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# *Hydrogen* Today

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*Hydrogen – It's not about the future anymore.*

## Show Me the Hydrogen



Nikola Motor Co. *Nikola One* hybrid fuel cell semi-truck

In November, Nikola Motor Company raised \$200 million to start building a hydrogen fuel cell semi-truck factory in Arizona. Budweiser has already preordered 800 of the trucks for their fleet. Drivers are quitting in droves because of onerous regulations and too much time away from home. These trucks are going to make it a lot easier to stay.

Continued next page.....

## *“Quotations”*

“I have yet to see any problem, however complicated, which when looked at in the right way, did not become still more complicated.”  
Poul Anderson (1926-2001)

“Success has many fathers and failure has none.” Jim Hossack

“The man who makes no mistakes does not usually make anything.”  
Edward John Phelps (1822-1900) Yale law professor

“Students are 20% of our population and 100% of our future.”  
Prince Ea

## American Hydrogen Association Mission

Hydrogen Today:  
Journal of the American  
Hydrogen Association  
P.O. Box 4205  
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### AHA Board

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\*\* SAFETY FIRST \*\*

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.

### Show Me the Hydrogen, cont...

#### *Nikola One*

The aerodynamic body and regenerative braking improve miles per gallon. Range is 1000 miles. Acceleration is "unbelievable" and 360 degree visibility by way of cameras greatly increases safety. The truck is quiet and there is no need for all-night diesel idling. In the cab, drivers can enjoy a full-size bed, TV, refrigerator & freezer, microwave, computer desk & 4G Internet (to keep in touch) and climate control.

If you're asking where all the hydrogen is going to come from, Nikola is way ahead of you. They've bought 400 NEL electrolyzers for a first stage refueling infrastructure. They plan to have 700 stations in N. America by 2028. Buyers will receive 1,000,000 miles worth of free hydrogen. The stations will be open to the general public to fill up your Toyota Mirai. Here's a station map:  
<https://nikolamotor.com/stations>

If you're in Arizona, Nikola is having a Public Demonstration Day in Scottsdale, Wednesday, April 17<sup>th</sup>, 2019. You'll need to RSVP. Some events will be live-streamed.  
<https://nikolamotor.com/nikolaworld/public>

If Nikola Motor Company sounds like a dream career for you, they're now hiring about 60 technicians for their new Phoenix Research & Development Center.  
<https://nikolamotor.com/careers/jobs#job-list>

New AHA Headquarters, Maricopa, AZ



Future AHA Maricopa HQ (Zimmer Design)



Grading the driveway with a track loader



Transplanting ocotillos off the new fence line



Waste-to-energy trailer. Wanna buy a Jaguar?



Birdwatching



Electrochemistry Lab ready for the next Michael Faraday





Spiffing up the front porch for a Grand Opening party



Backyard view



Let's make some solar hydrogen

## Editorial

After a year of moving and renovating the new American Hydrogen Association workshop, I'm more than ready to get back to the fun of hydrogen R & D. We met friends and learned a lot at the Hydrogen + Fuel Cell North American show in Anaheim last September, but overall 2018 felt like two steps backwards. After the natural gas fires and explosions in Massachusetts last fall, we've had to reconsider the commonly held policy of blending hydrogen into an old natural gas grid. What really sticks in my mind are the faces of people standing knee-deep in the rubble or ashes of their home destroyed by extreme hurricanes or wildfires. Is this the future you and your children want to live in?

Most of us naturally dread change, but the time for the Hydrogen Age is NOW. In the New Year, the AHA will be doing its best to help your projects. We'll be making solar hydrogen with a Hysolgenics electrolyzer, teaching hydrogen classes, producing how-to videos and enormously expanding the hydrogen knowledge base with a searchable online library, hydrogen safety handbook and the 'Whole Hydrogen Catalog.' Let us know if you're interested in helping convert the carbon in CO<sub>2</sub> or waste biomass into valuable, long-lasting products.

Make the call. Do the easy thing or do the right thing. At least tell your Congressman about what kind of future you want to live in.

dhh



Toyota semi-truck powered by two Mirai fuel cells

## Hydrogen Events

International Hydrogen & Fuel Cell Expo. 27 Feb. – 1 Mar., 2019, Tokyo, Japan. Free ticket. Technical sessions on fuel cell materials, applications, residential fuel cells, vehicles and hydrogen stations. <https://www.fcexpo.jp/en-gb.html>

International School Progress in Hydrogen Safety. 11-15 March, 2019, Ulster University, Belfast, Ireland. \$365. Covers technical regulations, refueling safety, international safety research, composite cylinders, LH2 and repairing FC vehicles. <https://www.ulster.ac.uk/conference/progress-in-hydrogen-safety>

Impulse Summit for Hydrogen and Fuel Cells. 22-23 May, 2019, Vancouver, Canada. \$1200. Topics include rail & maritime transportation, commercial vehicles, scaling-up fuel cells and electrolyzers. <https://www.f-cell.de/en/program/f-cell-hfc.html>

World Hydrogen Technology Conference. 3-7 June, 2019, Tokyo, Japan. \$890. Organized by the International Association of Hydrogen Energy (IAHE). 2019 topics include hydrogen policies, production, codes & standards, infrastructure and new hydrogen applications. <http://whtc2019.jp/index.html>

Hydrogen + Fuel Cells North America, 23-26, Sept., 2019. Salt Lake, Utah. <https://www.h2fc-fair.com/usa/>

## Books & Publications

DIY Lithium Batteries: How to Build Your Own Battery Packs; Micah Toll, 2017. Toll Publications, 134 pages.

Lithium batteries are everywhere these days from cell phones & laptops, power tools & electric toothbrushes to electric cars. There are many reasons to assemble your own battery. You may need a custom voltage, a custom shape to fit an electric bicycle frame or maybe you want to store solar electricity in the battery from a wrecked electric car.

Toll covers different types of lithium batteries, designing, connecting, charging and very importantly he discusses safety. The thin lithium battery in my Hotspot swelled enough to split the case. For some reason, it was glued in and although I tried to gingerly pry it out, it started getting hot. It didn't catch fire or explode, but it certainly was smoking. Read the book before you touch a lithium battery so you don't set your pants on fire or burn down the house.

The 3.7 VDC 18650 battery is available anywhere for about \$5. It is so-called because of its 18 x 65 millimeter dimensions. There's a pair in my solar light and electric cars may use a pack with 1000's. Go invent something.

The Solar House: Pioneering Sustainable Design, Anthony Denzer, 2013. Random House, 256 pages.

If heating (or cooling) your house with free solar energy sounds like a great idea, then why isn't everybody doing it? This book will go a long ways toward explaining. Fossil fuels were cheaper, solar houses look weird and some designs are high maintenance.

The first solar home designs were done by unemployed architects during the Depression desperately trying to drum up some new business. Designs continue to evolve from the brilliant innovations of Fred Keck in the '30's to expensive, uncomfortable failures. Keck recalled the warmth of a sunny window on a winter day when he was a boy.

Today there are wonderful new materials to work with and a growing awareness of the total cost of wasted energy. Natural or man-made disasters can cut off energy supplies for days, weeks or longer. Solar technology is available, most of it works and it can be cheaper in the long run if you do your homework. Think of it as gold hidden under a 1/4 inch of dust.

## The Rest of the Hydrogen Story

### Döbereiner's Lighter

In 1823, German chemistry professor Johann Wolfgang Döbereiner at the University of Jen, discovered that a stream of hydrogen directed at a bit of platinum heated up and caught fire. As professor Döbereiner and every Boy Scout knows, lighting a fire with flint and steel isn't very convenient. Practical matches weren't invented until several years later.

So Döbereiner invented a lighter which generated hydrogen from a zinc/sulfuric acid reaction in a jar. As a small volume of gas built up, the pressure would lower the acid level below the zinc and the reaction would stop. Opening a valve allowed a jet of hydrogen to contact platinum and produce a flame. Döbereiner lighters were produced until 1886. Although millions were probably sold, he never filed a patent and received almost no compensation for his invention. Döbereiner died in 1849 at age 69.





## Hydrogen on the Internet

University of Ulster Hydrogen Safety Technologies postgraduate short course. 12 weeks online starting 28 Jan., 2019. \$2890 international students. Learn prevention and mitigation for industry or teaching.

<https://www.ulster.ac.uk/courses/201819/hydrogen-safety-technologies-16688>



Final move for the solar hydrogen MicroDwell

### Thanks

Clyde, Marie – Repairs and tidying up new AHA HQ.

Marie – Help setting up alternate website.

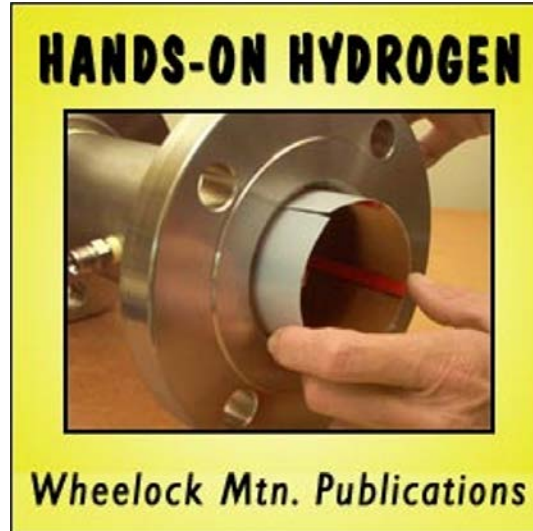
Warren – Lumber, metal building, 12 volt pump and more.

Warren – IRS filing fee.

Dave – Dodge Dakota repairs and detailing.

Jack Zimmer – Drawings of future AHA HQ.

Tens of 1000's of people working on renewable energy without thanks.



*Books for Do-It-Yourself Experimenters*

*By Phillip Hurley*

- Build Your Own Fuel Cells....\$16.95
- Build A Solar Hydrogen Fuel Cell System....\$16.95
- Practical Hydrogen Systems: An Experimenter's Guide....\$22.95
- Build Your Own Solar Panel....\$14.95
- Solar II....\$16.95
- Solar Supercapacitor Applications....\$11.95
- The Battery Builder's Guide....\$20.95

These are easy-to-follow directions for building your own hydrogen hardware. Hurley even gives you part numbers and throughout he stresses safety lessons.

Books are available in paperback on Amazon:

[https://www.amazon.com/Phillip-Hurley/e/B001K8XF3K/ref=sr\\_tc\\_2\\_0?qid=1545928563&sr=1-2-ent](https://www.amazon.com/Phillip-Hurley/e/B001K8XF3K/ref=sr_tc_2_0?qid=1545928563&sr=1-2-ent)

## 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 (55 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
- "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. Mail to the above address or to the *Hydrogen Today* editor at [editor@clean-air.org](mailto:editor@clean-air.org) Thanks.