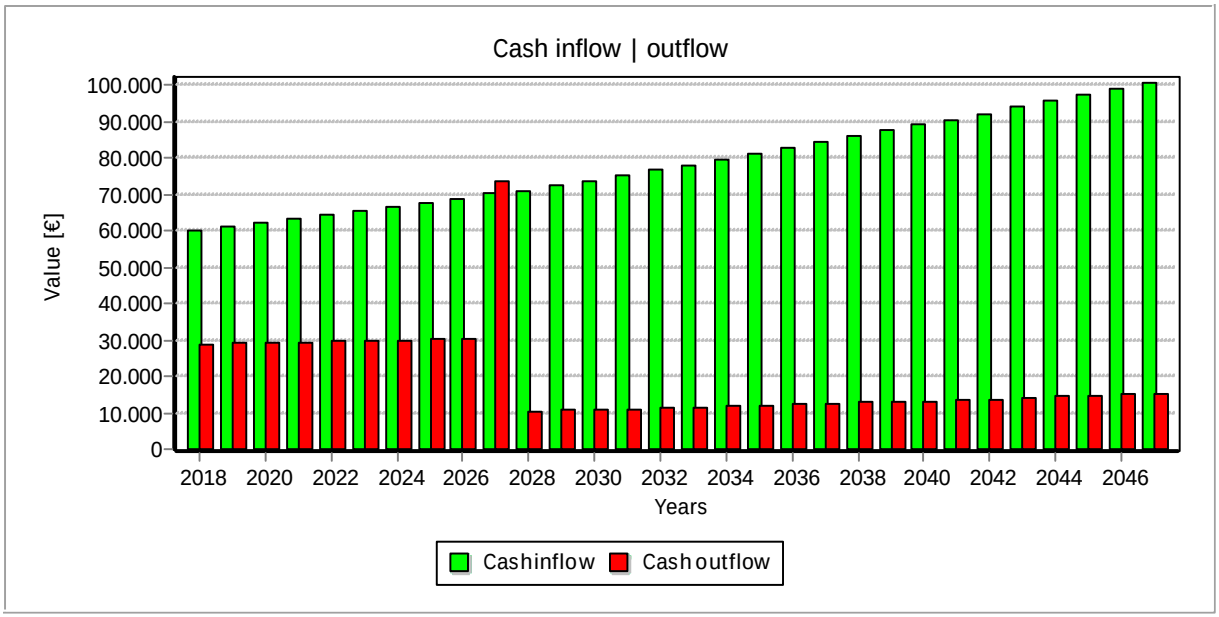
Year	2033	2034	2035	2036	2037
Energy produced [kWh]	431.305,0	427.384,0	423.463,1	420.481,9	415.621,0
Simult. consumption of prod. energy. [kWh]	58.322,0	58.283,7	58.258,2	58.379,6	58.172,3
Inputs [€]	78.268,81	79.762,55	81.289,16	82.979,05	84.358,01
Savings from self-consump. [€]	15.799,43	16.103,79	16.417,16	16.778,30	17.050,30
Energy sale [€]	56.208,99	56.731,18	57.264,60	57.900,63	58.300,36
Incentive [€]	0,00	0,00	0,00	0,00	0,00
Active interest [€]	6.260,39	6.927,58	7.607,40	8.300,12	9.007,35
Outputs [€]	11.549,76	11.780,75	12.016,37	12.256,70	12.501,83
Annual costs [€]	11.549,76	11.780,75	12.016,37	12.256,70	12.501,83
Extraordinary costs [€]	0,00	0,00	0,00	0,00	0,00
Overdraft cash interest expense [€]	0,00	0,00	0,00	0,00	0,00
Financing payment [€]	0,00	0,00	0,00	0,00	0,00
Interest contribution [€]	0,00	0,00	0,00	0,00	0,00
Equity contribution [€]	0,00	0,00	0,00	0,00	0,00
Cash flow [€]	66.719,05	67.981,80	69.272,79	70.722,35	71.856,18
Cumulative cash flow [€]	284.281,21	352.263,01	421.535,80	492.258,15	564.114,33
Own amount [€]	411.847,15	411.847,15	411.847,15	411.847,15	411.847,15
Future value [€]	692.757,76	760.739,56	830.012,35	900.734,70	972.590,88
Compound return rate [%]	3,304	3,676	3,970	4,205	4,390
NPV [€]	222.700,68	257.600,72	291.795,72	325.363,55	358.157,77
IRR [%]	5,96	6,68	7,28	7,79	8,22

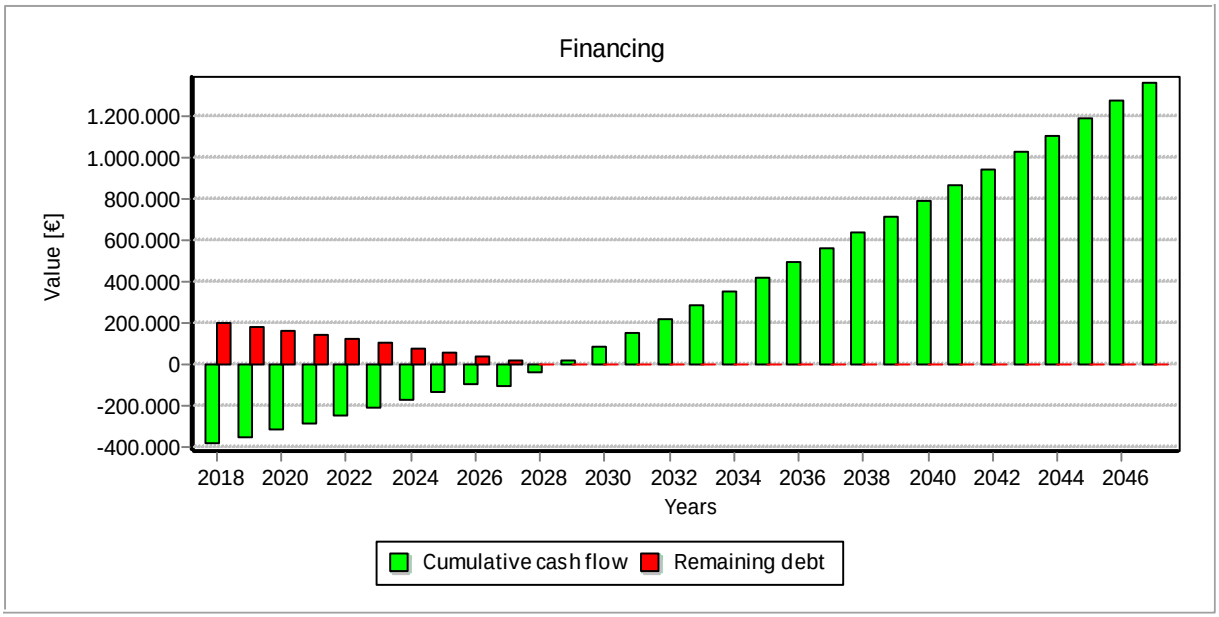
Year	2038	2039	2040	2041	2042
Energy produced [kWh]	411.700,0	407.779,1	404.763,1	399.937,3	396.016,4
Simult. consumption of prod. energy. [kWh]	58.129,3	58.075,2	58.197,0	58.001,9	57.957,6
Inputs [€]	85.941,23	87.515,99	89.299,08	90.753,52	92.375,44
Savings from self-consump. [€]	17.380,66	17.712,94	18.105,09	18.404,00	18.755,08
Energy sale [€]	58.834,66	59.345,25	59.991,10	60.386,31	60.884,93
Incentive [€]	0,00	0,00	0,00	0,00	0,00
Active interest [€]	9.725,91	10.457,80	11.202,89	11.963,21	12.735,43
Outputs [€]	12.751,87	13.006,90	13.267,04	13.532,38	13.803,03
Annual costs [€]	12.751,87	13.006,90	13.267,04	13.532,38	13.803,03
Extraordinary costs [€]	0,00	0,00	0,00	0,00	0,00
Overdraft cash interest expense [€]	0,00	0,00	0,00	0,00	0,00
Financing payment [€]	0,00	0,00	0,00	0,00	0,00
Interest contribution [€]	0,00	0,00	0,00	0,00	0,00
Equity contribution [€]	0,00	0,00	0,00	0,00	0,00
Cash flow [€]	73.189,36	74.509,09	76.032,04	77.221,14	78.572,41
Cumulative cash flow [€]	637.303,69	711.812,78	787.844,82	865.065,96	943.638,37
Own amount [€]	411.847,15	411.847,15	411.847,15	411.847,15	411.847,15
Future value [€]	1.045.780,24	1.120.289,33	1.196.321,37	1.273.542,51	1.352.114,92
Compound return rate [%]	4,537	4,654	4,745	4,816	4,870
NPV [€]	390.275,72	421.715,23	452.563,43	482.689,06	512.162,89
IRR [%]	8,59	8,90	9,17	9,40	9,61

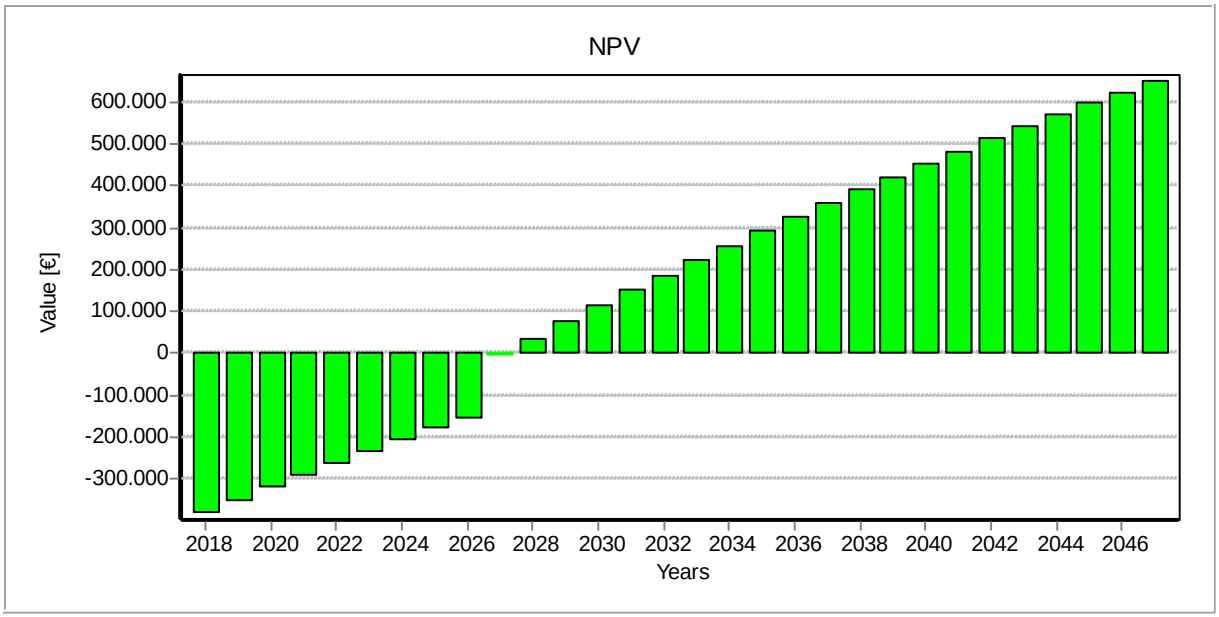
Year	2043	2044	2045	2046	2047
Energy produced [kWh]	392.095,3	389.044,1	384.253,3	380.332,5	376.411,4
Simult. consumption of prod. energy. [kWh]	57.914,6	58.022,8	57.817,5	57.787,2	57.744,2
Inputs [€]	94.028,30	95.890,87	97.372,92	99.070,70	100.788,12
Savings from self-consump. [€]	19.117,61	19.536,28	19.854,53	20.242,86	20.632,00
Energy sale [€]	61.389,54	62.033,95	62.382,45	62.864,65	63.351,63
Incentive [€]	0,00	0,00	0,00	0,00	0,00
Active interest [€]	13.521,15	14.320,64	15.135,94	15.963,19	16.804,49
Outputs [€]	14.079,09	14.360,67	14.647,89	14.940,84	15.239,66
Annual costs [€]	14.079,09	14.360,67	14.647,89	14.940,84	15.239,66
Extraordinary costs [€]	0,00	0,00	0,00	0,00	0,00
Overdraft cash interest expense [€]	0,00	0,00	0,00	0,00	0,00
Financing payment [€]	0,00	0,00	0,00	0,00	0,00
Interest contribution [€]	0,00	0,00	0,00	0,00	0,00
Equity contribution [€]	0,00	0,00	0,00	0,00	0,00
Cash flow [€]	79.949,21	81.530,20	82.725,03	84.129,86	85.548,46
Cumulative cash flow [€]	1.023.587,58	1.105.117,78	1.187.842,81	1.271.972,67	1.357.521,13
Own amount [€]	411.847,15	411.847,15	411.847,15	411.847,15	411.847,15
Future value [€]	1.432.064,13	1.513.594,33	1.596.319,36	1.680.449,22	1.765.997,68
Compound return rate [%]	4,910	4,939	4,958	4,968	4,972
NPV [€]	540.999,71	569.275,73	596.862,66	623.839,02	650.215,21
IRR [%]	9,79	9,94	10,08	10,20	10,31

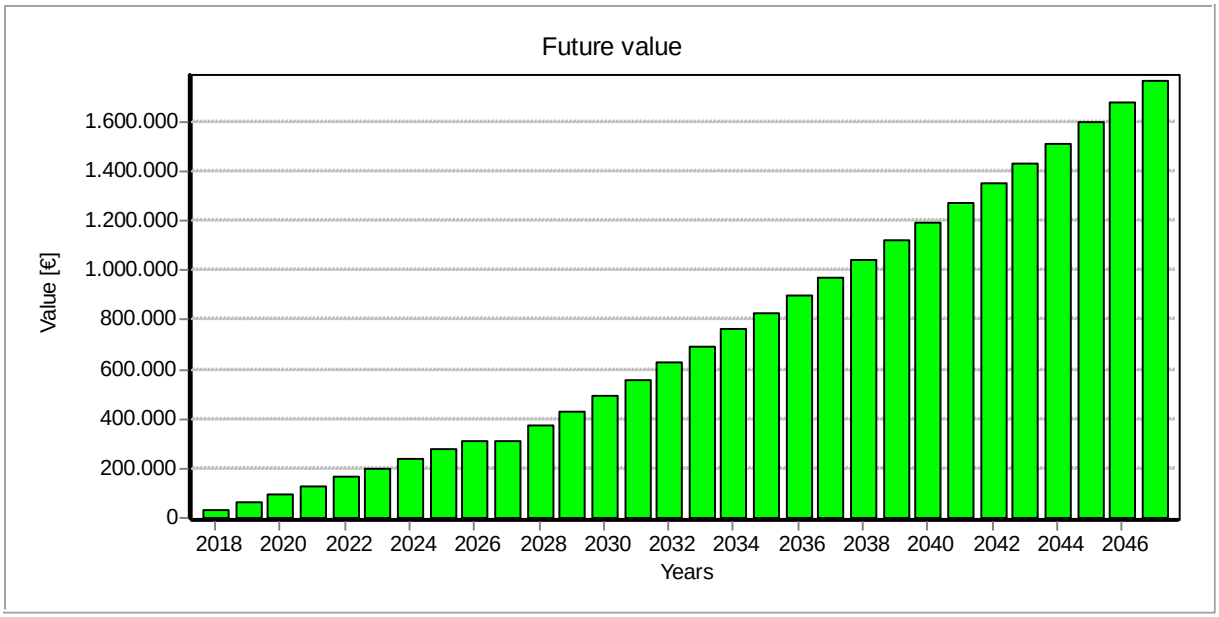

Cash flow
Value [€]
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years

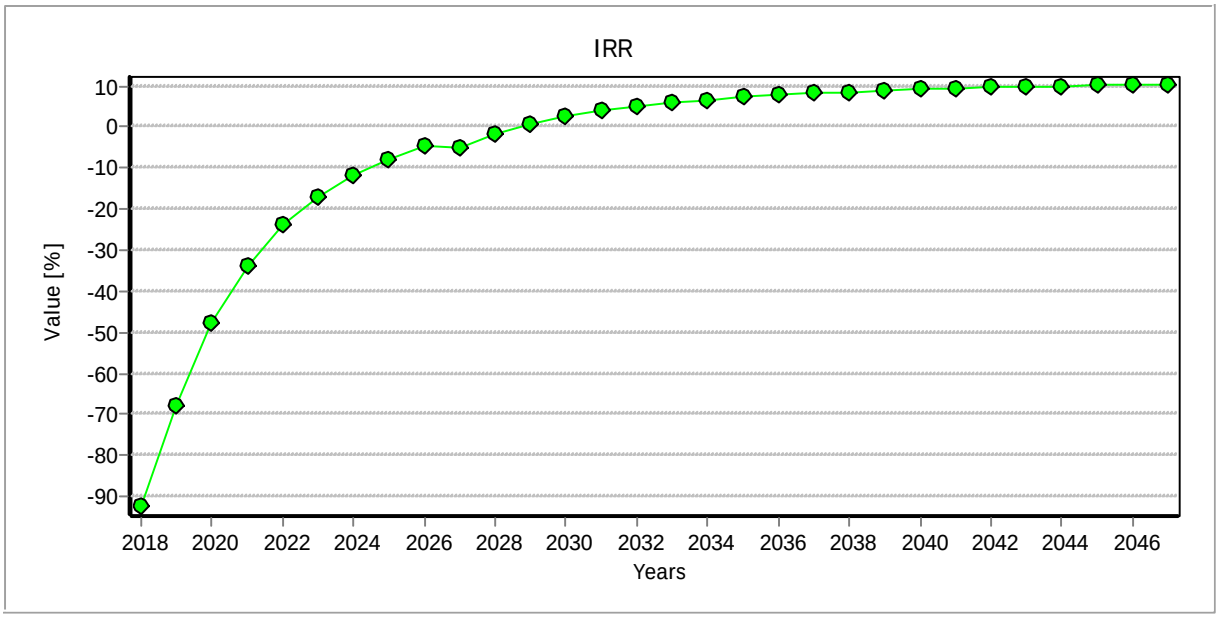

Cumulative cash flow
Value [€]
1.200.000
1.000.000
800.000
600.000
400.000
200.000
0
-200.000
-400.000
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years

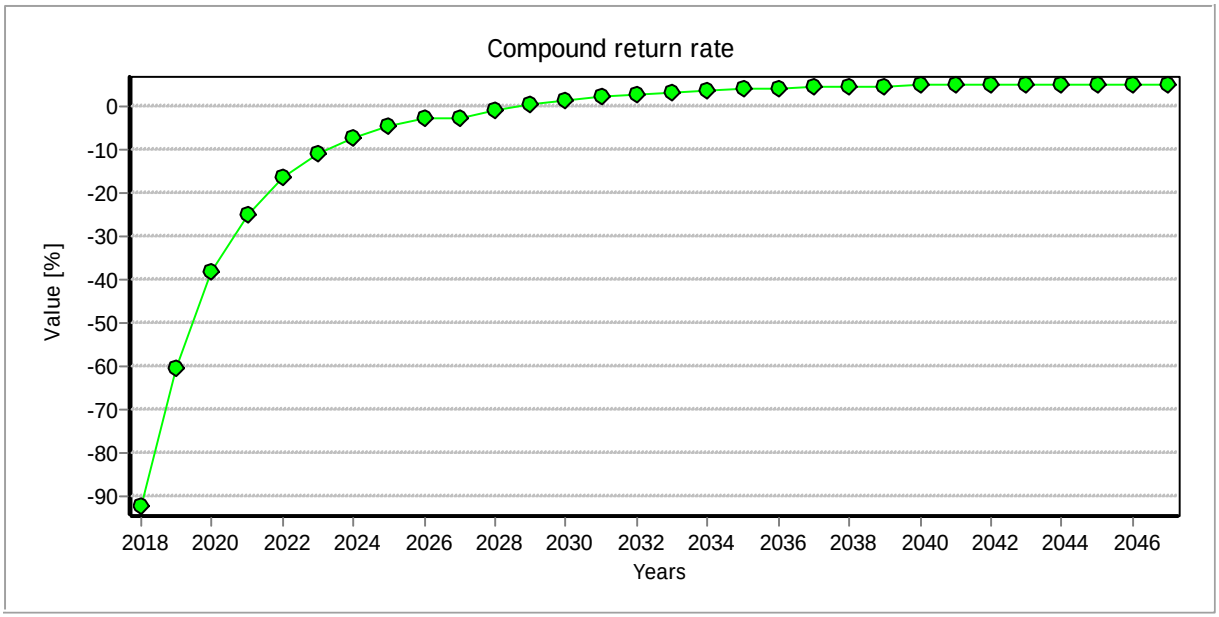

Cash inflow | outflow
Value [€]
100.000
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years
Cashinflow
Cash outflow


Financing
Value [€]
1.200.000
1.000.000
800.000
600.000
400.000
200.000
0
-200.000
-400.000
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years
Cumulative cash flow
Remaining debt


NPV
600.000
500.000
400.000
300.000
200.000
100.000
0
-100.000
-200.000
-300.000
Value [€]
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years


Future value
1.600.000
1.400.000
1.200.000
1.000.000
800.000
600.000
400.000
200.000
0
Value [€]
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years


IRR
Value [%]
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years


Compound return rate
Value [%]
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Years