Study of Solar Panel Efficiency and Estimation at an Institution Edifice

Mohammed Baba Sharfuddin Ali Khan 1, Dr. Syed Mujahed Hussaini 2, Abrar Hussain 3
1 M.tech (Scholar), JNTU, Hyderabad
2 BITS Pilani, Hyderabad
3 Assoc Prof, Hyderabad
E-mail: babasharfuddinkhan@gmail.com

Abstract. A photovoltaic cell is an electrical device tool that transforms the vitality of light to
other form with an aid of pv effect, an actual and chemical occurrence. An arrangement of pv
cell is elucidated as a device where voltaic attributes, as current, voltage, resistance, exposure
to light. Singly solar cells are often electrical structure blocks of photovoltaic modules, known
casually as solar panels. A single junction silicon based solar type can make a limited open-
circuit potential of nearly 0.5-0.6 volts. Solar cells are generally set out as photovoltaic,
ignoring of whether a source is from sun or an unnatural light. In computing to making energy,
it can be pre-owned as a photon-detector (ex. infrared detectors), perceive light,
electromagnetic radiations near to visible span, or quantifying light intensity. The operation of
a photovoltaic (PV) stall needs basic attribute: Engagement of light, causing either electron-
hole pair or excitants. The disconnection on charge conveyor for adverse types. The
disconnection on uprooting of those bearers to an outer circuit. In variance to a solar thermal
collector supplies heated by absorbed sun lighting, for a purpose of either straight heat or
deviated electrical power generated from a heat source. A “photo electrolytic cell” on the other
hand, refers straight to a kind of photovoltaic cell (as of developed since Edmond Becquerel,
new dye-sensitized solar blocks), to a device that splits water directly into hydrogen and
oxygen using only solar radiance.

1 Introduction

The site we have selected is an institution building; the institution is established on a large piece of
land measuring 5 acre’s whereby different blocks vary in sizes between 2000-4000sq.yrds totaling to
required space of open land thereby leaving the open space vacant for a garden and an open plot space
for parking. Here parking space can also be used for installation of solar panels using the total
requirement for installation was 5000sq.yrds, solar panel varying between 100-200v can be used in
order to make a setup of required amount of power source the site selected has a hefty range of electric
bill varying between 60,000-70,000pm and the units consumed by the structure is around 6000 units
and the subsidy given by the MNRE is around 25% and the rest 75% is to be taken care by the
institution’s responsibility which can easily be reimbursed in near future as per the requirements. The
general set up is shown in Figure 1.
2 Materials and Methods

The pv cells selected were of silicon based also anti-solar plate conductors which also generated energy during off times of rays, total subsidy given by MNRE is 20%, dual circuit flow selected, inverter, hassle-free battery system and general tools of material used as advised also the readings of irradiance has been noted in Fig 2.

1. Hassle free battery system- ranging a life span of almost 15 years.

2. Silicon based pv cells with a life span of 25 years.

3. Inverter with batteries attached aiding in reaching maximum life of desired form.

4. Aid from the government in bagging a subsidy of around 20% of the total cost incurred on the whole project completion.

5. Clear grounded system for good variance in order to avoid any type of back ends or losses.

6. Temporary stand’s were made of tensile iron to hold the weight of solar panels and be able to withstand it for long duration of time till it gets calculated.
7. On the other side of the stand we took dependency from the side wall’s of roof top in order to get good angle of inclination and also maintain a good posture for a long time without any disturbance’s and get good behavior in case of earthling.

8. The area selected was away from unwanted shades from any other surfaces.

| JAN   | FEB   | MAR  | APR  | MAY  | JUN  | JUL  | AUG  | SEP  | OCT  | NOV  | DEC  |
|-------|-------|------|------|------|------|------|------|------|------|------|------|
| 6.18  | 6.71  | 5.85 | 5.70 | 6.21 | 3.99 | 2.98 | 3.18 | 4.46 | 5.34 | 6.37 | 6.42 |

Figure 2. Average Direct Normal Irradiance

The irradiance experienced from the city of Hyderabad were noted down as per the calendar year with different months whereby the highest noted month was between Feb-may and the lowest one was maintained between July-august (Figure 2).

The whole data was maintained simultaneously as per the requirements of the site and given in accordance to the data noted and average 100v panel was under constant observation from timely based manner.
3. Results and Discussion

![Figure 3. Inverter with Battery setup.](image)

The complete experimental setup included an inverter with life support from a hassle free battery system along with single jointed wire in order to avoid power losses with an aid from dual circuit flow to avoid fluctuations from the system working on it from timely manner based voltage generation (Figure 3). As the internal system is kept under shade in order to keep constant temperature of the internal system and avoid any type of losses due to increment in temperature which increases the capacity of losses during power generation thereby decreasing its life and efficiency also the maintenance cost increases inexorable losses from the whole system of setup generation.

Thus, the readings were calculated and the system power generation was ended from consistent Endeavour from various sites of the whole system either from the output or the input against the system in a moderate and even way out.

4 Conclusions

Therefore, the whole readings were noted using the data generated and it has been concluded that the environment of the institution selected needs a large area for the generation of power so as to meet the requirements and hereby conclude that owing to the shades from nearby places like buildings, plants, residential places increases the maintenance costs, reducing the power generation, increase in the amount of solar collectors in order to reach the consumption limit which indirectly increases the overall cost of the plant thus making it overrated, . Inefficient, time-consuming, lower life time for the overall plant size.
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