Generating electricity from air flow

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A group of researchers at the City College of New York is developing a new way to generate power for planes and automobiles based on materials known as piezoelectrics, which convert the kinetic energy of motion into electricity. They will present their concept later this month at the 62nd Annual Meeting of the American Physical Society's (APS) Division of Fluid Dynamics will take place from November 22-24 at the Minneapolis Convention Center.

About a half-inch by one inch in size, these devices might be mounted on the roof or tail of a car or on an airplane fuselage where they would vibrate inside a flow, producing an output voltage. The power generated would not be enough to replace that supplied by the combustion engines, but it could run some system -- such as batteries that would be used to charge control panels and other small electronic devices such as mobile phones.

Led by CCNY professor Yiannis Andreopoulos, the researchers are currently attempting to optimize these devices by modeling the physical forces to which they are subjected in different air flows -- on the roof of a car, for instance, or on the back of a truck.

When the device is placed in the wake of a cylinder -- such as on the back of a truck -- the flow of air will cause the devices to vibrate in resonance, says Andreopoulos. On the roof of car, they will shake in a much more unsteady flow known as a turbulent boundary layer. In Minneapolis, Andreopoulos and his colleagues will present wind tunnel data showing how the devices work in both situations.

"These devices open the possibility to continuously scavenge otherwise wasted energy from the environment," says Andreopoulos.

More information: The presentation, "Harvesting energy in the wake of a circular cylinder using piezoelectric materials" by Dogus H. Akaydin, Niell Elvin, and Yiannis Andreopoulos of the City College of New York is at 8:00 a.m. on Sunday, November 22, 2009. Abstract: meetings.aps.org/Meeting/DFD09/Event/110728

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