Efficiency Analysis of Photovoltaic Systems for Carbon Footprint Reduction

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Summary

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Introduction

- Energy is crucial to all aspect of human life
- Climate Change has caused many issues
- The latest world energy council study demonstrates that there will be no revolution in existing energy production, and also by 2020 the request of energy would be increased roughly 50%–80% in compared to 1990 baseline
- Today the Result of evaluation of energy consumption is 22,109 kW h per year
- Upgrading and emphasizing the renewable energy market will be a factor for ecosystem endurance by decreasing the emission in general

Renewable Energy Technologies

- Solar
- Hydropower
- Geothermal
- Biomass
- Etc.

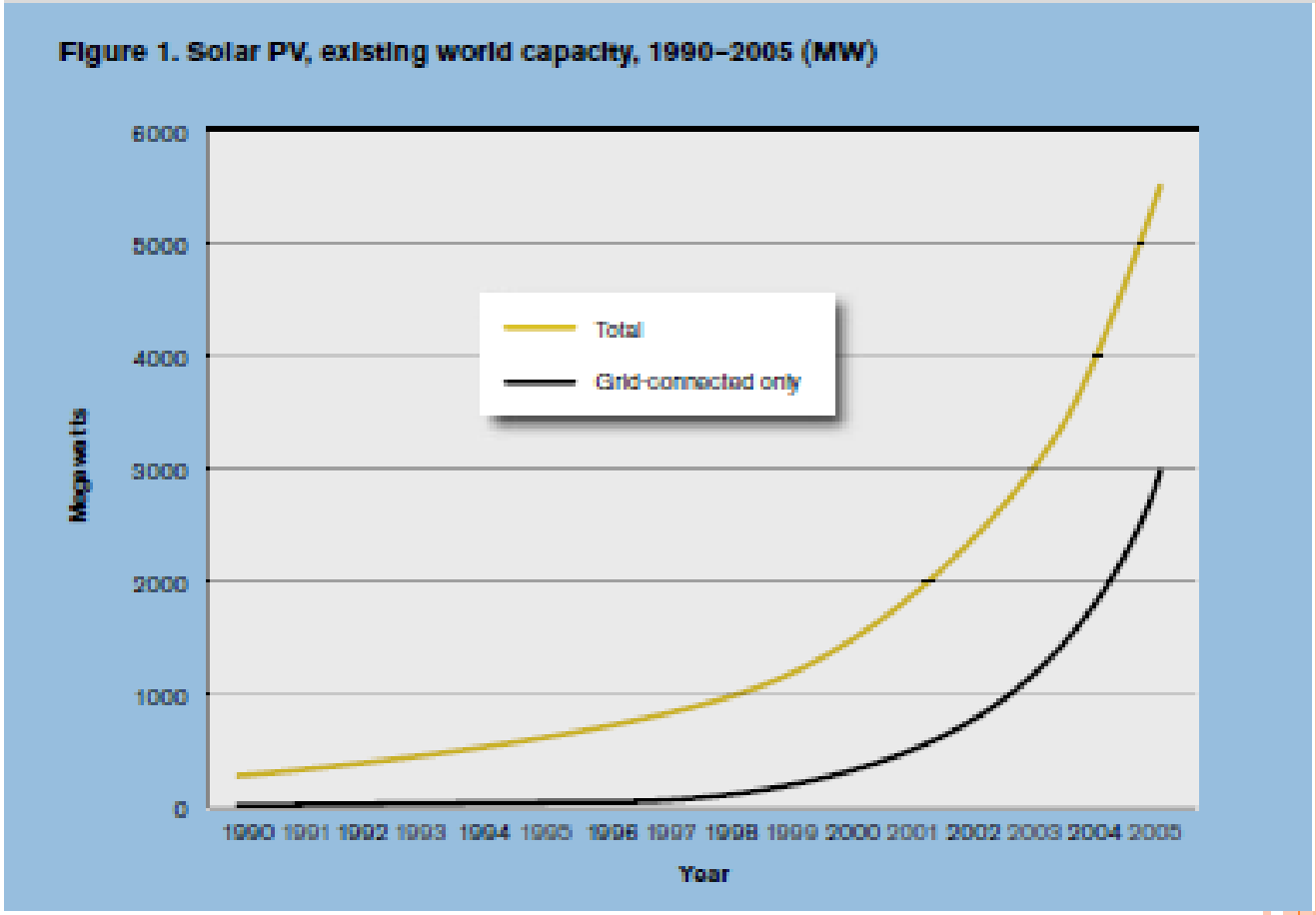
There are various debates on Nuclear energy and its consequent probable environmental issues

Solar Technologies

- Categorized into two major technologies:

-Photovoltaic

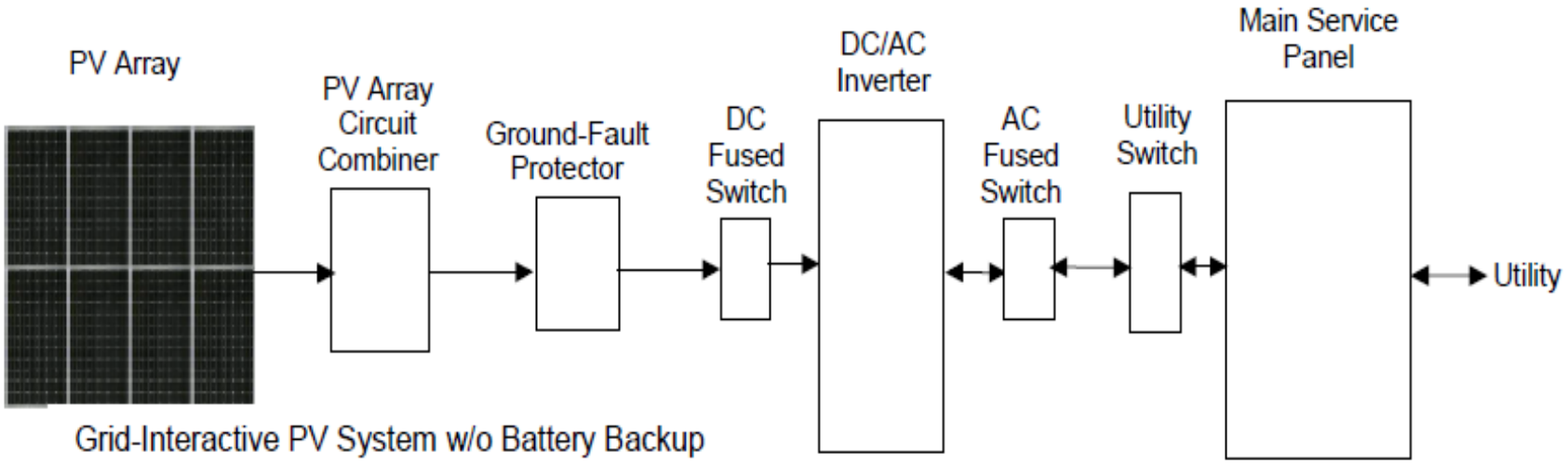
-Solar Thermal



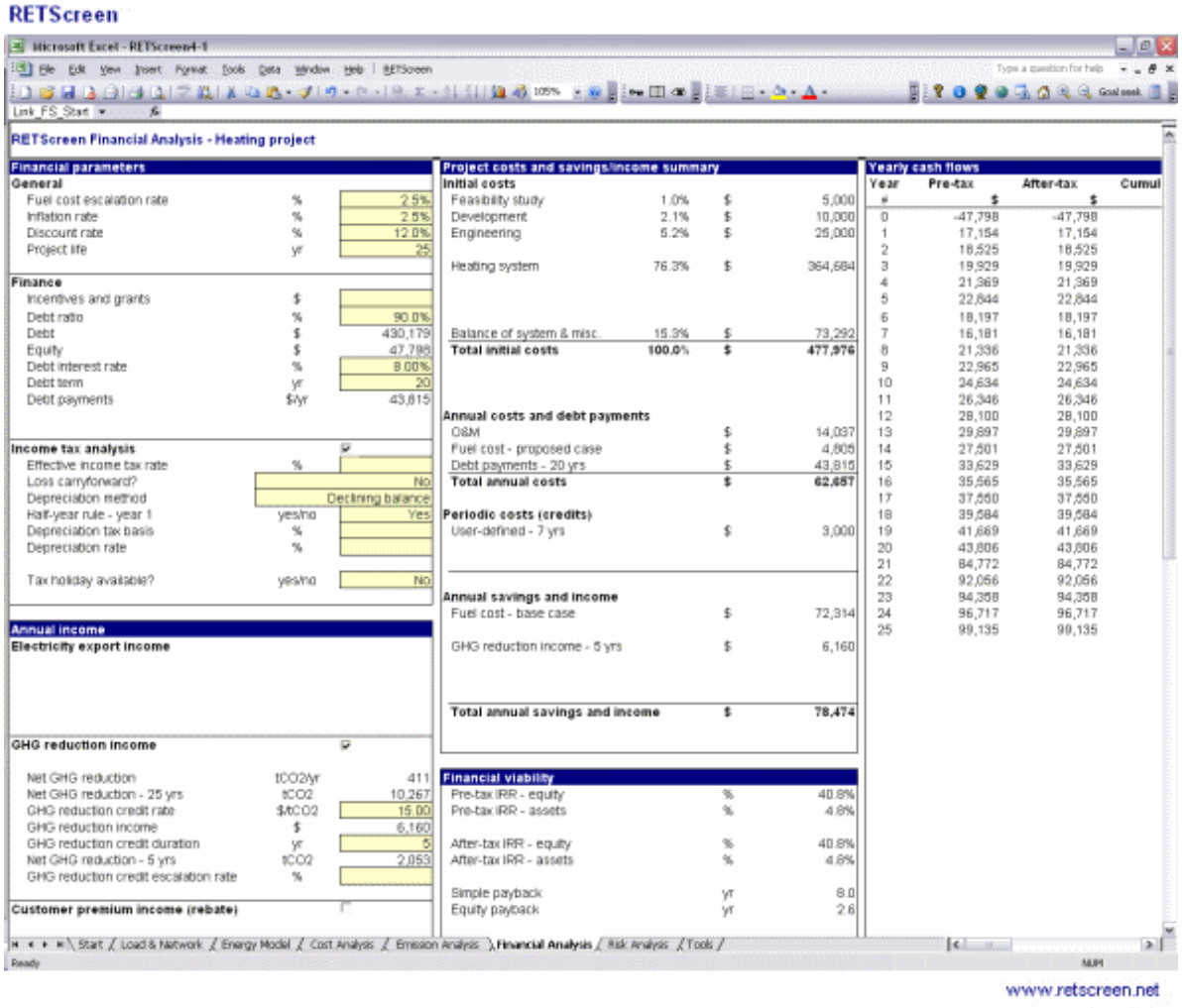
PHOTOVOLTAIC

Today, Photovoltaic is the most common application which is measure as the sustainable energy producer

The standard PV solar silicon is made of two layers: phosphorus-doped (N-type) and boron-doped (P-type)



RETSCREEN FOR ENERGY MODEL CALCULATIONS



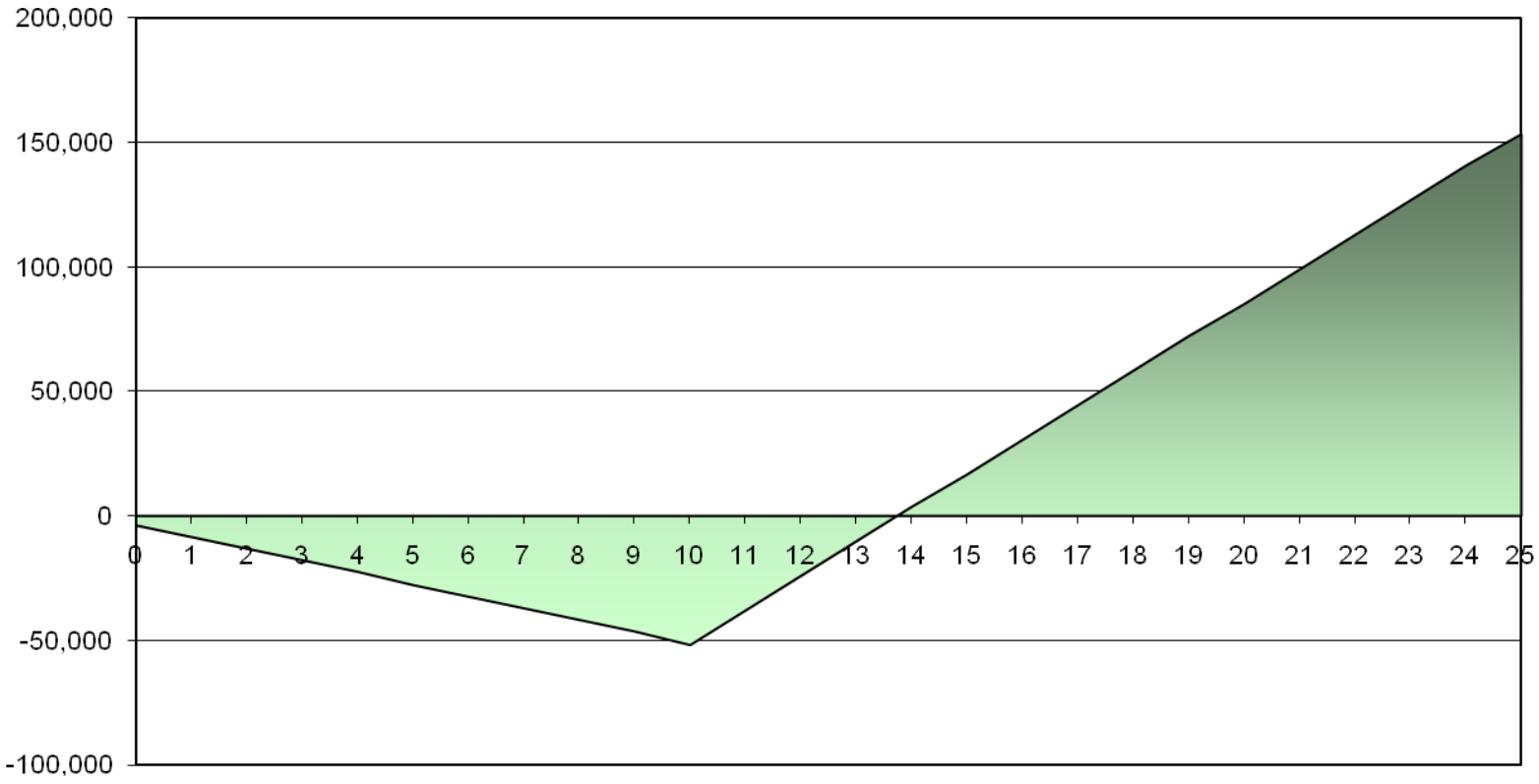
Assumptions

- In order to assess the installed array's power cost on a per kWh basis, several parameters need to be defined:

Parameter	Value
Solar Tracking Mode	Fixed
Project Life	25 years
Efficiency	12%
Misc Losses	1.0%
Feed in Tariff	0.365 £/kWh
Inverter Efficiency	90%
Capacity Factor	14.6%
Total Electricity Exported	0
Annual O&M Costs	500£
Debt Amount	113,957£
Debt Term	10 years
Debt Interest rate	10%

Case Study Results

- University of East London Library Rooftop
- The energy model has calculated overall annual output of around 32MWh
- with a breakeven point (assuming Feed in Tariffs at 36.5p and savings of 7p/kWh) for 13 years after a 30% capital costs grant with debt covering the remainder at 10% over a 10 ten year period
- The annual return is 2.5% based on total capital cost, or 3.2% based on whole minus the grant, through the original project plan to a cumulative cash flow of £150,000 by the 25th year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Emission Analysis

- The greenhouse gas analysis currently yields annual savings of 18.2tons of CO2 based on the UK's average CO2 emissions of 465kg/MWh with 1% accounting for Distribution losses.

GHG emission reduction summary

	Years of occurrence	Base case GHG emission	Proposed case GHG emission
	yr	tCO2	tCO2
Power project	1 to -1	14.9	0

emission reduction	14.9	tCO2	is equivalent to	2.7	

Conclusion

- Based on this literature about diverse renewable knowledge's and particularly solar, a completely full life cycle evaluation of solar PVs would be useful to reduce the unclear application
- The major comparative concern emphasized throughout the PV array's analysis was its unexpectedly low down capacity factor
- The sum primary capital invested, which is enhanced to 3.2% by the decline of the grant sum from the entirety initial cost

Key References

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Thank You