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Small Water Power Generation

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Abstract: *In the field of power generation, water power generation has a great contribution in the world. It is popular due to having efficient and reliable form of clean source of renewable energy. It can be an excellent method of harnessing renewable energy from small rivers and streams. The small water power project designed to be a run-of-river type, because it requires very little or no reservoir in order to power the turbine. The water will run straight through the turbine and back into the river or stream to use it for the other purposes. This has a minimal environmental impact on the local ecosystem. In this project, the basic concept of hydro power generation is shown. A proto type turbine was designed by Solid Works software. The turbine power and speed were directly proportional with the site head, but there were specific points for maximum turbine power and speed with the variation of the site water flow rate. Turbine is rotated by using the thrust of water of velocity of water. Alternator is attached with turbine shaftand so rotation of turbine is the result in rotation. This concept highly increases the overall efficiency. Power generation by this water power generator is calculated. To the sum up, it can be said that if this concept will be applied in the Hydro power plant, the output of power generation will be increase.*

Keywords- Power Generation, Hydro Power Plant, River Stream, Small River, Turbines.

I. INTRODUCTION TO HYDRO ELECTRIC GENERATION

Hydroelectric generation plants are power stations that generate electricity from the energy of moving water. The energy is harnessed through a process that uses the kinetic energy of falling or flowing water to drive turbines that generate electricity. Hydroelectric power is one of the most widely used renewable energy sources, accounting for a significant portion of the world's electricity generation.

Hydroelectric generation plants are a type of renewable energy technology that harnesses the power of flowing water to generate electricity. These plants use turbines and generators to convert the kinetic energy of moving water into electrical energy. Hydroelectric power is a popular form of renewable energy because it is a clean, reliable, and sustainable source of electricity.

The first hydroelectric power plant was built in 1882 in Wisconsin, USA, and since then, hydroelectric power has become a significant contributor to global electricity production. Hydroelectric power plants are found all over the world and are particularly popular in areas with Abundant water resources, such as rivers and dams.

Hydroelectric power is a versatile form of renewable energy that can be used to generate electricity for a variety of purposes, including powering homes, businesses, and industries. The benefits of hydroelectric power include its renewable nature, low operating costs, and ability to provide a stable source of electricity that is not subject to the fluctuations and price volatility of fossil fuels.

However, hydroelectric power plants also have some challenges and drawbacks, including environmental concerns such as habitat destruction and impacts on aquatic ecosystems. Additionally, hydroelectric power plants can be expensive to build, and their feasibility is often dependent on the availability of suitable water resources.

Despite these challenges, hydroelectric power remains an important form of renewable energy and a key part of the global energy mix.

Day by day demand of electricity is increases. If we are able to generate our own power then it will reduce the burden on generation unit. There are so many wastages water flow flowing freely but we didn't use that kinetic energy and we waste that energy. But if we think then we can create power from this wastage flow. For that we created a model that can help us to generate power and use it very easily.

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Concept of that model is very simple it totally same as hydro power generation unit but on a small-scale low head generation. We use spiral blade which can rotate with help of water flow. And convert kinetic energy into rotating mechanical energy. After that we know how to convert mechanical energy into electrical energy. Just like that we can able to generate our own power free of cost and easily and use it wherever we want.

II.LITRETURE SURVEY

Rasel A Sultan
BID Group
27 PUBLICATIONS 146 CITATIONS
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Memorial University of Newfoundland
6 PUBLICATIONS 7 CITATIONS
Flowing water creates energy that can be captured and turned into electricity. This is called hydroelectric power or hydropower. Hydropower is considered a renewable energy resource because it uses the earth's water cycle to generate electricity. Water evaporates from the earth's surface, forms clouds, precipitates back to earth, and flows toward the ocean. As far as Bangladesh is concerned, only a small fraction of electricity is generated by hydropower. The government has set a target of meeting five per cent of the electricity demand by 2015 by utilizing renewable energy, and 10 per cent by the year 2020. Currently, renewable energies contribute to less than one per cent of the country's total electricity generation. The aim of our thesis it was to demonstrate and observe the hydropower of our country in micro-scale by our experimental setup which is completely new in concept. this thesis paper consists results of our findings and might help in case of utilizing this renewable energy potential.

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Alternative Energy Solutions in Order to Address the Energy Demands of the World: Hydro-Electric and Tidal Energy.
Over the last two centuries, industrial activities, deforestation and the burning of fossil fuels have released high concentrations of heat-trapping agents called greenhouse gases (GHGs) into the atmosphere. While a certain amount of greenhouse gas is important to keep our climate warmandlivable, these higher concentrations are warming the Earth’s surface to temperatures that threaten life on our planet. Carbondioxide (CO2) and methane are two GHGs that have increased dramatically due to human activity. With the challenges faced by global warming, the world is faced with the threat of energy demand. The purpose of this capstone is to encourage the use of renewable energy resources in order to best meet those challenges by providing detailed information on the scientific, economic, and political backgrounds of two types of renewable energy resources: hydro-electric and tidal energy.
The paper addresses several key topics including: How does the renewable energy function?
Advantages/Disadvantages, Environmental Effects, Economic Feasibility, Current Electric Power Output/Capacity and Future Projections. Various mediums of research tools were used including energy reports published by the US Department of Energy (latest Annual Energy Outlook Reports) National Renewable Energy Laboratory, US Department of the Interior, and the Department of Energy and Climate Change. The research has indicated that tidal and hydroelectric energy have their advantages and disadvantages in terms of economic feasibility. Although both technologies can provide enough energy to sustain societies, they cannot address the energy demands of the world alone. A multifaceted approach needs to be taken to combine these energy resources with other renewables in orderto sustain human lives on a global scale. Hydro-electric and wind energy should be used accordingly to bestsuit a country’s geographical location since each nation has its own unique natural resources to offer for totalelectricity output.
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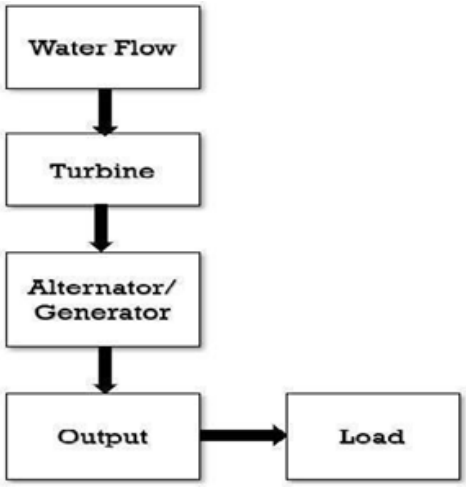
Hydroelectric power generation is one of many ways in which electricity can be generated. In 2009, the three most heavily used sources for generating electricity were coal, natural gas and oil. These sources not only release emissions that are harmful to the environment, they are resources that are quickly running out. Therefore, different ways of generating power will need to be explored. Hydroelectric power works to harvest the inherent energy of moving water by directing the water through turbine converting the energy of the moving water into mechanical energy. The mechanical energy is then converted into electricity in the generator. In order to choose the appropriate generator for a specific application, the flow rate and pressure head of water source must be known.

Hydropower on a small- scale is one of the most cost-effective energy technologies to be considered for rural electrification in less developed countries. It is also the main prospect for future hydro developments in Europe, where the large-scale opportunities have either been exploited already, or would now be considered environmentally unacceptable. Small hydro technology is extremely robust and is also one of the most environmentally benign energy technologies available. The development of hydro-electricity in the 20th century was usually associated with the building of large dams. Hundreds of massive barriers of concrete, rock and earth were placed across river valleys worldwide to create huge artificial lakes.

While they created a major, reliable power supply, plus irrigation and flood control benefits, the dams necessarily flooded large areas of fertile land and displaced many thousands of local inhabitants. In many cases, rapid silting up of the dam has since reduced its productivity and lifetime. There are also numerous environmental problems that can result from such major interference with river flows.

III. MODEL FUNDAMENTAL



The construction is very simple and similar to the hydro power plant. At first there is a body whichcan made up with plastic material or metal material. The measurements of the body can decide as per demand or where to use. After that take a hallow cylindrical shape tube. Fit inside the inner side of body in a position that one side of hollow pipe is attached at upper side and the other end at lower side of body. Then move towards turbine. Turbine can make with plastic as well as metal according to use. For making turbine calculate the inside measurement of hollow pipe so the turbine can rotate easily inside the hollow pipe. Take a straight pipe or metal rod to make a shaft.

Take a metal sheet or a plasticsheet which is light in weight draw a circle on it there is two circles to draw first is the big one which isless than equal to hollow pipe inner diameter and the second one which is equal to the shaft outer dimension. Cut them properly and take one more from center of circle to the outer line straight in a line.Stretch those proper as shown in fig. connect them on a shaft tight so they cannot break or losses due to water pressure. The no. of circle may require as per then length of shaft to make a full turbine. After making turbine, connect turbine into the

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hollow pipe with the help of ball bearings or any type of friction less object. At upper end connect a alternator/ generator with the help or gear mechanism or rope pulley mechanism. Before installing generator check the movement of turbine is it free rotate or not and the direction of rotation according to that generator will install.

The working principal is as same as the hydro power plant. In which the kinetic energy of water flow is use to rotate the turbine to generate power. from one side water will flow and fall on turbine and it get start rotating.Same principle is use in this project that we need a water flow put down the model on water flow. The metal plate which is installed at front side of body will stop the flow of water and store some water once stopped water get reach to the upper side of turbine. It gets fall on turbine with some pressure and start turbine to rotate. Kinetic energy will convert into mechanical energy. And mechanical energy will convert into electrical energy with help of generator. This energy is fully free, non-polluting and environmental free. Due to less in weight it can easy to move anywhere andsimple in use maintenance free.

IV. RESULT

Sr.No	Water Flow (Ltr/Sec)	Power Generation (InWatt)
1	1ltr/sec	Upto10watt
2	3ltr/sec	Upto15watt
3	5ltr/sec	Upto50watt
4	10ltr/sec	Upto100watt
5	100ltr/sec	Upto500watt

- Result will vary depending upon the specification and rating of generator
- It can be improve using good quality of generator

Graphical Representation