

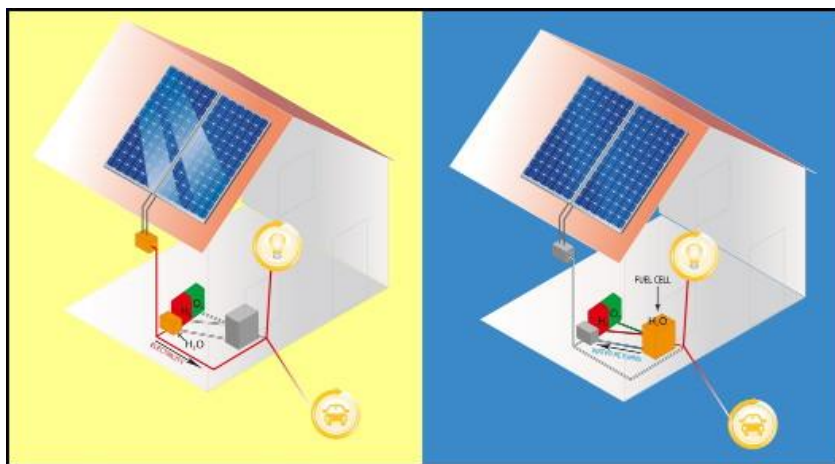
## SOLAR HYDROGEN POWER FOR HOMES.

by Bruce Mulliken, *Green Energy News*, Vol.15 No.24, 1 Sept. 2010

Utility companies need not lose any sleep: It will be a long time before significant numbers of homeowners in the industrial world will be able to disconnect from the grid. While the cost of generating power from intermittent renewables, such as solar and small wind, may be dropping (with generous government incentives to help), the cost of storing power is still prohibitively high. If intermittent renewable energy can't be stored then the power cable between home and grid can't be disconnected.

(Lucky the developing world, though. Where there is no power grid, the norm of the future may be to install independent home generating stations rather than build a formal power grid infrastructure. If so, the developing world will have the green state-of-the-art power system while the industrial world will keep its outdated, inefficient, dirty, centralized power distribution system.)

Batteries, for the time being, are currently in the forefront of energy storage for homes. But, Sun Catalytix of Cambridge, Massachusetts thinks a better solution would be to use electricity from solar photovoltaic panels to split water into hydrogen and oxygen and store both gases in tanks to be fed into a fuel cell to generate power (and perhaps heat) when the Sun drops below the horizon. Solar energy plus energy storage in the form of hydrogen and oxygen would equal an off-grid, personalized energy system.



Daniel Nocera, Ph.D. in discussing his work on solar hydrogen systems at Sun Catalytix, and his day job at the Massachusetts Institute of Technology, said at the 240th National Meeting of the American Chemical Society, "Our goal is to make each home its own power station. We're working toward development of 'personalized' energy units that can be manufactured, distributed and installed inexpensively. There certainly are major obstacles to be overcome — existing fuel cells

and solar cells must be improved, for instance. Nevertheless, one can envision villages in India and Africa not long from now purchasing an affordable basic system."

A new catalyst could help speed development of inexpensive home-brewed solar energy systems for powering homes and plug-in cars during the day (left) and for producing electricity from a fuel cell at night (right, Credit: Patrick Gillyooly/MIT)

With stored pure oxygen in tanks being used to feed the fuel cell, the power plant is bound to be more efficient than a typical hydrogen fuel cell which would use oxygen from the surrounding air to combine with hydrogen to generate electricity. Air, after all, is only about 21 percent oxygen. With 100 percent oxygen a fuel cell should work very well. Nocera's work is to improve the oxygen generation capabilities of electrolyzers which split water. His low-cost catalysts wouldn't require expensive platinum and would be able to boost oxygen production by 200 times. That's a lot of oxygen.

Still, as much as solar-hydrogen-oxygen power systems seem appealing they would have to be made safe. Storing oxygen is dangerous business. Pure oxygen in itself doesn't burn, and is not considered a flammable gas. Oxygen, however, does support — with great gusto — the burning of other substances. It's the oxygen component in air that makes things combust or oxidize. Oxygen stored in tanks must always be treated with caution. Pure oxygen and hydrogen are fuels of rocket engines, by the way.

If the Nocera/Sun Catalytix catalyst works well and gas storage can be made safe, then this energy storage could be a competitor to batteries, provided hydrogen fuel cells, too, come down in cost. Using pure oxygen instead of air should allow the fuel cell stack — the core of a fuel cell — to be smaller thus decrease its cost.

Links Sun Catalytix <http://www.suncatalytix.com>