

# Renewable hydrogen production becomes reality at winery

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(PhysOrg.com) -- The first demonstration of a renewable method for hydrogen production from wastewater using a microbial electrolysis system is underway at the Napa Wine Company in Oakville. The refrigerator-sized hydrogen generator will take winery wastewater, and using bacteria and a small amount of electrical energy, convert the organic material into hydrogen, according to a Penn State environmental engineer.

"This is a demonstration to prove we can continuously generate renewable hydrogen and to study the engineering factors affecting the system performance," said Bruce E. Logan, Kappe professor of environmental engineering. "The hydrogen produced will be vented except for a small amount that will be used in a [hydrogen fuel cell](#)." Eventually, Napa [Wine](#) Company would like to use the hydrogen to run vehicles and power systems.

Napa Wine Company's wastewater comes from cleaning equipment, grape disposal, wine making and other processes. The company already has on-site wastewater treatment and recycling and the partially treated water from the microbial electrolysis system will join other water for further treatment and use in irrigation.

"It is nice that Napa Wine Company offered up their winery and facilities to test this new approach," said Logan. "We chose a winery because it is a natural tourist attraction. People go there all the time to experience wine making and wine, and now they can also see a

demonstration of how to make clean hydrogen gas from agricultural wastes."

The demonstration microbial electrolysis plant is a continuous flow system that will process about 1,000 liters of wastewater a day. Microbial electrolysis cells consist of two electrodes immersed in liquid. Logan uses electrode pairs consisting of one carbon anode and one stainless steel cathode in his system rather than an [electrode](#) coated with a precious metal like platinum or gold. Replacing precious metals will keep down costs. The wastewater enters the cell where naturally occurring bacteria convert the organic material into electrical current. If the voltage produced by the bacteria is slightly increased, [hydrogen](#) gas is produced electrochemically on the stainless steel [cathode](#).

The demonstration plant is made up of 24 modules. Each module has six pairs of electrodes.

"The composition of the wastewater will change throughout the year," said Logan. "Now it is likely to be rather sugary, but later it may shift more toward the remnants of the fermentation process."

The bacteria that work in the electrolysis cells will consume either of these organic materials.

Provided by Pennsylvania State University ([news](#) : [web](#))

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