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Plastic grass could cover buildings to produce energy from wind

THE wind flowing over your roof is packed with energy, if you could only harness it. A new type of wind power generator carpets a surface with plastic strips that sway in the wind like grass, producing renewable energy where traditional windmills would be impractical.

The generator is made by fixing flexible strips of plastic to a board, so they stand upright like rows of dominoes. The strips have nanowires etched on one side and a coating of indium tin oxide (ITO) on the other. When the strips flail in the wind, the nanowires slap against the ITO surface of neighbouring strips. This temporary contact allows electrons to leap from one material to the other, creating a current through a phenomenon known as the triboelectric effect.

Covering a 300-square-metre rooftop with the strips "would be expected to deliver an electrical energy of 7.11 kW, which should mostly power a household," says Weiqing

Yang at Southwest Jiaotong University in Chengdu, China.

Yang worked on the project with Zhong Lin Wang's group at the Georgia Institute of Technology in Atlanta. The goal was to tap energy not just from steady winds, but from the choppy gusts typical of built-up areas too. "Compared with a wind turbine, our triboelectric nanogenerator (TENG) is effective at harvesting the energy from natural wind blowing in any direction," says Yang. He adds that the harvesting system is simple to make, and easy to scale to larger systems.

So far, the generator has only been tested in the lab, aiming an electric fan at a model rooftop covered with 60 strips. This generated enough electricity to light up 60 LEDs. The strips work at wind speeds as low as 21 kilometres per hour, but the most useful power was generated with direct wind at almost 100 km/h – or storm force 10.

That's neither easily available nor desirable, says Fernando Galembeck, who investigates energy harvesting at the University of Campinas in São Paulo, Brazil. "Significant amounts of power are obtained but we are still far from installing these devices on our rooftops and building walls."

Galembeck says that, as with any energy scavenging technique, energy storage will be crucial for the system's success, allowing the variable amounts of power generated in gentle winds to be stored until needed.

Yang says they are seeking a storage solution, as well as working on integrating the nanogenerator with solar panels to boost output.

Galembeck also points out that indium tin oxide isn't a suitable material, due to its poor mechanical properties, cost and toxicity. "The concept is highly promising but its realisation depends on shifting to other materials," he says.

(Image: Oleg Moiseyenko/Getty)

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By **James Urquhart**