Return on investment planner

Project	Turnkey PV-System
Name	Peter Peterson
Adress	Elsenstraße 106
Project size	215,0 kWp
Project type	Rooftop mounted PV-System
Date of creation	24.07.2020

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1. Project overview

Project evaluation

Fair value incl. rest of debt	208.454 €
Initial investment	205.000 €
Deviation	**+3.454 €**

At the stated initial investment, the investor can expect an additional return above the market expectation of 6%.

The assessment of an investment usually depends on the return expectations of the investor and the deviation between initial investment and fair value. The fair value is a reference for the determination of a potential purchase price. If the actual purchase price is higher than the fair value, then the investor cannot achieve the calculated return on equity. On the other hand, if the actual purchase price is lower than the fair value, then the investor will achieve a higher return on equity.

The project also has the following financial figures:

Return on equity	7,47%	Fair value (6% roe)	28.454 €
Return on investment	3,31%	Fair value incl. rest of debt	208.454 €
Equity amortization period	12 years	Net present value	3.454 €
Average cash flow p.a.	2.576 €	Cumulated cash flow	54.094 €

Project potential

A simulation of current market potentials (based on Milk the Sun's benchmarks), the return on equity can be increased by 2,04 % by reducing operating costs. The fair value would grow by 4.888 € under the assumed costs, rising to 213.343 €.

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Return on equity potential	**9,51%**	+2,04 %
Fair value incl. debts potential	**213.343 €**	+4.888 €

Based on Milk the Sun's benchmarks, there are following project improvement potentials:

• An insurance optimization has a savings potential of 46,3 %
• An operations & maintenance optimazition has a savings potential of 5,1 %

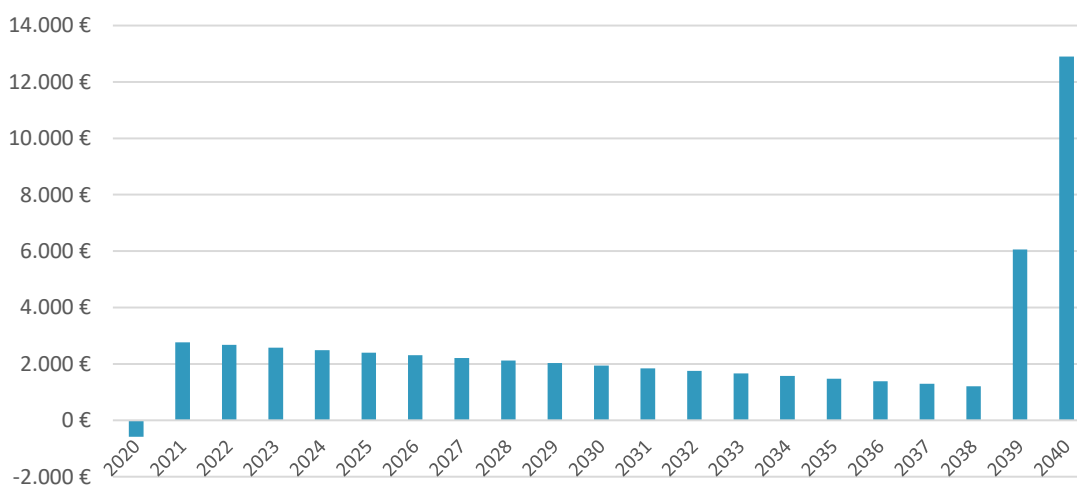A detailed overview of the benchmarking results can be found in Chapter 5. Benchmarking.

2. Operating result and cash flow

Operating result (EBITDA)
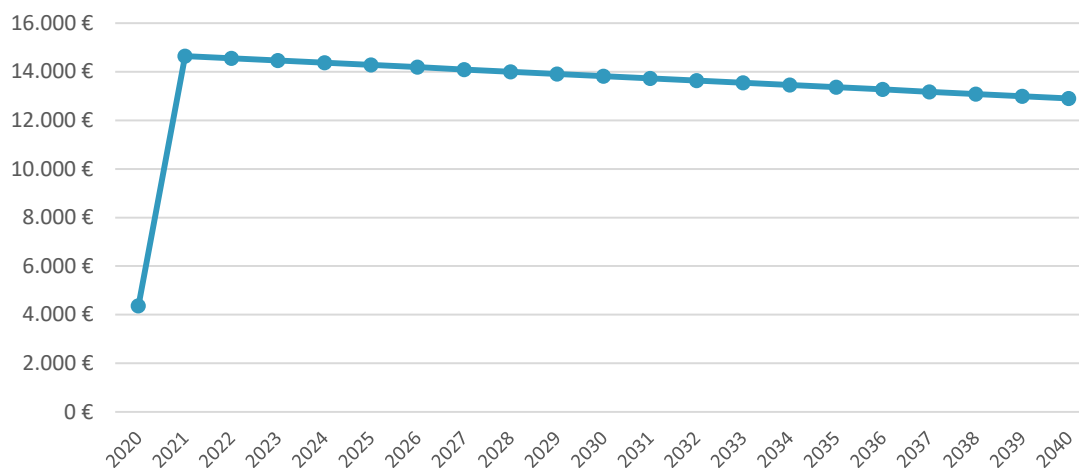
The chart shows the operating result/income (EBITDA) in each year of operation, starting from the grid connection. The operating result is the income left after deducting the operational expenses.

Cash flow

This is a graphic representation of the cash flow before taxes and depreciation in each year of operation. The cash flow describes the available financial resources, i.e. income after deducting all operational and financial expenses.

3. Detailed cash flow

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Earnings 1st compensation [€]	4.436	13.792	13.723	13.654	13.584	13.515	13.446	13.376	13.307	13.238	13.169
Earnings 2nd compensation [€]	0	0	0	0	0	0	0	0	0	0	0
Earnings 3rd compensation [€]	1.432	4.452	4.430	4.408	4.385	4.363	4.340	4.318	4.296	4.273	4.251
Lease [€]	417	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operating expenses [€]	1.083	2.600	2.600	2.600	2.600	2.600	2.600	2.600	2.600	2.600	2.600
EBITDA [€]	4.368	14.645	14.553	14.461	14.370	14.278	14.186	14.095	14.003	13.911	13.819
Interest 1st Loan [€]	1.841	4.287	4.097	3.902	3.703	3.498	3.289	3.074	2.854	2.628	2.397
Repayment 1st Loan [€]	3.110	7.595	7.785	7.979	8.179	8.383	8.593	8.807	9.028	9.253	9.485
Interest 2nd Loan [€]	0	0	0	0	0	0	0	0	0	0	0
Repayment 2nd Loan [€]	0	0	0	0	0	0	0	0	0	0	0
Cash flow [€]	-583	2.763	2.672	2.580	2.488	2.396	2.305	2.213	2.121	2.030	1.938
Cumulated cash flow [€]	-583	2.180	4.852	7.432	9.920	12.316	14.621	16.834	18.956	20.985	22.924
Amortization [%]	0%	9%	19%	30%	40%	49%	58%	67%	76%	84%	92%

Year	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Earnings 1st compensation [€]	13.099	13.030	12.961	12.891	12.822	12.753	12.683	12.614	12.545	12.475
Earnings 2nd compensation [€]	0	0	0	0	0	0	0	0	0	0
Earnings 3rd compensation [€]	4.229	4.206	4.184	4.161	4.139	4.117	4.094	4.072	4.050	4.027
Lease [€]	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operating expenses [€]	2.600	2.600	2.600	2.600	2.600	2.600	2.600	2.600	2.600	2.600
EBITDA [€]	13.728	13.636	13.544	13.453	13.361	13.269	13.178	13.086	12.994	12.903
Interest 1st Loan [€]	2.160	1.917	1.667	1.412	1.150	882	607	325	57	0
Repayment 1st Loan [€]	9.722	9.965	10.214	10.469	10.731	10.999	11.274	11.556	6.874	0
Interest 2nd Loan [€]	0	0	0	0	0	0	0	0	0	0
Repayment 2nd Loan [€]	0	0	0	0	0	0	0	0	0	0
Cash flow [€]	1.846	1.755	1.663	1.571	1.480	1.388	1.296	1.205	6.064	12.903
Cumulated cash flow [€]	24.770	26.525	28.188	29.759	31.239	32.627	33.923	35.128	41.191	54.094
Amortization [%]	99%	106%	113%	119%	125%	131%	136%	141%	165%	216%

The table shows the cash flows of the project before taxes and without depreciation over the entire period under consideration of the photovoltaic system by showing the income and expenses in each operating year. The energy generated and the resulting monetary income are offset by the expenses of operating the photovoltaic system and the debt service (if debt capital is used). In the first year, a relatively low yield can result if the plant is commissioned during the year.
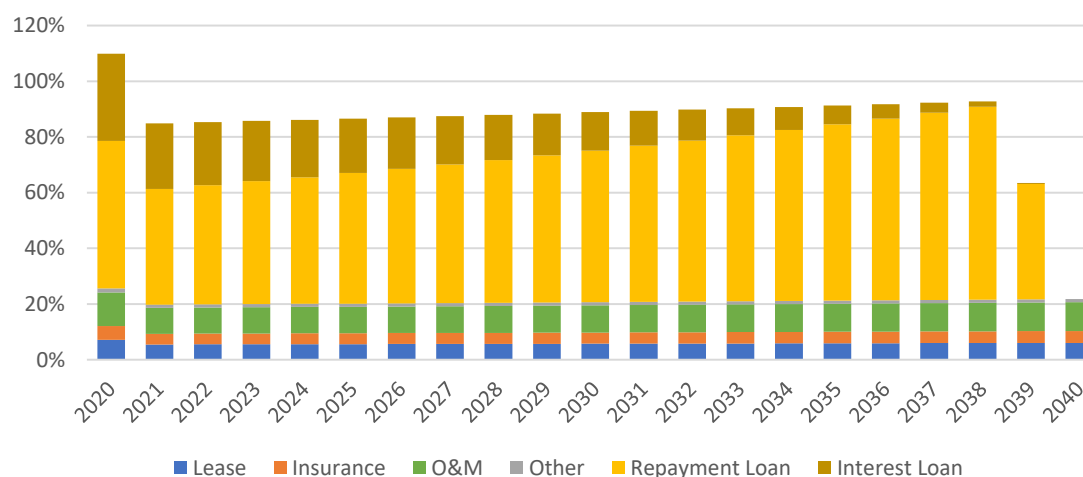
4. Expenses

Expenses total
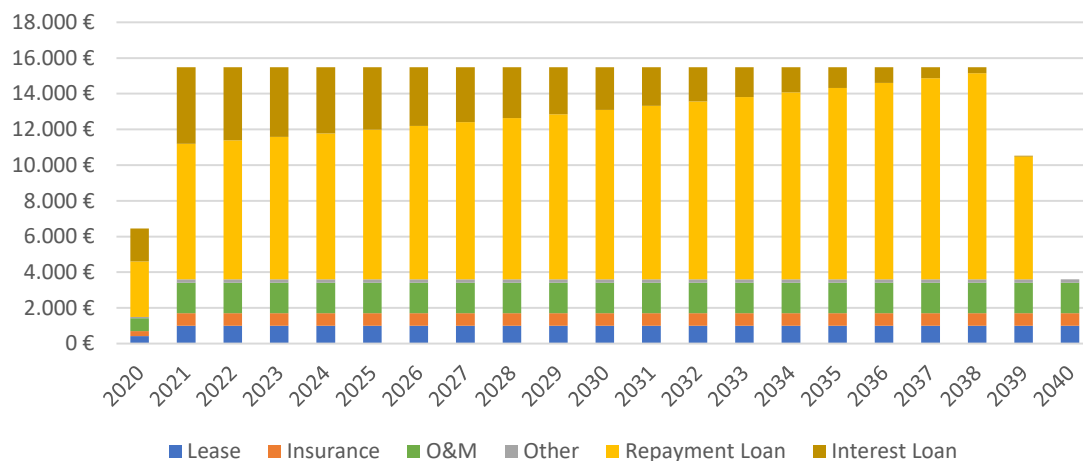
The chart shows the total expenses of the project. The expenses are divided into lease, insurance, other expenses, operation and maintenance. Furthermore, the financing costs such as repayment and interest efforts are displayed.

Expenses to earnings ratio

This chart shows the shares of the individual expense factors in relation to the yield of the project. The distribution may change over time.

5. Benchmarking

Summary

Potential Insurance p.a.	323,75 €	(46,3 %)
Potential O&M p.a.	87,50 €	(5,1 %)
Remaining term	20,33 years	
Potential total [€]	**8.362 €**	

Taking into account Milk the Sun's benchmarks, a total amount of 8.362 € can be saved for the remaining term of the PV project.

A detailed comparison of the given expenses in relation to the current market prices, based on Milk the Sun's data, is shown below. Certain assumptions about specifics of the project were made for the calculation of the benchmarks.

Insurance

Expenses p.a.	700,00 €
Benchmark	376,25 €
Potential	323,75 € p.a.

Milk the Sun's insurance benchmark includes the expenses for a liability and all-risk insurance given the current central european market conditions, without any special surcharges.

For the project under consideration, insurance costs of 376,25 € per year can be expected. Thus, the project shows a savings potential of 323,75 € per year in the field of insurance.

Operation & Maintenance

Expenses p.a.	1.700,00 €
Benchmark	1.612,50 €
Potential	87,50 € p.a.

Milk the Sun's operation and maintenance benchmark includes a professional service package that consists of an annual inspection, 24/7 remote monitoring and an incident management within central european markets.

For the project under consideration, O&M costs of 1.612,50 € per year can be expected. Thus, the project shows a savings potential of 87,50 € per year in the field of O&M.

6. Sensitivities

Return on equity to equity share
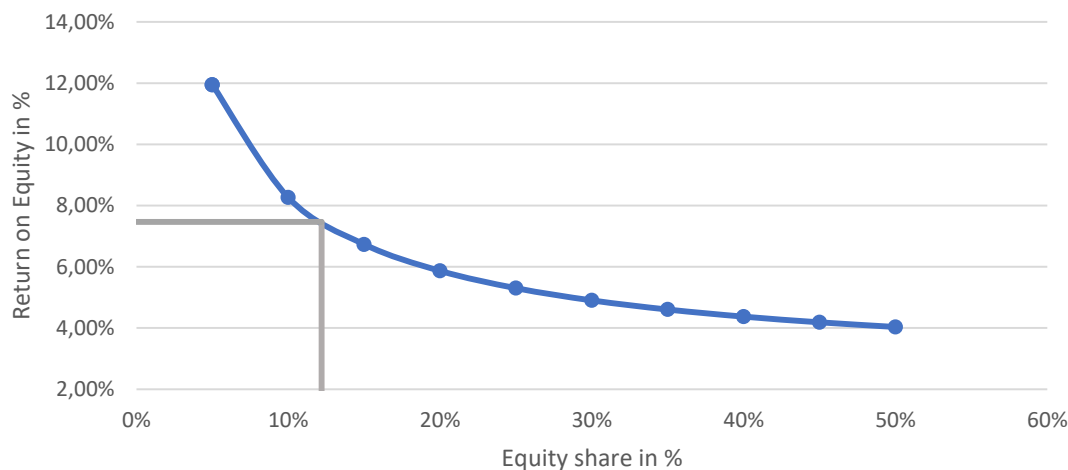
This chart shows the return on equity at various equity rations from 5% to 50%. The return on equity can be leveraged according to the "leverage effect" by increasing the amount of borrowed capital under the condition that the return on investment exceeds the interest rate for the debt financing. For the calculation of this sensitivity, the loan interest rates were treated as constant. Any interest rate adjustments resulting from the adjustment of the equity portion are not taken into account.

Avg. cash flow to specific yield
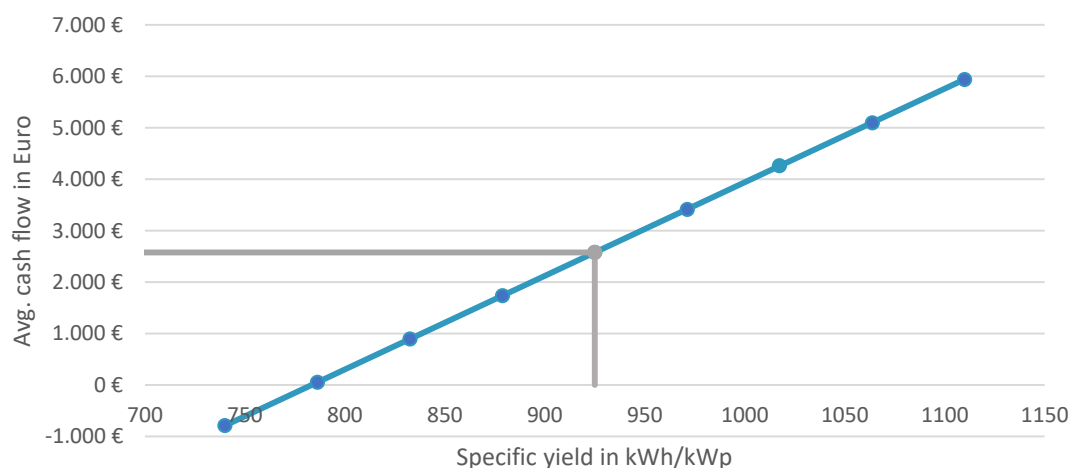
This is an illustration of how the average cash flow is influenced by the specific yield. A deviation from the expected yield caused by improper maintenance or soiling of the modules can significantly lower the cash flow.

7. Data and assumptions

Input data

Project	Turnkey PV-System		
Customer Name	Peter Peterson		
Project size [kWp]	215,00	1st Loan amount [€]	180.000
System type	Rooftop mounted	1st Loan type	Annuity loan
Specific yield [kWh/kWp]	925,00	1st Loan grace period	-
Grid connection	01.08.2020	1st Loan interest rate [%]	2,50
Initial investment [€]	205.000	1st Loan start date	01.08.2020
1st Compensation amount [ct/kWh]	8,20	1st Loan end date	31.07.2039
1st Compensation consumption [%]	85	1st Loan duration	19 years
1st Compensation end	31.12.2040	2nd Loan amount [€]	-
2nd Compensation amount [ct/kWh]	-	2nd Loan type	-
2nd Compensation consumption [%]	-	2nd Loan grace period	-
2nd Compensation end	-	2nd Loan interest rate [%]	-
Self consumption amount [ct]	15,00	2nd Loan start date	-
Self consumption amount [%]	15,00	2nd Loan end date	-
Country	Germany	2nd Loan duration	0 years
Degradation [%]	0,5	Insurance p.a. [€]	700
Lease type	Yearly lease	O&M p.a. [€]	1.700
Lease [€]	1.000	Other expenses p.a. [€]	200

Assumptions

Milk the Sun makes various assumptions for a standardised and comprehensible calculation. The influencing factors of inflation, depreciation and taxes are not taken into account for the project calculation. An overview of the assumptions made can be found below.

Period under consideration	20 years	Discount rate [%]	6,0
Days per year	360 days	Taxes [%]	0,0
Inflation [%]	0,0		

• The period under consideration always ends on the 31st of the final year
• Degradation starts after first year of operation, with correction in January (on an yearly basis)
• Calculation for expenses and loans on a monthly basis, bank conformity with the 30/360 method
• No leap years, standard of 360 days per year (see above)
• Self consumption is added to the operating result as a positive income
• The following energy distribution during the year is assumed for the calculation of earnings:

January	2,0%	July	14,5%
February	3,5%	August	13,0%
March	7,5%	September	9,0%
April	11,0%	October	5,0%
May	14,5%	November	3,0%
June	15,0%	December	2,0%

8. Glossary

Term	Explanation
Amortization (period)	Describes the process of covering an intitial investment through generated future cash flows. The amortization period is the amount of time it takes for the initial investment to be fully repaid.
Annuity loan	An annuity loan is amortized by a series of identical installments (annuities). The annuities consist of the loan principal and interest charges.
Borrowed capital	Money that is loaned to a business or a private person from banks, investors, etc. for the purpose of an making investment.
Cash flow	The amount of money that moves (flows) in and out of a business or a project during a certain period, in other words how much money a business receives or spends.
Cumulated cash flow	The sum of the cash flow generated in the current period and all previous periods.
Degradation	Represents the expected power loss of a PV-system over time.
Depreciation	Is a non-cash expense that reduces the value of an asset as a result of wear and tear, age, or obsolescence over the period of its useful life.
Discount rate	Is used to make payments that are made at different times comparable in value by converting them to a common point in time.
Equity	The amount of money a business owns which is used to make an investment.
Equity ratio	The percentage amount of equity in an investment.
Fair value	The present (discounted) value of future generated cash flows.
Initial investment	Is the money an organization or corporate entity spends to buy a fixed assets, such as buildings, vehicles, equipment, or land.
Insurance	An arrangement by which a company undertakes to provide a guarantee of compensation for specified loss or damage in return for payment of a specified premium
kWh	Abbreviation of kilowatt-hour. A measuring unit of energy. A kWh is the measure for 1,000 watts acting over a period of 1 hour.
kWp	Abbreviation of kilowatt-peak. Measure of nominal power of a photovoltaic solar energy plant under standard laboratory conditions.
Lease	A contractual arrangement committing the lessee (user) to pay the lessor (owner) for using an asset as well as potential proceeds resulting from it.
Leverage effect	Describes the use of debt on the Return on equity. If the borrowing rate is below the total return on investment, the use of outside capital will increase the return on equity.
Loan grace period	Is a period of time creditors give borrowers to make their payments before incurring a late charge or as an incentive of a later interest start for liquidity advantages.
Milk the Sun benchmark	A comparison of the given expenses in relation to the current market prices, based on Milk the Sun's data and expectations.
Net present value	Value of the future money back flow, determined by discounting future investment income from an investment to the present time.

8. Glossary

Term	Explanation
Operating result (EBITDA)	Monetary annual result from the operation of a photovoltaic system less the costs incurred annually for the operation of the system, but without taking into account interest payments. EBITDA is the economic indicator which considers earnings before interest, taxes, depreciation and amortisation.
Operation & Maintenance (O&M)	Regular upkeep and inspection of a photovoltaic plant ensures stable production.
Renumeration form	Payment for generated electricity from PV systems and other energy sources fed into the public grid.
Return on equity	Indicator of how much return is generated through the use of equity in a given amount. The return on equity is the ratio of net income to equity. The higher the return on equity, the more worthwhile an investment.
Return on investment	The return on the investment that generates the total capital, in disregard or in the absence of borrowed capital.
Sensitivity	The reaction of the variable under consideration to the change of another variable on which the variable under consideration depends. For example, the yield of a photovoltaic system depends positively on the specific annual yield.
Specific yield	Describes how many watt hours per installed capacity are produced by the photovoltaic system in a defined time interval. Is given in kWh/kWp and enables the direct comparison of photovoltaic systems of different sizes.

9. Legal disclosure

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