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IIT-I develops device that makes power from water, air

TIMES NEWS NETWORK

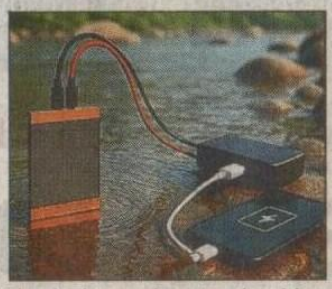
Indore: Professors and students at Indian Institute of Technology Indore (IIT-I) have developed a groundbreaking device that produces electricity using just water and air—without need for sunlight, batteries, or moving parts.

The device silently taps into the natural process of water evaporation to extract thermal energy from the atmosphere, converting it into clean and sustainable

CLEAN AND SUSTAINABLE

electricity for small electronic devices, an institute release said.

This pioneering research comes from Sustainable Energy and Environmental Materials (SEEM) Lab at IIT Indore, led by Prof Dhirendra K Rai and his research team member, Khushwant Singh. "Think of it as a self-charging power source, fuelled by nothing more than air and water. As long as evaporation continues, the device generates electricity—quietly, cleanly, and sustainably. Our aim was to design a solution that is both affordable and effective, so it can one day find real-world use in rural and off-grid areas," Prof Rai said.



The device works not only with clean water but also with saline or muddy water, retaining stability for months

"This innovation is a testament to IIT Indore's vision of creating knowledge that matters to society. By turning the simple phenomenon of water evaporation into a dependable power source, our researchers opened new pathways for sustainable technologies. Such ideas can transform lives, especially in rural and underserved communities, and reaffirm the role of science in building a cleaner and more equitable future," IIT Indore director Prof Suhas Joshi said.

At the heart of the invention is a specially-engineered membrane made of graphene oxide (a layered form of carbon) combined with zinc-imidazole, a stabilising compound. When the membrane is partially immersed in water, it begins generating electricity as water travels upward through microscopic channels and evaporates. The release added that this evaporation-driven movement separates positive and negative ions at opposite ends of the membrane, creating a steady voltage.

A single membrane of 3 × 2 cm^2 can generate up to 0.75 volts, while multiple membranes can be combined to scale up power output. The device works not only with clean water but also with saline or muddy water, retaining stability for months. Its versatility makes it ideal for regions with unreliable electricity or limited access to power.

Potential applications range from powering environmental sensors in forests and farms to providing emergency lighting during blackouts or supporting low-power medical wearables in remote clinics. Unlike solar panels, the device works indoors, at night, and under cloudy conditions. Lightweight, portable, and compatible with even unfiltered water, it promises a robust solution for challenging environments.