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"Key Steps in determining the feasibility of a solar power plant"

In recent years the drive to build solar power plants has increased. The cost of the electricity generated from solar power is much higher than for other renewable energy sources as shown in Table 1.

Despite this fact solar power plants are being installed around the world. There are several reasons for this. These include, reducing a countries dependence on oil, increasing a 'green' image, reducing CO2 emissions and an attempt to create new jobs and reducing a countries dependence on imported expensive diesel for power generation. In some parts of the world Solar power is the only alternative renewable energy that has the potential to provide significant quantities of electricity. The costs for the development of solar panels have been coming down as the technology improves and more facilities to manufacture the panels are being built.



Table Electricity Production Costs

POWER SOURCE	COST €/MWh
Nuclear	28-35
CCGT	35-40
Hydroelectric Power	25-60
Solar	380
Wind	60

In order to make a solar power project viable a Feed-In Tariff, alternative incentive schemes such as green certificates or high grant subsidies are required. However a Feed-In Tariff scheme maybe the most attractive one for investors. In this kind of incentive system the solar power plant is guaranteed to be able to sell the produced electricity at a pre-determined set price over the life time of the plant.

The key stages in studying the feasibility of a solar power plant project are in determining the:

- ▶ **Solar Potential** – The amount of electricity that can be produced annually.
- ▶ **Capital Expenditures** – This includes determining the type of photovoltaic cell to be used, grid connection requirements as well as installation and construction costs.
- ▶ **Project Schedule** – Development studies, installation and construction, grid connection work, payment schedule.
- ▶ **Operating Expenditures** – Insurance, operating and maintenance, business taxes, land leases.
- ▶ **Profit and Loss Forecasts, Cash Flows, depreciation of capital assets & Debt Structure**

It is important that all the stages above are carried out correctly to give the project developer a precise evaluation of its financial need of the project. This will ensure that the project is financially viable at any point in time over the lifetime of the plant including its development.

A good feasibility study should also provide the developer with an estimate of some key ratios, so parties involved in development can appreciate its bankability. If the key first assumptions regarding the CapEx, Opex and electricity production levels show that the DSCR\*1 and LLCR\*2 ratios are less than zero then the project may have to be adapted so it can be financed according to project finance standards.

Once all these elements have been reviewed and compliance with bank expectation ensured the developer will be able to check that the project Internal Rate of Return is above 20% and look for potential equity partners.

Below is a typical Cash Flow Statement for a 50MW photovoltaic power plant for which the interest rate was assumed to be 8%. The cash flows generated vary in function of interest rate and debt to equity ratio.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
<b>Cash Flow Statement including Equity</b>																								
Cash Flows	0	0	-23800000	-26696036	-2953188	-990678	903373	1890079	3448115	5037050	6658035	8312266	10000986	11725479	13487080	15287172	17127185	19008606	27720611	35734436	37006816	38327103	39697069	20271559
Equity			27500000	27500000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANNUAL CASH FLOWS	0	0	3700000	430344	-2953188	-990678	903373	1890079	3448115	5037050	6658035	8312266	10000986	11725479	13487080	15287172	17127185	19008606	27720611	35734436	37006816	38327103	39697069	20271559
CUMULATED CASH FLOW	0	0	3700000	430344	1377154	886476	1289851	3179926	6628041	11665091	16323125	26635392	36636377	48361856	61848937	77138108	94261293	112127189	140992510	176726946	219378763	252060865	291757933	312029493
FINANCIAL NEED ESTIMATE			23800000																					

Such a cash flow statement gives relevant information to the project developer about whether its financial need will be sufficiently covered both by debt and equity at any point in time of the power plant project lifetime.

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