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A Review on Microhydel Canal Based Hydroelectrical Energy Generation Plant

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***Abstract:** Energy generated by the force of water in hydropower can provide a more sustainable, nonpolluting alternative to fossil fuels, along with other renewable sources of energy, such as wind, solar and tidal power and geothermal energy. Among all the renewable energy sources, small hydropower is considered to be one of the most promising. Much of small hydro potential is in the hilly and remote, inaccessible areas of India, where generation from other sources or transmission of power over long distance would not be feasible. In the present paper, a brief description of small hydro potential and the methodology for developing small hydropower project has been discussed Based on the literature survey various environmental problems has been discussed.*

I. INTRODUCTION

In order to diversify the country's power generation mix, the Government of India, has issued several national policies to promote their further development. Among the renewable energy source, small hydro power contributes 13% of the total grid-connected power generation, thereby constituting second largest grid-connected system after wind power, as per the report by Ministry of New and Renewable Energy. India is endowed with a vast and viable hydro potential for cleaner power generation. Due to its abundant availability, it can be utilized effectively to reduce the gap between the energy demand and supply. Development of small hydro power plants rapidly is one of the important assignment in the policy announced by the Ministry of Power. Such kind of power plants is quite possible wherever water resources are available and where power is to be provided to remote areas away from the grid. Kerala state has huge untapped potential for small hydro power generation. Small, mini and micro hydro power plants play an important role in electrifying the rural parts Hydropower is the conversion of water to electrical power. It is one of the oldest forms of, and is the most developed renewable energy technology. A hydroelectric power station consists of turbines that rely on a gravity flow of water from the dam to turn a turbine to generate electricity. The water can be either released to the river downstream of the dam or pumped back into the reservoir and reused. We are introducing our project named MICROHYDEL CANAL BASED HYDROELECTRICAL ENERGY GENERATION PLANT to fulfill the requirement of many areas all over India as well as worldwide.

II. OBJECTIVES

A. To generate electrical energy with the help of potential energy of flowing water.
B. To provide the economical solution to the crisis of electricity all over the world.
C. To generate electricity for the streets near to the execution place for saving the electricity produced.
D. To observe the effect of this system on the nearby areas and the effects on the electricity supply.

III. PROBLEM STATEMENT

With the increase in population and industrial growth, the demand of power is increasing at a faster pace. The total installed generating capacity of the state is 6160 MW out of which the share of hydro is 522.50 MW. Small hydro power project can play an important role to overcome power crisis by generating additional power. As per the norms and conditions of canals in urban India and NMRE, We made an assumption for the success of the project and the vast use of project at canals

IV. FUTURE SCOPE

In the year 2020 the use of hydropower was 22.5 GigaWatt. It is assumed that the use of hydro energy plant is to grow up to 125GigaWatt by the year 2030. Hydropower benefits beyond electricity generation by providing Flood Control, Irrigation Support & Clean Drinking Water. Hydroelectric power plant is domestic source of energy allowing each state to produce its own energy without being dependent on international fuel resources. Hydroelectric power is low cost electricity and durability over time compared to construction cost can be migrated by using for construction of bridges dams and tunnel. As it's a canal based system, Streetlights near to the canal can be supplied with electricity. This reduces the use of electricity

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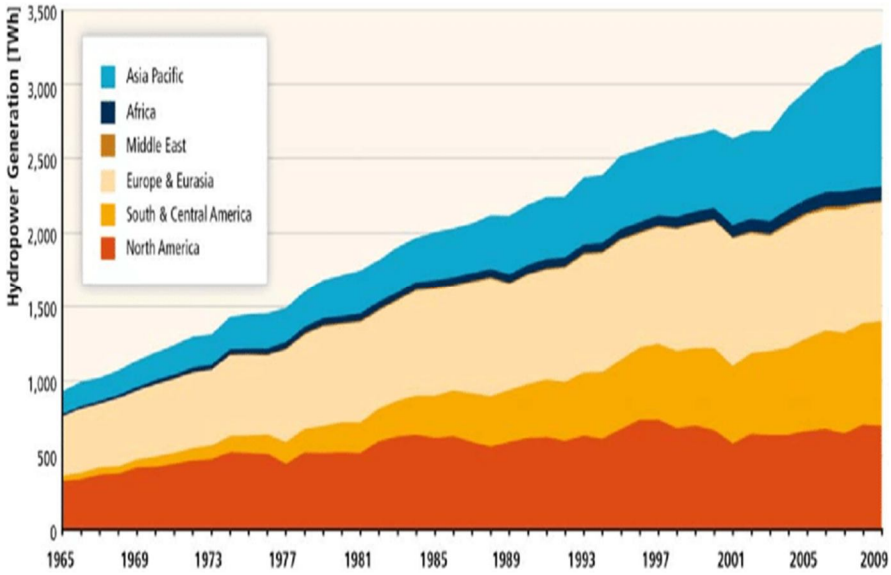


Fig.1. Growth of Hydropower all over World.

V. LITERATURE REVIEW

The initial step in the development of this work was reviewing all the existing documents around the project pre-feasibility and feasibility studies done p reviously. Moreover, a literature review was performed around hydropower basic theory and equipment, with main focus on small hydro power development in different parts of the world.

The previous studies made on this type of system are listed below:

A. S. U. Patel, Prashant Pakale, Mechannical Engg Department, D. N. Patel College of Engineering, Shahada, Maharashtra.
According to their search, Basic principal is to produce energy from the flowing water even if the pressure of water is low. Force produced by the velocity of flowing water makes the turbine move in circular way and to met the efficiency of turbines to produce the kinetic energy. Further the study has taken the results and made conclusion about the system that this principal will work more efficiently with the direct proportion to the velocity of water in the stream.

B. Paper Published by Students and Prof. of MGM Gandheli Campus, Aurangabad.
Their research has made following conclusions and summary about their system and project: A micro hydro power plant has been planned at Gandheli Campus. This paper tell us about the capacity of selection of site for the more efficient working of the system.

VI. METHODOLOGY

This study has been undertaken as to collect the data and results from previous study. It will explain more about the preferred required report paper. Our main reason for this model based work is to generate electrical energy for the local streets and find the solution for crisis of electricity.

Methodology for the System is as follow:-

A. Survey
The following activities are carried out for the various alternatives considered to justify the final choice of the location of different components of the project :A) River surveys B) Reservoir surveys C) Head works surveys i.e. Plant sites and colonies D) Canal, branch canals, and water conductor system E) Major canal structures F) Power house, switch yard, G) Geological Surveys H) Surveys for command area including Ground Confirmation Survey I) Soil conservation Construction material surveys J) Archeological, Right of way, communication etc.

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B. Evaluation for Its Necessity

Clean fuel source, since hydropower is fueled by water. Therefore, it won't pollute the air. It is a Domestic source of energy, so each state or the local areas can produce their own energy without relying on international support about this. Renewable power source, which is more reliable and affordable than fossil fuels. Hydropower creates reservoirs that offer recreational opportunities, such as swimming, fishing and boating. Hydropower electricity plants can provide power to the grid immediately, and provide back-up power during major electricity outages. It also provides a major electricity supply to the nearby areas. We are in need of source which does not require the water to be stored. As it's a in stream model, it has a special benefit about this case.

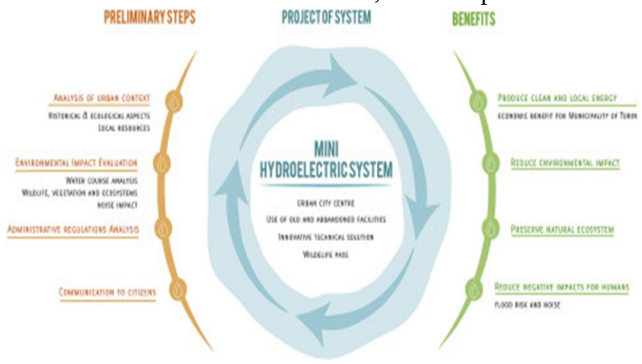


Fig.2.Neccessity Of Hydropower Plant.

C. Design Of Electric Power Plant

1) As we surveyed all the areas where hydropower plant can be implanted, we found that we must prefer the trapezoidal canal section for this case and also got known that, Trapezoidal Canal Section is easy to design and make the calculations for our further Study. While designing the powerplant, we have to keep in mind the minimum velocity required to produce that much amount of potential to fit the system.

2) After design of canal section, we also designed an electric power plant with the help of information for the revised studies and past works done on the electric power plant terminology. We tried to make an system which can either directly supply the electricity or make the electricity available to store. As the flow velocity of water is high then the potential will be high and so the system will work more efficiently.

Model Making

a) After the completion of design features , we moved on to the next step of model making. As we selected the Trapezoidal Canal for the system, We made a compact model showing the desired requirement of all the aspects we needed. With the use of GI sheets, canal section is made which can sustain at the pressure of water. The Supportings are provided to the model for more strength and durability.

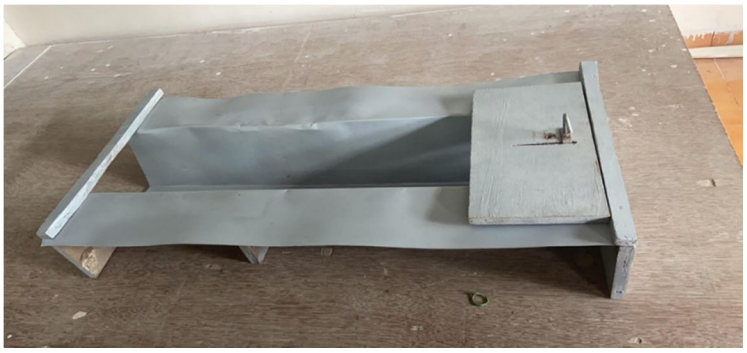


Fig.3.Canal Section Model

b) After making of canal section, the most important work related to project is done, making of system for conversion of kinetic energy into electrical energy. A compact model of turbines is made to represent the actual converter working. With the use of DC Generator, Energy Conversion is made easier. Rotating shafts are also used in the system to make the conversion flow more efficient. Bearings are used to make the turbines.

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D. Testing Of Model

The last stage of methodology of project is to test the model we made by taking the reference of actual canal section. We took some tests of model at different places and get the results we assumed to be. After Successful tests on the system we found some results and conclusion.

E. Results

1) Total installed capacity of our hydropower project is going to be between 60kW to 80kW.

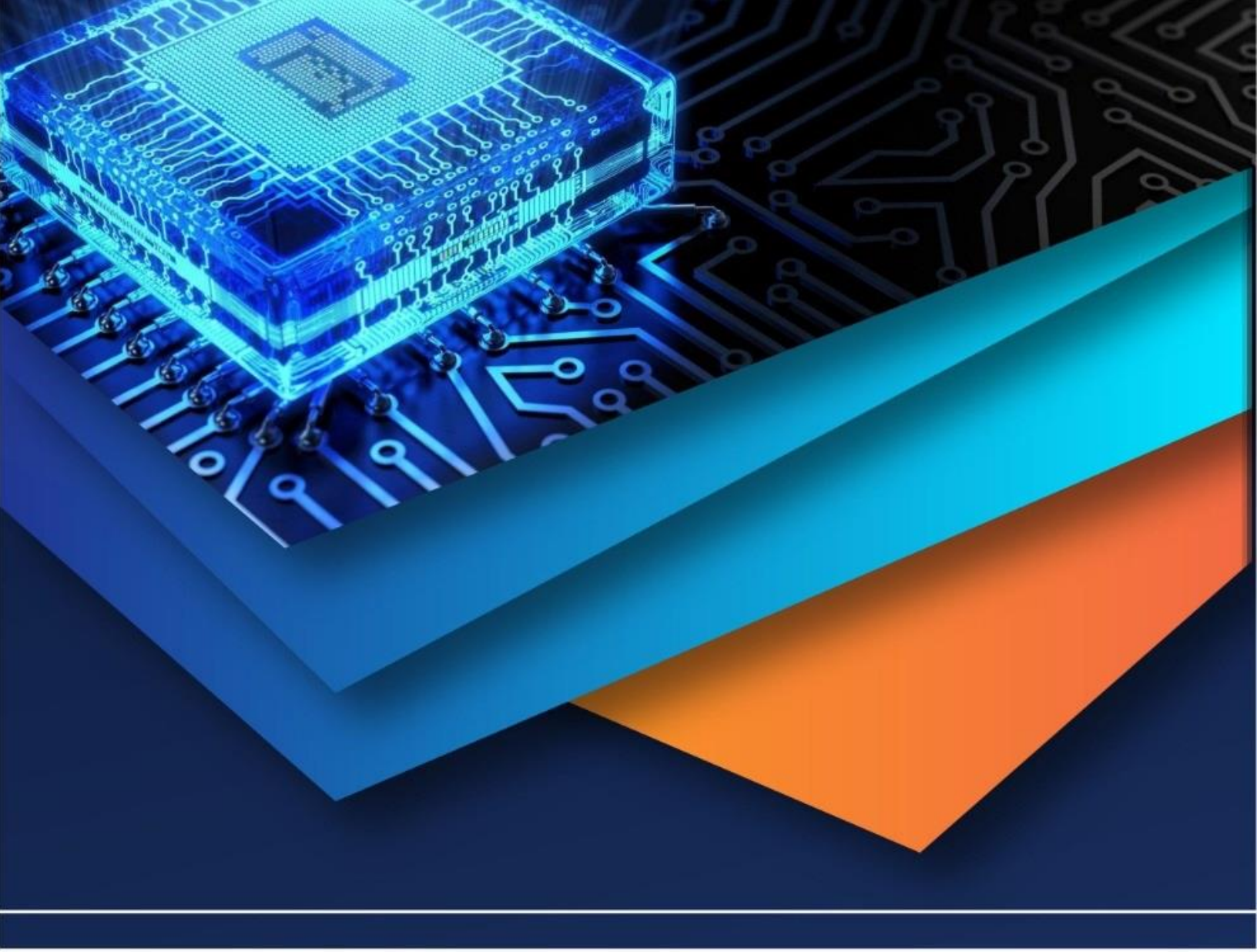
2) Minimum velocity of flowing water must be 0.9m/s.

VII. CONCLUSION

It is possible to generate the electricity from the flowing water resources. Potential of flowing water is converted in the electrical energy with the help of turbines and generator. The system perhaps to have an ideal solution for the crisis of electricity in day to day life.This system depends on the stream velocity and type of canal. This factors leads to the more production of electricity from the generator with the help of turbines. The expected installed capacity of this system is to be between 60kW to 80kW. And the minimum velocity is to be 0.9m/s.

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