EFFICIENCY ANALYSIS OF PHOTOVOLTAIC SYSTEMS FOR CARBON FOOTPRINT REDUCTION

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SUMMARY

- Introduction
- Renewable Energy Technologies
- Solar Technologies
- PV
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- Emission Analysis
- Conclusion
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Introduction

- Energy is crucial to all aspects 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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Tracking Mode</td>
<td>Fixed</td>
</tr>
<tr>
<td>Project Life</td>
<td>25 years</td>
</tr>
<tr>
<td>Efficiency</td>
<td>12%</td>
</tr>
<tr>
<td>Misc Losses</td>
<td>1.0%</td>
</tr>
<tr>
<td>Feed in Tariff</td>
<td>0.365 £/kWh</td>
</tr>
<tr>
<td>Inverter Efficiency</td>
<td>90%</td>
</tr>
<tr>
<td>Capacity Factor</td>
<td>14.6%</td>
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<tr>
<td>Total Electricity Exported</td>
<td>0</td>
</tr>
<tr>
<td>Annual O&amp;M Costs</td>
<td>500£</td>
</tr>
<tr>
<td>Debt Amount</td>
<td>113,957£</td>
</tr>
<tr>
<td>Debt Term</td>
<td>10 years</td>
</tr>
<tr>
<td>Debt Interest rate</td>
<td>10%</td>
</tr>
</tbody>
</table>
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
Emission Analysis

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

Thank You