Researchers harnesss the energy of moving seawater used to cool a power plant

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Credit: Nataliia Kelsheva

A team of scientists from Universiti Malaysia Sarawak has found a way to recover energy from an outflow of seawater used for cooling a power plant in Seijingkat, Malaysia. As the hot water flows from the plant, it creates an artificial waterfall. The team has developed and tested a hanging hydropower-generating system that was custom-designed for use at this sensitive site to recover energy from the artificial waterfall.

Unlike natural water systems such as rivers, the flow at this artificial site is unaffected by the weather, promising a consistent and reliable source of energy all year round.

The researchers first created a mathematical model of their system, which consisted of a water-powered turbine connected to a generator, to determine the energy output and consequent efficiency expected when the turbine turned at various speeds. They also took into consideration the unique challenges of the site before building the system. The hot seawater necessitated the use of marine-grade stainless steel in many parts of the system to avoid corrosion. Furthermore, the flow of water could not be stopped for installation, and measurements of performance had to be taken from a distance.

Despite these challenges, the team built and ran the system for a test period of three months. They measured the rotation speed of the turbine and compared this to the theoretical model to estimate its efficiency. They achieved a maximum efficiency of approximately 40%, approaching the theoretical limit of 50%. On the basis of their results, they also conducted an economical study of the system and determined that it would take a minimum of 4.2 years to recover the initial costs.

The researchers say that, while their system performed well, improvements could be made with further modelling of performance. Nevertheless, they conclude that their work demonstrates the feasibility of building custom-designed power-generating systems for challenging

sites to produce local sources of renewable energy.

Provided by Universiti Malaysia Sarawak