



# Microwave Surfing

## *The Dream Is Alive!*

■ Rajeev Bansal

Power can be, and at no distant date will be, transmitted without wires, for all commercial uses, such as the lighting of homes and the driving of aeroplanes. I have discovered the essential principles, and it only remains to develop them commercially. When this is done, you will be able to go anywhere in the world—to the mountain-top overlooking your farm, to the arctic, or to the desert—and set up a little equipment that will give you heat to cook with and light to read by.

—Nikola Tesla (1856–1943) in an interview with *The American Magazine* as quoted in [1]

As I wrote in a column [2] some years ago, most of us would be thrilled just to be able to untether our mobile devices from their charging cables and adapters. But Tesla, the inventor of ac, had bigger dreams when he set up his research laboratory

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Rajeev Bansal ([rajeev.bansal@uconn.edu](mailto:rajeev.bansal@uconn.edu)) is with the University of Connecticut, Storrs, Connecticut, 06269, USA.

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at Wardencllyffe [3] on Long Island in 1902. Behind the laboratory building, one can still see the old foundations that once supported a 57-m experimental tower for transmitting information and electricity wirelessly over long distances [4].

Unfortunately, Tesla's efforts to send electricity through air led nowhere, and, within a few years, the tower was scrapped to help pay the debts associated with the laboratory. Even Tesla's name was largely

forgotten until Elon Musk revived it recently as the brand name for his electric cars.

Now, thanks to Emrod, a company based in New Zealand, Tesla's

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dream of wireless power transmission is enjoying a renaissance. Emrod is working with Powerco, a New Zealand electricity distributor, to develop and test a prototype system that will send electricity generated by a solar farm to a client over a distance of several kilometers. The company plans to do this by converting dc electricity to a microwave beam that is transmitted and converted back to usable electricity at the customer's site [4].

Some readers would recall that this "powerbeaming" was tried before during the energy crisis in the 1970s, when NASA was tinkering with the Solar Power Satellite system. In fact, NASA's record of transmitting 34 kW of electric power over a distance of 1 mi still stands [4]. However, no

commercial system was ever developed using this approach.

According to Greg Kushnir, Emrod's founder, the company will start by transmitting "a few kilowatts" over a mile.

## Now, thanks to Emrod, a company based in New Zealand, Tesla's dream of wireless power transmission is enjoying a renaissance.

The company hopes to improve upon the current system efficiency of around 60% by using microwave relay towers along the transmission path and metamaterials in their receivers. To protect against the potential risks posed by intense microwave radiation, the beam will be surrounded by low-power laser "curtains." If these harmless laser beams

detect an interfering object (such as a bird or low-flying helicopter), the microwave radiation is instantly turned off [4].

When it comes to power transmission through air, Emrod is not the only player in the field. TransferFi of Singa-

pore is experimenting with shaped radio beams for short-range power transmission, while the American company PowerLight Technologies has been working with the U.S. Department of Defense to supply power to remote bases and drones via lasers. The Japanese company Mitsubishi is exploring NASA's Solar Power Satellite concept again [4]. Tesla would have felt vindicated.

## References

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