Professor demonstrates new hydrogen fuel system

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Northern Nevada energy consumers can be excused if they have a sense of "sticker shock" when their power bills come due following the holiday season. Or, that they have a feeling of powerlessness as the price of gasoline climbs to $3 per gallon. They wonder: will the days of the $1 tank of gas ever return?

Thanks to research done by a University of Nevada, Reno professor in the area of hydrogen energy generation, soaring power bills could become a thing of the past. And, finding a power source for your car that costs as little as $1 per gallon could also soon become a welcome reality.

Manoranjan Misra, professor of materials science and engineering, recently received a $3 million research grant from the U.S. Department of Energy to continue his groundbreaking work in various forms of renewable energy. Misra's current project focuses on harnessing photoactive material from the sun to generate hydrogen. Hydrogen is one of the cleanest forms of energy, and studies have shown that it is 33 percent more efficient than liquid fuels. Northern Nevada, with its uncommonly sunny weather – with more than 300 sunny days per year – could become the perfect hub to generate hydrogen energy, according to Misra.

"We can utilize this great energy resource to our advantage to produce hydrogen," Misra said. "We are uniquely positioned in Northern Nevada, as the average energy from the sun is around one kilowatt per square meter area. In Reno it is much higher than that. Because it is so bright

and sunny here in Reno, we have in many ways the perfect location for photo-hydrogen generation."

Misra and his research team have created a new hydrogen material that has more than a billion nanotubes, which gives it excellent potential to produce hydrogen from another abundant resource – water. Misra's small-scale hydrogen generation system, located in the Laxalt Mineral Research Building, produces the material through an electrochemical process from applied ultrasonic waves.

"We are currently using simulated solar light in the lab," Misra said, "and we are finding our system to be a good and robust way to facilitate the movement of electrons by the incident light to produce hydrogen from water." By the end of the decade, Misra estimates that the system could grow to a more industrial size scale, which would allow power companies to produce hydrogen that could be used to power automobiles or power your home. The new power source is extremely cost-effective, Misra says.

"What do we pay now for a tank of gas? A little less than three dollars per gallon? The equivalent for hydrogen generation might be something more along the lines of $1 per gallon to produce," Misra says. "Plus, hydrogen is much more friendly to the environment. Given the weather in Northern Nevada, where on most days we have 10 to 15 percent more sunlight than in other areas of the country, the future of this type of this energy is limitless."

Source: University of Nevada, Reno