

# *Hydrogen* Today



## Show Me the Hydrogen



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If you pull into the Sunline Transit Agency in Thousand Palms, CA, within sight of I-10, Bill Loper will be happy to fill your car or truck with compressed hydrogen. The major consumer is their fleet of fuel cell buses, but occasionally fuel cell vehicles from the car manufacturers show up. Hydrogen is produced on-site by a HyRadix reformer and is available at either 3600 or 5000 psi and also as a Hythane-natural gas blend. How much for a fill-up? \$50. Way back in 1992, the Sunline Board made the remarkable decision to clean up their community's air. They purchased 40 CNG buses and bought their first Ballard hydrogen fuel cell bus in 2000. The Sunline Education Center is currently closed for renovation. See ( [www.sunline.org](http://www.sunline.org) ) for much more information.

### *“Quotations”*

“We cannot always build the future for our youth, but we can build our youth for the future.” (Franklin D. Roosevelt, 1940)

“None of us is smarter than all of us.” (“Satchel” Page, major league baseball pitcher)

*‘We Deliver Clean Air’*

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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.

Here's the Deal

By Roy McAlister  
President of the American Hydrogen Association

*REPORT TO U.S. SENATE COMMITTEE ON ENVIRONMENT*

The American Hydrogen Association is an organization of unpaid volunteers representing virtually every age and walk of life. We are united by the belief that Industrial Revolution technologies can evolve into a Renewable Resources Revolution. The mission of our organization is to promote *prosperity without pollution*. Our charter for achieving this mission is centered on education and scientific demonstrations.

We have questioned the Industrial Revolution because it has been predicated on fossil fuels. The harder we work the less coal, oil, and natural gas we have and the less clean air and water. Depletion of resources causes inflation and conflict in our supply and demand economy. This depletion/inflation syndrome leads to economic hardship and suffering. As we deplete fossil reserves we impair our health and suffer from diseases traceable to hydrocarbon combustion contaminants from our industries and transportation system. Health care expenses related to environmental pollution exceed the cost of fuel burned by our cars and industry.

Our planet's atmosphere acts as a giant heat engine. Energy is trapped in the atmosphere by additions of carbon dioxide and methane. Today there is about 30% more carbon dioxide and 100% more methane in the atmosphere than at any time in the last 160,000 years. As more energy is added to this heat engine it does more work in the form of floods, hurricanes, and tornados. We have increased the world's population and dependence on fossil fuels to

the extent that we burn the fossil equivalent of about 180 million barrels of oil each day. Ravaging record-setting weather extremes are evidence of abnormal solar collection by the atmosphere as a result of burning hydrocarbons as we search for the good life.

But, along with these difficult problems, The Industrial Revolution has brought tremendous technical advances. In the last 200 years we have advanced at an exponential rate and provided over 90% of the scientific discoveries and technology developed by humans. Many of these technologies facilitate adoption of renewable resources. Redirecting our engineering and manufacturing excellence to renewable resources will bring about *prosperity without pollution*.

Hydrogen is the common denominator in the Renewable Resources Revolution. It is the smallest atom, but the most plentiful element in the universe. In our own solar system over 90% of matter is hydrogen. On earth, hydrogen is most often found as water or H<sub>2</sub>O, which covers 70% of our planet. Our bodies and all other forms of life are made up of cells that operate on water chemistry. From conception to death we operate on chemical processes that use hydrogen as the currency. Photosynthesis in green plants is based on splitting water into hydrogen and oxygen by solar energy. Oxygen is released in this process.

### *Benefits of Adopting Hydrogen as a Replacement for Hydrocarbons*

1. JOBS. We need to be producing solar engine generators and wind & wave generators at twice the rate that automobiles are manufactured. It will take 30 to 50 years to manufacture enough of these renewable energy conversion devices to replace the hydrocarbons that our nation burns. Not even a war economy could provide as many jobs.

2. IMPROVED INFRASTRUCTURE. Additional jobs are indicated for converting the present infrastructure to operation on renewable resources. Renewable electricity will be distributed by expansion of the present grid system. Presently established utilities can retail this perpetual supply of electricity. Hydrogen can be produced by electrolysis of water and stored in depleted natural gas and oil formations. Renewable electricity can be wheeled from solar-rich areas to water-rich areas for production of hydrogen. Hydrogen can be transported by adding it to natural gas and distributing it through existing natural gas networks.

3. IMPROVED TRANSPORTATION SYSTEM. Hydrogen can be used in the world's present fleet of 400 million cars, buses, trucks, aircraft, and trains. Cars burning hydrogen can actually reduce atmospheric concentrations of unburned hydrocarbons, carbon monoxides, and diesel soot in polluted cities. A family car can clean enough air to fill about five houses each day.

4. EXPORTS. The U.S. has vast deserts that can produce enough renewable electricity and hydrogen to run Mexico, the United States, Canada, and the manufacturing centers of the Pacific Rim. Hydrogen can be liquefied and shipped to distant ports without fear of an oil spill. If hydrogen is accidentally released, it dissipates quickly into the atmosphere and poses no threat of contamination to ocean creatures or beaches.

5. PEACE DIVIDEND. Many of our nation's most talented engineers and technicians have been devoted to defense projects. We have developed world leadership in microelectronics, optics, cryogenics, and other aerospace technologies. Application of personnel on *environmental defense* will advance the hydrogen economy. Peace and *prosperity without pollution* are both dividends of the Renewable Resources Revolution.

6. WORLD LEADERSHIP. U.S. ingenuity, productivity, and environmental concerns must be shaped into meaningful world leadership. Otherwise coal and oil will be burned in exponentially increasing amounts as emerging nations strive for improved living standards. The global environment is already burdened with contamination. U.S. products and technology that protect the environment must successfully compete in the global economy and win the hearts and minds of 4/5ths of the world's population now demanding more energy. Saudi Arabia has announced the intention to supply 25% of the world's energy as solar hydrogen. The U.S. needs to become energy self-sufficient and supply at least 30% of the world's energy requirements from the deserts of Texas, New Mexico, Oregon, Idaho, Utah, Arizona, Nevada and California. We can lead the world in achievement of higher living standards by hosting the Renewable Resources Revolution. We will be the clean-air nation with greatly reduced health-care costs for diseases due to environmental pollution. Carbon and hydrogen will be new cash crops from garbage, sewage, and agricultural wastes. Cars made of high-strength carbon composites will provide greater safety and efficiency improvements that allow a family to travel economically on renewable hydrogen at the equivalent of 150 mpg.

#### *What Can the Government Do?*

Eliminate the national debt by leasing Federal land for Renewable Energy Parks. The royalties and sales taxes will help balance the budget. Allow entrepreneurs to create thriving businesses by fostering fair competition. Set an agenda to achieve U.S. energy independence and development of renewable energy exports. Widely dispersed electrical generation will assure availability regardless of threats due to weather, earthquakes or terrorist attacks.

If more Americans are aware of these facts, we can achieve sustainable *prosperity without pollution*.

### Hydrogen on the Internet

Santa Fe (NM) Community College's Biofuels Center of Excellence offers training in Biodiesel, Algae, Ethanol and Biogas. Besides detailed technical nuts and bolts, they teach business analysis and OSHA regulations. When you finish these programs, you'll be ready-for-hire or, even better, ready to start your own business. <http://biofuels.greentraining.sfcc.edu>

HCI in Bailey, Colorado has metal hydride hydrogen storage experimenter's and training kits. <http://www.hydrogencomponents.com>

### Honorary Lifetime Membership

At the last AHA Board meeting, the Directors created the Honorary Lifetime Membership category to recognize those special members who not only generously donated their time and dollars, but who also dedicated themselves to the AHA mission for *decades*. These members will receive all AHA benefits for life without payment of dues. The first Honorary Lifetime Members are Roy McAlister, Kathy McAlister and DK Harrison.

## Hydrogen Events

The Phoenix American Hydrogen Association now meets the second Thursday of every month from 6 to 8pm at Denny's restaurant, 650 N. Scottsdale Rd. in Tempe, AZ (SW Scottsdale Rd/202, one mile north of ASU light rail station). Call 480-964-0458 or 480-229-0828 for details.

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) Their website is [www.ahasvc.org](http://www.ahasvc.org)

2012 U.S. Biochar Conference from July 29<sup>th</sup> to August 1<sup>st</sup> in Rohnert park, CA. Find out how adding charcoal to the soil can both improve yield and sequester carbon.  
<http://www.2012.biochar.us.com>

## Books & Publications

That Used to Be Us: How America Fell Behind in the World It Invented and How We Can Come Back, Thomas Friedman, 2011.

Farrar, Straus and Giroux, \$25, 380 pages.

Keeping the Republic: Saving America by Trusting Americans, Mitch Daniels, 2011.

Sentinel, \$26.95, 252 pages.

Many adults know that something is wrong with America, but can't put it into words. Should we blame Washington or China or climate change? Friedman says we've stopped investing in people, knowledge and our infrastructure. Americans spend more on potato chips than the government does on energy R & D. High school students are being prepared for \$12 an hour jobs. People with cell phones can't afford to pay for food or energy.

Mitch Daniels, in two terms as Indiana Governor, turned a \$700 million deficit into a billion dollar surplus by trusting the people with the hard truth. Everyone told him his ideas would never work, but the citizens had enough common sense to make right decisions for themselves.

We need people in Washington with the courage and long term thinking to cut spending and tax fairly to deal with the national debt. We need people with courage, who believe in the greatness of America, to do great things.

The Last Dropout- Stop The Epidemic, Bill Milliken, 2007.

Hay House, \$14.95, 241 pages.

A few weeks ago, I thought a high school dropout rate of 10% was pretty scary. The truth is that it's a lot worse and a lot scarier. Each dropout who turns to crime or drugs costs society \$1.7 million in prisons, health care or other social expenses. Why isn't that money being spent keeping kids in school?

In 1960, Bill Milliken started hanging out on the streets of New York to find out why kids were dropping out and what to do about it. He soon figured out it's hard to study when you're sick, homeless,

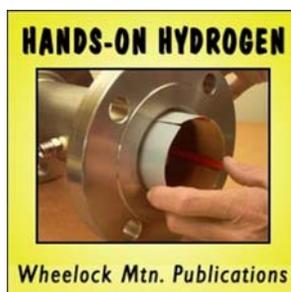
abused, addicted, have a toothache or can't see the blackboard. It's hard to learn when you're bullied or hungry. (When I worked for a community bicycle program, we spent our own money feeding the kids because nobody else was around to feed them.) Help was available, but was often inconvenient or unaffordable. Millikan's plan was to bring the community into the school. He recruited dentists, nurses, counselors and mentors who would help students right at school.

Milliken's Communities in Schools program is based on 5 principles:

1. Relationship with a caring adult.
2. Safe places to learn and grow.
3. Physical *and* emotional health.
4. Learn marketable skills.
5. Chance to give something back to the community.

Milliken describes the growing pains from hanging out on the street to hanging out in the White House. There are some lessons for the AHA to learn. Before you can fix a problem, people have to be aware of it. Now you know about it. How about starting with something small- one school, one student? It might even be your own child.

<http://www.communitiesinschools.org>



*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>

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

## H2 University

### Leasing Residential Photovoltaic Systems

Many of us would love to have solar panels on the roof, but even with all the rebates, a minimal system would set us back ten or twenty thousand dollars. Leasing a PV system with no cash up front and lower electric bills may sound very appealing. Let's look at some of the pros and cons. An installer will inspect your site with a satellite image to see if it's suitable for solar and they'll also make sure your roof doesn't need major repairs.

#### PROS

- Complete PV system installed at no cost. The leaser owns and maintains the equipment for 20 years. Any down payment you can afford will go towards lowering your monthly bill.
- You'll save approximately 15% on your electric bill. Those who run two air conditioners all day to keep the cat cool will save the most.

#### CONS

- Not available yet in many states.
- You lose all federal, state and utility incentives. They go to the leasing company.
- You still pay your monthly utility connection charge and for any power used beyond your PV's production.
- When the grid goes down, so does your PV system. It has to turn off to protect utility workers. There are no batteries.
- When you buy a PV system, at the end of 20 years, it's still yours. If you lease, you can purchase the system, remove it, renew the contract or install a new system.
- If you sell your home and the new owner doesn't want to take over your lease payments, you will be charged a penalty.

Leasing may best benefit those who plan to stay in one place for twenty plus years. Before you go green, do the math and do read the fine print. As my mother used to say, "Look before you leap."

<http://www.sunrunhome.com>

<http://www.sungevity.com>

<http://www.solarcity.com>

### Biomass Gasification

Although many different chemical reactions take place, gasification is simply heating dry biomass several hundred degrees in a low oxygen container until the hydrocarbons and residual water decompose into hydrogen and carbon monoxide, a product known as syngas, wood gas or producer gas. Some charcoal and ash are left behind. Syngas was used in the early 1900's for gas lighting and in

WWII Europe, trucks and tractors were run with on-board gasifiers during gasoline shortages. Today, gasification systems can provide heat, shaft power and electricity. Gasifiers can cook your dinner or turn a city's solid waste into electricity.

Uniform wood chips are the ideal feedstock. Corn cobs, tires, manure and nut shells are also used. Although abundant worldwide, rice hulls are a difficult fuel because the high silicon content vitrifies inside the gasifier. When used as a soil amendment, the charcoal is called biochar. The micro-chambers inside biochar hold water and provide a place for beneficial bacteria and fungus to thrive. Biochar also captures carbon for centuries.

Jim Mason at All Power Labs in Berkeley, California has gasifier plans, parts, kits and assembled 10-25 kW units. They offer weekend seminars several times a year for \$100 where you can meet dozens of other renewable energy enthusiasts. For gasifier basics, videos, a forum and a catalog see:

<http://gekgasifier.com> .

Simple soda can gasifier demonstration:

[http://www.youtube.com/watch?v=OYA-Er2zmbE&feature=player\\_embedded](http://www.youtube.com/watch?v=OYA-Er2zmbE&feature=player_embedded)

### Thanks

Andrew, Ken, Bill, Ben, Frank, Mike, Carl, Al, Rick, Wayne, Barry, Tamae and especially Claude and Dave- helping with the fuel cells.

Bill-outstanding tour of Sunline Transit Agency without any notice.

Mike- pledged \$50 towards AHA membership in Valley of the Sun Clean Cities Coalition.

DK & Helen- 25 loads of AHA historical documents, tools and goods for AHA yard sale.

Colin- fixing the water heater leak.

John- accommodations in the redwoods.

## 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 & Senior (60 and over) Membership- \$25.00/year
- Sustaining Membership- \$100.00/year
- 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

Print this form and mail with your check or money order to:

American Hydrogen Association  
P.O. Box 4205  
Mesa, AZ 85201  
USA

Or email payment to:

americanhydrogenassociation@gmail.com through [www.PayPal.com](http://www.PayPal.com)

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