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Net-zero housing for typical 2 BHK housing system

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ABSTRACT

Electricity has been an important part of human's life from its beginning but as time passed human used the electricity in an excessive manner and now we are facing problems of load shedding and global warming to reduce this the Designing of various electricity alternatives which will satisfy the electricity need of a particular 2BHK house considering all the requirements of that area. This will helps us to generate our own energy and we won't need to take any electricity from the electricity board. This will be cost-efficient and also will be eco-friendly.

Keywords— *Energy, Net-zero housing, Solar, Photovoltaic, Wind power*

1. DESIGN OF SOLAR PLANT

We have designed a solar power plant for a typical 2BHK house and calculations are done for the same and later on we will be multiplying the same for the whole structure. This PV solar system will initially cost high due to the presence of silicon cells but if the initial cost is neglected for the current situation, the outcomes will be seen for the next 25-30 years without any disturbances. This form of energy is adequate for the skyscraper and we have shown this by calculations and we have also shown the electrical connections which are required for the same. The connection will pass through inverted with charge controller attached to it to pass excess energy passing through the circuit.

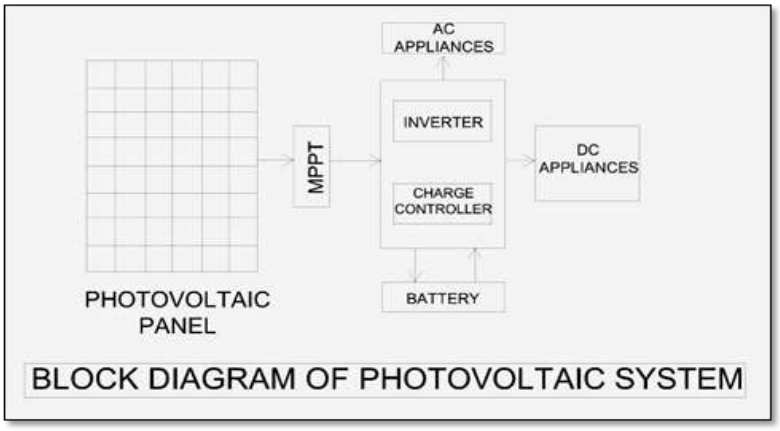

Fig. 1: Block diagram of the Photovoltaic System

2. CALCULATIONS FOR CONSUMPTIONS PER DAY

Table 1: Consumption per day

Component	Power (Watts)	Time/Day (HR)	Number of components	Total unit consumption (KW-HR)
Tube light	18	6	4	0.43
CFL	5	4	6	0.12
FAN (36 inches)	30	7	4	0.84
Iron	550	0.5	1	0.28
Geyser	1000	1	1	1

Fridge (155L)	200	13	1	2.60
Washing machine	500	1	1	0.5
Television	150	1	1	0.45
Desktop	200	1	1	0.4

Total Electricity Consumption of the day = **6.62 Units**

The calculation shown above is for the 2BHK house and this represents the total consumption for the house and to meet this total consumption we will need a PV system and for the output and dimensional requirements of a PV system, we will be using the global formula as shown below. But, using the traditional method every time is a time consuming task so to reduce that time we have developed an Excel program in which we have to give 2-3 basic input data i.e. Total Area available, Solar Panel yield an annual average radiation and this will give us directly the amount of energy developed by our solar panel.

3. GLOBAL FORMULA

$$E = A \times r \times H \times PR$$

Where,
E = Energy (kWh)
A = Total solar panel Area (m²)
r = solar panel yield (%)
H = Annual average irradiation on tilted panels (shadings not included)*
By this formula, we get **5.06 Units** of Electricity generated.

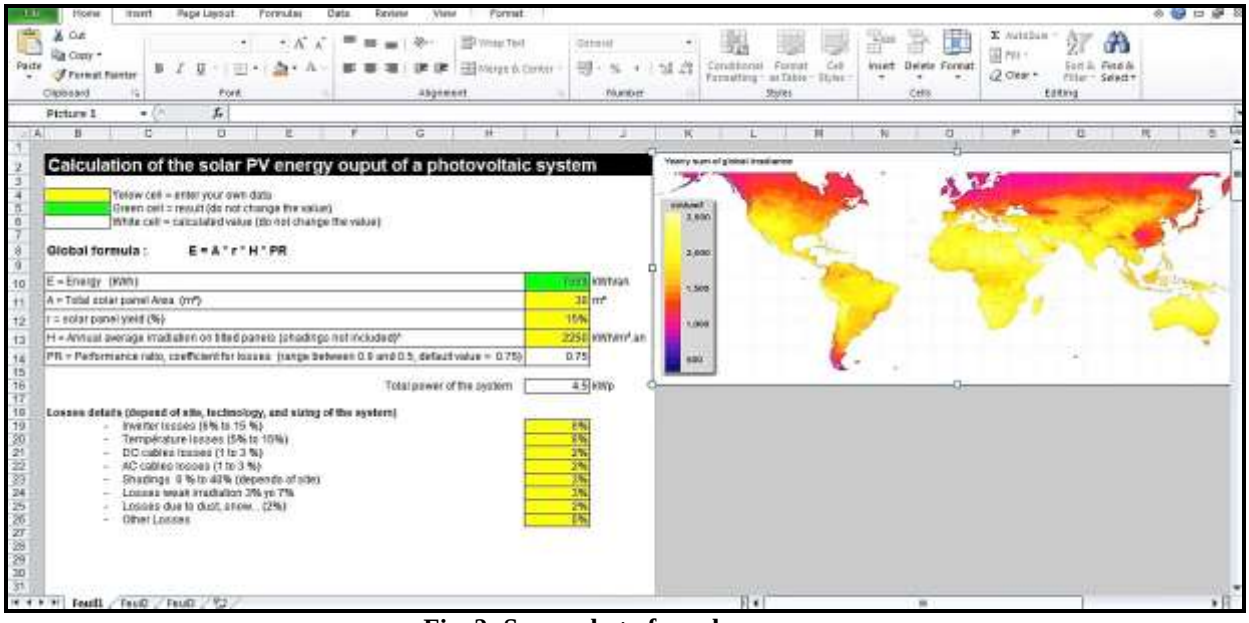

Fig. 2: Screenshot of excel program

The Excel program gives us the accurate output and the image there shows us the annual average radiation required in the input.

4. DESIGN OF WIND POWER

The wind power always keeps fluctuating over the period of time or all day but a very small amount of energy generation is also just sufficient as it saves our green energy. The wind turbine we will be using will be a domestic purpose wind turbine of 1.3m diameter and it is enough for the generation. We will be multiplying the number of wind turbines as per requirement. The variation of wind energy is shown in the graph. All the parameters in the graph are taken for our locality. The variation shown is for the day time i.e. for 24 hours.

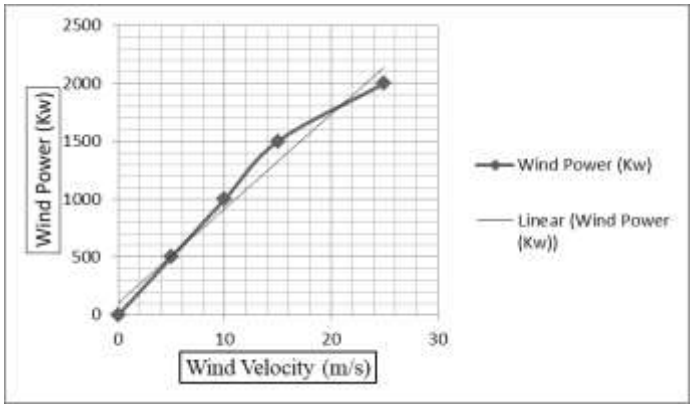

Fig. 3: Variation of wind energy in 24 hours

5. CALCULATION OF WIND POWER

$$P = (1/2) \times \rho \times A \times V^3$$

ρ = Air density (Kg/m^3)
A = Rotor swept area (m^2)
V= Wind speed (m/sec)
By this formula, we get 3.99 Units that is **4 Units** of Electricity generated.
**All these calculations are done for our region considering our region's climatic conditions.

6. CONCLUSION

Power Consumption= **6.62 Units**
Power generated by Solar and Wind Power= 5.06+4 = **9.06 Units**
That is Power Generated < Power Generated.

Therefore, by this system, we will be able to generate more than sufficient energy required by our building. This excess energy can be either send to the grids or can be stored in batteries for further use.

These calculations show us that the Skyscraper will satisfy the Net-Zero housing system and will not require any other source of energy.

7. REFERENCES

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