Photovoltaic system

NOMINAL POWER EQUAL TO 5,76 KWP
PROJECT NAME:
RESIDENTIAL HOME IN ADELAIDE

Located in

ADELAIDE
HAYWARD AVE 245

Customer

JOHN SMITH

33 SYMONDS PL
5000 - ADELAIDE (SA)

ECONOMIC REPORT

Designer

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DATE:
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PURPOSE OF THIS DOCUMENT

The purpose of this report is the analysis of the economic aspects of the realization of a plant for production of electrical energy, with a power of 5,76 kWp, using photovoltaic conversion named Residential home in Adelaide, be built at the site in Hayward Ave 245, Adelaide.

1 - EXPLANATORY REPORT

1.1   - DESCRIPTION OF THE SYSTEM

The photovoltaic system is composed of n° 32 PV modules and n ° 1 inverters with a total nominal power of 5,76 kWp for an estimated annual production of energy equal to 8.817,29 kWh distributed over an area of 40 m² and a producibility of 1.530,78 kWh/kWp.
The connection to the grid will be carried out according to a scheme Single-phase in Low voltage with supply voltage 230,00 V.

Characteristics of the system	
Nominal power	5,76 kWp
Number of PV modules	32
Total area modules	40 m²
Tilt	22,7 °
Azimuth	2,9 °
Number of inverter	1
Estimated annual production of energy	8.817,29 kWh
Producibility	1.530,78 kWh/kWp
Connection to the grid	Single-phase in Low voltage
Voltage supply	230,00 V

1.2   - ENERGY PRODUCED

The energy produced by the plant on a yearly basis is 8.817,29 kWh, the following graph shows the energy produced on a monthly basis:
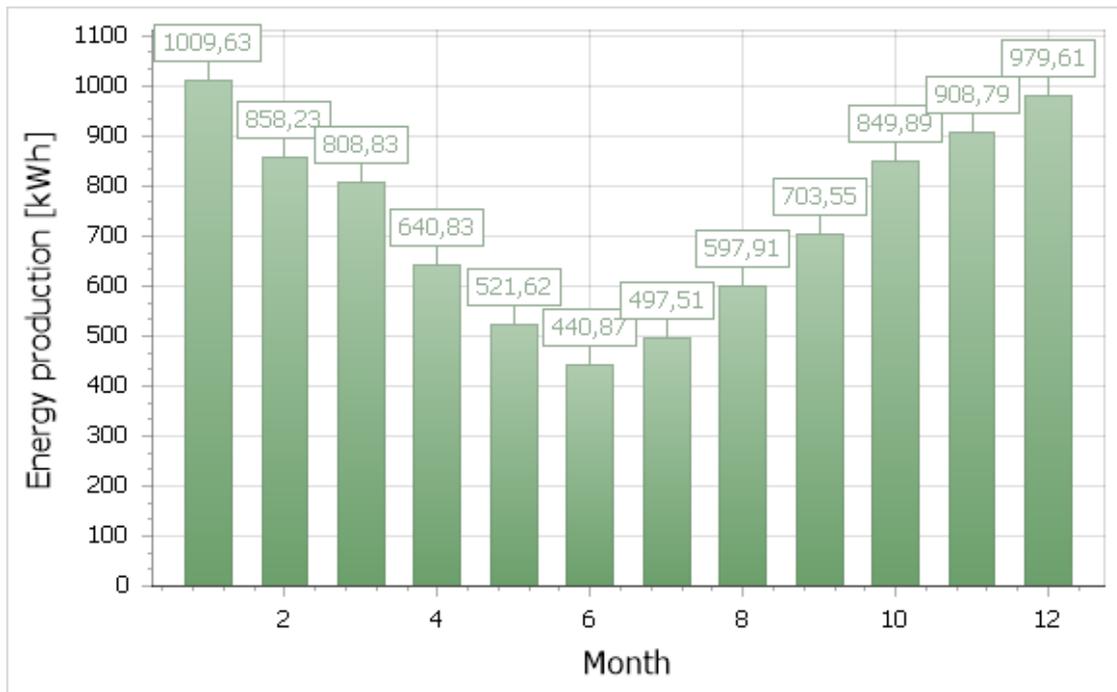
1.3 - COSTS

The estimated costs for the realization of plant are listed below:

Costs of realization	
Total cost of the plant	€ 12.096,00
Specific cost	2.100,00 €/kWh

Furthermore we consider the periodic costs and extraordinary for maintenance of the system:

Periodic costs			
Description	**Period**	**Duration**	**Amount**
Service	1	20	€ 100,00
Insurance	1	20	€ 450,00
Total periodic costs			€ 11.000,00

Extraordinary costs		
Description	**Year**	**Amount**
Inverter replacement	10	€ 600,00
Total extraordinary costs		€ 600,00

1.4 - ENERGY CONSUMPTION

The data required for the analysis of energy consumption are defined below:

Consumptions	
Total annual consumption	7.300,00 kWh
Average cost of electricity withdrawn	0,15 €/kWh
Share of self-consumption	52,00%
Annual increase of consumption	0,00%

1.5 - REVENUES

The data required for the analysis of revenues are defined below:

Nominal power	5,76 kW
Estimated annual production of energy	8.817,29 kWh
Energy self-consumed annually	52,00%
Annual loss of system efficiency	0,70%
Total annual consumption	7.300,00 kWh
Annual increase of consumption	0,00%

Financing	
Capital to finance	€ 6.048,00
Term	12 years
Loan interest	6,00%
Frequency installment	Annual
Installment amount	€ 721,39
Global financing:	**€ 8.656,65**

2 - Economic analysis

For economic analysis were considered the following rates:

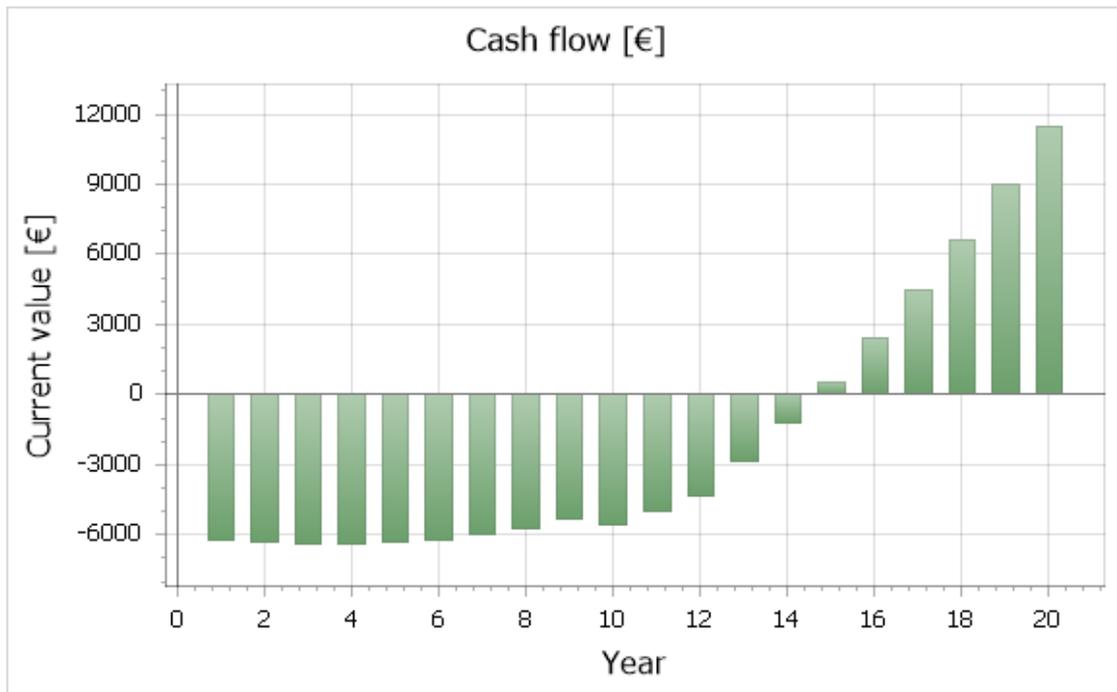| Inflation	2,00%
Energy price inflation	6,00%
Discount rate	4,00%

The number of years required to return the initial investment through positive annual cash flow is: 14,7 years. The overall gain of the investment is: € 11.494,96.

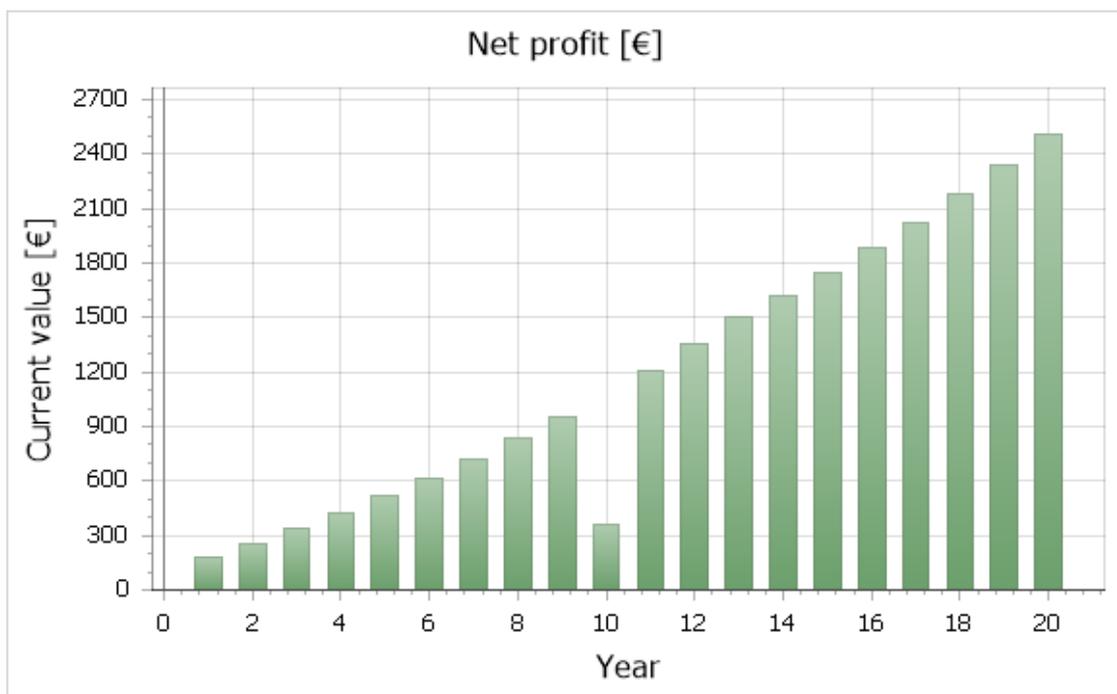## 2.1   - ECONOMIC INDICATORS

2.1.1 - NET PRESENT VALUE (NPV)

Net present value
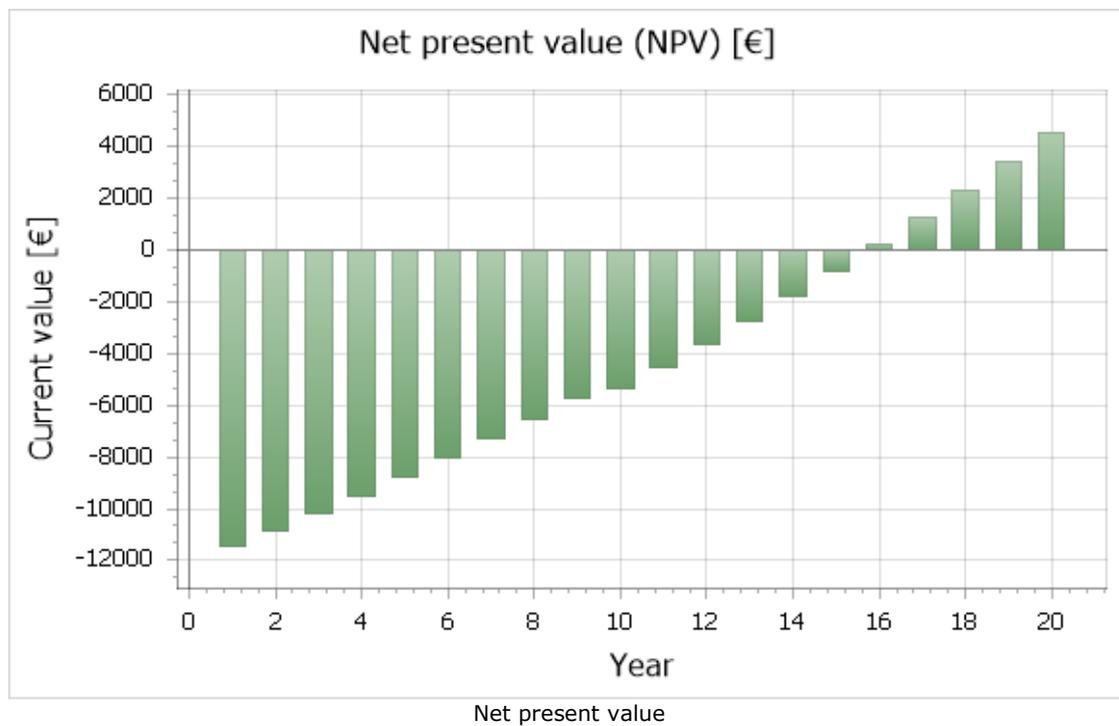
2.1.2 - CASH FLOW

Cash flow

2.1.3 - NET PROFIT

Net profit

2.2 - ECONOMIC ANALYSIS TABLE

Economic analysis table									
Year	Production [kWh]	Energy fed to grid [kWh]	Energy consumption [kWh]	Self-consumption [kWh]	Energy purchase tariff [€/kWh]	Energy taken from grid [kWh]	Revenue from net metering [€]	Revenue from energy sale [€]	Total revenue [€]
1	8.817,29	4.232,30	7.300,00	4.584,99	0	2.715,01	407,25	0	407,25
2	8.755,57	4.202,67	7.300,00	4.552,90	0	2.747,10	436,79	0	436,79

3	8.694,28	4.173,26	7.300,00	4.521,03	0	2.778,97	468,37	0	468,37
4	8.633,42	4.144,04	7.300,00	4.489,38	0	2.810,62	502,12	0	502,12
5	8.572,99	4.115,03	7.300,00	4.457,95	0	2.842,05	538,20	0	538,20
6	8.512,98	4.086,23	7.300,00	4.426,75	0	2.873,25	576,76	0	576,76
7	8.453,39	4.057,63	7.300,00	4.395,76	0	2.904,24	617,96	0	617,96
8	8.394,21	4.029,22	7.300,00	4.364,99	0	2.935,01	661,98	0	661,98
9	8.335,45	4.001,02	7.300,00	4.334,44	0	2.965,56	709,00	0	709,00
10	8.277,10	3.973,01	7.300,00	4.304,09	0	2.995,91	759,23	0	759,23
11	8.219,17	3.945,20	7.300,00	4.273,97	0	3.026,03	812,87	0	812,87
12	8.161,63	3.917,58	7.300,00	4.244,05	0	3.055,95	870,17	0	870,17
13	8.104,50	3.890,16	7.300,00	4.214,34	0	3.085,66	931,34	0	931,34
14	8.047,77	3.862,93	7.300,00	4.184,84	0	3.115,16	996,66	0	996,66
15	7.991,43	3.835,89	7.300,00	4.155,55	0	3.144,45	1.066,40	0	1.066,40
16	7.935,49	3.809,04	7.300,00	4.126,46	0	3.173,54	1.140,84	0	1.140,84
17	7.879,95	3.782,37	7.300,00	4.097,57	0	3.202,43	1.220,29	0	1.220,29
18	7.824,79	3.755,90	7.300,00	4.068,89	0	3.231,11	1.305,10	0	1.305,10
19	7.770,01	3.729,61	7.300,00	4.040,41	0	3.259,59	1.395,60	0	1.395,60
20	7.715,62	3.703,50	7.300,00	4.012,12	0	3.287,88	1.492,17	0	1.492,17

Economic analysis table									
Year	Revenue of feed-in tariff on energy produced [€]	Revenue of feed-in tariff on energy fed into grid [€]	Revenue of feed-in tariff on energy self-consumed [€]	Saving on energy bill [€]	Maintenance costs [€]	Financing [€]	Loan capital amount [€]	Loan interest amount [€]	Gross profit [€]
1	0	0	0	687,75	550,00	721,39	358,51	362,88	0
2	0	0	0	723,91	561,00	721,39	380,02	341,37	0
3	0	0	0	761,97	572,22	721,39	402,82	318,57	0
4	0	0	0	802,04	583,66	721,39	426,99	294,40	0
5	0	0	0	844,21	595,34	721,39	452,61	268,78	0
6	0	0	0	888,60	607,24	721,39	479,76	241,62	0
7	0	0	0	935,32	619,39	721,39	508,55	212,84	0
8	0	0	0	984,50	631,78	721,39	539,06	182,32	0
9	0	0	0	1.036,26	644,41	721,39	571,41	149,98	0
10	0	0	0	1.090,75	1.374,36	721,39	605,69	115,70	0
11	0	0	0	1.148,10	670,45	721,39	642,03	79,36	0
12	0	0	0	1.208,47	683,86	721,39	680,55	40,83	0
13	0	0	0	1.272,01	697,53				0
14	0	0	0	1.338,89	711,48				0
15	0	0	0	1.409,29	725,71				0
16	0	0	0	1.483,39	740,23				0
17	0	0	0	1.561,39	755,03				0
18	0	0	0	1.643,49	770,13				0

| 19 | 0 | 0 | 0 | 1.729,90 | 785,54 | | | | 0 |
| 20 | 0 | 0 | 0 | 1.820,86 | 801,25 | | | | 0 |

Economic analysis table								
Year	Total tax [€]	Income subject to tax [€]	Taxable income [€]	Depreciation [€]	Net profit [€]	Cash flow [€]	Cumulative cash flow [€]	Net present value (NPV) [€]	
1	0	0	0	0	182,12	-176,39	-6.224,39	-11.477,75	
2	0	0	0	0	258,33	-121,69	-6.346,07	-10.838,08	
3	0	0	0	0	339,55	-63,27	-6.409,34	-10.176,55	
4	0	0	0	0	426,10	-0,89	-6.410,23	-9.492,71	
5	0	0	0	0	518,29	65,69	-6.344,54	-8.786,15	
6	0	0	0	0	616,49	136,73	-6.207,82	-8.056,41	
7	0	0	0	0	721,05	212,50	-5.995,32	-7.303,06	
8	0	0	0	0	832,37	293,31	-5.702,01	-6.525,66	
9	0	0	0	0	950,87	379,46	-5.322,54	-5.723,77	
10	0	0	0	0	359,93	-245,76	-5.568,31	-5.381,35	
11	0	0	0	0	1.211,18	569,14	-4.999,16	-4.529,13	
12	0	0	0	0	1.353,95	673,39	-4.325,77	-3.651,07	
13	0	0	0	0	1.505,82	1.505,82	-2.819,95	-2.746,71	
14	0	0	0	0	1.624,07	1.624,07	-1.195,87	-1.808,85	
15	0	0	0	0	1.749,98	1.749,98	554,10	-837,15	
16	0	0	0	0	1.884,00	1.884,00	2.438,11	168,74	
17	0	0	0	0	2.026,65	2.026,65	4.464,76	1.209,17	
18	0	0	0	0	2.178,45	2.178,45	6.643,21	2.284,51	
19	0	0	0	0	2.339,97	2.339,97	8.983,18	3.395,16	
20	0	0	0	0	2.511,79	2.511,79	11.494,96	4.541,51	

2.2.1 - DEFINITIONS OF ECONOMIC ANALYSIS TABLE

Production [kWh]: Energy production estimated by the program. Also matches the Energy fed to grid + Self-consumption.

Energy fed to grid [kWh]: Energy produced by the system and fed into the grid because not consumed by users of the PV system.

Energy consumption [kWh]: Annual energy consumption, including any increases in consumption. Also matches Self-consumption + Energy taken from the grid.

Self-consumption [kWh]: The amount of energy produced by the system and at the same time consumed by the users of system.

Energy taken from grid [kWh]: Energy consumed by the user and coming from the grid.

Revenue of feed-in tariff on energy produced [€]: Energy produced * Feed-in tariff for the produced energy.

Revenue of feed-in tariff on energy fed into grid [€]: Energy fed into grid * Feed-in tariff for energy fed to the grid.

Revenue of feed-in tariff on energy self-consumed [€]: Energy self-consumed * Feed-in tariff for self-consumed energy.

Revenue from net metering [€]: Valorization of energy escanged into the grid.

Total revenue [€]: Revenu of feed-in tariff + Revenue from net metering.

Energy purchase tariff [€/kWh]: Energy purchase tariff revalued annually by the Energy price inflation.

Saving on energy bill [€]: Savings due to non-purchase of energy. Calculated as Self-consumption * Energy purchase tariff.

Maintenance costs [€]: Cost of maintenance periodic and extraordinary.

Depreciation [€]: Depreciation of the system, calculated for each year as the Realization cost * System depreciation * Annual Depreciation.

Financing [€]: Amount of annual installment with financing. The amount is calculated by the program based on the capital to be financed. Also matches Loan capital amount + Loan interest amount.

Loan capital amount [€]: Principal portion of the installment loan.

Loan interest amount [€]: Interest portion of the installment loan.

Gross profit [€]: Total revenue + Saving on energy bill - Maintenance costs - Depreciation - Loan interest amount.

Total tax [€]: Taxable income * Tax rate for income.

Income subject to tax [€]: Part of the Total revenue subject to tax.

Taxable income [€]: Refers to the basis upon which an income tax system imposes the taxes, calculated for each year as Income subject to tax - Maintenance costs - Depreciation. Note that the program does not handle tax credits, so if Taxable income is negative then Total tax will be forced to zero.

Net profit [€]: Gross profit - Total tax.

Cash flow [€]: Net profit + Depreciation - Loan capital amount.

Cumulative cash flow [€]: cash flow of year + cash flow of previous year. The first year is calculated as: cash flow of year - system cost + amount to be financed.

Net present value (NPV) [€]: By calculating the NPV is established the convenience expected of investment, by discounting the future cash flows in order to detect the present value of the investment.