International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.01, February 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

Small Hydropower Generation on Hilly Areas___

Sima kumari[1] , Rakesh kumar[2]

[1,2]Final Year, Department of Civil Engineering

IIMT College of Engineering,Greater noida, UP,(India)

ABSTRACT

Small hydro power is non pollution and environmentally being source of energy. These small hilly projects are located in hilly and remote area .It provides a good solution of energy problems in hilly areas .The demand of energy in world is analyzed with the projection for future growth .The option that meets the huge demand of energy is renewable source of energy. The Asian continent has for promoting sustainable development based on different pathways of energy consumption are explored in the content of overall energy security and environment implementation. Energy demand is increasing worldwide amid rising fuel cost and environmental pollution. Small hydropower has emerged as alternate source of energy to support sustainable development also made availability of electric energy for the people of hilly areas which is one of the measure achievement to upgrade life of hilly region people. Small scale hydropower has been used as a general way of generating electricity in isolated regions since end of 19th century. Hydropower systems can be installed in small rivers, streams or in existing water supply networks, such as drinking water networks. It is renewable source of energy.

KEYWORDS:-Small hydropower scheme, renewable energy , megawatt(MW) ,incentives, power house.

I.INTRODUCTION

Every development project has impact on a number of parameters of environment. Some impact may be cumulative in nature and some may have only localized impact. Hydroelectric power, or hydro electricity is basically electric energy that has been generated using natural forces such as gravity or flowing water. It usually produced by dams, because dams can store and direct large volumes of water. Hydroelectric power is becoming increasingly popular. Dams can generate electricity because they contain special mechanisms designed to take the energy in flowing water and turn it into electrical power. A power source is used to spin a turbine basically propeller which is turn spins a metal shaft, forming the equivalent of an electrical generator that produces and stores electricity. The power source, in the case of hydropower, is water itself. When water moves a turbine, the turbine spins, the electromagnets in the turbine generate an electric current in the stationary coils of wires inside them. Small hydropower projects are those that produce electric power not more than 25 megawatt (MW).It is further divided into three categories –small, mini, micro power plants. Power plants produces up to capacity 100kilowatt(KW).Those have capacity 2MW to 25 MW are small hydro power plants.

Small hydro power plants differ from bigger hydro power plants in terms of scale. Small hydropower plant can be set up in a small area in the order of just 2 acres. With the advancement of Technology, and increasing requirement of Electricity, the Thrust was shifted to big Hydropower stations. Realising the fact that small hydropower projects can system is cooperatively uneconomical an a also along the canal systems having sufficient drops, there is a renewed interest internationally in the development of small hydropower projects. Hydropower represents use of water resources towards inflation free energy due to absence of fuel cost with mature technology characterized by highest prime moving efficiency and spectacular operational flexibility. Generators can be either of a Synchronous or Asynchronous type. In a synchronous generator the frequency of the electricity produced is directly related (i.e. synchronous) with the rotational speed of the shaft. Therefore at 50 Hz generation, the shaft rotates at a fixed sub multiple of 50Hz, depending on the gearing ratio. This type of generator must be designed to withstand the high runaway speeds that can sometimes occur during hydroelectric turbine system faults. They often have to be specially designed, thus increasing their cost considerably. These generators come in single phase (for small systems) and three phase (for larger outputs), and the single phase type is more commonly known as an alternator. Within induction generation or asynchronous generation a motor is used as a generator. This type of generator is simple in construction containing fewer parts, making it cheaper and more reliable than synchronous generators. It can withstand 200% runaway speeds without harm, and has no brushes or other parts to require maintenance. In this type of generator than that of the grid

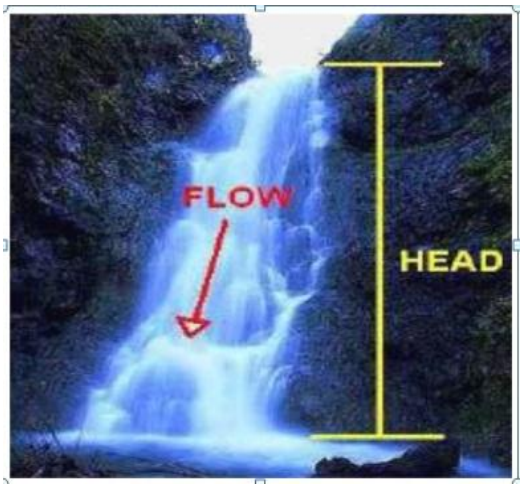


Figure: Available head for small hydro power

International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.01, February 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

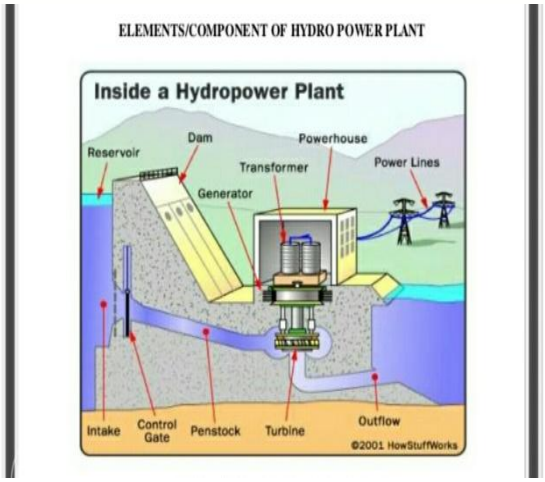
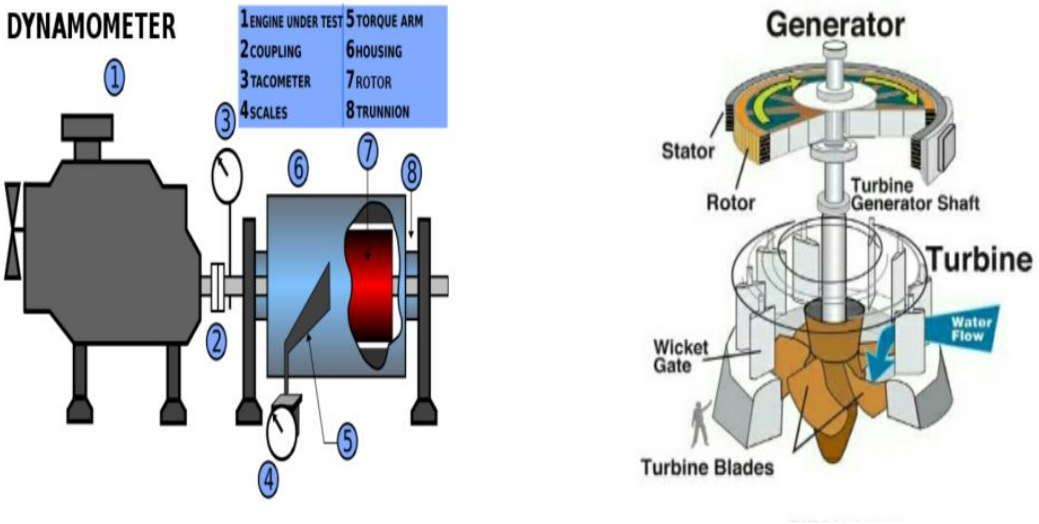


Figure: Elements of hydropower plant



Figures: Generator

International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.01, February 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

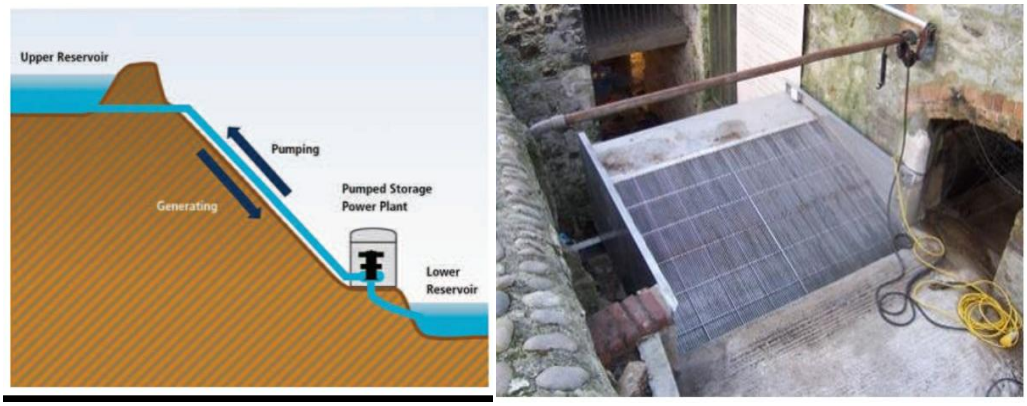


Figure: Trash rack

Figure: Settling basin

Figure: Diversion weir

II.METHODOLOGY

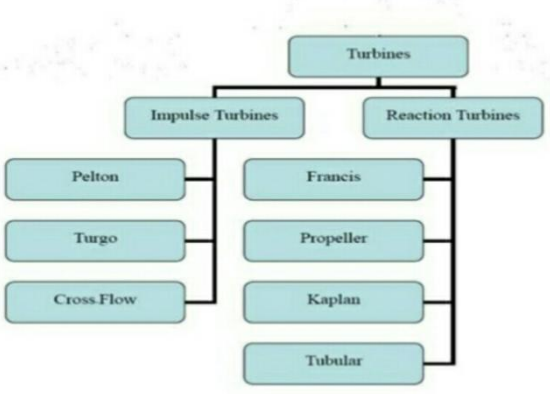
The appropriate area of reservoir be should be set up which is enough to store the required amount of water the stored water contain potential energy (=mgh) which is connected through penstock and made to flow this channel to lower portion of the reservoir as pressure is directly proportion to the height of water .higher the pressure and lower the area of penstock maximum velocity will be achieved ,the achieved maximum velocity get strikes with turbine and made it rotate with in rpm which is further on connected to shaft of dynamo ,the electric dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through Faradays's law of induction. A dynamo machine consists of a stationary structure, called the stator, which provides a constant magnetic field, and a set of rotating windings called the armatures which turn within the field. Due to Faradays law of induction the motion of the wire within the magnetic field creates an electromotive force which pushes on the electrons in the metal, creating an electric current in the wire. On small machines the constant magnetic field maybe provided by one or more permanent

magnets; larger machines have the constant magnetic field provided by one or more electromagnets, which are usually called field coils, thus the conversion of potential energy into mechanical energy and finally mechanical into electrical can successfully accomplished. The flow-rate of a river can either be estimated using analytical techniques, such as the area-rainfall method, or measured directly. In either case, a hydrology study should be based on many years of daily records. Typically, for short duration studies like this one, the area-rainfall method is preferable because historic precipitation data can be obtained.In this study, flow-rates will be estimated as follows:

1. 20-years worth of daily rainfall data for the catchment area would be obtained from the local whether department.
2. A hydrograph of the river will be plotted. This curve statistically relates rainfall quantities to the number of days of occurrence.
3. Catchment areas would be calculated from drainage basin maps obtained from Survey Department and also referenced from the Google earth maps.
4. Evapotranspiration of the catchment area will be estimated using Blaney-Criddle method and Runoff quantities calculated using the area-rainfall method.
5. Site-specific flow-duration curves would be constructed to calculate the power potentials of the sites.
6. Sizing of components of the project based on flow rate and available head
7. Site specific flow rate measurement using the velocity area method to confirm the appropriateness of the estimated flow rate.
8. Financial and economical appraisal of the site would be analyzed with RETSCeen software to determine the project financial viability.

The selection of type of turbine is made on the basis of "Head".The broad classification is given below

- Low head(upto60m)-Kaplan Turbine
- Medium head(30to600m)-Francis Turbine
- High head (more than 300m)-Pelton



III.CONCLUSION

In this paper, we have designed and installed a small hydro power plant for hilly areas. The power generated from this power plant is provided electricity to all houses hold e.t.c .This will help to improve the living standard of local people also can established small scale industry which not only meet the demand of local people also creates the opportunity of employment.

- Cost competitive
- Reliable
- Base Load Power
- Flood control

IV.DECLARATION

I here by declare that this submission is my own work towards the partiall fulfillment of b.tech in civil engineering from Dr A.P.J Abdul Kalam technical university through IIMT COLLEGE OF ENGINEERING to the best of my knowledge ,it contains no material previously published by another person nor material previously published by another person nor material trackled with previously published. The acknowledgement has been made in the text.

V.ACKNOWLEDGEMENT

I wish to acknowledgement the help from Mrs. Mona Khosla and Mrs Zainav for helping me carry out measurement at the project site, I also thankful to the staff of hydrological mechanics department for providing me the necessary equipment and apparatus throughout the study. I also greatful to Mrs. Ekta mishra for proper guidance and abbreviation of equations and calculation of datas. My parents investing and supporting in my education which cant be measured. I wish them all well.

REFERENCES

[1.] MICRO HYDRO DESIGN BY ADAM HARVEY.
[2.] .MOTOR AS GENERATORS BY NIGEL SMITH.
[3.] http:www.energynext.in
[4.] http://www.hydropower.org/
[5.] Google images