

# ELECTRICITY GENERATION FROM TREATED WASTE WATER BY USING TURBINE

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**Abstract:** The alternative energy source of municipal waste water for micro hydro power generation, are detail discussed in the present investigation. Reuse of municipal waste water can be a stable, inflation proof, economical, reliable and renewable energy source of electricity. Both the historical and the present day civilization of many kind are closely interwoven with energy and there is no reason to doubt but that in the future our existence will be more dependent upon the energy. Electrical energy occupies the top position in the energy hierarchy. But conventional sources of electricity generation are limited in used. So there are many renewable energy resources are used for generation safe fluid. Electricity such as: solar energy, Biomass energy and wind energy etc. But in the modern day one of the most useful resources are including for generation of Electricity is “Sewage based Hydro power plant”. The plant will convert municipal liquid waste into power, meeting the energy needs of approximately 35000 homes. Sewage is generated by residential, Institutional, Commercial and Industrial establishments. It includes household waste, liquid waste from toilets, baths, Showers, Kitchen, Sink.

This study presents a methodology to assess the potential for hydropower in wastewater systems, either upstream or downstream of wastewater treatment plants (WWTP). An algorithm was developed in two phases, first to estimate the annual electricity production in selected areas based on the inflows to each WWTP and second to carry out an economic evaluation of the feasibility of each scheme considering local investment costs and local electricity sell tariffs. The developed method was applied to the case study of new naidu.

**Keyword:** *Waste water, Turbine, Concrete panel.*

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## I INTRODUCTION

An overview of Hydropower application to the waste water (Sewage) is described here. Firstly the waste water treated in Sewage Treatment plant. It includes physical, chemical and biological contaminants. Its objective is to produce an environmentally. Here the treated water used for generating electricity by a Micro Hydro power plant. Treated water of sewage at a high pressure or flowing with a high velocity can be used to run turbine or water wheel coupled to Generator and therefore of electrical power is becoming more and more popular as it is

reliable and requires least maintenance and care. Output power has been estimated for available different head and flow rate of the waste water. Various types of the turbine-generator sets for different available head have also suggested for reliable operation of the developed this plant. The main advantage of this power plant is an independent power plant. It is not dependent on the monsoon because the availability of sewage water is always maintained. Electricity generation through this method is costlier in initial cost but cheapest in maintains and production cost. This plant is focused on reducing fuels. This plant has used a range of

innovative solution, including renewable energy and local generation to meet future growth needs while improving efficiency reducing cost.

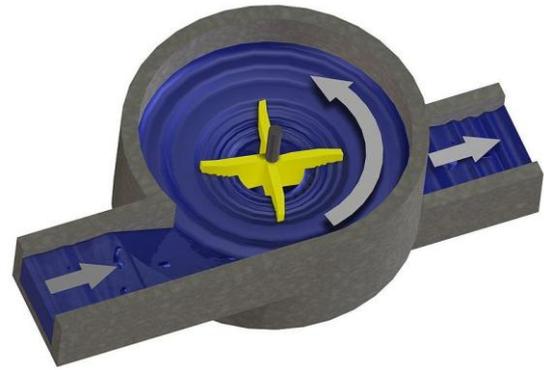
Hydropower is a renewable, non-polluting and environmentally benign source of energy. Hydropower is based on simple concepts moving water turns a turbine, the turbine spins a Generator and electricity is produced. The use of water falling through a height has been utilized as a source of energy since a long time; it is perhaps, the oldest renewable energy techniques known to the mankind for mechanical energy conversion as well as electricity generation. It also use for the aeration process and increase the quality of water.

Micro-hydropower was the most common way of electricity generating in the early 20th century. The first commercial use of hydroelectric power to produce electricity was a waterwheel. Micro hydropower system is one of the popular renewable energy sources in the developing countries.

Micro-Hydropower system (MHPS) is relatively Micro power sources that are appropriate in many cases for individual users who are independent of the electricity supply grid. Hydroelectric power is the technology of generating electric power from the movement of water through rivers, streams and tides, water is fed trapezoidal channel to a turbine where it strike the turbine blades and causes the shaft to rotate . To generate electricity the rotating shaft is connected to generate which converts the motion of the shaft into electrical energy.

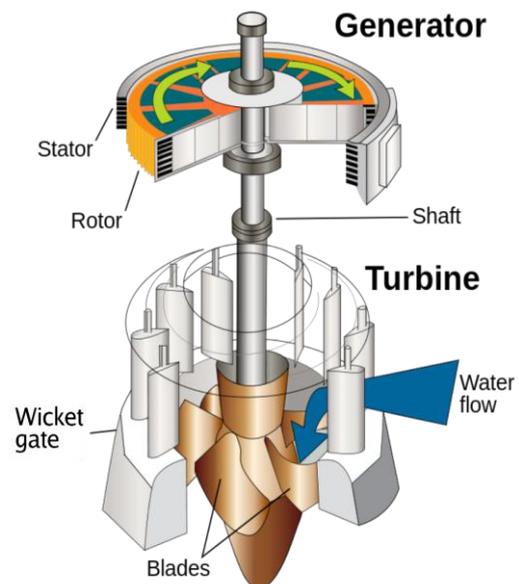
## II MODELING & METHODOLOGY

This proposed mini hydro generation is based on whirlpool motion of water due to low water head we cannot achieve the exact height and water pressure on turbine. So in order to rotate the turbine efficiently the turbine is placed inside a round basin which have inlet in top side and outlet discharge of water from bottom. This can be installed on river by making a partition on main stream and dedicating a water flow path to the basin. According to desirable condition this basin and water inlet can be manufactured with PVC to minimize the construction cost and time and also portable to move anywhere and the size of basin is accordingly to that of generator specification.



**Fig 1. Layout of turbine**

Dynamic turbine is used to utilize the full flow of water inlet to rotate the turbine. Selection of turbine blade is an important factor to enhance the efficiency of whole system because the turbine blades should be able to catch the flow of whirlpool.



**Fig 2. Vortex turbine**

Most of the generation units are installed with induction generators which are easy to manipulate because of its operation. As they can work with the fluctuating inputs and also rough, with no use of brushes.

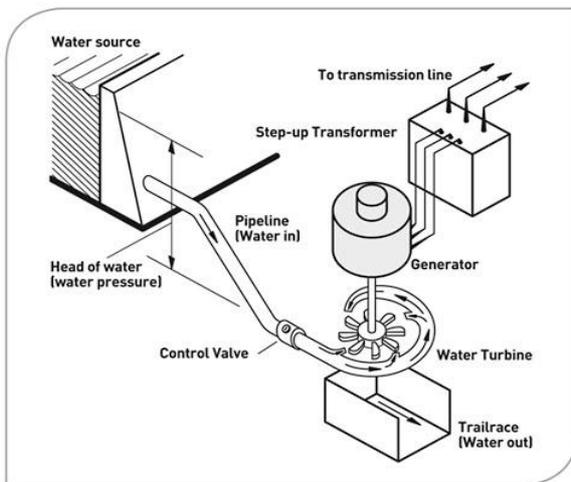
## III WORKING PRINCIPLE

It is the device which is used in micro hydro-electric power plant for the purpose of flow of water. The water flow of from treatment plant towards turbine with the help of trapezoidal open channel. It converts the potential energy of water into kinetic energy. The trapezoidal open channel are made up of concrete

material. The trapezoidal open channel is open in nature & of larger size. The passage of flow water from tank. Water ways may be in the form of canal or tunnel. OR It is used to carry the water from water treatment to surge tank. It is a device which is connected in between treatment plant & power house. It is of vertical type, at the time of starting of hydro-electric power plant, near powerhouse valve is closed. Then water flows from treatment plant towards turbine & filled the surge tank, after that valve is open either manually or automatically, water flow towards turbine when valves are open & turbine or prime mover starts to rotate. This sequence is follow to avoid or to prevent the turbines against water hammer effect.

The water force applied on the blade then the blades are rotate in rotary motion. The shaft is rotated by applying water force then shaft is rotated in clockwise direction.

After that power produced.



**Fig 3. Working of power plant**

**IV SOURCE AND EQUIPMENT**

**1. Source of plant:-**

- a) Treated waste water
- b) New naidu sewage treatment plant

**2. Material:-**

- a) **Concrete pannel:-**

the trapezoidal panel is made of cement concrete, it is use for to carry water and give direction to flow water.

**b) Equipment:-**

- Turbine:- micro vortex turbine use full for electricity generation at various head level.

- Battery:- it is use full for to store and supply the electricity.

**V OBSERVATION TABLE AND RESULT**

Table 1. Analysis

CONTENT	VALUE
Water flow rate, Q (M <sup>3</sup> /sec.)	1.33
Height of water inlet(m)	2
Velocity (m/sec.)	0.87
Turbine outer diameter(m)	0.6
Turbine runner hub diameter(m)	0.32
Approximate turbine rotation(rpm)	420
Approximate Output of turbine(MW)	194.30
Estimation cost (Above 95w)	1\$
Open channel C/S area (m <sup>2</sup> )	2.95

**VI FUTURE SCOPE & PROBABLE OUTCOME**

**a) FUTURE SCOPE :**

Pune city drains handle sheer volumes of waste water every day. A new method of aerating water combined with power generation could go a long way in solving the problem of water treatment as well as power generation. Even under low head this much amount of water if efficiently utilized can generate sufficient power not only for the plant but also for the grid. By using the power of water in vortex flow under gravity, an attempt is made to make power from Indian drains.

**b) PROBABLE OUTCOME :**

Probable outcome of project is, to generate electricity and increase the quality of water and also re-aeration is possibly done.

Excepted annual electricity production is approximately by analyzing is 196.18 MW.

Accepted result by using vortex turbine increasing aeration and improve the quality of water. By using low head large amount of electricity generated.

**VII CONCLUSION**

Plant proves to be a simple and cost effective solution for treated waste water disposal. The key feature of this project is the triple advantage of power generation, aeration and segregation, all of which are achieved simultaneously. Power generated from treated waste

water turns out to be a major source of renewable energy. Cities such as Pune, Mumbai and other major cities are typical regions where plant can function with much effect. This installation ensures reduced water pollution and in effect a better planet for all of us.

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