# ENERGY FROM RAIN

Tracy Staedter, Discovery News

Feb. 7, 2008 -- Energy is everywhere. In the sun, wind, and now rain.
Researchers have developed a technique that harvests energy from rain showers and converts it into electricity. The technology could work in industrial air conditioning systems, where water condenses and drops like rain. It could also be used in combination with solar power to scavenge as much energy from the environment as possible, or to power tiny, wireless sensors designed to monitor environmental conditions."Our calculations show that even in the most unfavorable conditions, the mechanical energy of the raindrops...is high enough to power low-consumption devices," said RomainGuigon, a research and development engineer at the research institute CEA Leti-Minatec in Grenoble , France .Raiman, who conducted the research with fellow engineers Jean-Jacques Chaillout, Thomas Jager, and Ghislain Despesse, admits rain energy is small compared to that of the sun, but that's not the point.

"It's just a system that can be used where solar energy is difficult to exploit and/or combined with another technology for harvesting energy," said Guigon.The method relies on a plastic called PVDF (for polyvinylidene difluoride), which is used in a range of products from pipes, films, and wire insulators to high-end paints for metal. PVDF has the unusual property of piezoelectricity, which means it can produce a charge when it's mechanically deformed.Guigon and his team embedded electrodes into a thin membrane of PVDF, just 25 micrometers thick (it takes 1,000 micrometers to make one millimeter). Then they bombarded the sheet with drops of water varying in diameter from 1 to 5 mm.As the drops hit the material, they create vibrations, which creates a charge. The electrodes recover the charge for use as power.Not surprisingly, the largest drops cause the biggest vibrations. The researchers found the system could scavenge 12 milliwatts from the largest drops and generate at least 1 microwatt of continuous power.But is that enough?

All devices -- even the tiniest sensors -- require a minimum amount of current and voltage coursing through the circuits.

"They haven't included any circuit analysis," said Dan Inman, professor of mechanical engineering and director of the Center for Intelligent Material Systems and Structures at Virginia Tech in Blacksburg .That information is important when trying to understand how efficiently the energy created from the raindrops will be converted into power useful in electronic devices."They need to clarify that. That would be the next step," said Inman. But he thinks that looking to rain for power is a worthy endeavor."You need to look at all possible sources of energy. Our lives are full of batteries, and they are not very ecological. Anything you can use to reduce the need for them or extend their use is a good thing to look at," said Inman.