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Electricity Generation from Sewer Water

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Abstract— *This paper presents a generation of electrical energy by using wastewater. Wastewater is that the water that emerges after freshwater is employed by the citizenry for domestic, commercial and industrial use. Asset by the CPHEEO (Central Public Health Environmental & Engineering Organization) guidelines, freshwater intake per person per day should be between 135 and 150 liters per day. It is officially spoken as "daily liters per capita". So there will be a lot of wastewater are produces in the domestic, commercial and industrial sectors. This wastewater can be used as a source for electrical energy generation. From the energy crisis situation in the present, this wastewater gives a small contribution to the generation of electrical energy. Using the Working Principle of Hydro turbine we can convert mechanical energy into electrical energy.*

Keywords— Sewage [waste water], Hydro turbine, generation, electrical energy.

I. INTRODUCTION

Population growth is expected to impact freshwater availability. As the population grows, the overall demand for water will increase also increase the wastewater and the demand for electrical energy is rising rapidly. Asset by the CPHEEO (Central Public Health Environmental & Engineering Organization) guidelines, freshwater intake per person per day should be between 135 and 150 liters per day. Wastewater is that the water that emerges after freshwater is employed by the citizenry for domestic, commercial and industrial use. It is fresh water that is used for a variety of domestic uses such as washing, bathing & flushing toilets. Washing involves the washing of utensils utilized in cooking, washing vegetables and other food items, bathing, washing hands, washing clothes. The water that emerges after these uses contains, substance, oils utilized in cooking, oil within the hair, detergents, dirt from floors that are washed, soap utilized in bathing along with oils/greases washed from the human body this water is known as Grey Water. Water wont to flush toilets to evacuate human excreta is named “Black Water” or Sewage.

This wastewater can be used as a source for electrical energy generation, to fulfill the crisis at present, this wastewater gives a small contribution to the generation of electrical energy. Using the Working Principle of Hydro turbine we can convert mechanical energy into electrical energy. The water turbine changes the K.E. of the falling water into energy at the turbine shaft. The turbine drives the alternator including it and converts mechanical energy into electricity. We can place a Chainlink burning both sides of the model to reduce the sewage blockage.

II. SITE DATA

Freshwater is only 2.5% of the total water volume on Earth is freshwater, with the largest portion of it lies underground. Demand for fresh water is rising with factors, such as population growth, water pollution economic, as well as technological progress.

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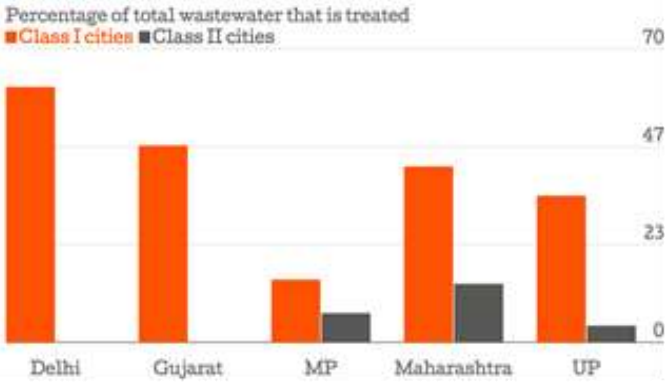

FIGURE 1: Percentage of total waste water

Asset by CPHEEO (Central Public Health Environmental & Engineering Organisation) standards. the freshwater consumption per day per person should be between 135 to 150 liters per day. (It is officially expressed as ' liters per capita daily ' (LPCD) of a large public water system and sewerage bodies/authorities across the country use the preceding figure to determine the likelihood of this water consumption) If water is consumed without access to an underground sewerage/drainage system by persons living in a residential complex, it is estimated that 135 (LPCD) are consumed.

The total quantity (No. of residents X 135 liters) comes into a sewage treatment plant (STP) on the premises, this total volume has to be treated by the STP. In a vast majority of cases, the actual waste overloading of the STP. This happens routinely because most residential complexes don't install water meters or similar water volume and flow measurement devices to stay track of water consumption during a residential complex/gated community. Consequently, when a tool is installed and readings monitored, consumption has been found to be double and sometimes triple the suggested figure of 135 (LPCD).

III. BLOCK DIAGRAM

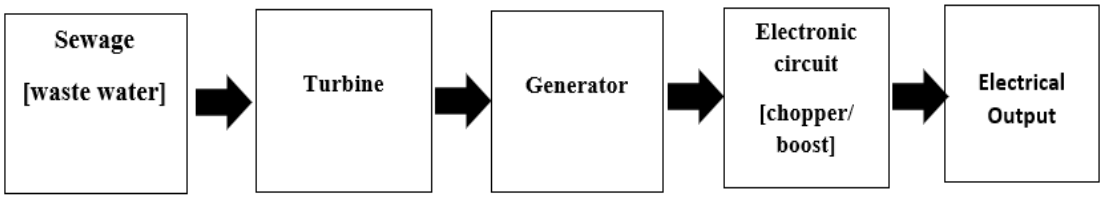

FIGURE 2: Block diagram of Electricity generation from sewer water

Using the Working Principle of Hydro turbine we can convert mechanical energy into electrical energy. The water turbine changes the K.E. of the falling water into energy at the turbine shaft. The turbine drives the alternator including it and converts energy into electricity. This is the basic "hydropower plant operating principle".

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3.1 Sewage [waste water]

Sewage may be a sort of wastewater that's produced by a community of individuals. It is defined by flow, activity, chemical and toxic constituents, volume or rate, and its bacteriological status.

Wastewater is a by-product of residential, commercial, manufacturing, or agricultural activities. The characteristics of wastewater vary counting on the source. Types of wastewater include domestic wastewater from households, municipal wastewater from communities and industrial wastewater from industrial activities.

3.2 Turbine

A turbine may be a rotary robot that extracts energy from a fluid flow and converts it into useful work. The work produced by a turbine is often used for generating electric power when combined with a generator.

Methodology for Turbine Flow- Generally, the construction of turbines is the same as the hydro turbine. A row of blades is fitted to a shaft or plate. Water has then skilled the turbine over the blades, causing the inner shaft to rotate. The rotational motion is then moved to a generator the generates electricity. There is a spread of various sorts of turbines that are best utilized in different situations. Each sort of turbine is made to supply maximum output for things it's utilized in.

The classification of hydro turbines may be based on how water flows through the turbine.

• Axial Flow: Water flows through the turbine parallel to the axis of rotation.

• Radial Flow: Water flows through the turbine perpendicular to the axis of rotation.

• Mixed Flow: Water flows through in a combination of both radial and axial flows. For example, water flows in radially but exits axially in a Francis turbine.

3.3 Generators

Types of electric generators depend on the kind of generating equipment used, the electricity generated is either DC or AC. AC generators are classified as single-phase or polyphase. In this project, we are using a dc generator to generate electrical power (output).

Types of DC generators –

DC generators are graded according to how excited (i.e. produced) their fields are. There are three methods of excitation, and thus three main types of DC generators:-

- Permanent DC generators for magnets-Field coils excited by permanent magnets
- Separately Excited DC Generators – Field coils excited by some external source.
- Self Excited DC Generators-The generator itself excited the field coils.

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Permanent Magnet DC Generator-

When the flux within the magnetic circuit is made through the utilization of permanent magnets, then it's referred to as a static magnet DC generator. In this device, the rotor windings are replaced with permanent magnets. These devices don't require a separate DC supply for the excitation circuit or do they need slip rings and get in touch with brushes. These machines are superior alternatives to traditional induction motors which will be including turbines.

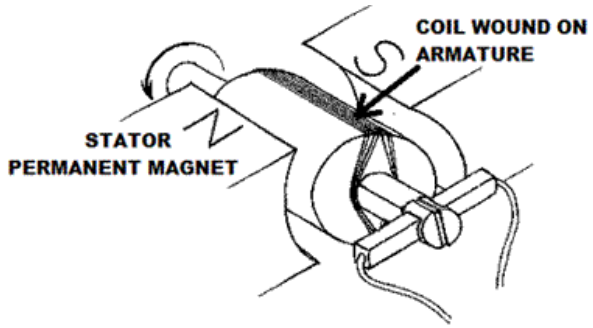

FIGURE 3: Block diagram of permanent magnet dc generator

It is composed of an armature and one or more permanent magnets located around the armature. Much power is generated by this type of DC generator.

3.4 Electronic Circuit

Here we'll look at the Step-up chopper or boost converter which increases the voltage of the input DC to a specified voltage of DC output. A Boost converter circuit diagram is shown in the figure below.

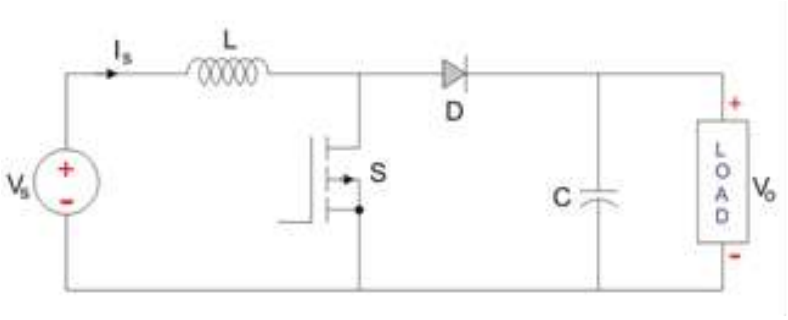

FIGURE 4: Electronic circuit

The input voltage source is connected to an inductor the solid-state device which operates as a switch is connected across the source the second switch used could also be a diode. The inductor connected to input source results in constant input current, and thus the Boost converter is seen because the constant current input source and therefore the load are often seen as a constant voltage source. The controlled switch is activated and switched off using Pulse Width Modulation (PWM). PWM can be time-based or frequency-based. Frequency-based modulation and its disadvantages sort of a wide selection of frequencies, in turn, will give the specified output voltage. Time-based Modulation is mostly used for DC-DC converters. The frequency remains constant during this kind of PWM modulation is simple to construct and use.

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IV. CONCLUSION

Hydro Power is an environmentally friendly, sustainable and economically viable source of energy. It is a good solution to the global energy problem. It saves the electricity required to form the conventional power plant. This wastewater gives a small contribution to the generation of electrical energy.

V. FUTURE SCOPE

1. By giving such kind of modification we can generate a high amount of electricity.
2. In the future by using this kind of conversion we can overcome the deficiency of electricity.
3. This method can be used in areas where a large amount of sewage is produced.

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