

## NEWS

## Start-ups Try to Capture Road Traffic's Excess Energy

Stopping or slowing traffic powers piezoelectric and mechanical systems

By LUCAS LAURSEN / OCTOBER 2010



Photo: Gil Cohen Magen/Reuters

12 October 2010—Visitors to aerospace engineer Haim Abramovich's office at the Israel Institute of Technology, in Haifa, once asked if they could run a freight train over his latest invention. Abramovich didn't blink: The visitors were from Israel's National Road Company, and they wanted to know whether his piezoelectric material—which he developed to warp aerodynamic surfaces at the command of an electric current—would instead generate power if embedded beneath rumbling roads and rails.

Abramovich, who had just launched start-up [Innowattech](#) to develop wearable microgenerators for powering mobile devices, was convinced the road and track were better homes for his technology. So the company "turned around 180 degrees," he recalls, and figured out how to embed piezoelectric material beneath a road. Now, along with several other inventive start-ups, Innowattech is poised to harvest some of the spare kinetic energy of the world's moving vehicles—call it the kinetic surplus.

Innowattech's design consists of a thin box around the piezoelectric material, which is then placed underneath a layer of asphalt. When a car drives over the box, it takes the vertical force and compresses the piezoelectric material, thereby generating electricity, Abramovich explains. The energy—80 kilowatt-hours per kilometer of road for car traffic—can be stored in a nearby battery or supercapacitor, depending on the application, or sent directly to streetlights and other roadside devices.

But wait. The energy must come from somewhere, right? "We do not take the energy from the car," Abramovich says, preemptively. "We take the energy which will otherwise be wasted by heat when the road deforms" under the weight of the car. The layer of piezoelectric material is stiffer than the road material it replaces, so it even saves passing vehicles a tiny amount of energy.

Another design, from U.S. tech-transfer firm New Energy Technologies, aims to capture energy when vehicles are slowing down. Cars or trucks would drive over a mat that would be installed on top of the road, on a highway off-ramp, or near a toll booth, saving wear and tear on the car brakes and transforming some of the slowing vehicle's motion into electricity. The mat uses mechanical or hydraulic cells to generate electricity and can be customized for cars or cargo truck traffic.

The idea of skimming kinetic energy from slowing vehicles before it gets wasted as heat has already undergone a few real-world tests, with mixed results. Last summer, Highway Energy Systems, in Henstridge, England, which was founded by serial inventor and independent mechanical engineer Peter Hughes, installed his [Electro-Kinetic Road Ramps](#) in the parking lot of a grocery store in Gloucester. The panels produced as much as 40 kilowatt-hours, but Hughes reports that the panel seals suffered damage from grit, temperature extremes, and torsion from trucks turning on them. He is planning

to replace that system. "We were premature," Hughes says, "but we do not consider the problems insurmountable."

New Energy Technologies ran brief demonstrations last year at a fast-food chain in New Jersey and a hotel in Washington, D.C., and the company is planning future demonstrations with other city and state transportation departments. Innowattech, which has both road and rail demos outside Haifa, may install its first commercial unit in Italy or the United States by the end of this year, Abramovich says.

The firms competing in this sector are diverse, but they have this in common: It's the little guys who have bet first. Entrepreneur and military veteran Terry Kenney sold a hydraulic system of his own design to the Port of Oakland, Calif. KinergyPower, in Welland, Canada, whose founder once worked as a welder, plans to install its first unit for the municipality in early October.

Now that governments are taking notice—the U.S. Federal Highway Administration just gave mechanical engineer Dan Inman and colleagues at Virginia Tech a three-year \$1 million contract—will utilities and road builders be next? "It's a matter of being convinced that there is a big market," says Abramovich. "It might take another two or three years before they see that you can do some profit." In the meantime, the road is full of potential.

#### **About the Author**

Lucas Laursen is a freelance journalist based in Madrid. In the September 2010 issue he wrote about a computer system that warns egg farmers when hens are going to start murderous rampages.