
Hydrogen Today



Show Me The Hydrogen



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Hydrogen Hot Springs in Alaska

Since the first gold prospectors a century ago, people have been coming to Chena Hot Springs to enjoy a spectacular view of the Northern Lights while relaxing in the hot water. Now visitors from around the world are traveling to this remote resort 60 miles northeast of Fairbanks to learn about hydrogen. Last year, after spending \$1000 a day for diesel generator fuel, owner Bernie Karl installed two geothermal generators. This year he's using excess power to produce hydrogen from an electrolyzer. The hydrogen will be blended with propane for cooking and heating. With help from the University of Alaska, they have successfully grown tomatoes and lettuce in geothermally heated greenhouses. They plan to eventually convert their fleet to run on hydrogen. Read more at:

www.yourownpower.com and
www.chenahotsprings.com

Record-Setting Hydrogen Prius

Recently, in Livermore, CA, the Lawrence Livermore National Lab tested a unique hydrogen powered Toyota Prius hybrid. The Prius was converted to hydrogen by Quantum Fuel Systems. Using a combination compressed gas-cryogenic liquid H₂ tank carrying 40 gallons of liquid H₂, the Prius was driven 653 miles, equivalent to 65 miles per gallon gasoline.

Ford Sets H2 Speed Record

17 Aug. Bonneville Salt Flats, Utah. A Ford race car set a fuel cell world land speed record of 207.297 mph.

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**** SAFETY FIRST ****

Here's The Deal

(Excerpts from a new book called "***Renewable Energy Engines***" by Roy McAlister, AHA President)

It is time for Civilization to progress past what might be defined as "The "Economy of Thieves" that is dependent on fossil fuels to power the Industrial Revolution. In this sense, *thieves* have prevailed by rejecting the responsibility to pay for the replacement of resources that they corrupt and deplete and by refusing to pay for protecting natural habitats to avoid extinction of countless species of life on Earth.

Here are some observations and suggestions for achieving much greater returns on the blood, sweat, and tears that have been invested to advance the Industrial Revolution – and to facilitate intelligently designed evolution of the healthful and peaceful Renewable Resources Revolution.

- 1) **LESS THAN ZERO CO₂:** It is imperative to utilize the best technologies and practices of the Industrial Revolution to make the transition to energy-conversion practices that actually diminish atmospheric concentrations of greenhouse gases and particulates -- and thus provide much larger returns on the enormous investments that Civilization has made in scientific research, engineering, education, infrastructure development, and equipment for farming, mining, construction, manufacturing, and transportation.
- 2) **CARBON DURABLE GOODS:** Sewage, garbage, farm wastes, and forest slash must be prioritized as sources of sequestered carbon to reinforce better equipment to harness solar, wind, wave, hydro, and OTEC (Ocean Thermal Energy Conversion) resources along with transportation components that are lighter than aluminum and stronger than steel. This will accelerate infrastructure developments to safely convert oceanic methane hydrates into hydrogen and carbon-enhanced durable goods along with potable water.
- 3) **HYDROGEN POWER:** Hydrogen that is co-produced along with sequestered carbon from such organic wastes will fuel engines that actually clean the air and encourage more rapid advancement of practical fuel cells.
- 4) **ENERGY SECURITY:** Energy independence and peace with Earth's beleaguered environment can be achieved by adoption of proven renewable energy conversion technologies – without CO₂ emissions from fossil combustion and without creating vulnerabilities including health threats and enormous anticipated costs due to terrorism and accidents involving radioactive wastes and/or radioactive weapons that are proliferated by nuclear power.
- 5) **WISER CHOICES:** We can double energy utilization efficiency compared to conventional fossil or nuclear power plants by adopting distributed heat and power systems that create markets for hydrogen and other locally produced renewable fuels. Coupled with energy efficient lighting, refrigerators, and appliances along with manufacturing equipment we can have far greater comfort, convenience, and energy security.

6) **THE RENEWABLE ENERGY STANDARD:** We need to base the “dollar” on renewable electricity and fuels by buying and storing hydrogen and methane in depleted natural gas and oil formations. This is far more logical and will provide much greater returns on past and needed investments in U.S. electricity and pipeline grids than storing gold or other precious metals in Fort Knox and will make the dollar worthy of far greater trust in the anti-inflationary economy that it develops. In order to become sustainable, the U.S. economy must achieve economic development equivalent to 1,000 new millionaires every day forever, which is a realistic result of making the dollar “worth” the renewable energy needed to facilitate sustainable prosperity.

7) **FULL EMPLOYMENT WITHOUT INFLATION:** The Solar Hydrogen Economy will facilitate opportunities for full employment without inflation to make, use and sell what it takes to achieve sustainable prosperity. Full employment opportunities to develop the Solar Hydrogen Economy in virtually every community on Earth will promulgate greatly improved efficiencies in energy utilization that world peace provides compared to military-enforced dependence upon fossil and radioactive fuels.

8) **BE A MENTOR:** Educate your family, friends, teachers, and local officials about the opportunity to be part of a Grand Plan to achieve sustainable prosperity starting with conservation and replacement of enough fossil fuels with renewable energy to overcome our need to burn fuel imported from OPEC (Organization of Petroleum Exporting Countries) sources. At the US transportation burn rate of 145 billion gallons of gasoline and diesel fuels per year, cumulative national improvements equivalent to 1 mpg will save more than two-times the amount of fossil oil that might be produced from the Arctic National Wildlife Refuge. Improvements equivalent to 7.6 mpg will save more oil than we receive from the Middle East.

9) **PICK THE WINNER:** All the fossil oil that existed before we started burning it could have been placed in a cube about 4.1 miles on an edge. Every day for the next five billion years the Earth will receive more solar energy than the one-time burning of all the fossil oil that ever existed.

10) **GETTING STARTED:** Numerous non-profit organizations such as the American Lung Association, National Foundation for Cancer Research, the Audubon Society, Ducks Unlimited, American Cancer Society, Union of Concerned Scientists, Defenders of Wildlife, Ploughshares Foundation, Heart Association, Sierra Club and so many other great organizations are concerned about, trying to quantify, or urging action to overcome the interrelated dilemmas of greenhouse gas induced weather changes, environmental degradation, health threats, and economic hardships due to dependence upon burning over one million years’ of fossil accumulations per year. Please consider donating a building and/or land to receive vehicles donated (to us and other non-profit organizations) where we will convert donated vehicles to operation on hydrogen and lease them to concerned citizens that would like to drive vehicles that actually clean the air and create local markets for hydrogen provided by enlightened municipal waste managers, farmers, and other entrepreneurs.

Civilization is the greatest invention that humans have made and now it is time to improve our collective invention by evolving the Industrial Revolution into the Sustainable Prosperity Revolution.



Can This Classic 1983 Subaru BRAT Clean The Air With Hydrogen?

When you are ready to donate a locomotive, tractor, car, truck, building, land, or a landfill to facilitate conversion of vehicles to hydrogen please contact Ben Ferguson at H2CarGo@gmail.com

Hydrogen Today Editorial

Welcome back to Hydrogen Today. Persistent complaining about not getting my subscription landed me the job as editor. I'll try to live up to the tough standards set by my dedicated predecessors. You can read back issues on the AHA website www.clean-air.org under Newsletters.

Every morning for more than 50 years, I've heard the reassuring thunk of the newspaper hitting the driveway. Still, we're all aware, "The times, they are a-changing." The cotton field a half mile from home, once covered with 600 year-old Hohokam pottery shards and home to myriad small creatures, is now a shopping center where you can buy a nano-ceramic hair straightener for \$69.99. Six months ago a spool of 18 gauge copper magnet wire cost \$15.45. Today it's \$44.45. Grocery prices are increasing by the week because someone had the clever idea of turning our food into ethanol fuel.

Right now you and I can still make choices. Will we go on wasting energy, trashing the soil and abusing our water resources? I dread having to explain to the grand-children why we wasted their future. Can we survive, or even prosper, when gasoline hits \$12.00 a gallon? Sure, if we start getting by on less. Get out of the more and more, bigger and better rut that marketing is strangling us with. What's genuinely important for me is health and friends, seeds for the garden and lubricating oil for my lathe bearings. If you're taking your energy, food and water supplies for granted, you're already in trouble.

Hydrogen will solve many, but not all of our problems. The AHA is about renewable energy. You'll read here about solar electric bicycles and wind turbine towers. The AHA is about sustaining a peaceful and healthy life for every inhabitant of the earth using the sun's abundant energy and appropriate technology. Let's figure out how to create 1000's of new renewable energy jobs. Our aim is to give you honest, common sense information- the Truth, solid scientific data. You'll find no close-minded "I'm Right, You're Wrong" attitude here. General Electric, Toyota and Princeton do not have a monopoly on great ideas. Progress, great and small, often comes from around the kitchen table and from curious Philosopher Mechanics experimenting in their backyards. Let us hear what you're doing to save the world. Tell us what you need. Go build your own electrolyzer or fuel cell, hang out in your library or at a renewable energy fair, start a local AHA chapter and plant a tree, or two.

Hydrogen Events - 2007

Sept. 25 – (Tue) Solar Power 2007 Conference, San Diego, CA. It normally costs \$895 to attend this major event, but for one day the public can attend the expo and evening lectures for free. www.solarpowerconference.com.

Sept. 29 – (Sat) Roy McAlister lectures in San Francisco and Stanford, CA. Morning presentation: 10:00 AM at the Pacific Energy Center, 831 Howard Street, San Francisco (between 4th and 5th Streets, three blocks from the Powell Street BART Station). Afternoon presentation: 3:00 PM at the Graduate School of Business, Bishop Auditorium, South Building, 518 Memorial Way, Stanford, California, 94305-5015. See www.ahasvc.org for updates.

History of the AHA Silicon Valley Chapter

By John Gotthold, President & Co-founder

Doug- Thank you for your revival of HYDROGEN TODAY. The news letter was one of the major sources that kept me going in the early days.

The Silicon Valley Chapter came about because I attended Hydrogen Ninety One, in Independence, Missouri in 1991, at the invitation of Roger Billings. The first person I met walking into the hotel lobby was Roy McAlister. He told me that the American Hydrogen Association had been started the prior year and that Karl Darr, one of the other founding members lived in San Jose. I returned full of enthusiasm and was determined to ride back to HYDROGEN NINETY THREE on a Hydrogen Harley chopper powered by a fuel cell. I contacted Karl Darr and we agreed to found the SILICON VALLEY CHAPTER of AHA. We started initial monthly meetings at the civic center in Sunnyvale and attracted attendance of twenty to forty people. In nineteen ninety two Karl was blessed with a third child and informed by his wife that she was no longer working and that he had to work extra hard to support the family in an area where it takes two paychecks to support a house. So I continued to support the meetings and assumed the Chapter Presidency.

In late 1992 Paul V. Warsitz attended a couple of the AHASVC meetings and proposed that he and I should partner and start producing fuel cells. We set up shop in my garage and started trying to figure out how to build a fuel cell. In early 1993, Howard Smith, one of our chapter members, wangled us an invitation to LOS ALAMOS NATIONAL LABS. Goric Hosiapian at the time was the head of the half dozen researchers who were all part of the national effort to develop hydrogen fuel cell transportation. We took a crew of seven people back to New Mexico, including a couple of retired NASA scientists, and were given the grand tour. The key was that ORD and GENERAL MOTORS were taking the information created by the Los Alamos researchers home and never giving them any feed back. Under President Clinton, there were bean counters roaming the halls and asking the research projects to justify their existence by service to US industry. They invited us just to show that they were doing public out reach. The boss gave us his published papers and not much else. He got called away and we got a chance to talk to the engineers. They couldn't talk about their work for the auto companies but they did tell us of the promising avenues of research that they did not have time to take and more importantly they gave us the list of their material suppliers.

Paul and I returned home to the garage and renewed our efforts. It turned out that information was missing or misleading in those papers and we had to spend all of 1993 to get to the point that we could build a fuel cell. Instead of the thirty kilowatt I had imagined in 1991 we settled for 1/ 2 Watt. To utilize the fuel cell I designed the Solar Hydrogen Education Kit, consisting of a small solar array, a KOH electrolyzer, a fuel cell and a small fan driven by an electric motor. The kit didn't do much except demonstrate that you can indeed make hydrogen fuel from sunlight and water and turn it back into electricity. We continued selling kits from the garage under the Warsitz Enterprises Co. at about three hundred a year. We started the pricing at \$145 but lowered it to \$120 to get better volume.

In 1997, Glenn Reed Havens, who had periodically been attending AHASVC meetings, proposed that the time was finally right to try to make a business out of it. He put up \$60,000 and we moved from the garage, much to my wife's relief, to a bay building on Mathilda Ave. in Sunnyvale, as WARSITZ ENTERPRISES, Inc. We continued the kit business and looked for opportunities to do bigger things. By 1998 we could build a 25 Watt fuel cell and used it for a recharger for the 308 Ferrari replica that we had converted to electric battery power. We started on projects for our own MEA (membrane electrode assembly), a high pressure (2,000 psi) electrolyzer, a 60 Watt and 100

Watt portable suitcase power system, a 1 kW solar fuel cell emergency power system housed in a floatable trailer and at the end a 3 kW fuel cell power system for a northwest competition that attracted twenty three competitors. To do all this we expanded into two bays and Glenn Havens raised an additional \$90,000 and we reinvested the \$30,000 per year we made from the kits and selling the "hydroport" and the "Hydrogen" hydrogen power systems. Additionally we made contact and tried to help a dozen other entrepreneurs with their solar hydrogen projects. When we initially took the bay space they informed us that the building was being sold in a year, which was delayed to two years. By the end of 1999 we had to move to Hollister, California, where Paul had a friend who could rent the corporation space in a large steel building. The company continued sporadically through 2000, but by the end of the year was closed down, having gone through \$250,000 of investor's money and earnings. Paul and I were on minimal salary and at least twenty other people put in weekends and evenings trying to make fuel cells happen. Lessons learned- Don't try to start up ahead of the market and two, energy is a very price sensitive market.

The reason I tell the tale of Warsitz Enterprises, Inc is simple, During the time in Sunnyvale, WEI would contribute demonstration systems for hydrogen barbecue, fuel cells, solar arrays, etc to demonstrate at the AHASVC meetings. These demonstrations of actual hardware brought our AHASVC attendance up to 50 persons per meeting.

For a year there was a spin off from Warsitz Enterprises, with different players, called EverWatt, Inc., 2000-2001, which was formed to bid for a State of California project to provide hydrogen education materials for schools through out the state. Management contretemps lost that opportunity and the corporation ceased after a year. Another lesson- make sure the management can keep egos subordinated to the needs of the company. EverWatt contributed little to AHASVC except hope.

2002-2007 AHASVC has survived with about a dozen hard core players, all trying to figure a way to get into the hydrogen business in some fashion. Now with Roy's visit we will attempt to grow again.- John Gotthold.

Hydrogen on the Internet

International Clearinghouse for Hydrogen Commerce

www.hydrogencommerce.com

A mammoth site dedicated to the Hydrogen Economy vs. Big Energy and 'traitorous' elected officials. Lots of current hydrogen news.

Renewable Energy Access

www.renewableenergyaccess.com

Subscribe to their free Renewable Energy Weekly News. There's important political, business and science information that rarely makes the mainstream media. Also worldwide events and R.E. jobs.

SmartFlix

www.smartflix.com

Rents mostly technical and how-to DVD's by mail. Subjects include alternate energy, airbrushing, Buddhism, machining, welding and rebuilding the Mazda rotary engine. They charge \$9.99 per one week rental. That's a bargain considering some of these videos sell for \$30 and up. They pay postage both ways. Currently they have over 5300 titles.

Books & Publications

Home Power magazine

www.homepower.com

800-707-6585

A must-read monthly magazine publishing technical articles on wind turbines, solar cooking & hot water, PV, hydrogen and electric vehicles since 1987. \$24.95 per year. Back issues are available on CD's.

Lindsay Publications

www.lindsaybks.com

"Exceptional technical books for experimenters, inventors, tinkerers, mad scientists and Thomas Edison types." Their catalog has reprints of older technical books, but plenty of titles on alternate energy, home machining and do-it-yourself projects. Warning- Philosopher Mechanics may find it hard to resist ordering most of the books.

Wheelock Mountain Publications

www.goodideacreative.com/wheelockmtn.html

Phillip Hurley has written an excellent series on constructing your own solar panels, fuel cells and electrolyzers. Mr. Hurley, a lifelong amateur scientist, wrote these books after he found it very difficult to locate information on building a practical home-scale solar hydrogen system. They are available only as inexpensive, energy saving ebooks. Safety is stressed throughout. Acrobat Reader version 6 or later is required. Look for reviews in the next *Hydrogen Today*. Download these books and get started collecting the parts.

-Build Your Own Fuel Cells- Uses graphite blocks and home-made proton exchange membranes (PEM). \$14.95

-Build a Solar Hydrogen Fuel Cell System- Covers solar panel, simple PVC electrolyzer, fuel cell and hydrogen storage. \$16.95

-Practical Hydrogen Systems: An Experimenter's Guide- A more sophisticated automated electrolyzer system using stainless steel components. \$16.95

-Build Your Own Solar Panel (Revised ed.)- \$12.95

-Solar I- After you've built a solar panel, this covers mounting racks, wiring and batteries. \$12.95

Also available as an ebook is Walter Pyle's "Solar Hydrogen Chronicles", mandatory reading for anyone interested in using hydrogen at home. It's a collection of hydrogen articles from Home Power magazine. \$12.95

Knowledge Publications

www.knowledgepublications.com

Books and DVD's by Roy McAlister. They also sell reprints of books on hydrogen and alternate energy.

The Hydrogen University

The Hydrogen University will be a regular feature in *Hydrogen Today*. Science related to hydrogen will be explained in plain English so you can use it- neither 2nd-grade simple nor with differential equations. High school chemistry and algebra would be useful, but not required. You'll learn the principles and how to make and safely use fuel cells, dynamometers, methane generators, engine H₂ conversions, H₂ welders, solar furnaces, solar air conditioners, solar stills and electrolyzers. An electrolyzer is like no kitchen appliance. It starts and stops and gurgles on its own. You'll learn more from a \$9 electrolyzer than from a \$90,000 one because you can see what's going on inside the clear plastic tubing. Remember to start your projects small. It's safer. It's faster and easier to figure out problems and it's cheaper to make improvements and correct mistakes. If you really want to learn, you will have to make a few mistakes practicing.

Speaking of mistakes, let's start out with the very important subject of safety. "Safety First." There are plenty of sound safety rules, but consider how many people had to suffer first before the invention of such things as safety glasses, seat belts or smoke detectors. Although hydrogen has been around for ages, it is now being produced and used in new ways, so there is some danger in the unknown. However, it is NOT necessary to maim yourself to discover an unknown hazard. Learn all you can about what you are doing. Takes classes, including of course, first aid and CPR or watch some videos. Ask questions. It's amazing how many people are still willing to help you out, if you ask sincerely.

Hydrogen is much safer than gasoline, a dangerous product we routinely deal with every day. The news constantly reports awful stories about people who didn't know what they were doing when using power tools, electricity, compressed gases, ladders or corrosive chemicals. Even worse are the people who know the rules well, but ignore them just that one time. "I couldn't find my safety glasses..." Learn enough not to be scared of your tools, but always respect them.

Keep you working area clean, don't rush things and plan ahead for trouble. Are you prepared for a leak or a fire? Find out what the limits of your materials are in terms of pressure, temperature, amperes or RPM's and then measure with the appropriate instruments. A rule of thumb is to use parts rated for 1.5 times your working parameters.

Make safety a habit, You should almost feel naked without your safety glasses. Safety gear may not look cool, but being blinded or burned is far, far worse. Whatever your age, act professionally at all times.

Thanks

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Charles Terry & Mel Larsen- thanks for everything.



Magnegas

What if you could run city sewage, animal manure, used engine oil or antifreeze and even garbage from landfills through a 10,000°F electric arc and produce hydrogen, oxygen, clean water and some carbon byproducts? Does it sound like “Back To The Future?” The city of Flagstaff, Arizona has recently been considering renting just such a device from a Palm Harbor, Florida company called Magnegas to locally produce hydrogen for vehicle fuel and to reduce landfill expenses. Magnegas, which is 65% hydrogen, can be used in natural gas vehicles and electrical generators, for space and water heating, for cooking and welding. They say the units are relatively efficient, operate quietly and produce very little pollution. The Magnegas website (www.magnegas.com) has details on their Plasma Arc Flow process.

Similar plasma processes are being developed by ForeverGreen Enterprises (www.fgenterprises.net) in New Jersey and by Joseph Longo in Bristol, Connecticut (www.popsi.com . Search for “The Prophet of Garbage”.)

Stuart Island Energy Initiative

On a tiny island off the coast of NW Washington state, Stephen Friend, Jason Lerner and Charles Delahunt built their own version of the hydrogen economy. Read about how they built a no-grid independent energy system with photovoltaics, batteries, electrolyzer, fuel cell and hydrogen storage. www.siei.org/mainpage.html

Another Hydrogen Home

Mike Strizki, in Hopewell, NJ, is using 56 solar panels to supply 100% of his home energy. Sixty per cent of the power is used to electrolyze water. The hydrogen is stored in ten 1,000 gallons tanks. Learn more at:

www.swagelok.com/markets/alternative_fuels/renewable_energy_starts_at_home.htm

AHA Membership Form

Name(s) _____

Address _____

City _____ State _____ Zip _____

Country _____

Telephone _____ email _____

Regular Membership- \$39.00/year

New members receive a free copy of Roy McAlister's book, "Solar Hydrogen Civilization".

Family Membership- \$49.00/year

Student & Senior (60 and over) Membership- \$25.00/year

Sustaining Membership- \$100.00/year

Corporation/Institutional Membership- \$2500/year

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