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Hybrid Technology for Smart Housing Complex Using Nonconventional Energy

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Abstract

The issue of green energy articulates the contours of the vision for a renewable energy grand plan for domestic usage in India. A renewable energy has suddenly become hot in India for last decade. However the vision of 100% renewable future is still anathema to many policy makers. They continue to live in the old world of fossil fuels in which they grow up. The develop world has begun to embrace a renewable future plans are afoot to achieve it by 2050. The application of renewable energy in a smart housing complex accelerates the transmission to low carbon energy system. Judicious control using embedded version gives a sizeable mileage to energy conservation. A grand plan of such housing complex has been extracted to enhance the support in Indian scenario grand plan for energy security gives the acceleration for deployment of control on the multi various renewable sources and assimilate them in common platform of power system make a clean hazard free and energy conservation attributes using smart technology. This is lifting the financial wall removal for our country.

Keyword: Solar; Hydel; Piezoelectric; Nonconventional energy; Fuel cell; Hybrid

1. Introduction

Perpetual population growth hits the living system in the globe complicated simultaneous demand of electrical energy growing by leafs and bounce the number of days on dependency over fossil fuel becomes limited this enables a new item on development of the momentum of alternatives for the controlled generation of electrical energy and distribute among the users. The new and renewable energy grand plan for smart energy efficient housing complex is a process of adequate sustainability. The economic and easy altitude of new energy generation is adopted are given by a) RTGS PV system b) Piezoelectricity c) Portable wind energy system d) Micro hydel production system. Most of the energy dependents on nature, these leads us to think for economic storing of energy. Due to irregularity in the reception of energy healthy control is most mandatory. µc based embedded system makes it linear and convenient for steady use of quality power.

2. Design Procedure

For smart multistoried housing complex provisions have been created for power feeding from different new and renewable sources, namely (a) Solar S.PV power block, (b) Piezoelectric Power block, (c) Micro hydel pumps storage generation block, (d) Utility service power substation. Those supplies are fed to control panel and is executed by arduino one time it issues command to store energy in battery/fuel cell section & to build the potential energy by pump storing water in the overhead preserver. When energy demand is in excess it redirect the power from utility services the entire service D.C rising main is always fed with power source and uninterrupted quality D.C power is available in the bus bars. This D.C power is transmitted to the bus bar via the H.V. D.C system conditioners. Now H.V D.C power is received in each floor and step down to utility D.C voltage preferably at 110 volt D.C to individual floor consumer & one section is reserved for the essential common services viz. street light, staircase light and the pump storage D.C motor. It is notable that use of D.C service is helpful for the point of view of increasing transmission efficiency, improved voltage regulation & economic viability.

3. Piezoelectric Crystal

Piezoelectric crystal produce piezoelectricity which is an electrical charge, produce with the applied mechanical stress. So we can produce electric charge by the pressure.

The quartz crystal is commercially produced piezoelectric material. The piezoelectric crystal is a small scale of energy resources. The main concept of this crystal it produce electricity with the applied

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mechanical stress. The electricity is small, so it is not used in a large scale of industry. It is an electrical transducer because it produce electricity from force, but it generate voltage few mili-volt to ten volt depending of its construction.

Fig1: Piezoelectric

Piezoelectric data calculation for power:

SL No.	Weight	Power(Watt)
1	10 KG	0.12
2	20 KG	0.24
3	50KG	0.60

4. Block Diagram

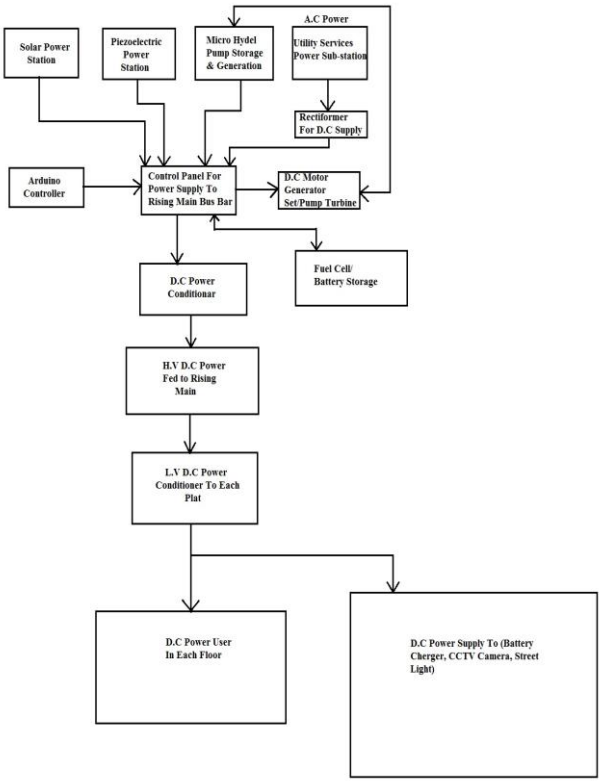

Fig2: Block Diagram of the system

5. Architecture

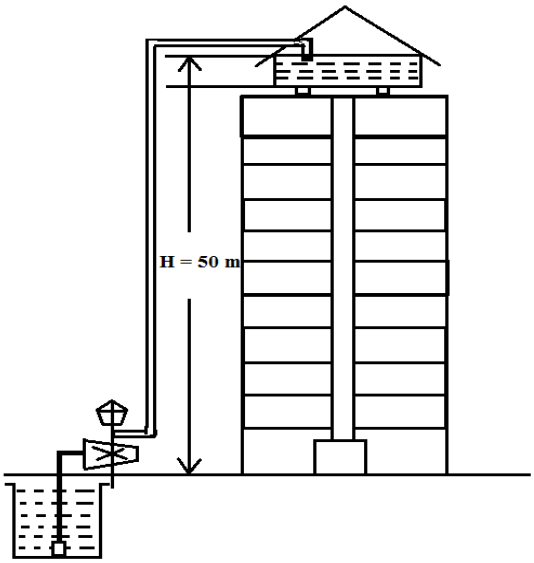

Fig3: Side view

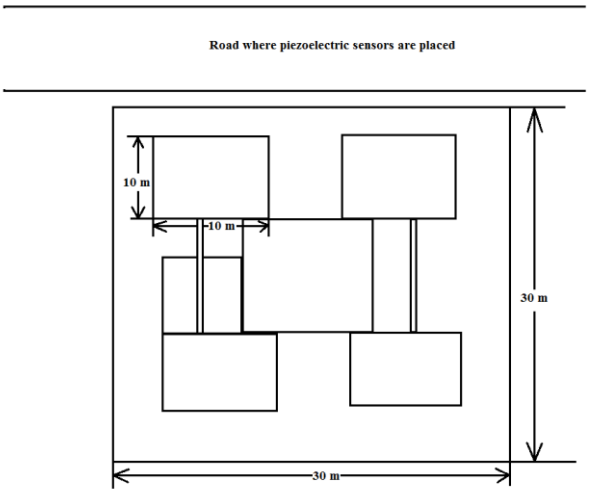

Fig4: Top View

6. Results

Power required for each flat: Power required per flat per day approx

7 * 4 = 28 kW

Required power for 16 numbers of floors:

28 * 16 = 448 kW

Energy demand /day = 448 * 24 = 10752 kWh

Approx. 11000 BOT unit

Let diversity factor = 0.8

Energy required will be = 10752 * 0.8 = 1801 unit.

The total electrical power demand for 64 numbers of flat.

- Power requirement for Common services:- Stair Case :
  16 * 12w = 192w =0.192kw.

- Corridor lighting :
  4 number of LEDs / floor.
  16 * 4 = 64 x 12w = 768w = 0.768 kw.
- Basement lighting:
  100 lamps {10 x 10}
  So, 100 * 12 = 1.2kw
- Street Light:-
  Distance between two streets light is 30Metre
  So 30 * 4=120metre peripheral length
  Considering 5metre distance between each pole
  6 numbers of poles required for each side, so 17 watt x 6 = 102 watt
  For 4 sides 4*102 = 408watt=0.408KW
- For the pump storage the DC Power required will 120 KW.

Total energy required =
(448+1.2+0.768+120+75+0.192+0.408) kW
= 645.568 kW
Let diversity factor, 0.7.
So, 645.568 * 0.7 = 451.8976 kW.
Approx. 500 kW.
From generation site:
From solar per meter sqr can generate 1 kW power.
So, from rooftop surface, 30*30 = 900 m^2= 900* 1 kW = 900 kW.
From Hydel, (pick load time)
kW = ((η * ɣ * H)/102) * Q
= ((0.85*1*50)/102)*3
= 125 kW
From piezoelectric power generation:
From road surface,
Frontal road surface area: 100 m * 30 m = 3000 m^2.
Traffic density = 0.5 vehicle /m^2
As per survey number of vehicle for 3000 m^2 = 1500 vehicles.
Average weight of a vehicle = 1000 kg/vh.
Available avg. total weight= 1500000 kg.
Watt/Power available per 50 kg = 0.6 watt.
So, 1kg with respect to power = (0.6watt/ 50kg)
Total Power Available = 1.5kw
For 8 hrs load total energy 8hrs * 1.5kw=200kwh.
This power will be utilized for battery charging and CCTV camera of the building. so, the number of battery required is 25.
Water Tank & Upper reserver for pump storage:
Water provisoin per head 50ltr, for 5 head family =250ltr.
So, water required per flat 16kltr = 16m^{3s}
Assuming 100% extra actual water required 16 * 2= 32 kltr=32m^3
Total tank volume =30*30*2=1800m^3.
Total overhead storage of water =1800*40=72000m^3 .
If the discharge rate is taken for Q=3m^3/sec.
No. of second available for running the turbine 72000 m^3 / 3m^3 per sec= 24000 sec.
i.e, 24000/3600=6.6hrs (approx 7hrs).

7. Discussion

The design is based on nonconventional energy resources, there so many alternatives for power extractions. The housing complex is getting energy from solar, hydel, piezoelectric as well as a conventional energy source. The system runs through low voltage DC which not fatal as well as Efficiency is high.

8. Conclusion

It is observed that form the survey that the total energy demand of the housing complex can be fulfilled by these energy resources which are eco friendly. The pollution level will be decreased and from the future aspect it will be a massive success in building a smart project in collaboration with nonconventional.

Future Scope

The system of power distribution to the highrise building made through conventional source and non-contionalpower source simultaneously. These helps for neat power facilities and helps for large scale coservation of energy. In future we can update it into 1) Only Low voltage D.C. system, So it is hazard free 2) System efficiency will be improved. 3) By the use of multi facial solar cell the system capacity may be increased. 4) Advanced organic quartz makes the piezo system makes the power generation having high yeild. 5) Pump storage microhedel also adopted for aditional storage of power in bulk level.

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