

ELECTRIFY INDIA (A Practical Approach to Water Scarcity)

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Abstract— The aim of this project is to utilize the power generation potential capabilities especially north eastern states which are suffering from power scarcity and to make them self-powered. In this methodology, by using solar pump, water is pumped into a huge water tank built at several meters in height and then it is pumped for household needs, where a generator is kept on its way. Thus utilizing power in maximum way .It has a dual advantage: it ensures constant supply of water to the households as well as the power needed to light the house can be harnessed from the above methodology One of the main advantage of this project is to eliminate many socio-economic problems such as land acquisition rehabilitation and political problems etc. It is least expensive as well as eco-friendly

Index Terms— solar pump generator renewable energy.

I. INTRODUCTION

One of the major problems faced by many of the underdeveloped countries, especially India is scarcity of power. According to recent estimations about 80,000 villages in India suffers from electricity deficit. This retards the growth of the nation and leads to many socio-economic issues such as poverty, poor education etc. To deal with the above problems, a new methodology has been proposed.

The main application of the project can be viewed in 2 cases. Considering Fig 1 and Fig 2,the case of north eastern and eastern part of India with huge amount of natural resources such as minerals as well as river basins having 40 % of India’s hydroelectricity potential, whereas it accounts for only 14 % of the country’s total installed capacity. The per capita consumption in this area is only 315 units against national average of 704 which indicates the level of access of electricity in these regions. This retards the development of these regions, which contains the national population of 27.4% and 22.67% of total geographic area. Second case is that now a day many of the skyscrapers are along the river side or other water bodies. Accommodation provided by these buildings serves for about 45 % of urban population where most of those were employed. Thus the consumption of electricity is very large during the peak time (non-office hours 5: 30 pm to 6 am) where the tariff is almost double. The

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state electricity boards are facing problems and such a consumption pattern is not good for a healthy power system.

The main application as well as advantage of the project lies in the fact that it is easy to implement, requires least amount of technical skills, we use renewable sources, doesn’t create any disturbance to the nature and does not cause political issues as in the case of nuclear projects.

II. CASE STUDY OF ELECTRICITY ACCESS OF VARIOUS PARTS OF INDIA

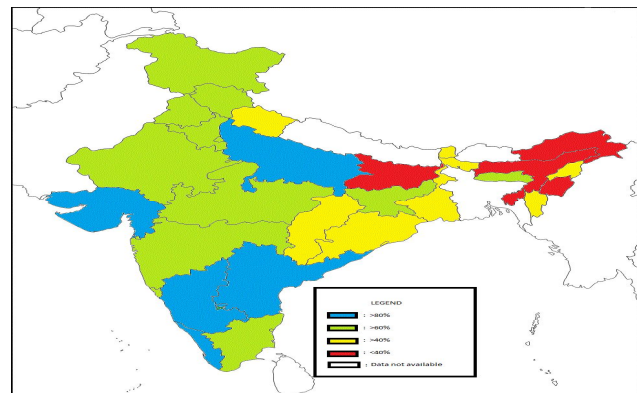


Fig 1 :Percentage of regions electrified across India

2.1 North Eastern States

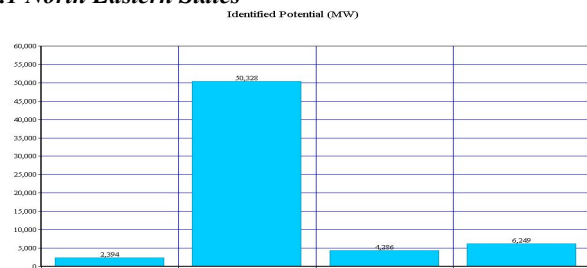


Fig 2: Identified Potential(In MW)

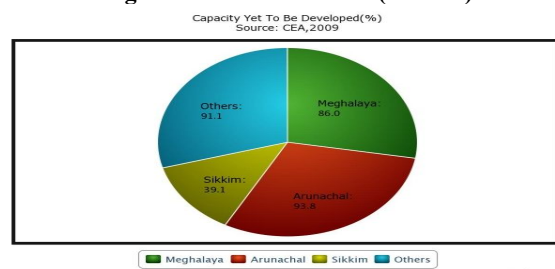


Fig 3: Capacity yet to be developed

Referring to the above figures, analysis shows that majority of regions in North Eastern states are still needed to be electrified although enough potential is available in these regions .

III. SOLUTION

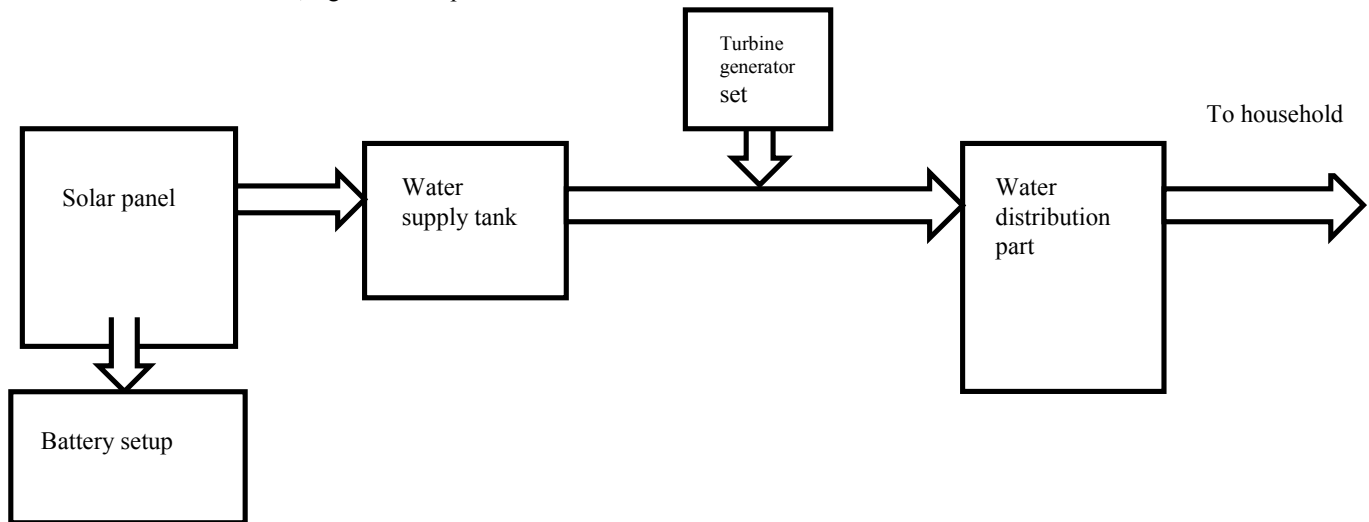
The solution to the problems discussed above can be viewed as given below:

3.1 North Eastern and Eastern States

As the North eastern states of India were covered by the mighty Brahmaputra-Barak river system, large tanks are erected near the river basins and bio degradable solar pump is used to pump water to the tank during the day time. A battery set up is also provided to store the excess amount of power generated. The tank constructed can be viewed as a reservoir that supplies water to the households nearby. On the way to the distribution section, a generator is placed which is used to

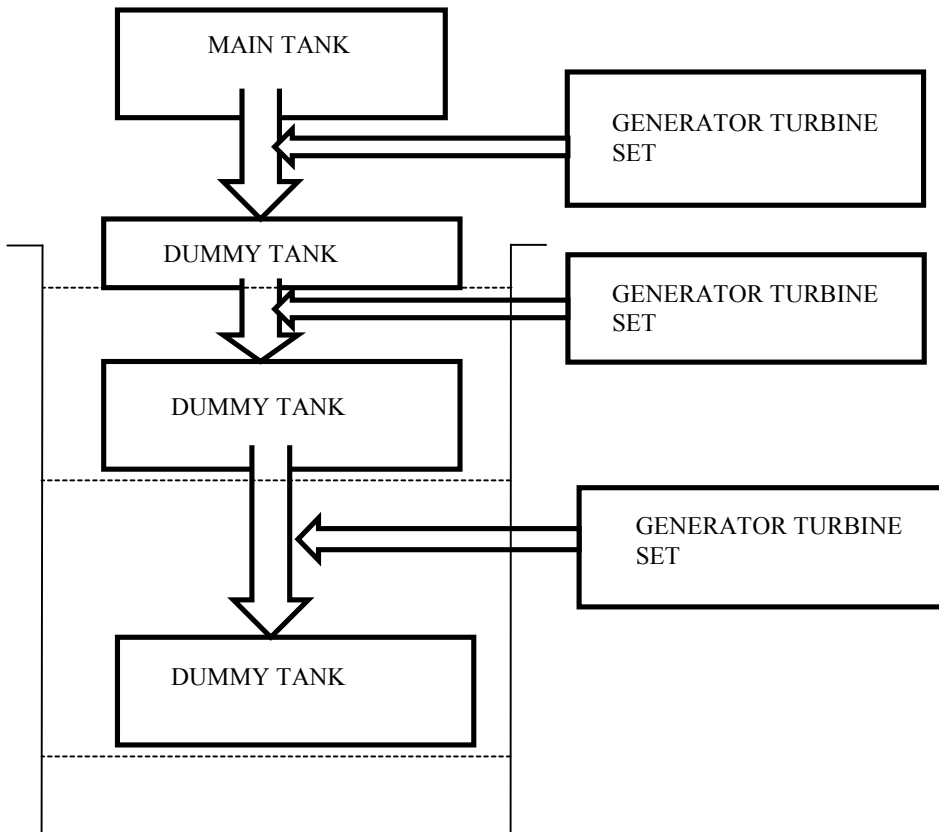
generate electricity. Since the power generated depends on the velocity of water falling to the turbine, the distribution pipe is designed such that its area of cross section is large near the tank side and it reduces as it approaches the generator side ($A_1 V_1 = A_2 V_2$).

A tank of 1lakh L capacity at a height of 50m will have a net potential energy of $m \cdot g \cdot h = 4,90,00,00$ J of energy. Considering all the losses (mechanical, electrical, fluidity losses), we can obtain about 40% efficiency which is 1,96,00,000 J of energy i.e. we could get 19.6 MW of power for about a sec.



3.2 Skyscraper buildings

In case of such buildings near river basins, the main tank is constructed at much height above the building and small dummy tanks are constructed at each floor as shown in the block diagram, to ensure continuous flow of water through the outlet pipes. On the way to each dummy tank, generators are placed to harness energy.



3.3 Practical Implementation



A prototype of the proposed system was implemented. We used a solar panel to pump the water to the top of the tank. We have a control panel which controls the water level of the tank and switches off the motor accordingly. We implemented a control switch to switch the power between the main supply and generated supply

CONCLUSION

By the proper application of the above methodology we can light around 50 to 70 houses, along with continuous water supply, thus putting up a step to lighten up India. Also in case of skyscrapers, corridor lights that are to be ON during the night time can be energised by the proposed mechanism. In cities this method could be implemented in flats and hostels.

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