

Innovative Technique of Production of Electric Power from Kinetic Energy of Water Flow in Pipelines

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Abstract— Electrical Energy has its applications in each and every domain of our life. It is directly or indirectly involved in every aspect of human life. Its usage has increased to a large scale nowadays. As of now the major portion of electric energy generated is by hydro and thermal energy. So there is a danger of its depletion in the near future. Technical Community is consistently searching for renewable, sustainable and feasible energy source. Generating the energy from the economic and available resources has become very much essential nowadays. Bioenergy, solar energy are yet to prove their efficiency. Hence we are proposing an idea of generation of the electric power by converting kinetic energy of flowing water in water pipe. This type of power generation is carried out here by one of the natural resources which is water, along with some necessary arrangement of turbines and pipes in order to produce the desired electric power efficiently. This proves to be one of the smart solutions of converting one form of energy to other and utilizing the converted energy as the basic need in everyday purposes.

Keywords— Turbines, Electrical Power, Turbine Flow, Kinetic Energy, Electricity Generation

I. INTRODUCTION

This paper explains the generation of electric energy from the flowing water in pipes [1]. The velocity of the water is responsible for this power generation. Greater is the velocity of the water, more is the production of electric power. The turbines are designed in a particular manner so that they are exactly fitted on the pipes. The amount of the generation of power can also be controlled in order to meet the given requirements. This type of electric power can be generated anywhere in the pipes, provided the velocity of the water meets the required power generation constraints [2]. The electric power can be produced very efficiently by the systematic arrangement of more number of turbines and motors.

II. PROPOSED SYSTEM

This paper proposes to generate the electricity by a very simple and smart solution that can be implemented in our day to day life applications. The basic idea and the purpose of this type of implementation is to use the natural resources to the maximum extent and to bring its usage to the real and day to day applications. Electricity and water are both becoming rare, and we all are very well aware of this fact. But with the

combination of both these types of energies and using them in this proposed way helps us to solve this major problem of their extinction [3]. Water flowing in the pipes is the most common thing, but generation of electric power through it is much more fascinating thing. Whenever, the water flows through the water pipes, this system proposes that electric energy can be created by water striking the turbines in the pipe.

III. WORKING

The working mechanism of this idea is quite simple and executable. Basically this idea can be implemented everywhere where there is availability of the sufficient water flow from one of the sources and the required arrangement for the generation is fixed there. To be in specific we can consider the very familiar example of the water flow in water pipes in building or houses. Every house and building has at least one overhead tank and the main pipeline fitted to it carries water at certain speed [4]. The speed depends on various parameters such as overhead tank height, pipe diameter, number of outlets. The kinetic energy of flowing water in such pipes is the energy that has to be converted to the electrical energy [5]. To do this, we have to fit the blades of the turbines inside the flowing water pipe. The turbines will be fitted at regular distances on the pipe so that there will be no obstruction for the flow of water in pipe. The turbine has to be designed according to the point of use. Each time the energy is generated as the turbines spins. As the velocity of the water increases the rotation of the turbines increases and there will be generation of more electric power [6]. A systematic study has to be made to get maximum conversion efficiency [7].

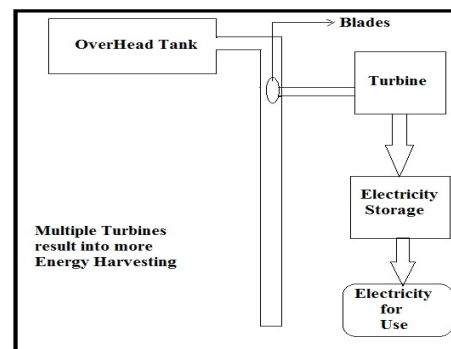


Figure 1: Block Diagram of the system

IV. FLOWCHART FOR THE PROCESS

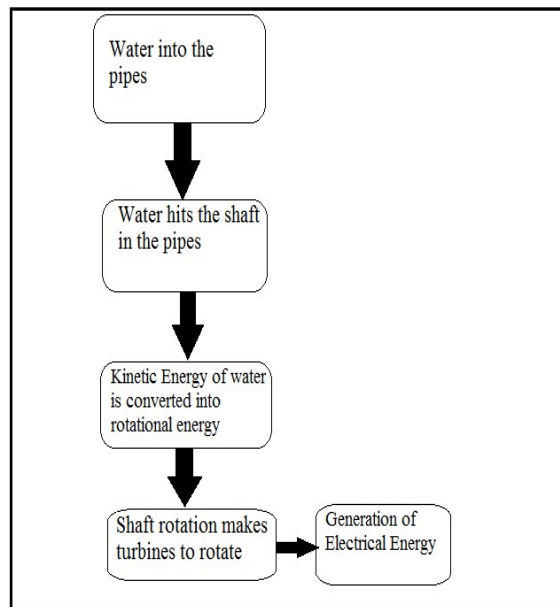


Figure 2: Flow chart of the process of generating energy

The flowchart is described in steps as follows:

The water in the pipes is made to flow with high velocity features the first step. The third step describes shafts in the pipes which are systematically arranged to rotate whenever high velocity water hits them. The third step follows with the conversion of large amount of kinetic energy into rotational energy. Shaft rotation makes the turbines to rotate to produce the required amount of electrical energy is the fourth step. Finally the electricity is generated by these four steps which are simple and affordable to implement too. Such implementations should be carried in an approach to find the better ways of power generation [8].

V. RESULTS AND DISCUSSIONS

This paper includes a noteworthy feature of generating electric power from the water flowing in the pipes, which is fascinating and challenging too. Such innovative paper must be implemented as projects taking into concern the issue of depletion of electric power in the near future. This project proves to be one of the most innovative techniques of electrical energy generation, as it produces the electric power from the water flowing in the pipes. It has a widerange of usage, from the household chores to the industrial purposes this project holds great impact on the society [9]. Because of low cost characteristic, this also promises a considerable saving of Electricity Board, thus reserving a greater amount of nation's revenue.

The schematic diagram of arrangement is as shown below:

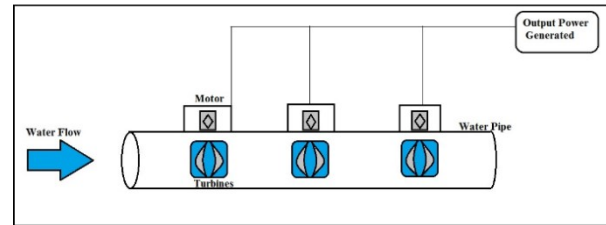


Figure 3: Schematic representation of the system

VI. ADVANTAGES

- Generation of electricity at minimum cost.
- Less usage of hardware materials.
- Use of the natural resource as water in complete process.
- Eco-friendly method to generate electric power.
- Can be implemented anywhere and everywhere.

VII. FUTURE SCOPE

- This idea can be extended to every industry which emits the waste effluents through pipes [10], [11].
- The water pipes under the road can be used to generate the electric power in such a way that the street lamps on the roads can be lighted up by the generated electricity produced in the water pipes under the ground.

VIII. CONCLUSION

The above discussed system can easily be implemented as the turbines can be easily fitted into the municipality pipelines, waste water pipelines, irrigation pipelines and in many more applications. The total cost of implementation of this project is also very less and the output power which we get from it is worth of this implementation. Thus, this is the idea when implemented solves the major problem of shortage of electric power in rural and also in urban areas, also frequent load shedding in major cities and thus can prove a boon to the society.

REFERENCES

- [1]. "Self-Excited Induction Generator and Municipal Waste Water Based Micro Hydro Power Generation System" by R. K. Saket and Lokesh Varshney at IACSIT International Journal of Engineering and Technology, Vol. 4, No. 3, June 2012.
- [2]. "Portland Now Generates Electricity from Turbines Installed in city water pipes", by Rafi Schwartz, GOOD, A magazine for global citizen, United States of America.
- [3]. "Trends and future demand for electric power generation", Khatib, H., World Energy Council, Jordan, International Conference on Opportunities and Advances in International Electric Power Generation, IET, Durham, United Kingdom.
- [4]. "Water Scarcity and the Role of Storage in Development", Andrew Keller R. Sakthivadivel and David Seckler, International Water Management Institute.
- [5]. "Electric Power Systems Research", Prof. C.A Nucci, Elveseir International Journal, ISSN: 0378-7796.
- [6]. "Water Dependency of Energy Production and Power Generation Systems", Tamim Younos Rachelle Hill, Heather Poole, Virginia

Polytechnic Institute And State University Blacksburg, Virginia, USA.

- [7]. "A survey of Water Use and Sustainability in the United States with a Focus on Power Generation", Electric Power Research Institute No. 1005474, Palo Alto, California, USA.
- [8]. Water and Sustainability (Volume 2): U.S. "Water Consumption for Power Production- The Next Half Century", Electric Power Research Institute. No. 10006786, Palo Alto, California.
- [9]. S. F. Lanjewar, S. D. Abhyankar, and Sushmita Moon, "Micro Hydro Power Generation," in proceedings of the International Conference on Green Power Generation: vision 2020: The Institution of Engineers (India), Anpara Local Centre, pp. 10-12, December, 2010.
- [10]. M. G. Simoes and F. A. Farret, "Renewable Energy Systems: Design and Analysis with Induction Generators," CRC Press, New York, USA, 2004.
- [11]. Small hydro power: technology and current status Oliver Paish, IT Power Ltd, The Manor House, Chineham Court, Lutyens Close, Chineham, Hampshire RG24 8AG, United Kingdom.
- [12]. Paish Oliver, "Micro-Hydro Power: Status and Prospects", Journal of Power and Energy, Professional Engineering Publishing, 2002.
- [13]. Khennas S, Barnett A. "Best Practices for Sustainable Development of Micro-Hydro in Developing Countries", ESMAP Technical Paper 006, IBRD, World Bank, 2000.
- [14]. Peter H. Gleick "WATER USE", Pacific Institute, 654 13th Street, Oakland, California 94612, Annual Review of Environment and Resource.