

HYBRID POWER GENERATION BY USING TIDAL AND SOLAR ENERGY

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Abstract

There are many power generating methods available in our nation to meet the power needs. But the resources used to generate are almost fossil fuels and non-renewable energy resources. Some other power generating methods utilizes the renewable sources to produce electric power. Tidal energy is a form of energy that can be utilized to produce electric power but there is no equipment or machine to utilize the tidal energy and to convert into a useful form of energy our ultimate aim is to design a machine that utilize the tidal energy to produce electric energy. Some of the renewable energy resources are not available at all time ,solar energy is also a renewable energy but it is not available at all times during nights and windy,rainy seasons the availability of sunlight is very less. But tidal energy is constant at all times so the usage of tidal energy can pave way for constant energy generation. Our machine is designed to utilize the tidal energy and also the solar energy to produce electric power. If any one input energy source is very low then the power generation also gets reduced in its rate but it never stops completely. Our machine is designed such that it can be engaged and disengaged the transfer of machine from one place to another is easy that means the machine is portable. Number of fans used to produce power is more than two to ensure the complete utilization of the tidal energy resource.

Keywords *Tidal energy,wind energy,solar panel,air velocity,rotary motion.*

1. INTRODUCTION

Electric power used by the people is always increasing due to the increase in population, hence power generation methods must be capable of producing sufficient power. Extraction of power from fossil fuels and some other non-renewable resources are just a temporary solution made to meet the need of electricity. When renewable sources are used as source for power generation, the method is permanent and it is preferable than the power producing by non-renewable sources. Tidal energy and solar energy are some of the renewable energy sources which can be utilized for power generation. Solar energy is almost utilized by the usage of solar panels and some other applications that produces the necessary from sunlight. Sometimes the level of sunlight may vary during bad weather conditions such as rainy, cloudy and much more seasons, but tidal energy is constant without any variation. Tides are formed near the seashores which moves towards the land at a considerable velocity. During this travel of water from ocean to the land a layer of air that is present between the land and the sea, also moves with a velocity that is proportional with the velocity of the tides. This velocity of air and tides can be utilized to drive the power generating source. Wind mills are placed at locations where the velocity of air is maximum, so the placing of wind mills near seashores can produce a large amount of electric current. Our design ultimately aims to utilize the velocity of air that is present in the seashores. As to meet the power requirement our design will be very helpful. A combination of windmill and a solar panel is our design. The designation of our project is to produce electric power from the renewable energy sources. There are many power generating methods which produces electricity from renewable energy sources, but the tidal energy are almost not utilized properly, our design will be helpful to utilize the tidal energy to produce the required current or electricity. The movement of water from sea to the land occurs frequently and this process never stops. The rate of movement, that means the velocity of waves formed may vary with respect to the time and the season, but the formation of waves never stops. The tidal energy is considered to be a renewable energy source as the formation of waves never stops. Power generating methods used in our country are almost efficient but the absence of any equipment or method to use the tidal energy as a source for power production keeps the power generated less than the power required by the people. Power requirement can be decreased but the power generated can be increased by increasing the efficiency of the power generating methods and also by increasing the available power generating methods. Therefore new inventions should be made in power generating methods and equipment used to produce power.

2. LITERATURE REVIEW

India is a country which is surrounded by water on its three sides and land on one side. This explains that a large number of beaches available in India. The utilization of tidal energy must be done to increase the rate of power production from renewable energy resources. As the number of available beaches is more than the tidal energy source is also more, therefore the proper utilization of available tidal energy will lead a way to meet the power requirement. The length of seashore in India is more as compared to other countries but there is no special equipment or power generating method is used to produce power from the oceans. The velocity of air present between the sea water and the land is varying frequently due to formation of tides or waves, windmills are driven by the air that is moving. Therefore the amount of power produced by the windmill is directly proportional the velocity of air that hits the blades of the windmill, hence the windmills are placed in locations where the velocity of air is high. If the air that moves with very low velocity hits the blades of the windmill the rotation of the blades doesn't takes place, because the rotation is done only when the force produced by air is capable to rotate the blades. The force generated by the air is more when the velocity of air is more and force is less when the velocity is less. Therefore air moving with high velocity is preferable over air moving with low velocity for power generation. During the motion of water from sea to land as waves, it forces the air to move towards the land at a velocity which is equal to the velocity of the tides. The motion of air is directly related to the motion of the waves. Water cant move without disturbing the air present in front of it , thus the velocity of air is high as sufficient to drive a windmill or any other power generating equipment.Coastline of India measures about 7,517kilometrs. The availability of large coastal area urges us to develop and invent many power generating arrangements that is capable of producing power from the tidal energy resource. The power consumption of our country is keeps on increasing due to the increase in the population. A new method must be founded to meet the power requirement, and this method should include power generation from renewable energy source. Solar energy can be utilized to meet the power requirement, a number devices are available to utilize the solar energy. Some of the devices are solar vehicle, solar light, solar water heater. The machines or arrangements that uses the tidal energy as its source to produce power is very helpful to make use of tidal energy into a useful form of energy. The power generated is less as compared to the power required , due to this lack of power leads to frequent power cut. Thus by increasing the power generation power cuts can be avoided. Power cuts must be fully controlled as it may cause various discomforts in our day to day life. The power generation methods used in our country are as follows, power generated from nuclear power plants, power generation by the usage of coal, diesel, biomass, hydro power plants these methods includes non-renewable energy source for power generation. Some other power generating methods that keeps renewable energy source as its input is power generation from wind energy, solar energy. Average electric usage in India is about 1074.65kWh . Installed power capacity is 319.60GW. The total power generated can be divided into two parts that is one is produced from renewable source and another one is non-renewable source.The power generated from renewable energy source is only 30.3% of the total power generated , and the power generated by using non-renewable energy is about 69.7% of the total power generated. Thus it is proved that there is a great difference between the power produced from renewable and non-renewable energy source by its amount.The utilization of infinite resource to produce power, is important to save the fossil fuels and to decrease the unwanted usage of fossil fuels. The utilization of infinite resources includes the power generation from that sources by using special arrangements and machines. According to statistics the power generated from solar energy is about 12.28GW. Power produced by windmill and other machines that uses wind energy as a source is about 3.17GW. The method of power producing by wind is first came into existence in India during the year 1986, windmills are first introduced or planted in the coastal areas of Maharashtra and Gujarat. But the initial cost investment for windmills is large when compared to the investment required for power production by using fossil fuels. Hence windmills are less in numbers as compared to power generators which uses fossil fuels.

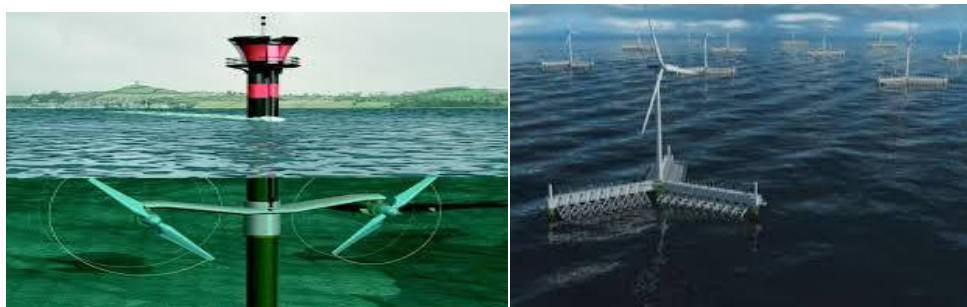


Fig 2.1 and 2.2 existing power generation designs.

3. WORKING AND FEATURES

The ultimate aim of our project is to utilize the tidal energy into a useful power source to produce electric current. The set up is made in a way such that it can be placed at the seashore where the tides touches the land. The working principle of the machine is almost similar to the working of the windmill. The production of electricity is based upon the velocity of the air that gets hit on the blades of the design. The air that gets hit on the blades is directly forced by the tides that moves towards the land from the sea. The waves are formed at the seashores at anytime without failing thus there is no absence of power source or in-availability of the energy source, therefore tides can be used a power source to produce energy from it. As our country is almost surrounded by water on its border the number of beaches available are more as compared to some other countries. By considering this feature as an advantage a equipment that converts the tidal energy into electric energy is mostly demanded. To meet the electric need of our country and to decrease the usage of fossil fuels our design will be very helpful. Our design not only includes the conversion of tidal energy into electrical energy it also includes the usage of solar panels to utilize the solar energy to produce electricity. The setup includes two types of energy conversion one is from tidal energy to electric energy and another one is solar energy to electric energy. The tidal energy is not directly utilized by using the tides, it is used in a way such that it induces the velocity of air to be high as compared to its normal velocity. The velocity of air plays a vital role in production of electricity from windmills and some other applications that uses the wind energy to produce electric power. Our project is designed in a way such that it allows air from the seashore to enter the a close chamber and the power is generated in that area of closed chamber. The reason to select a closed chamber instead of a open chamber is that the velocity of air is maximum at the closed chamber as compared to that of the open chamber. The principle is that when the waves are moving towards the seashore, the velocity of the waves is high and due to this velocity the air present in between the sea and the shore is forced to move by the waves. Thus the velocity of air is increased to a high level that can be used to run the blades of windmill or any equipment that consists of a blade and a generator. The velocity of air is maximum at the seashore and it is decreased as compared to other parts of the beach. The design is almost aimed to be kept without being immersed in water. A solar panel is also included in the design to make the power generation more efficient. The power generated by the tidal energy is stored in a battery. The usage of battery can be avoided by connecting the power producing equipment with light sources or some other electrical applications. The battery is used to store the electric current for further usage. The working of the equipment is as follows. The equipment is placed in the seashore where the tides are able to reach the machine, when the waves are moving towards the land the velocity of the waves are high, due to this the velocity of air is also increased to a high level. As the high velocity waves are going inside the closed chamber ,certain amount of high velocity air already sent into the closed chamber. The blades that are fitted inside the closed gets rotated due to the hitting of air on the blades. The rate of rotation of the blades are directly proportional to the velocity of air that hits the blades. Therefore the design mainly aims at increasing the velocity of the air that enters the chamber, the fans that are present in the chamber are kept horizontally. Two fans or turbines placed in the chamber to increase the efficiency of the equipment. A solar panel is placed at the top of the equipment to increase the amount of electricity produced by the machine. The solar panel is kept at a certain height from the closed chamber in-order to avoid water touching the surface of the solar panel. If the solar panel is touched or came into contact with water there is nothing to be wrong but frequent contact of the solar panel with water may cause a formation of sediments over the solar panel. Therefore the contact between the solar panel and the water should be almost avoided to avoid such problems. The position of the equipment must be in a way such that the water will be in contact with the equipment when the waves reaches their maximum level of distance towards the land surface. The solar panel is connected to the battery to save the electric current produced by the solar panel. Both the solar panel and the fan blades are responsible for amount of electric current that is produced by the equipment. The utilization of tidal energy and the solar energy are achieved by a single equipment. The efficiency of the equipment is almost high as the input energy is of renewable energy source. The fans are rotated on one-side during the entry of air inside in the equipment, and during the exit of air from the chamber the fans rotates on opposite direction. Electric current is produced by the rotation of the fans in one direction and rotation about another direction does not have any reaction on the production of electric current. So a bearing is attached to the fans and the machine, the usage of bearings is to avoid reverse rotation of the blades . sometimes the reverse rotation can cause failure in the operation of the DC generator. Hence the need of the generator is must to avoid such problems. The equipment must be placed in beaches where the availability of human beings is very less. The placing of equipment in places where humans are taking baths in seas should be avoided to control and to avoid the accidents. If this machine is placed in beaches where the presence of humans are high, then the rate of accidents is also high, because humans are not capable of escaping by opposing the tidal energy. The velocity of the tides are high and they are so powerful such that they can be capable of moving a human being easily. The distance between the solar panel and the closed chamber is high as to ensure the minimum probability of contact between the water and the solar panel. The vertical distance between the chamber and the solar panel can be varied according to the requirement. This makes the equipment to be more user friendly. The total arrangement of the equipment that includes the solar panel, dc generator, battery, and the rotating blades can be displaced easily. The reason

to the displacement of the equipment is to protect the solar panel and to the hitting of waves on the blades. Sometimes the level of sea increases and it decreases, during these changes the equipment should also be displaced and kept at a position so that there will be a contact between the water and the fan blades. The equipment is almost efficient ant any climatic condition due to the usage of tidal energy as a resource to produce electrical energy. The solar panel is efficient only during day time and in summer seasons, in winter and other seasons the amount sun-rays or sunlight that falls on the solar panel is very less and due to this lack in the availability of sunlight the amount of power produced also gets reduced to a low value. The overall efficiency of the equipment is good due to utilization of two types of renewable sources.

4. DESIGN

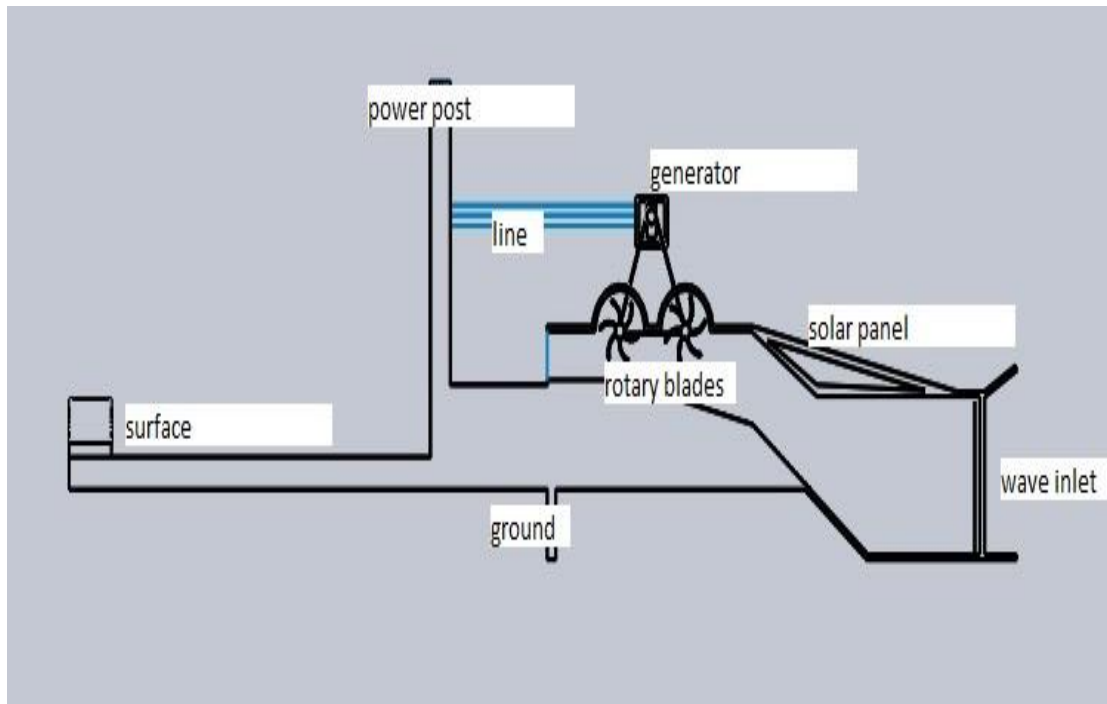


Fig 4.1 2D layout of design

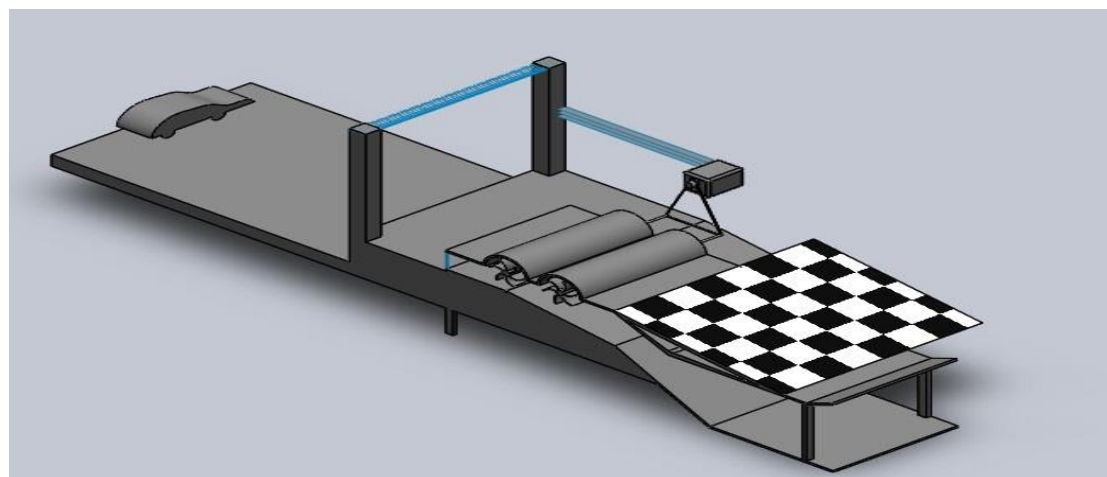


Fig 4.2 isometric view of design

5. CONCLUSION

The absence of equipment or a machine that is helpful in converting tidal energy into a useful form of energy is vanished by the usage of our machine. The machine is almost user friendly as the dis-engagement of the machine is easy, sometimes the machine should be placed at some other places to increase the efficiency and to ensure the proper usage of the machine. The power generated from the machine is a continuous source of energy as the power producing method is based on the utilization of renewable energy resources sometimes the power generated by the solar panel will be very low due to absence of sunlight at that time the usage of tidal energy is done to create the power. As the fans or turbines used to generate power is more than one, the tidal energy is completely utilized without the wastage of energy. The tidal energy is used to increase the velocity of the air that hits the fans and by increasing this velocity the efficiency of the machine is also increased. Therefore our machine can fulfill the power requirement by utilizing the infinite resource to produce electric power.

6. REFERENCE

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