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New Wind Harvester Can Generate Power From A Gentle Breeze

Editor OilPrice.com

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Nanyang Technological University scientists have developed a low-cost device that can harness energy from wind as gentle as a light breeze and store it as electricity.

When exposed to winds with a velocity as low as two meters per second (m/s), the device can produce a voltage of three volts and generate electricity power of up to 290 microwatts, which is sufficient to power a commercial sensor device and for it to also send the data to a mobile phone or a computer.

The team's study paper has been published in the scientific peer-reviewed journal Mechanical Systems and Signal Processing.

The light and durable device, called a wind harvester, also diverts any electricity that is not in use to a battery, where it can be stored to power devices in the absence of wind.

The scientists say their invention has the potential to replace batteries in powering light emitting diode (LED) lights and structural health monitoring sensors. Those are used on urban structures, such as bridges and skyscrapers, to monitor their structural health, alerting engineers to issues such as instabilities or physical damage.

Measuring only 15 centimeters by 20 centimeters, the device can easily be mounted on the sides of buildings, and would be ideal for urban environments, such as Singaporean suburbs, where average wind speeds are less than 2.5 m/s, aside of thunderstorms.

Professor Yang Yaowen, a structural engineer from NTU's School of Civil and Environmental Engineering (CEE), who led the project, said, "As a renewable and clean energy source, wind power generation has attracted extensive research attention. Our research aims to tackle the lack of a small-scale energy harvester for more targeted functions, such as to power smaller sensors and

maintenance, and does not use heavy metals, which if not disposed of properly, could cause environmental problems."

The innovation has received interest from the industry. The NTU research team is also working towards commercializing their invention.

The device was developed to harness efficient wind energy at low cost and with low wear and tear. Its body is made of fiber epoxy, a highly durable polymer, with the main attachment that interacts with the wind and is made of inexpensive materials, such as copper, aluminum foil, and polytetrafluoroethylene, a durable polymer that is also known as Teflon.

Due to the dynamic design of its structure, when the harvester is exposed to wind flow, it begins to vibrate, causing its plate to approach to and depart from the stopper. This causes charges to be formed on the film, and an electrical current is formed as they flow from the aluminum foil to the copper film.

In laboratory tests, the NTU-developed harvester could power 40 LEDs consistently at a wind speed of 4 m/s. It could also trigger a sensor device, and power it sufficiently to send the room temperature information to a mobile phone wirelessly.

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This demonstrated that the harvester could not only generate electricity to consistently power a device, but that it could store excess charge that was sufficient to keep the device powered for an extended period in the absence of wind.

Prof Yang added: "Wind energy is a source of renewable energy. It does not contaminate, it is inexhaustible and reduces the use of fossil fuels, which are the origin of greenhouse gasses that cause global warming. Our invention has been shown to effectively harness this sustainable source of energy to charge batteries and light LEDs, demonstrating its potential as an energy generator to power the next generation of electronics, which are smaller in size and require less power."

The NTU team will be conducting further research to further improve the energy storage functions of their device, as well as experiment with different materials to improve its output power. The research team is also in the process of filing for a patent with NTUitive, NTU's innovation and enterprise company.

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Then there are those questions. How long might those materials last out in the elements? Can it handle hot weather, cold weather, ice storms and Cat 4 hurricanes?

It really small, too. At about 6 x 8 inches its not a bug blunderous thing. One does wonder what an upsized unit would do, like light lamps in developing areas.

So just what is meant by low cost? The materials list doesn't look expensive, one does wonder what one might cost in the retail box.

By Brian Westenhaus via New Energy & Fuel

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