

# Hydrogen Today



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## Show Me the Hydrogen



## AHA Horizon 500 Watt Fuel Cell

This Horizon H-500 PEM fuel cell completes the cycle of turning sunlight into hydrogen and the hydrogen back into electricity and water. The fuel cell produces 14 volts at up to 35 amps. At maximum load it uses 6.5 liters of hydrogen per minute. We're using 99.95% welding grade H<sub>2</sub>. Components seen are a pressure regulator (7 PSI), hydrogen supply valve, fuel cell stack, on/off switch, controller, 13 VDC external power supply for controller, purge valve and a 12 volt lamp for a test load. The fuel cell will power the AHA MicroDwell hydrogen house. Five hundred watts doesn't sound like a lot – unless you don't have any power. That's about 50 LED lights.

<http://www.horizonfuelcell.com/#!h-series-stacks/c52t>

## “Quotations”

“The best way to predict the future is to create it.” Abraham Lincoln

“Opportunity is missed by most people because it is dressed in overalls and looks like work.” Thomas Edison

*‘We Deliver Clean Air’*

Hydrogen Today:  
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Hydrogen Association  
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[www.clean-air.org](http://www.clean-air.org)

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\*\* SAFETY FIRST \*\*

## American Hydrogen Association Mission

Develop and prove solar hydrogen technologies that will eliminate economic, environmental and energy hardships caused by burning one million years accumulation of fossil fuels every year *and*

Educate scientists, entrepreneurs and experimenters, parents and educators, CEO's, legislators, utilities, the media and farmers how to use solar hydrogen to create sustainable prosperity without pollution.

### Editorial

The gang here in Phoenix has worked hard and come a long way since the last newsletter. We'll again be displaying a Hydrogen House at MicroDwell 2015 from January 31st to March 8<sup>th</sup> at the Shemer Art Center. We got the Horizon fuel cell running after figuring out how to connect metric hoses to inch size barbs. To improve communications, we now have a mobile website and you can join the AHA Google forum that will keep you up-to-date.

The video crew has been making dozens of practice movies and they're almost ready for the Big Time. We're restoring Dr. Zweig's historic '79 hydrogen Dodge pickup truck. A lot of people will be seeing it when we drive to the Home Depot.

Even if you don't live near Phoenix Headquarters, there are a hundred ways you can still help. Set up an AHA display table somewhere for Earth Day, mail books to libraries, conduct experiments, write video scripts or book reviews, prepare sections of the AHA Hydrogen Safety Handbook, research methane dissociation to hydrogen technology or program an Arduino to monitor an MQ-8 hydrogen leak sensor. Write a hydrogen welding manual.

Even with Hyundai now selling fuel cell cars and millions being spent world-wide on hydrogen fuelling stations, we are still far from a clean, solar hydrogen civilization. To me there is no better challenge than to say something is impossible. Our motto "Prosperity Without Pollution" doesn't mean prosperity at the expense of someone else. Everyone deserves an education, a fulfilling living-wage occupation, clean water, clean food and HOPE. People shouldn't have to seek a better life in heaven or America.

<http://www.microdwell.net/2015-event/2015-contributors/american-hydrogen-association-2015-structure/>

<http://m.clean-air.org/>

<http://groups.google.com/group/americanhydrogenassociation>

## The Rest of the (Hydrogen) Story

In the 1890's, an international race was on to be the first person in history to liquefy hydrogen at minus 253° C. Kamerlingh Onnes, a Dutchman, had established a cryogenics lab in Leiden. It came to the attention of city officials that he was storing chlorine, ammonia, methane and hydrogen on the premises. The neighborhood was particularly sensitive because of a catastrophic gunpowder explosion there in 1807. The authorities shut him down for three years.

In the meantime, in 1895 James Dewar in London was able to liquefy 20 cc of hydrogen using his Dewar double-wall, vacuum-insulated vessel. Other than a reputation for laboratory explosions, Dewar never received the fame he was looking for. He lost the financial rights to his Dewar flask to the Thermos Company.

In the quest to liquefy the newly discovered helium (-269° C), Dewar declined Onnes request for samples of the gas. Onnes went on to liquefy helium in 1908 and in 1913, he won the Nobel Prize in Physics for discovering what is now known as superconductivity.

## Hydrogen Events

The Phoenix American Hydrogen Association meets the second Thursday of every month from 6 to 8 PM at Denny's Restaurant, 650 N. Scottsdale Rd. in Tempe, AZ (SW Scottsdale Rd/202, one mile north of ASU light rail station). Call 480-234-5070.

The Silicon Valley AHA chapter meets every third Saturday at the Peninsula Conservation Center, 3921 East Bayshore Road, Palo Alto, CA from 10am to noon. Meetings are now online. Contact Pres. John Gotthold at 408-245-6065 or [jgotthold@comcast.net](mailto:jgotthold@comcast.net) He'll need your email to send you the link before the meetings. Their website is [www.ahasvc.org](http://www.ahasvc.org)

## Hydrogen on the Internet

Delicious Bookmarking – We hear a lot about cool Internet tools, but many are loaded with ads or charge a monthly subscription. Every day I bookmark renewable energy links of interest. It's tedious to tag or sort all of them into dozens of folders. Undated links with titles like “Content Overview” or “Experiment 1” soon get lost among a thousand others. Bookmarks can be messy to transfer to a new computer. Delicious is a handier way to track your favorites. Besides normal organizing, your bookmarks are now available from any computer and they can be forwarded with a couple clicks, which is the main reason I save them in the first place. <http://delicious.com/>

## Thanks



MaryLou Benigno, Tucson, AZ (1941-2014) Educator, grandmother, environmentalist, calligrapher & potter. MaryLou has finally found her ultimate sustainable community.

Alvin Herb, Savannah, GA (1933-2014) Chemist and inventor of energy-saving devices. Al always wanted to help people.

Roy McAlister DVD's – Steve H.

Barnes drill press, tool chest, "Out of Gas" – Larry M.

Computer – Ron H.

H.P. printer, wall clock, soap dish – Joe R.

TV & converter – Frank B.

Hand tools – Duane D.

Install coax cable, anti-foam – Claude C.

Green screen – Ben F.

Bandsaw, chop saw, hydraulic lift, executive chair, coffee pot, sink, Swagelok fittings and microwave oven – Warren H.

Refrigerator, 250 lbs. wild birdseed, bandsaw tires, temperature controller, thread gage, flashback arrestor, Adobe software, gallon paint, extension cords, aluminum powder, postage, library books, 50 pounds glass beads, vise grips, towing lights, ½ drive ratchet, air hose reel, paint brushes and moving blanket - dh

MicroDwell 2104

Fold brochures – Ann & Beth H.

MicroDwell 2015

Painting and carpentry – Melissa D., Charles D., Hunter S., Duane D.

'79 Hydrogen Dodge Restoration

Painting preparation – Ben F., Warren H., Duane D.

## Books & Publications

Science Through Hydrogen – Clean Energy for the Future, Macdonald & Berry, 2010  
Heliocentris, \$16.99, 85 pages

This is one of four high school level, student/teacher solar hydrogen experiment manuals. They are best used with a fuel cell kit available from <http://fuelcellstore.com/>. Besides the science, students will learn valuable skills like planning, measuring, analyzing risks and presenting experiment results.

Hindenburg, Exploring the Truth, Dr. Addison Bain, 2014  
Bluenote Publications, \$39.95, 251 pages

Every child knows how dangerous hydrogen is. Just look at the Hindenburg. And that is just what Dr. Bain did, like a detective at a crime scene. He knows a thing or two about hydrogen. He is essentially the father of NASA's hydrogen rocket propellant program and he literally wrote the book on hydrogen safety – the *NASA Hydrogen Safety Handbook*. Dr. Bain became curious in 1990 after reading a sign in Washington's Air and Space Museum that said hydrogen caused the Hindenburg explosion. As a scientist he knew that pure hydrogen inside the airship was not capable of exploding. For twenty years, he has interviewed remaining eye-witnesses across the globe, conducted material experiments and spent endless hours in archives. A multitude of photos and drawings and his smooth writing make his story easy to follow. He teases us by debunking the Hindenburg disaster theories before we find out what really happened. You not only get a fascinating history lesson, but you'll learn some of the physics and chemistry of hydrogen.

## H2 University

D.I.Y. PhD.

Too many students these days spoil their future by trapping themselves into student loan debt. Other than a few unions, apprenticeships are poorly developed in the U.S. and too many students enter the work market without being good at even one sellable skill. A good education does require four or five hours a day of study, but it doesn't have to cost a lot of money. University libraries are going to digital books available only to registered students. It may be worthwhile signing up for one course to get access. You can lose a lot of sleep with YouTube's wealth of do-it-yourself and basics videos. Take all of them with a grain of salt. There are still craftsmen around willing to take you under their wing, but they won't waste time and their own productivity on you if don't have a genuine passion. Helping fix a frozen pump at midnight for free teaches you things you'll never find in a textbook or classroom.

Khan Academy - Sal Khan started tutoring a cousin in math and now 2 million students a month learn math and science from his 5,000 free videos. <https://www.khanacademy.org/>

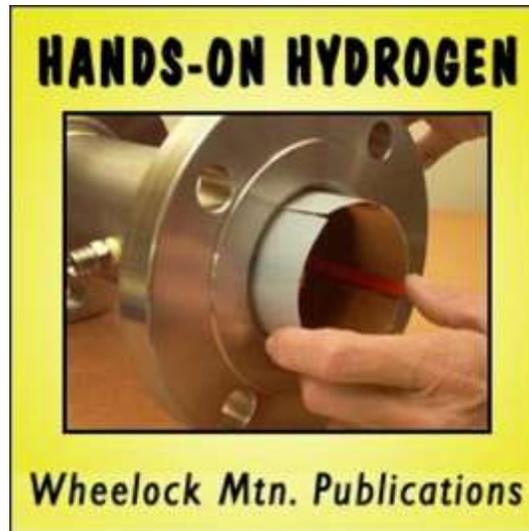
MIT OpenCourseWare – Massachusetts Institute of Technology project makes available online free class outline materials for 2200 courses. Learn Chinese, daylighting, urban planning, tribology or toy design. The most popular classes are computer science and calculus. <http://ocw.mit.edu/index.htm>

edX – 382 free self-paced and scheduled online courses. Linus to cybersecurity to sustainability. These look pretty intense. <https://www.edx.org/>

Hamilton Books, Falls Village, CT. Steep discounts on 40,000 remainders from all categories and inexpensive shipping. <http://www.hamiltonbook.com/>

Smartflix – Rent one of 6,800 technical videos for 9 bucks. Learn about sign language, probability, night flying, lock picking, video lighting, sand casting, welding, Springfield XD, biodiesel and even hydrogen. Read the reviews first. <https://smartflix.com/>

Massive Online Open Classroom <https://www.mooc-list.com/>



*Ebooks for Do-It-Yourself Experimenters*

*By Phillip Hurley*

- Build Your Own Fuel Cells....\$14.95
- Build A Solar Hydrogen Fuel Cell System....\$16.95
- Practical Hydrogen Systems: An Experimenter's Guide....\$16.95
- Build Your Own Solar Panel....\$12.95
- Solar II....\$12.95
- Solar Hydrogen Chronicles....\$12.95
- Solar Supercapacitor Applications....\$16.95
- The Battery Builder's Guide....\$16.95

<http://www.goodideacreative.com/wheelockmtn.html>

*Accepts PayPal*

Good Idea Creative Services  
324 Minister Hill Rd.  
Wheelock, VT 05851

## AHA Membership Form

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Country \_\_\_\_\_

Telephone \_\_\_\_\_ email \_\_\_\_\_

- Regular Membership- \$39.00/year (New members receive a free copy of Roy McAlister's "Solar Hydrogen Civilization").
- Student, Military & Senior (60 and over) Membership- \$25.00/year
- Sustaining Membership- \$100.00/year (autographed book and H2 bookmark)
- Life Membership- \$1000
- Corporation/Institutional Membership- \$1000/year
- "Solar Hydrogen Civilization" book only - \$24.95 postpaid.
- Email *Hydrogen Today* only
- Send AHA New Chapter Packet
- "Hilda Hydro - Girls Go Green" - \$8.95 postpaid

Mail to: American Hydrogen Association  
P.O. Box 4205  
Mesa, AZ 85211  
USA

Or go to: <http://clean-air.org/store.html>

Join the AHA and use our services to learn how every community can achieve sustainable  
*Prosperity Without Pollution.*

AHA publishes *Hydrogen Today* to help educate the public about new developments in renewable energy and the science and people behind them. Join us in making a better world. You can help too by writing for *Hydrogen Today*. Tell others about your grassroots alternative energy projects, either scientific or social. Review a book, product, service or event. A picture is still worth a thousand words. The range should be approximately 300-1000 words. Send to the above address or to the *Hydrogen Today* editor at [editor@clean-air.org](mailto:editor@clean-air.org)