The Feasibility of Applying Micro-hydroelectric Power Technology in Building Water Supply Pipes

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Abstract

With the rapid development of industries, commerce, and standards of living, the energy requirements of various nations are significantly increasing. Currently, the primary sources of global energy supply are oil, coal, and other fossil fuels. Because of the depletion of natural resources, the development of green energy technology has become a vital topic in national development and academic research. Considering that the household water in urban buildings is discarded after use, converting the energy from household water into electricity is the focus of this study.

In this study, the micro-hydroelectric power technology developed for applications in rivers will be modified and minimized for applications in the water supply pipes in buildings. The flow produced in building water supply pipes will be used to drive micro-hydroelectricity turbines and convert hydroelectric power into mechanical power. This mechanical power will then be converted into electric power through permanent-magnet synchronous generators. Micro-hydroelectric systems do not involve the damaging procedures of high currents or high power use, and have a long service life that reduces maintenance costs. In this study, innovative micro blades with aerodynamic design will be used to minimize the cross-sectional area of water flow. In addition to the flexible structural design, these blades are advantageous because they are small, lightweight, and inexpensive. To explore the feasibility of using micro-hydroelectric power technology in buildings, experimental power and storage efficiency will be monitored, residential power use patterns collected and analyzed, and individual (or family) water use surveyed.

Key Words: building water supply pipeline, generator, hydroelectric power, micro-hydroelectricity, Pico-hydroelectricity, renewable energy, turbine