

Hydrogen Today

"Clean Energy For A Better World"

Official Publication of the American Hydrogen Association • 216 S. Clark Drive, Suite 103 • Tempe, AZ 85281 Vol. 8, No. 2 1997

Rotary can make a difference in how we live by encouraging the development and use of sustainable, non-polluting energy sources. The following resolution was recently passed by the Rotary Club of Phoenix, Arizona, USA, and endorsed by all three Rotary District Governors in Arizona. We are seeking others to join us to create a Pollution Free Planet. If you would like to become a part of this movement, contact us at the address below.

Pollution Free Planet RESOLUTION

WHEREAS, Rotary International has created a ten year project, "Preserve Planet Earth", dealing with many and varied Environmental Issues, and

WHEREAS, motor vehicles and gasoline powered engines are major contributors to air pollution in Phoenix, Arizona, USA, and

WHEREAS, we as Rotarians are committed to a better community and to enhancing the quality of life in Phoenix, Arizona, our Country, and indeed, the World,

NOW, THEREFORE, BE IT RESOLVED that the Rotary Club of Phoenix, Arizona, the 100th Club in all of Rotary, does support, encourage, and endorse the use of Hydrogen as a safe, renewable, non-polluting energy source for use in motor vehicles and other applications now requiring gasoline or other hydrocarbon-based fuels,

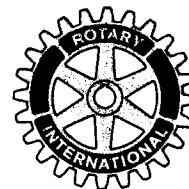
BE IT FURTHER RESOLVED, that this Rotary Club shall, by appointing a committee to be called Pollution Free Planet Committee whose Vision is "*to provide to all a pollution free planet through the worldwide use of hydrogen and other renewable energy sources*" and whose Mission is to "*provide leadership to create widespread public awareness of Hydrogen as a superior and feasible alternative to hydrocarbon based fuels*" encourage the study, and advocate throughout Rotary the use of Hydrogen as an alternative to hydrocarbon based fuels, and

BE IT FURTHER RESOLVED that this club shall support the goals of the Pollution Free Planet Committee financially; encourage pilot projects to demonstrate the viability of Hydrogen as an alternative energy source in concert with the American Hydrogen Association (AHA); encourage public support for this position through its leadership and actions within our Rotary District, our community, our state, and throughout Rotary.

Dated this 15th Day of April 1997.

/s/ Carl Schmieder, Club Secretary

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Solar Hydrogen is the "forever fuel"

1 Hydrogen Today

Promising Resolutions:



KIWANIS INTERNATIONAL

June 24, 1997

Kathy McAlister
American Hydrogen Association
216 S. Clark Dr. #103
Tempe, AZ 85281

Dear Ms. McAlister:

Thank you for sharing the "Pollution Free Planet" resolution with us. Before we can act on this request, the resolution will need to be passed by our resolutions committee. That committee meets in April to discuss resolutions for the upcoming year.

I will forward your request for our help on the resolutions committee for next year. They will discuss the idea of a pollution free planet during their meeting. If it passes, it will then be presented to Kiwanis clubs at our 1998 International Convention in Montreal.

Thank you for bringing our attention to this matter.

Sincerely,

Christopher J. Rice
Director of Program Development

cc: Laura L. Miller, Manager of Program Development

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IN TRUST, For Future Generations

By: Sherwin Berger

On Sunday, May 4, 1997 at 1:55 PM EST, Kofi Annan, the Secretary General of the United Nations, made a statement that was beamed to 220 countries on CNN's Global Forum program. His words should gladden the hearts and give hope to millions of beleaguered citizens of a complex, unfair and often cruel world. As spokesman for the only global organization that works toward improving the human condition in all countries, his pronouncement has special relevance. Mr. Annan said an old African proverb ought to guide the actions of the UN and all people: *The world is not ours — it is given to us, in trust, for future generations.*"

The words are brief, simple, yet profoundly fitting for many of the afflictions that rend the environmental, economic, political and social fabric of a planet enduring monstrous stresses. In its brevity, like the brevity of the Commandments, the thought goes to the heart of those disparities that corrupt so much of the actions that separate rather than draw us together. For a legacy in which we can take joy in passing the torch of sensitive caring to future generations, we must at all times carry with us the deeper implications of these simple words.

*Jacques-Yves Cousteau
Carl Sagan
Rick Handley
Tributes on Page 8 & 9*

Whether these words are translated into actions that reflect our fondest hopes and noble aspirations for future generations depends upon our understanding of what is at stake for posterity if powerful and meaningful actions are not taken now. Without the commitment and dedication necessary from all well-meaning people, all the virtuous intent or all the moral rectitude expressed is simply hollow, meaningless rhetoric. There is a tragic irony evidenced among those who give lip service to the environmental, economic and social agonies so evident everywhere and the cavalier disconnect between awareness and involvement. We must get in touch with the crisis reality we are living in. If we fail to reject expediency and avoid personal involvement, there will be nothing of value to pass on, *in trust, for future generations.*

Members of the American Hydrogen Association and readers of *Hydrogen Today* will recognize in this proverb a truth often expressed in our messages of hope and sustainability even as our biosphere labors under ever more voracious plundering of its organic and inorganic natural resources. This wanton decimation is defended by its perpetrators with clever sophistry, junk science, unimaginable corporate greed and a brain washing of the public that glorifies hedonistic values, creature comforts far beyond any rational need, wealth accumulation and a daily inescapable ritual of powerful advertising messages for the consumption of more and more of everything. Add to this potent brew of thought deadening messages the fact that the Archer Daniels Midland (ADM) corporation often promotes the statistic that there are three new mouths to feed every second of every day, 365 days a year and ADM is there as "supermarket to the world" to help in harvesting farm products and processing grains to assist this growing population.

No doubt ADM is accurate in their graphic representation of new mouths to feed but left unsaid is any reference to replacing the proclivity to overpopulate with sustainable improvements in the life styles of present human numbers.

Among the many inspiring, hopeful entreaties that the AHA has promoted, we have spoken of simple, proven, rational methods for significantly decreasing the pillaging of finite fossil fuels. We have not only spoken of severely limiting the use of fossil fuels by transitioning to non-polluting hydrogen as our productive, electrical generating and transportation source of energy, but we have also shown that the hydrogen used for these purposes can be produced in cost effective ways that solve other perilous environmental problems while simultaneously creating a **SECOND CLEAN HUMANE INDUSTRIAL REVOLUTION** that will become the most enormous and lasting job creation program ever conceived.

We have also shown how utilizing inexhaustible hydrogen will be the single most significant factor in reversing global climate change. Burning fossil fuels is the major source of the most pernicious greenhouse gas, CO₂. In contrast, burning non-polluting hydrogen in place of fossil fuels will virtually eliminate this source of CO₂ and will sever the link between this most voluminous and damaging of the greenhouse gases and its potent effect on global climate change.

As a major contributor to a better understanding for the creation of hydrogen energy systems to replace those of fossil fuels and nuclear energy, the AHA can be justifiably proud of our accomplishments. But we must be ever mindful that there are grave issues that must take center stage, even as we promote a more general awareness of the unassailable virtues of hydrogen. A case in point is the research done by AHA member Chuck Terrey on the shrinking time span in which consumption of oil products and the depletion of crude oil reserves inevitably converge.

Mr. Terrey's pointed comments, frequently addressed to the President and Vice President, have been essentially ignored. Yet ignoring facts does not change their accuracy or validity. To buttress Mr. Terrey's arguments, we now have a fine article that appeared in the May 8th issue of the prestigious journal *Nature*. The author, Dr. Craig Bond Hatfield, from the University of Toledo, Ohio, states that by year 2036 global oil reserves will be depleted. Chuck Terrey has been saying the same thing for some time. Dr. Hatfield, in a classic case of understatement says, "Serious planning is needed to deal with the economic consequences." With all respect and deference to Dr. Hatfield, the time for serious planning is many years in the past and while planning now is certainly in order, *even more critical is the need for immediate recognition of hydrogen and hydrogen technologies as a solution at hand that can prevent*

a global catastrophe. Without such recognition of hydrogen, the happy optimism (based on enormous revenues) of the energy consortium will prevail and will surely precipitate a condition where the words — "*in trust, for future generations*" will have been rendered meaningless.

An article in the Arizona Republic of May 3rd, making reference to Dr. Hatfield's upcoming article in *Nature* and the responses about the article from the World Energy Council (WEC) in London, a consortium

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of the world's energy providers, states that "the oil industry acknowledges that oil reserves are finite; the oil companies say that Hatfield's statements are too alarmist." Perhaps Dr. Hatfield wasn't nearly alarmist enough! If reserves are finite, as admitted, and we are using oil at such an astounding rate, why not begin an immediate transition to an inexhaustible fuel that can be used wherever fossil fuels and nuclear energy are used today, rather than awaiting the inevitable.

The WEC contends that "the general view of the industry and of energy experts is that there is plenty of oil and the oil industry is bullish." At this juncture one must wonder what "plenty of oil" means and if the use of the word bullish isn't indicative of something more in keeping with the nonsense we are being force fed by the energy consortium.

To defend their tragic myopia the oil industry, through the WEC, further states that:

1. - "predictions on the state of world oil supplies have been made throughout the industry's 140 year history, but every time they have been wrong."
2. - "The reasons that predictions have been wrong are that assessments of oil reserves are constantly being updated as new oil fields are found and technologies improve to allow oil to be extracted from known but previously unreachable sites."
3. - "Supply and demand for oil is regulated by the market."

In response to these assertions:

Number 1 is ludicrous. It doesn't indicate whether "predications" were too low or too high. 140 years ago, or even 60 years ago, not enough was understood geologically about petroleum bearing strata to make an accurate estimate in either direction. Today with our sophisticated technologies and expanded knowledge of geology, predications are much more precise.

Number 2 is undoubtedly correct but these updated estimates are surely factored into Energy Information Administration and American Petroleum Institute figures addressed in Mr. Terrey's research. If the WEC ideas of "technologies to improve and allow oil to be extracted from known but previously unreachable sites" means drilling in or near national parks, in the Arctic National Wildlife Refuge, in wet lands, off shore, or through the overburden of ice in the Antarctic, the environmental and esthetic damage would be on a scale to arouse powerful worldwide condemnation. Some pristine, wonderful, wild and beautiful places must remain *"in trust, for future generations."*

Number 3 is the kind of meaningless statement that could be made about any commodity. It is the kind of reckless remark intended to lull the public into a false sense of security and it is a statement totally lacking in any perception of responsibility for a monstrous act of indifference whose repercussions will sabotage the concept of *"in trust, for future generations."* In the case of oil, if we refer once again to Chuck Terrey's research, the demand for oil is constantly increasing at a remarkable 1-1/2% per year, based upon increasing industrialization and upon the burgeoning population referred to by Archer Daniels Midland.

To put a fine point on all this palaver by the oil industry and the WEC — it is patent nonsense. It is dangerous nonsense because it subverts the essence of Mr. Kofi Annan's words. It is a tragic nonsense

because nowhere in all the rhetoric is there even a modicum of recognition of the research done by medical organizations and authorities regarding the horrendous human suffering and death due to pollution from burning fossil fuels. Nor is there a word of recognition or compassion for the destroyed property and ravaged lives directly traceable to global climate change and pollution based upon drilling for, pumping, transporting, refining and burning fossil fuels.

This could all be comprehensible if there was not a marvelous alternative known to all the players in the world's most gargantuan monopoly game. The oil industry knows about hydrogen, the transportation sector knows about hydrogen and utility companies know about hydrogen. The void between knowing and taking meaningful action defines the character of the corporate and political forces that, working in secret, are the determinants of production, marketing and distribution of all goods and services as well as the designers of international economic foreign policy. *It is a process in which the average citizen has zero input.*

The private sector makes the most far reaching, sweeping decisions behind the closed doors of corporate boardrooms to which the public has no access. Federal, state and local elected officials, in whom we put our trust to conduct the public's business, have also been less than forthcoming with information the public must have in order to function as informed citizens. Legislation is often crafted with, and is sometimes actually written by the lobbyists for powerful interests - - in secret. When such legislation is passed into law, in violation of the Open Meetings Laws passed by the federal and by most state governments, the result almost always does violence to the best interests of the public and favors the business interests of the industries these lobbyists represent. The wanton arrogance of the corporate and political sectors, whose integrity most people naively assume is transfused with a spirit of solicitude for those who elect them or who purchase their products, must be scrutinized much more carefully by citizens who understand the serious threat to the democratic process posed by influence of the political sector and secrecy. Knowledge of hydrogen has been the best kept technological secret of the 20th Century. As we approach the new millennium it is mandatory for industry and government, in light of the accelerating perils associated with the continued indiscriminate use of finite fossil fuels, to examine the validity of claims made by AHA and other proponents of a transition to hydrogen energy systems. We believe that given a level playing field (a pet phrase of the corporate and political manipulators of economic policy) hydrogen can more than hold its own in open, public competition with other forms of energy.

The time is now for secrecy to stop and for the public to be made aware of the multiple advantages of hydrogen. If presented in a fair and objective fashion, which reveals all its benign ramifications, the AHA believes that the public and the private sector will recognize the environmental and economic merits of hydrogen as a product to market and to be used by all segments of society far far into the foreseeable future. Given a fair opportunity the political sector will also embrace the rationale of supporting massive hydrogen utilization. This will generously serve the economy and our national security interests as we gain additional awareness that the dominance of unstable and unfriendly Middle Eastern countries threaten future oil supplies and oil importation continues to inflate our trade imbalance.

Hydrogen, as an inexhaustible source of future world energy needs, has for too long been veiled in misunderstanding, misinformation, ignorance and fear that is totally unjustified. Viewed as a total concept, the story of hydrogen can no longer be ignored. Hydrogen incorporates not only energy usage, but also emphasizes a radically modified industrial structure; massive, long term, high salaried employment opportunities; exciting capital investment opportunities; improved productivity; training and

education in new careers and environmental benefits that encompass air, water and soil cleansing on a monumental planetary scale. In effect a transition to hydrogen energy will dismantle the dismal, polluting infrastructure that is a legacy of the Industrial Revolution and will replace it with a new, non-polluting infrastructure symbolic of a revitalization in humane values that motivates many new converts to this grand cause. This is surely an incredibly exciting challenge and opportunity to make profound, beneficial changes that will enhance the lives of posterity for many future generations.

Ordinarily, when one technology seeks to replace another that has been in place for a long period and around which vast, plant, equipment, personnel, productive capacity and investment have been expended, one would expect considerable resistance from the entrenched powers. This is natural as they might face serious dislocations and losses. In this instance those considerations are considerably less germane due to numerous and persuasive offsetting advantages. Indeed, it is more probable that, viewed as a total long range business plan, industry will, if truly concerned with the bottom line, become enthusiastic, cooperative participants by virtue of ongoing opportunities for them to decrease operating expenses and remain financially prosperous, even while changing the historical thrust of their activities. Benign hydrogen technologies seek to build upon the existing productive capacity of oil, automotive, aerospace and shipbuilding firms, engineering companies and thousands of others, both large and small, who will be touched by these sweeping changes but who can simultaneously profit by contributing to the growth of flourishing hydrogen energy economy. It would be extremely dangerous to postpone radical changes which will eventually be forced upon us, under less than ideal conditions, perhaps even emergency conditions with which we have already had one nasty experience. Another prolonged oil crisis could unravel our present boom and lead to very serious economic consequences.

The proposals that AHA urges are practical and eminently rational solutions proven through engineering application studies, prototype development, testing and end use applications spanning a period of many years. Looking ahead, it is certainly the case that there is voluminous and mounting evidence of hydrogen's superiority and that a focus on hydrogen fuel and adjunct technologies is not misplaced idealism but is rather a practical, attainable, cost effective reality. It is no longer valid to simply say that the costs of transition are too great or that the per kilowatt or gallon equivalent is too high. Revealing the entire hydrogen story will show these assertions to be totally inaccurate.

The obvious logic of the hydrogen solution is still being ignored by those who mistakenly believe that full scale adoption of this healing technology would have a negative impact upon their business interests. In reality the reverse is true — we most assuredly can experience corporate health and economic prosperity without pollution. Many of the products that we consider necessities today were fiercely resisted by vested interests of their day. Yet, as past events clearly demonstrate, the vigorous growth of corporations that adapted to new technologies that were originally opposed, resulted in the auto industry, electric lighting, radio and TV.

Hydrogen energy systems offer elegant, permanent solutions to many of the most vexing problems that humankind faces. Yet, hydrogen and other forms of renewable energy are not immediate fixes; it will take time to reverse the accumulated damage from fossil fuels, - - but this is exactly the point that must be stressed. We must think and plan for the long term as did our founding fathers.

George Washington made a speech in which he used the word posterity nine times. Thomas Jefferson, in his first inaugural, referred to "the thousandth and thousandth generation." On the day he signed the Declaration of Independence, John Adams wrote to his wife, "I do not know what will be the

outcome of this. We may pay a very high price, but posterity, it is certain that posterity will profit from our sacrifice." All our founding fathers spoke, wrote and dedicated their lives to the cause of posterity. Today, we can do no less if we are to continue to gladden the hearts and give hope to the millions who heard Kofi Annan speak the words of the old African proverb: "*The world is not ours - it is given to us, in trust, for future generations.*"

A Tribute to Jacques-Yves Cousteau

By: Sherwin Berger

Few celebrities have ever achieved and deserved the universal respect and recognition accorded to Jacques-Yves Cousteau. The waters of our planet were his living laboratory and his joyous playground. He brought the passion for his work as oceanographer, inventor, explorer and environmentalist into our homes via the stunning underwater documentaries with which his name has become identified. But Cousteau's contributions go far beyond the visual images and TV persona that we will always remember.

Cousteau's death is a loss of incalculable dimensions. In his quiet, unassuming fashion, he was often the most outspoken and vigorous conscience of modern environmentalism. Perhaps the most revealing measure of the man is the powerful, moving speech he made at the Rio de Janeiro Conference on the Environment in June 1992. Unhappily, his address did not receive the ongoing approbation that it so richly deserves. Today this speech and all his writings could serve well as models of urgent, clarion call for redressing the environmental problems that he understood so clearly. As eloquent environmental ambassador to the world he set an enviable standard for deep and probing thoughts that accurately expressed the multiple dangers that afflict the biosphere and how these perils jeopardize the continuation of life as we know it on planet Earth.

Cousteau's outstanding achievement in making millions aware of the beauty, majesty, yet the fragility of our environment is a proud legacy for future generations. The article that precedes this tribute reflects his influence.

In terms of his multi-faceted investigations into the mysteries and marvels of life, he was preeminent. His writings, his films, and his public speeches marked him as a man with surpassing intellect and great heart. His resolve and dedication to his labors, even in the face of dreadful personal tragedies, is a testament to what he perceived as his obligation to all life forms.

Jacques-Yves Cousteau's tender ministrations on behalf of our blue Water Planet will be sorely missed.

Carl Sagan: A great soul of the Cosmos,

As Carl Sagan looked for life in the Universe, he shared that quest with all of us to enjoy. He taught by writing 'Dragons of Eden' (1973), 'Broca's Brain' (1979) and 'Contact' (1985) and by hosting the popular television series called 'Cosmos' in 1980. Earlier Sagan advanced the understanding of the origin of life by experimenting with mixtures of hydrogen sulfide, methane, water, and ammonia which he irradiated with long-wave ultraviolet light to produce amino acids. Earth, Sagan implied, surely has brothers and sisters of a different kind. He showed us the stars, the galaxies, the vastness and beauty of space...and yes, it would be a shame to waste all that space just on us Earthlings. Carl Sagan shared his education, dreams, insight, convictions and dedication as a scientist. We sometimes forget, as adults, that life is so beautiful, precious, bountiful, and innocent. In teaching the science of the cosmos, Carl Sagan showed us how to respect and love our Earth and Universe.

Summations for these two great men could be the same. Both of them taught about hydrogen - the stuff of life, stars, and oceans. Carl, we hope you are searching the cosmos. Knowing the Earth is not ours - - it is given to us, *in trust*, for "billions and billions" of future generations.

Rick Handley: a friend of AHA remembered,

Driving home from work, Rick Handley, an award winning documentary film producer was listening to an interview on a university radio station about hydrogen and he decided to attend the monthly AHA meeting of the student chapter at Arizona State University. Later, Rick volunteered to make an eight minute video for AHA; "The Solar-Hydrogen Economy," narrated by Harry Braun.

Rick Handley was working on another energy-related documentary for *Good Morning America*. Rick called from California to discuss an interview that he had with a nuclear engineer from a local nuclear power plant, who noted that President Reagan had just been there commending the utility industry for taking free nuclear fuel, and returning nuclear weapon grade materials for the government. Rick traveled to New York City to document the nuclear medical wastes and other objectionable materials that were being dumped into landfills. He also planned to film how landfill gases such as methane, hydrogen sulfide, and other greenhouse gases that cause climate change are often allowed to escape into the atmosphere.

He promised to try to develop interview footage for another AHA video showing how landfill materials and gases could be used for making hydrogen and carbon products. The New York City garbage collection and disposal system could use the hydrogen and methane to operate their fleet of trucks. The methane could be used in any engine. The exhaust from the engine would go through a heat exchanger and reactor to form hydrogen and carbon monoxide from the landfill methane. These gases greatly improve the thermal efficiency of the converted engine.

It was overcast and raining intermittently that morning, so Rick went back to the hotel to pick-up different lenses for the cameras. While the crew waited in the car, Rick ran-up to get the lenses. He didn't come back. The crew finally decided to find him. Rick reportedly fell out the hotel window. They found him on the ground outside the hotel.

Five years later, Rick would enjoy hearing about how many people have been touched by the video that he helped Harry Braun produce for AHA. Now there is much discussion about the utilities taking nuclear-grade radioactive materials from the government. The storage problem of the nuclear medical wastes has been extensively reported and these wastes have been identified as serious hazards to landfills.

This December the U.S. Supreme Court is expected to rule on one of the issues of fees and storage policies concerning radioactive utility wastes. Will taxpayers, or utility stock holders, or rate payers be responsible for the cost of disposing of spent fuel and radioactive wastes?

Rick, we know you would be out there documenting these exciting developments. Your work was for all of us - - it was given to us, *in trust*, for future generations.

A NEW ENGINE FOR A SUSTAINABLE CIVILIZATION

By Mel Larsen

The great civilizations of the past, like the Aztec or the Roman Empires have vanished for various reasons. Our present civilization is just as vulnerable, because it is based on the industrial revolution which is dependent on fossil fuels. Farming, mining, transportation, and manufacturing are dependent on fossil fuels. The gigantic plastics, man-made fibers, and pharmaceutical industries to name just a few, are in the process of committing suicide unless we stop burning up the fossil deposits. These precious petrocarbons must be preserved for the essential materials that we are dependent upon in our daily lives.

The American Hydrogen Association, being dedicated to the transition from fossil fuels to unlimited, non-polluting hydrogen is not only advocating and promoting the use of hydrogen to eliminate the waste and the associated air pollution, but is developing the change-over options by advancing equipment to produce hydrogen by the bio-mass and solar processes.

One reason that I decided to design and develop a new engine is to incorporate the best features of engines that powered the industrial revolution and to invent the additions that are needed in engines that will power

Mel Larsen con't from page 9.

the renewable resources revolution.

Ideally, what is needed is an engine that can convert hydrogen or other renewable fuels to shaft power with the efficiency of a Diesel but with the smallness of a gas turbine. At first this seemed impossible but through the years a new design called RADAX has been worked out for improving on the efficiency of the Diesel and delivering power at 2,000 RPM or lower speeds without requiring the expensive and heavy gear-reduction system of a gas turbine that likes to run at 30,000 RPM.

The thermal efficiency advantages are gained by stratified-charge combustion of hydrogen in unthrottled excess air. By expanding the combustion gases in cylinders with pistons that force a rotary cam shaft to turn through three cam actions per revolution, the torque is multiplied three times in comparison with a crankshaft output. Hydrogen burns much faster than hydrocarbon fuels and this allows the timing of combustion to occur when power is needed rather than during the earlier stages of compression as required by hydrocarbon fuels. Hydrogen has a much higher octane rating than gasoline and it does not ignite by compression in the same conditions that ignite diesel fuel. This allows the ignition of stratified-charge hydrogen to be precisely at the time needed to produce maximum efficiency and power from the engine.

Developing an engine that has three times the torque of ordinary engines, 24 power strokes per output shaft revolution, inherent balance, and which can be reversed by electronic controls makes it possible to greatly simplify the drive train. These characteristics along with the high operating efficiency have allowed the RADAX to offer a propulsion package including the fuel supply that is smaller and much lighter than virtually any other engine or electric drive system.

On an overall analysis of solar to vehicle propulsion, this new engine offers savings in the bill of materials, manufacturing cost, and it provides a greater range of power production at higher efficiency than other engines or electric drive trains.

What will this engine be when it grows up? There are three bigger RADAX engines in the design stage; a bigger 8 cylinder version, a 16 cylinder version for off-road equipment, and a 20 cylinder version for locomotives, cogeneration, and commercial marine applications.

See page 31 for more information about the October 18th AHA auto conversion class. More information about RADAX engine testing will be provided in the "coming attractions" portion of this class.

Note: Gen-set class October 11-12th.

MORE ON CLIMATE CHANGE

Ref: www.ncdc.noaa.gov

According to two new studies by the National Oceanic and Atmospheric Administration, there are significant signs of climate change. One study titled "Maximum and Minimum Temperature Trends for the Globe" reports that the temperature range between the daytime high and nighttime low temperatures is decreasing for most parts of the world. Another study "Billion Dollar U.S. Weather Disasters 1980-1997" lists weather-related disasters. Since 1988, twenty-five weather disasters have caused total damages of about \$140 billion. Twenty-one of these occurred between August 1992 and May 1997 and accounted for about \$90 billion in damages and 911 deaths.

Regarding greenhouse gas politics; on July 17, 1997, the Senate Foreign Relations Committee decided unanimously by voice vote to urge the Clinton administration not to sign a treaty that would require reduction in U.S. greenhouse gas emissions unless developing nations also sign. The Senate Interior Appropriations Committee approved \$101 million for the clean coal program and \$364 million for another Fossil Energy R& D budget.

See S. Res. 98 introduced by Sen. Robert Byrd (D-W.Va.) passed by 95-0 vote. This bill will allow for binding commitments to reduce greenhouse gas emissions. All the resolutions in the world won't help unless subsidies/funding for fossil and coal stop. Our behavior of spending has to match our commitment to reducing greenhouse gases.

ARE YOU SICK FROM THE BROWN CLOUD? By: Kathy McAlister

Are you sick and tired at looking at the brown cloud - and do you wonder if it is making you sick?

Well, I did get sick from the pollution. But did you know that the American road vehicles emit significant air-borne pollution including: 28% of the **lead** (makes you dull minded); 32% **nitrogen oxides** (nitrogen oxides react with hydrocarbons and make smog and ozone); 37% of the **formaldehyde** (- it kills all life and causes cancer); 45% of **benzene** (cancer related illnesses); 62% of **carbon monoxide** (accumulates in the blood and poisons us); 27% of **volatile organics** (creates smog, ozone, and poisons life) and 18% **suspended particulates** (ruins our lungs). American cars source 25% of the **world greenhouse gas** - carbon dioxide, methane, and refrigerants - the stuff that is changing Earth's weather.

SMOG GUZZLER

By: Deek Harrison

Become a "CLEAN AIR" Advocate

Clean SMOG AS U DRIVE

JOIN: The American Hydrogen Association

HYDROGEN, our only **NON-CARBON** fuel, will not become readily available until we demand it on a grass roots level. You have all heard the propaganda of: unsafe; too expensive to make; not practical; not available; inefficient; it backfires; pre-ignites; can't use it in my internal combustion engine, if I use it the vehicle manufacturer wouldn't honor the warranty, etc., etc., etc.

Now these are all effective arguments if your goal is to keep us hooked on polluting hydrocarbons. And that is the goal of many powerful forces.

In the last issue of "*Hydrogen Today*" I tried to stir-up some discussions (we never argue), and point out some of the myths regarding "it's too expensive." It will stay that way until we demand it and require politicians to provide a level playing field. This includes taking the 60 billion dollar per year subsidy away from fossil and nuclear energy or providing this subsidy to solar hydrogen. In this issue, I would like to address "**UNSAFE**". Compared to what?

Compared to gasoline? That insidious fumes creeper, that you never want to use as a solvent because it is poisonous and the fumes can creep around until they find the water heater and blow the place down? That safe fluid that spills out of ruptured tanks after accidents, until it finds enough air to fry you? Remember the Pinto? That "Crispy Critter?" If we were choosing a fuel today just for safety, gasoline would not even be in the running. Neither would propane or Diesel fuel.

The safest hydrocarbon on the ranking towards hydrogen would be Natural Gas, and it's pipeline distribution system is one way we should be distributing hydrogen. With hydrogen's lighter than air and rapid diffusion characteristics, combined with high pressure tanks as the proven safest choice, we would have far safer cars in a crash. Particularly when we eliminate gasoline tanks. We could even use carbon fiber tanks as side rails for improved side-impact protection. The CNG industry has already proven they can drive coast to coast with currently available CNG. They also have "Fuel-Masters" to safely fuel in your garage. It is the same principle of hooking your gas line (like the hot water heater fuel line) to the Fuel-Master. Then the Fuel Master compresses the natural gas to the right compression to use in your vehicle. So why do we stay hooked on more expensive and more dangerous gasoline? What happens to the numbers when we turn gasoline into hydrogen and carbon products?

Hydrogen can also be made at home using solar-electric to electrolyze and compress to usable grade fuel. Hamilton Standard's patented SPE-HYGEN-90 can be garage mounted to safely produce 2,000 psi hydrogen right in your own garage. This is safe and silent technology with more than 100 million hours in life-support applications for making oxygen for submarines. This makes it important to protect your opportunity to negotiate for electricity as deregulation of the utilities nears. But you better be busy or you will lose the benefit because utility lobbyists are trying to re-regulate the de-regulated industry. Solar, windpower, ocean energy, hydro and other sources could give us enough hydrogen to clean the cities as we drive. How much better that would be than the coming no-drive days?

How much will you pay for CLEAN AIR? From the obvious resistance in the press and the bureaucracy; I'm convinced that we must create a grassroots demand to get enough hydrogen production for it to be affordable. If the oil companies can produce it for their own use at \$.30/gal equivalent, they can sell it for \$.60/gal equivalent.

We should be converting our IC engines to CNG and/or landfill gas, which will facilitate a simple two-step process to burning hydrogen as a renewable fuel.

Step 1: Just Hy-boost the CNG with 5 to 10% hydrogen right in the CNG tank.

Step 2: Inject hydrogen directly into the combustion chamber after top-dead center (TDC).

We need to retain multi-fuel capabilities until we can convert IC gasoline engines to hydrogen engines.

We should be buying used CNG vehicles and donating them to AHA. Bring back the muscle cars - let's clean all the SMOG out of the cities by using hydrogen as a fuel. When you operate a hydrogen vehicle, you are steam cleaning the air as you drive. Until we demand large-scale production of hydrogen, we will continue to have the brown clouds. Become a clean air advocate.

Fuel Cells 2000

***By: Bernie Ksiazek and Robert Rose
Ph: (202) 785-9620 or Fx: (202) 785-9629***

Fuel cells can help solve power-related air traffic control system failures like the one that hit National Airport Monday. "The power outage and subsequent failure of the main radar system at National Airport is only the latest in a long series of such failures around the country. With the advent of fuel cells for power generation, a solution is now available," said Robert Rose, executive director of Fuel Cells 2000. Rose urged the Federal Aviation Administration to begin installation fuel cell power systems.

"Fuel cells can be installed as the main power source for air traffic control systems utilizing the power grid as the backup. This installation would avoid many of the current causes of failure and also could supplant inefficient and expensive backup systems," Rose said in a statement. Fuel cells produce energy electrochemically by harnessing the reaction of hydrogen from fuel with oxygen from the air. The process is highly efficient and the system produces very little or no pollution.

The need for an alternative to conventional backup power has become obvious. Lengthy radar failures are a chronic problem in the system. According to a report of the National Transportation Safety Board, the traffic control system is based on technology from the 1960's which is very sensitive to power failures. While backup power is installed in the system, even a slight delay in the switch to backup power can provoke a computer failure, and recovery can take hours.

In a letter today to Jane Garvey, new Federal Aviation Administrator, Rose added that fuel cells are a particularly good fit for air traffic control systems because they produce high quality power suitable for the sensitive electronics in the control tower. And since fuel cells are virtually pollution-free, they can be installed in urban areas without concern for air quality. In fact, fuel cells are so clean Los Angeles and other jurisdictions have formally exempted them from air quality permits.

Best of all from the perspective of the average American, installation of fuel cells for power generation at the nation's airports could lead to safer air travel. Fuel cells are entirely compatible with the existing FAA computer system, and would reduce the likelihood of catastrophic failures. Fuel cells also would function effectively and fit well with an upgraded system, reducing or eliminating the need for inefficient traditional backup systems. Fuel cells systems make technical sense and practical sense for the nation's air traffic control system. This technology should be considered as you address the needs for improving the reliability of the system today and modernizing the system for tomorrow.

Monday - Sept. 15, 1997

1:00 - 5:00 p.m.

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California Hydrogen Business Council

Contact: (800) Hydfuel or (888) Hydrogen

This meeting will be held in conjunction with meetings of the Hydrogen Technical Advisory Panel, DoE Hydrogen Program and the National Hydrogen Association. All businesses interested in hydrogen are encouraged to attend and participate. A limited amount of five minute segments are available for business and entrepreneurs to present their services and products.

The meeting is free and open to the public. A reception and networking session with Hors D'Oeuvres will follow, a \$10.00 contribution is requested from businesses to cover the costs. ***See Page 14 for more information.***

Landfill Gas: How to Profit from the New Mandates

Ref. by: Geoff Young (800) 282-0868

September 17, 1997 - Frankfort, KY

This workshop is part of a series conducted under EPA's Landfill Methane Outreach Program. In March of 1996, EPA issued New Source Performance Standards and Emissions Guidelines for landfills under the authority of Title 1 of the Clean Air Act. These regulations target landfill gas emissions that contain non-methane organic compounds that contribute to smog formation. Both private and municipal landfills are affected if they meet the following criteria: (1) existing landfills which received waste after November 8, 1997, or (2) new landfills which opened after May 30, 1991, and have a design capacity of 2,750,000 tons and (3) maximum annual non-methane emissions over 50 metric tons. Even landfills that are not covered under these regulations can benefit from learning more about the potential profits and benefits associated with landfill gas use.

The workshop will include a trade show with displays provided by landfill gas equipment manufacturers, project developers, engineering firms, technical consultants, public agencies and public interest groups. Many can take a tour the next morning following the workshop to the Outer Loop Landfill. There will be landfill gas collection systems, typical well installations, gas flares systems and discussion with the Waste Management officials on gas recovery use. For more information contact: Geoff Young, Kentucky Department for Natural Resources, Division of Energy, 663 Teton Trail, Frankfort, KY 40501. Fax: (502)-564-7484. Workshop date: Sept. 17, 1997

Renewable Energy Experts & Advocates

"The Philosopher Mechanic: AHA conversion class notes"

and Hydrogen Hannah

American Hydrogen Association has many talented authors, who have donated all or portions of income from book sales to AHA. Tom Dickerman, Chairman of the American Association for Fuel Cells, project of the American Hydrogen Association, has published a collection of 20 authors (over 200 pages) on renewable energy. This book will be available here at AHA. See page 32 for order blank. One purpose of **Renewable Energy Experts & Advocates** is to help high school debate teams. The debate topic for 1997-98 reads: ***"How can the U.S. best reduce its fossil fuel consumption? Resolved: That the federal government should establish a policy to substantially increase renewable energy use in the United States."*** Mr. Dickerman's new book is an effective way to broaden the debate teams' knowledge of hydrogen and other renewables. Experts in wind, solar, geothermal, passive solar, and fuel cells have contributed to this new reference. Papers from universities, energy consultants, and experts from non-profit organizations and the Department of Energy have been combined to make this book available to students. Thank you Tom for all the work in putting this book together. Check your local debate teams and make sure they have a copy of the book. If not, please consider buying the team a book.

Hydrogen Hannah, by Ann Hoffmann is being printed. Stonehedge, Inc. has funded and commissioned Ann Hoffmann to write a book on busting the "brown cloud" with hydrogen. The "brown cloud" is the ugly haze that is formed by oxides of nitrogen and hydrocarbons. It is smog that hangs over urban areas and is mostly caused by vehicle emissions. The text and design of the book has been written for 3rd-5th grade level. Become a member of the ***Brown Cloud Busters ... Rotary, Kiwanis, and AHA*** are working to eradicate this smog. See page 32 for order form.

"The Philosopher Mechanic" AHA class notes on converting your car to hydrogen and/or other alternative fuels has been very popular particularly for those who can not attend the conversion classes. The two books, Jay Storer's, **Propane fuel conversion** and Roy McAlister's ***"Philosopher Mechanic"*** are available to AHA members for U.S.\$56.00 including surface shipping to U.S. addresses.

The ***Micro fuel cell experimenter's kit*** is available for U.S.\$159.00 (designed and produced by our Northern CA chapter of AHA.) Mr. Uwe Kueter of H-Tec of Germany has developed a larger model electrolyzer kit called the ***PEMpower 1-XL***. These kits (Micro fuel cell experimenter's kit and the ***PEMpower 1*** model) both demonstrate the main components of a solar hydrogen system. Electricity is generated by photovoltaic modules. An electrolyzer splits water into hydrogen and oxygen. Hydrogen is collected in a small storage tank as stored energy. When electricity is needed, hydrogen can be passed into the PEM fuel cell. Inside the fuel cell, hydrogen and oxygen react to form water. The energy released is converted directly into electricity that runs an electric fan. Shipping this kit costs U.S.\$1,500.00. Contact AHA (602) 890-2444 for more information on these two experimenter's kit.

con't from page 15. allows it to be piped as a liquid.

Until recently, the Fischer-Tropsch process was employed in more costly and less efficient systems. Natural gas had to be combined with pure oxygen to create the necessary chemical building blocks, called synthesis gas, and producing the pure oxygen required costly air-separation units. The ceramic membrane sifts oxygen from the air without allowing synthesis gas to escape. Add to the secret sauce - a magical proprietary catalyst that spins out only short-chain hydrocarbons such as naphtha and kerosene thus avoiding the wax "pudding". This means the light crude will readily flow in standard oil pipelines.

Sasol, A Johannesburg oil company, used the Fischer-Tropsch chemistry to convert gasified coal after oil shipments to South Africa were embargoed by the West in the mid-1980's. Exxon, Philips, Brown & Root Inc, a subsidiary of Dallas-based Haliburton, Qatar Petroleum Corp and Statoil, Norway's state oil company have designed conversion plants.

Phase 1 for the new "Ceramic Membrane Alliance" will develop the membrane materials, catalysts and other key components. Phase 2. will scale up to a 12,000 cubic feet-per-day experimental unit and subscale an engineering prototype that can process 500,000 cubic feet per day of gas. In Phase 3. the technology will further scale up to a 15 million cubic-foot-per-day, pre-commercial unit at Air Products' industrial gas complex in LaPorte, Texas.

PHOENIX GAS SYSTEMS PROGRESS

By: Roy E. McAlister

Phoenix Gas Systems LLC (PGS) a subsidiary of Hydrogen Burner Technology, Inc., produces partial oxidation equipment for supplying hydrogen. Recent tests were announced indicating that 99.999+% hydrogen purity can be provided from PGS Model 500 NG-A. This high purity is essential for analytical chemistry, pharmaceutical manufacturing, catalytic hydrogenation, and proton exchange membrane applications such as hydrogen fuel cells.

The PGS system is called the Underoxidized Burner (UOB) technology and uses no catalyst or ceramic membrane to produce hydrogen. It will work with a wide variety of hydrocarbon fuels to burn a small amount of fuel in specific temperature ranges in order to produce hydrogen from the rest of the fuel. The UOB generator is already available in several sizes for smaller users.

PGS indicates that the UOB energy operating costs will be 35 cents or less per hundred cubic feet^{con't to pg 27.}

Carbon Whiskers and Nanotubes,

by Roy McAlister

Announcements of research work being accomplished at Northeastern University and the National Renewable Energy Laboratory (NREL) on carbon whiskers and nanotubes illustrate exciting new frontiers in hydrogen technology. By creating large surface areas from small amounts of matter that attracts hydrogen, the density of gas storage can be greatly increased.

A team of scientists at Northeastern, Dr. Nelly Rodriguez and Dr. Terry Baker believe that hydrogen is stored on the surfaces and within the whisker crystals that they produce by reacting hydrocarbons with carbon monoxide on nickel or iron based catalysts.

A recent NREL announcement indicates that hydrogen is condensed to high density inside narrow single-walled nanotubes which are prepared by co-evaporation of cobalt and graphite in an electric arc. In the soot that forms are *single-walled nanotube* (SWNT) particles. This soot is partially oxidized by hot water vapor to remove amorphous material and to open the SWNTs to hydrogen penetration. The NREL researchers believe the hydrogen is strongly bound by adsorption within the cavities of the nanotubes and storage densities of 5 to 10 weight percent are indicated.

Considerably greater storage densities have been inferred by the measurements on small samples by the Rodriguez-Baker team.

According to the NREL announcement, a typical gasoline tank size of storage requires system densities approaching 6.5 weight percent and 62 kilograms of hydrogen per cubic meter. SWNTs with diameters of 16.3 angstroms to 20 angstroms apparently would provide this density at room temperature and moderate pressure. The temperature, pressure, and heat-exchange requirements for hydrogen adsorption and desorption, and the time needed for charging and discharging, are expected to be related to nanotube diameter, length, and orientation.

These exciting announcements by scientists at Northeastern University and NREL indicate good hope for more compact hydrogen storage systems. Using carbon in such applications is particularly important because it makes another market for carbon as a durable good that can be recycled.

Our task is to educate the public and stimulate demand, so that industry and the marketplace will provide the new products and services we need. This is where the members of the AHA can join together, share information and create social change for our own prosperity and quality of life, and for that of future generations.

PROSPERITY WITHOUT POLLUTION
(REBUILDING SCHOOLS IN WAR-TORN CAMBODIA)



Cambodia's educational system has been destroyed by 25 years of war. Now they face additional hardships by virtue of an on going civil war perpetuated by rival leaders. An AHA member, who resides in Cambodia, is seeking our help for badly needed materials to help the children of Cambodia and to rebuild their schools. The situation is particularly critical now because of the civil war. Please help by participating in this program.

Presently underway is a stop-gap outreach program to build one- or two-room schoolhouses. So far most of the efforts have compromised on buildings without the amenities considered essential for protecting the safety and health of most of the world's school children. Windows will be placed on rooftops to prevent indiscriminate shooting through conventional windows. School is being conducted in buildings without potable tap water, sanitary toilets, electricity, lighting, or air circulation.

This outreach program will provide do-it-yourself kits and equipment to drill wells, treat water, build sanitary toilets, produce electricity, and provide lighting for these new schools. Along with these developments will be educational programs designed to provide hands-on instruction for developing these amenities in the homes and businesses of the surrounding communities.

This Hydrogen Association Outreach Program invites you to learn more about our Cambodian Schools Program which is urgently needed to advance war-torn Cambodia to a healthful and progressive standard of living. ***Donations are urgently needed. Funds collected for this purpose will be 100% dedicated to this educational self-help program.*** Please contact the American Hydrogen Association by phone (602) 921-0433 with any question about the project or donations.

I know of no safe repository of the ultimate power of society but the people. And if we think them not enlightened enough, the remedy is not to take the power from them, but to inform them by education.

Thomas Jefferson

China's 1st Nickel-Hydrogen Battery Plant Opens: News Notes

China's first nickel-hydrogen battery factory has opened, and is designed to be capable of producing 30 million batteries and 300 tons of battery materials annually. The plant opened in Shenyang, the capital of northeast China's Liaoning Province, will produce advanced batteries that could be widely used in telecommunications devices, computers, electronics, and electric vehicles. Zhongliao Sanpu Battery Co. Ltd, one of the key partners in the project, has developed three categories of batteries in 13 varieties. Production goals for the year call for 10 million batteries, 200 tons of hydrogen-rich alloying powder and 100,000 mobile-phone batteries. By July 1998, the company expects to be producing 100,000 batteries per day.

GM, ARCO and EXXON: to research and develop fuel cells.

By Staff writer

General Motor's Delphi Energy and Engine Management Systems will be working with the the big oil companies, ARCO and Exxon to research and develop proton exchange membrane (PEM) technology. The goal of the corporations is to use gasoline as the prime source of "fuel" for the chemical-to-electricity fuel cell.

In the fuel cell, the cathode terminal is positively charged and the anode terminal is negatively charged. A membrane is used in order to separate terminals in the proton exchange membrane type of fuel cell. At the anode, hydrogen is split into its electrons and protons (positive hydrogen ions). When protons pass through the membrane, it creates a flow of direct current electricity between the terminals.

***Thinking about Christmas
or a child's B-day???***

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from AHA or your near-by bookstore*

HYDROGEN HANNAH

*By: Ann Hoffmann
organized by George O'Connor
for American Hydrogen Association*

Renewable Fuels Recommended by Senate Agriculture Committee:

By: Staff

Considering that farmers consume roughly one percent of the total gasoline in America, or 1.4 billion gallons, the Senate Agriculture Committee recommended that they encourage investment in renewable energy technologies for U.S. farms. The Clinton administration and private sector witnesses reminded the Senate Agricultural Committee that an overreliance on erratic foreign oil supplies could portend a significant jolt to the nation's farmers and the economy. People will want food production to continue during an energy crisis, but the farmers and the delivery transportation systems will be paralyzed from lack of fuel.

Of particular interest to the committee's members was the agriculture industry as both an energy user and potential source for renewable energy as recommended by an article in *Hydrogen Today*, entitled, *Hydrogen: A cash Crop For American Farmers.*

Hopefully many farmers attended the Texas Renewable Energy Industries Association's biomass conference, "*Livestock Waste Streams: Energy & Environment*" on Aug. 4th at Texas A&M University Agricultural Research & Extension Center in Amarillo, TX. An interesting topic discussed was "Combustion of Feedlot Manure for Energy Recovery" by Kalyan Annamalai. Also biogas generation topics include: "Swine Manure Digestion Systems," "Alternative Waste Management System with Methane Collection," "Dairy Manure Digestion Research & Demonstration Project," and "Energy Production & Nutrient Recovery from Dairy Manure Digester."

There will be case studies including economic, and environmental considerations. Contact: TREIA at (512) 345-5446 for papers and information on this conference.

The purpose of AHA is to close the information gap between researchers, industry and the public, drawing on world-wide developments concerning hydrogen, solar power, materials, energy conversion, economics, and the environment.

JOIN TODAY

THE AMERICAN HYDROGEN ASSOCIATION

***A stand can be made against invasion by an army;
no stand can be made against invasion by an idea.***

Victor Hugo

Praxair Produces Hydrogen For New Semiconductor Plant
By: Staff writer

The manufacture of semi-conductors relies on hydrogen, as do many other industrial processes. Hydrogen is used to produce silanes, the silicon-hydrogen raw materials for manufacturing polysilicon, which in turn is doped to make semiconductors. During the process of producing the polysilicon, nitrogen, a relatively inert gas, is introduced to keep unwanted chemical reactions from forming compounds that would degrade the purity, and hence the useability of the final product.

Praxair, a major supplier of industrial gases has been selected by Advanced Silicon Materials, Inc. to supply both the hydrogen and nitrogen to the company's new polysilicon manufacturing plant in Butte, Montana. Praxair says that its patented hydrogen generating system offers cost savings of approximately 20% over hydrogen made from steam methane (CH₄) reformers.

Praxair is the largest industrial gases company in North and South America, and is one of the largest in the world. It is noteworthy that Praxair can produce hydrogen at a significant savings over conventional methods. Hydrogen, will be cost competitive, once produced utilizing economies of scale while constantly developing competitive improvements in durable products.

Dennis Weaver to speak at Natural Choices Expo:

Building Conscious Community

September 12 - 14, 1997 - Tucson, Arizona

Inventor of Ecolonomics, Dennis Weaver of *McCloud* and many other personages, and an active member of AHA, will be speaking on building a healthy planet. This event combines topics to inspire individuals to make responsible choices and to take action to achieve better health, and a peaceful and environmentally sustainable future. Planned as a forum for shedding light on non-toxic natural resources, there will be 80-plus speakers and demonstrations on solar, hands-on strawbale construction, a rammed earth exhibit, and renewable energy exhibits. On Saturday, there will be a natural fiber fashion showing by Cele Peterson. For more information call Mikaela Peterson (520) 7790; fx: (520) 749-4479.

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Deregulation of Electricity: or is it re-regulation???

By: Kathy McAlister

Soon after Franklin Delano Roosevelt became President of the United States, he provided federal control of banking, agriculture, and energy. Roosevelt assumed the presidency in 1933 during the Great Depression. He set in motion government controls that changed the way business would be conducted throughout the remainder of the 20th century.

As surely as the century ends, electric utilities will find competition from new suppliers as electricity becomes deregulated.

Sixty five years later, established utilities are lobbying hard for special dispensations that will allow them to recover investments in power plants that are not able to compete with independent power producers. They want new government regulation that requires customers to pay a sur-charge on power produced by lower-cost sources. This sur-charge is to pay "stranded" power plants to not produce high-priced power. These utilities do not want to compete.

This would be bad for electricity customers, bad for competitive producers of lower cost electricity, and particularly bad for the Nation. If the U.S. is to compete in the world market, electricity must be allowed to reach factories, farms, and homemakers at prices that are competitive without penalties for paying fat and dumb utilities not to produce. It has been proven that co-generation plants that produce electricity and heat on-site are capable of delivering two or three times as much useful energy to the customer as central utility plants. The cost of co-generated electricity is typically 30% to 60% lower than electricity from central power plants.

Illustratively, utilities chose to build nuclear and fossil power plants when they could have built more cost-effective solar, wind, and biomass power plants. Now they want customers to pay them not to produce until they recover their investments plus additional tax-burdened subsidies to dismantle these environmental hazards. Utilities are lobbying for guaranteed income from competitor's sales of electricity after deregulation.

Free enterprise should be honored without penalties to pay for what FDR sited as the cause of the depression - - which included inefficiencies in energy production and distribution. Deregulation should not be re-regulated to subsidize these inefficient utilities that resulted from too much government protection and monopolistic guarantees.

WIND ADVANCES *By: Kathy McAlister*

The Department of Energy has entered a contract with Wind Turbine Company of Bellvue, Washington, to develop a new utility-grade wind turbine. The new product is designated as WTC 1000. Wind Turbine Company expects the new wind turbine to bring the cost of electricity down from the present level of \$0.04 to \$0.05 per KWH to about \$0.03/KWH.

This is the type of development that is needed to spur competitive excellence as deregulation enters the picture. WTC president, Larry Miles indicated that the new wind turbine will make it cheaper to turn off fossil fired power plants "whenever the wind is blowing."

AHA has a suggestion. Use the wind, wave, biomass, hydro, and solar energy conversion systems to meet electricity demands and use any remaining capacity to electrolyze water into hydrogen and oxygen. Deliver the oxygen to industrial, medical, and smelting operations. See also related stories on the use of oxygen for partial oxidation to produce hydrogen from hydrocarbons. The hydrogen can be stored in depleted natural gas fields and other similar geological strata. When energy is needed for transportation and electricity production, use the hydrogen and achieve a sustainable economy.

PacifiCorp, Eugene, (Oregon) Water and Electric Board, and Seawest Energy have started development of a 41.4-megawatt wind turbine power plant in the Foote Creek Rim area of Carbon County, Wyoming. This new \$60 million project will start operation in early 1999.

China is beginning to exploit the estimated 800 billion KWH wind resource in the Xinjian Region which is in the Northwest area of China. The Xinjian Region which is now responsible for producing 44 percent of China's power now has about 25,000 kilowatts of installed wind turbine capacity. Plans call for adding another 50,000 kilowatts in the near future.

Scheduled for completion at Djungar Gates, Kasakhstan, (Central Asia) in late 1998, is the first 50-megawatt installation of a 500 megawatt wind turbine system by York Research Corporation. York's president, Robert Beningson said, "His company is positioned for rapid growth to serve the market opened by deregulation of electric utilities."

Seven municipal utilities, the Department of Energy, and the Electric Power and Research Institute will build and operate a 2,250 kilowatt wind power plant near Algona, Iowa. The plant will use three 750 KW Zond Z-50 wind turbines which are the largest wind turbines made in the USA.

The Z-50 has 50 meter diameter rotors which have variable speed and variable pitch capabilities to make the most electricity from all wind conditions. The Algona plant will have the Z-50s mounted 50 meters above the ground level.

Watch for more exciting opportunities to make money with renewable resources in the deregulated electricity business.

Is the World Running Out of Oil?

By: Roy E. McAlister, President of AHA

Virtually every city of the world is endangered by environmental pollution and economic dependence upon fossil fuels. Nearly all forms of transportation and electricity are provided by engines that use fossil fuels.

Perhaps what is even more endangering is the false sense of security and misplaced bravado that is found in the belief that, so far, fossil reserves have always expanded to meet market demands. Oil production by oil wells started in 1859. The very short 140 year history of oil production pales in comparison to the 100 million years since deposition of the biomass swamps that are today's finite fossil fuel reserves.

Estimates vary regarding the time that is available for the inevitable transition from oil and other fossil fuels to renewable fuels. Illustratively, for decades the American Petroleum Institute has tried to discredit accounting of petroleum depletion and has encouraged the public to remain dependent on oil. However, API has recently admitted that if the definition of "proved reserves" would be expanded to include "un-applied technologies" for improving the recovery of oil in the ground in "as-yet undiscovered oil fields" that the world's oil supply could be stretched to last at 1993 production levels for 63 years. Problems with this intended API assurance include the following:

1. Most cities are seriously endangered from pollution traceable to fossil fuels.

2. Sixty years is in the order of magnitude of time needed to build the solar, wind, ocean energy, hydro, and biomass infrastructure needed to replace fossil fuels. Hopefully these sustainable, clean, energy resources will replace oil in thirty years for the following reasons.

a. Ninety percent of the world's population uses a small fraction of the fossil fuel per person in comparison to the U.S. where five percent of the

population uses twenty five percent of world's oil production.

b. 1993 production levels are not adequate for an energy hungry world that exponentially increases this hunger for fuel by doubling the human population every few decades. Every year 100 million more persons seek respect and the good life that requires energy-intensive food production, manufacturing and transportation.

c. Fossil reserves are far too valuable to be burned for energy. One hundred gallons of oil can be converted to durable recyclable goods such as TVs, CDs carpeting, clothing, and piping products that generate \$3,500 in sales compared to \$100 for fuel sales.

Congress has introduced a renewable energy portfolio standard of 10 percent by 2010 and 20 percent by 2020. These numbers are unacceptable. If you take the API number of 63 years and congress's time-table, you will soon realize that we are not going to be energy prepared for running out of oil.

Endangered cities need fossil resources along with renewable materials to build an economy that is based on recyclable durable goods and wealth expansion rather than the present economy of depletion and wealth redistribution.

AHA's Research & Educational Center will provide short courses on BRINGING PROSPERITY WITHOUT POLLUTION TO ENDANGERED CITIES. Delegates from the world's endangered cities will receive short courses including the following topics:

1. Sustainable Housing
2. Developing Energy Supplies From Sewage and Garbage
3. Conversion of Vehicles to Minus Emissions Operation.
4. Cogeneration, Wheeling & Conservation - - Foster Transition Technologies to Sustainability
5. Sustainable Food Production
6. Achieving a Sustainable Wealth Expansion Economy.

Our new expanded location for AHA's Research and Educational Center needs funding. If you are interested in developing a private trust for renewables, please contact Roy McAlister, at (602) 921-0433. AHA will be happy to work with you, your accountant or lawyer. Northern Trust Bank in Phoenix, Craig Wilson and George O'Connor have agreed to assist in the development of these types of accounts for AHA.

Another good note, Representative Peter Fazio (D-OR) introduced HR 1359, which would establish a renewable energy trust fund. In the Senate, Dale Bumpers (D-AR) introduced S237, which also calls for a renewable energy trust fund. Presently, private citizens can contribute to these proposed trusts and to various other trusts, including Charitable Remainder and Wealth Replacement Trusts for attractive tax benefits while accomplishing support for AHA's projects.

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The First, World Sustainable Energy Trade Fair

By: Richard Jennings

Hundreds of years ago, the Dutch used the power of the wind to keep the sea from inundating their land. At one of the remaining original windmills you can see how they lived at that time. Amidst the tools and machinery, there were small niches where the family existed inside the wooden tower. Today's windmills are quite different. They generate up to 1.65 Megawatts of electric power each. And while the service area is large enough to sleep in, you wouldn't want to live there. These giants were on display at the first World Renewable Energy Trade Fair held May 27, 1997 in Amsterdam.

Wind is the fastest growing energy source, producing 26% of electricity worldwide. From Amsterdam northeast to Lelystad there has been an array of 35-300 KW turbines quietly producing grid electricity for the last six years. These are now being replaced with 18 - 750 KW units. The European Wind Energy Association says the trend is towards these larger units. Meanwhile in the Gelderlands of west-central Netherlands, NUON-water will be producing 55 million cubic meters of drinking water per year from electricity that is produced exclusively by renewables, primarily wind. This will cut their CO₂ emissions by 75% with no increase in utility rates. These efforts indicate why the CO₂ emissions in Europe are only half of those in the USA.

Wind energy is an accepted supply for the European grid system, with Denmark's wind industry now larger than its fishing industry. The European Union has called for an increase from the current 4%, to a total of 8% of the energy supply to be provided by renewables by the year 2010. This is a goal of 40,000 MW of capacity, generating enough electricity for 50 million people. One of the more interesting ideas at the show was a bold project presented by the ever resourceful Greenpeace. They claim that a 15% share is necessary to keep up with growing economies, and will actually cut CO₂ emissions. Their plan is for wind farms in the North Sea. With considerations for wind resources, human activities and the protection of biodiversity, they plan for a system with 10,000 MW of capacity, or 5% of the theoretically available resources. It would supply from 20-40% of the Dutch electrical needs. The Greenpeace proposal is staggering in its scope and boldness. Yet, it has a realistic chance of happening. Both the banking and insurance industries have come to recognize global warming as a threat to stability and profits. A 1993 wind growth fund from the Dutch Triodos Bank ran out of fundable projects in a few weeks. Several sources said that there were not enough fundable projects for the capital available at this time.

Giant systems were not the only wind alternatives represented at the show. Marlec of Corby, England has an array of small windmills and photovoltaics for off grid systems. One innovation was a furling model that pivots the horizontal axis in high winds. This reduces the surface area of the blades facing into the wind and reduces the amount of energy. The models mount on standard pipe, eliminating the need for special towers. They claim to have the lowest price per watt for small units as well as the lowest wind startup and greatest amp-hours generated in real wind conditions. Marlec sells in 60 countries.

One of the few exhibitors from the USA was Southwest Windpower, maker of small wind generators. They also make a furling model that will maintain 85% of power even in 120 MPH winds. Their other model has variable pitch blades that twist in high winds to prevent damaging the alternator. Simple and inexpensive, these units are designed to be mounted on rooftops among other places. They will complement a photovoltaic system for more even power production.

On the last day of the show a "sustainable housing" tour was offered. It was surprising to see no windmills on any houses in this windy land. Several of the tour guides explained that each area has "beauty committees" which have to approve any outside building modifications. Ironically, here in the land of the windmill, windmills do not pass the neighborhood consensus of what is acceptable to look at. Okay, how about solar? We were shown a building complex with a solar array that was connected to the grid through an inverter. Another irony. The residents began to use more energy after the solar system was installed. Why? Because it was "free." Actually, it was fed into the grid and all of their power was metered. The conclusion reached by this reporter was that the Dutch government is ahead of the US government in sustainable energy policy. But on an individual building level, there is more innovation in the USA.

When the sun sets and the wind dies down... then what? One storage solution is batteries. This works on a household level, and to a very limited degree in automobiles. How sustainable is an electric car that plugs into the grid to recharge with electricity from a nuclear power plant? Another storage method is hydrogen. *con't to page 26.*

VIRTUE - The Solar-Hydrogen Economy

By: Joe Dillard and Kathy McAlister

We are on the eve of the 21st century and the next millennium looms before us. We are running an uncontrolled experiment of fossil fueled burning on the planet Earth, but some of the end results are predictable. Depletion, scarcity, hardship, self doubt, and hostility will result from continued dependence upon fossil resources. This generation can not avoid being responsible for this problem. Most of the fossil reserve that has been depleted was burned in our lifetime. During this time the global population increased from the 3-billion level in the 1960s to 4-billion in 1972, to 5-billion in 1987, and is about to reach 6-billion by 1999. This tremendous population is dependent upon fossil fuels. We caused the pollution problems, and we must find virtuous solutions. Of course the technological solution is solar-hydrogen. The human solution is virtue. (*Part II: Virtue in Leadership next issue*)

Look at your trusty dictionary to provide the definition of virtue. It is interesting to discover what makes a person virtuous. The word is derived from the Latin word: *virtus* meaning strength and manliness. 1.: conformity to a standard of right: MORALITY 2: a particular moral excellence 3: active power to accomplish a given effect: POTENCY, 4: manly strength or courage: VALOR 5: a commendable quality: MERIT 6: chastity esp. in a woman.

Clearly, the dictionary was pre-politically correct. Today, we have a tougher time passing on virtue, because, in too many instances we have given the job of forming our childrens' characters to institutions that substitute for parents and family. Character has been cultivated into consensus rulings, compromise, dishonesty, irresponsibility, and instant gratification at someone else's expense. When the Roman Empire fell, virtue was at an all time low.

Virtue is learned by example...through our actions. Conventional energy holds a powerful grip on our actions. It is powerful because it is the basis of our economic system. If you have money, you act one way...if you are a have-not, you act another way. Having energy or no energy changes your lifestyle. Industrialized countries are addicted to fossil fueled transportation and a plentiful supply of electric energy. About the same time that we start running out of fossil fuels, most nuclear power plants will be decommissioned. As energy supplies become short, populations increase, manufactured resources become more difficult to produce; results will be poor distribution of food and essential goods, hardship and strife. Wars will be caused by greed and jealousy. We will continue to pollute the planet and deplete our natural resources in search of the good life. Under these conditions are we going to have the virtue to be civil? Will we destroy the progress that has been gained by 200 years of accelerating industrial development?

We can, as a civilization, work together to change our society and energy picture before time runs out on the fossil blessing that launched the Industrial Revolution. Solar-hydrogen can solve these problems! Do we have the virtue and resolve to prepare for sustainable prosperity, or will we have to accept defeat and hardship. Much of the virtue that is needed must be found in examples by great leaders. So start now, show your neighborhood how to operate a minus emissions engine that uses hydrogen and/or landfill gas to clean the neighborhood. Ask farmers to send renewable energy to the cities along with food and fiber. Let's show our children how to solve the problems of pollution with sustainable economic development. It is a virtue to do so and our children's-children will thank us for that virtuous leadership.

Already in the marketplace are virtuous options that need to be encouraged by our purchasing actions. According to information released by the New England Electric System, deregulated power suppliers in Massachusetts are making interesting offers. Illustratively, Enova Energy offers electricity at \$0.025/KWH base price and performs free home energy surveys, Northfield Mountain Energy offers electricity at \$0.026/KWH from hydroelectric dams and gives away water-saving showerheads, Working Assets Green Power Inc., offers electricity at \$0.034 and promises no bulk power purchases from coal burning plants or large hydroelectric dams.

Find out where your power is coming from and what it costs to replace the energy source (for sustainability), what it costs to transport the energy to you, what the environmental costs are, and what options you may have to improve your purchasing program. If your electricity costs less than the sustainable replacement cost, consider it a "steal" and question whether you want to compromise your character by accepting resources that are stolen from the welfare of future generations. Share your findings with the neighborhood.

Let's teach, by what we do; show how to carry on the torch of freedom from pollution, assured self sufficiency, and peace of mind. Create a model for the rest of the world to to enjoy and one that our maker will think is virtuous.

News Notes of Interest

By: Sherwin Berger

The 15-member bloc of European Union (EU) environmental ministers are at loggerheads over proposals by the European Commission to impose stricter limits on motor vehicles pollutants by 2005. The ministers even disagree about the need for stricter limits.

If there is an imposition of requirements considered too stringent, refining industries threaten to move operations out of the EU. However, the assembly is supported by ARCO Chemical, which makes "cleaner" reformulated motor fuels. The entire episode is similar to all the needless brickering that takes place here. Needless, because we know the problem can be solved initially by the introduction of a small quantity of hydrogen into the fuel of a vehicle. A permanent solution is conversion to direct burn hydrogen vehicles or hydrogen-fuel cells.

Internal combustion engines (ICE) can easily be modified to run on hydrogen. With hydrogen fuel the ICE is transformed into an air cleaning machine: the exhaust is actually cleaner than the air going into the engine. This has been demonstrated at Emission Test Stations here in Arizona. Where the pollution meters showed a minus pollution effect. An ICE running on hydrogen fuel does not produce carbon monoxide, carbon dioxide, hydrocarbons, or PM-10. The by-product of hydrogen combustion is water vapor.

The EU ought to reexamine the salutary options for solving air pollution and global climate change problems. While energy is essential for the sound functioning of economies, there is no question that a transition to clean energy is mandatory if we are to achieve a sustainable, prosperous civilization. The question is, how quickly and with what degree of urgency can we realize such a transition. The answer for the EU (as well as for all other governing bodies) is in setting strict emission standards, establishing enforceable time tables and promoting known engineering techniques that emphasize the implementation of hydrogen energy systems. Equally important is a massive educational program that alerts the public to the desperately serious nature of the problems and the clean energy solutions at hand that can defuse this crisis.

NEED A CLASSROOM READING BOOK

HYDROGEN HANNAH

By: Ann Hoffmann

supplimentary teaching suggestion
when buying your book from AHA

con't from pg. 22. Three pieces of equipment are needed to store and use hydrogen. The first is an electrolyzer which uses electricity to split water into hydrogen and oxygen. This can be from the electricity generated by wind or solar power. The second is a storage system, basically tanks with a storage medium inside. The third is a fuel cell, which recombines the hydrogen and oxygen into water. This process releases most of the electrical energy that was used by the electrolyzer. All of these machines can be quite simple, but in reality, the ones that work well are "high tech" showcases of advanced materials. And they were conspicuously absent from the show. There was no electrolyzer exhibited. There was one German maker of tanks, and one Italian manufacturer of PEM fuel cells. The tanks were shown by GfE Metaale und Materialien GMBH of Nuremburg. Their developer, Lutz Fischer described the units as containing an alloy of Tin, Zinc, and Manganese. One of these tanks can hold enough hydrogen for a 100 Km range on a vehicle. The tanks are guaranteed for a minimum of 5000 charge/discharge cycles. Lutz is also interested in developing hydrogen cooking systems. De Nora S.p.A. of Milan, Italy described their 5 and 10 kW PEM fuel cells in a paper. These third generation cells have higher reliability, and improved power density. A major focus of their work has been to develop their fuel cells from the most inexpensive materials possible and to make the fuel cells recyclable. DeNora quotes studies that show the cost of fuel cells declining to the level needed for world use (\$50-100/kW) by 2010.

Finally, a word about what may have been the ultimate pollution free product, at least in its operation. That is the power for the Baygen FreePlay Radio. British inventor, Trevor Bayless, heard about the need for radios in Africa and the fact that batteries were the expensive limiting factor. Hence, his windup radio combining a clockwork spring and a 3 v generator. Just twenty seconds and sixty turns of the handle will get you a half hour of radio broadcasts, AM, FM and SW (spring-wound). The unit is made in South Africa. For every 100 radios that Mr. Bayless sells, he donates 12 radios to areas that need them.

An unofficial theme at the show was the upcoming talks in Kyoto, Japan to codify the work begun at the Rio conference. These talks will legally bind CO₂ reduction by treaty. This is a critical event. 1996 saw the largest increase in atmospheric CO₂ since 1988, while the European Union continues to give \$10 - 15 billion subsidies to the fossil fuel industry. Greenpeace argues against any new con't to page 26.

“PROJECT SALT SHAKER”
FOR PROTECTION OF STRATOSPHERIC OZONE
By: Roy E. McAlister, P.E. & President of American Hydrogen Association

Worried about skin cancer, accelerated aging and cataracts? One of the difficult problems facing humanity is depletion of protective concentrations of ozone in the stratosphere. Stratospheric ozone plays the vital role of absorbing harmful ultraviolet radiation. Without the protective presence of adequate ozone in the stratosphere, many species of life on earth are destined to incur abnormal diseases, abnormal birth defects, and/or extinction due to ultraviolet damage. Other species will incur increasing distress from diseases and reduced food supplies. Skin cancer, accelerated aging, and cataracts in humans are known to be caused by ultraviolet radiation. Losses of productive land is produced by the combination of increased ultraviolet radiation at the earth's surface, particularly in conjunction with accumulations of greenhouse gases in the atmosphere.

Chlorine is the most problematic component of manufactured chemicals such as chlorinated hydrocarbons that migrate from the surface of the earth to cause depletion of ozone in the stratosphere. Chlorine depletes ozone in a series of chemical reactions that continue endlessly. Removal of chlorine from the stratosphere is imperative to environmental protection efforts.

Table salt is a compound that consists of equal numbers of chlorine and sodium atoms. It is formed by reacting sodium with chlorine. The American Hydrogen Association believes that the destructive nature of chlorine on ozone in the stratosphere can be relieved by reacting the chlorine that is now there with sodium. But how can the sodium be delivered to the thin air at the edge of space?

One way would be to dig some naval guns out of moth balls and stack two guns end on end. Create a special projectile shell with a tough skin to contain sodium for a very fast acceleration and delivery to the edge of space. Replace gun powder with a mixture of hydrogen and oxygen and aim at the sky. When the projectile reaches the desired altitude, ignite another charge of hydrogen and oxygen to atomize the sodium. The atomized sodium will react with chlorine and a small amount of harmless table salt will fall into the oceans. End of problem. But is it the end of the story?

Unfortunately, chlorine will continue for a long time to be delivered into the atmosphere by relatively inert chlorinated hydrocarbons such as freon refrigerants and cleaning compounds. After passing through the denser atmosphere in a path defined by more or less random collisions with other molecules and reaching the outer atmosphere these chlorinated hydrocarbons such as freon refrigerants and chlorinated hydrocarbon cleaning compounds. After passing through the denser atmosphere in a path defined by more or less random collisions with other molecules and reaching the outer atmosphere these chlorinated hydrocarbons are broken by ultraviolet radiation which releases chlorine to do endless killing of ozone molecules. Since World War II, civilization has released millions of tons of chlorinated hydrocarbons into the lower atmosphere. Some of the molecules released at the time of WWII are just now reaching the stratosphere. Chlorine from past dumping of chlorinated hydrocarbons into the atmosphere will continue to be delivered to the stratosphere for centuries.

In order to protect essential concentrations of ozone in the stratosphere, it will be necessary to bring down chlorine on a routine basis. This is why it is important to launch sodium with clean hydrogen and oxygen as the propellant in the gun or rockets that deliver sodium to the stratosphere.

It appears that simple chemistry can be employed to remove chlorine from the stratosphere. The risk/reward ratio for this corrective action is compelling and should be thought of as a delayed cost of business for the wonderful progress and economic development that the use of chlorocarbons have provided in the advancement of the Industrial Revolution. Now that it is known that chlorine degrades the stratosphere, a proactive chemistry can be employed to remove harmful chlorine. This approach has manageable risks and offers a potential solution to one of the most difficult problems of the Industrial Revolution.

It is good Economics to protect the environment. Freon patents were sold to South America. In Arizona, we are still allowed to use freon. Freon must be banned totally from Earth. The life you save may be your own. You can support this and similar humanitarian efforts with your tax deductible contribution. For additional technical and contribution information, please contact Roy McAlister at AHA. (602) 890-2444 or 921-0433

Antarctica is Melting!!

(-Ref- Spring 1997 Auto-Free Times)

Two years ago the northern section of the 620 mile-long Larsen Ice Shelf collapsed into the sea. Under current conditions according to Rudi del Walle, Director of Geology at the Argentinian Antarctic Institute, the rest of the ice shelf could collapse within two years.

“It will be destroyed without any doubt,” he said.

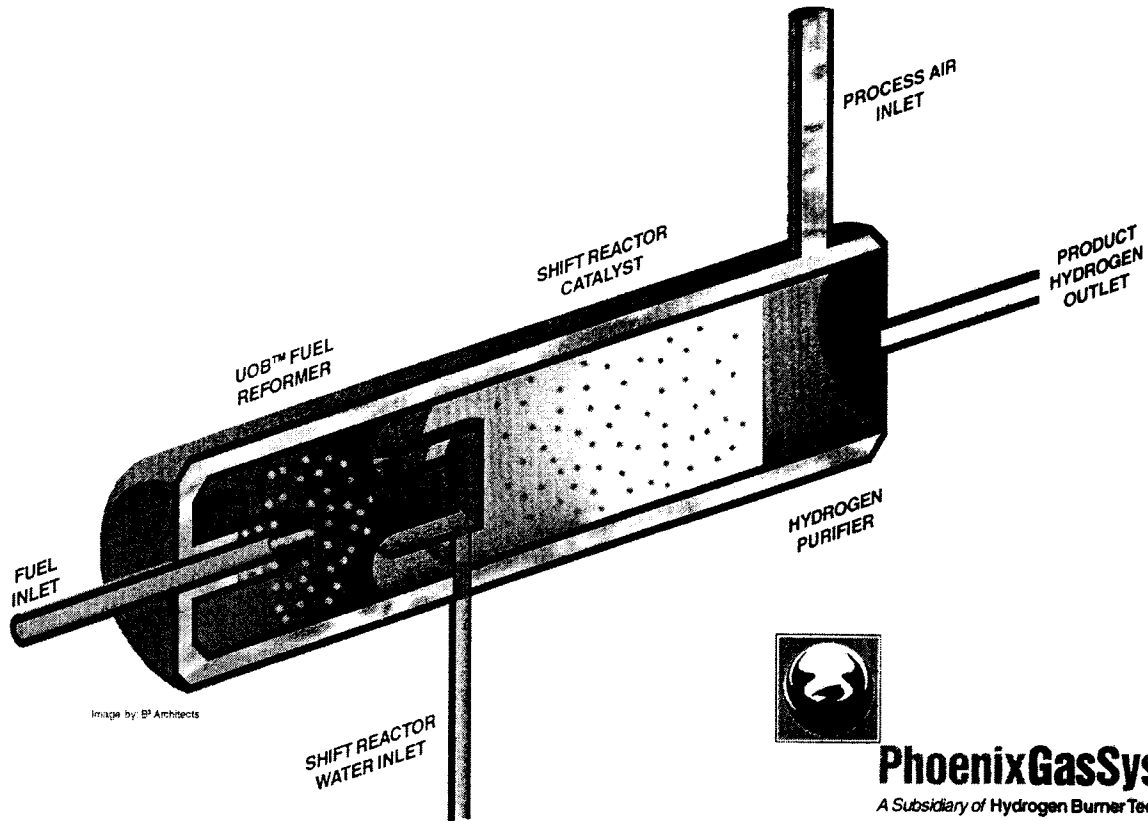
Del Valle has been observing the 4,600 square-mile ice shelf for the past seven years, and is convinced that global warming is causing the dramatic changes.

Lakes and rivers have formed in the summer from melting ice, and Del Valle said in recent years, it has even rained in coastal Antarctica - a previous unheard-of-event. Over the past 50 years, the Antarctic Peninsula has seen a sustained atmospheric warming of 4.5 degrees.

For more information: “Charging Ahead - The Business of Renewable Energy, and What It means for America”, by John J. Berger, published by Henry Holt; and “The Heat is On - The High Stakes Battle Over the Earth’s Threatened Climate,” by Ross Gelbspan, published by Addison Wesley.

<p>POP QUIZ: (See answers in second box)</p> <ol style="list-style-type: none"> 1. What is ozone? 2. What percent of the Earth’s ozone is in the stratosphere? 3. What is the percent of increase in skin cancer for each percent of ozone depletion? 4. Number of ozone molecules destroyed by each chlorine atom that reaches the stratosphere? 5. Percent difference between the average ozone levels over the arctic in March 1979-1982 and March 1997? 	<p>cont’ from pg.24. developments and explorations because the atmosphere cannot absorb the carbon from the known reserves. In an unusual speech, John Browne, Chief Executive of British Petroleum acknowledged the reality of Global Warming and described how his company is working to develop sustainable energy. He did of course defend the petroleum industry which produces 88% of the worlds energy. He did not mention the new report <u>World Oil Supply 1930-2050</u> by Campbell and Laherre, Petroconsultants Pty Ltd, 1995. It is sold to oil industry at \$32,000 per copy. In the report are these predictions:</p> <ol style="list-style-type: none"> 1. World oil output will peak by year 2000 and decline 50% by 2025. 2. World now uses 23 billion barrels per year. 3. Industry finds only 7 billion barrels per year. 4. After 2005 the energy needed to find and extract a barrel of oil will exceed the energy in the oil. <p>The conclusions this reporter drew from the World Sustainable Energy Trade Fair were these.</p> <p><i>Sustainable energy generation systems are currently available and competitive with hydrocarbon based systems. Sustainable energy would have an economic advantage if governments had the will to charge corporations for the pollution created by petrochemical energy. Instead, we the people pay to clean up after the polluters. One action you the reader can perform is to demand of your representatives that this country honor its commitments and leadership responsibility at the Kyoto summit for real reductions of emissions. Kyoto will be a test of national wills, and targets cannot be met with business as usual.</i></p> <p>For contacts, see page 31.</p>
<ol style="list-style-type: none"> 1. Ozone is O₃, a molecule made of three atoms of oxygen. 2. Ninety percent of the Earth’s ozone is in the stratosphere. It is essential for blocking harmful ultraviolet radiation. 3. For each percent decrease in stratospheric ozone, about three percent increase in skin cancer. 4. Chlorine never stops destroying ozone. Tens of thousands of ozone molecules may be destroyed before a chlorine atom randomly wanders out of the stratosphere. 5. In 1997, about forty percent less ozone was present. 	
<p>GOOD PEOPLE GOOD SERVICE GOOD PLACE TO DO BUSINESS <i>Mobil Mini Inc.</i> 602-921-3111 <i>safe and secure storage systems</i></p>	

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PhoenixGasSystems
A Subsidiary of Hydrogen Burner Technology, Inc.

cont't from page 16. Hydrogen Burner Technology.

of hydrogen. This equates to about \$1.32 per gallon of gasoline equivalent (GGE). In addition, this model is exceeding output by 100 scfh (standard cubic feet of hydrogen per hour) and is being upgraded to a 600 NG-A. "This increase in output is due to our efforts to improve system efficiency and quality in order to better serve our customers" said Mr. David Moard, President.

For more information:
Dana C. Doherty
Hydrogen Burner Technology, Inc.
(562) 597-2442

Kathy's Page

Are the two most abundant elements in the universe hydrogen and stupidity?

Wonder why your *Hydrogen Today* has typing errors? Was it chicanery, planned and put there to make you read *Hydrogen Today* so you could call and complain, and AHA would launch into a discussion on hydrogen? Or are the mistakes to make AHA more appealing by being more human ... so that more people could identify with the cause of clean renewable energies? Remember those smart kids in your class that didn't have time to talk about average things in life!!! So you didn't talk to them.

The answer, of course, is NO to the above reasons. But it does have similarities to the above title of this article. The second most common element in the Universe "stupidity." The same element that is slowing the world from having a cleaner place to live.

But the mistakes are clearly my fault. I do have other qualities other than typing...and not having spell checker to work on the computer. If that makes me average...then I am in the right group of people. For AHA believes that it will be the average, creative, logical person, who will make the change to clean, peaceful, healthy world of renewables. Wouldn't it be nice to say H₂ was 2H; "hydrogen and a healthy" universe.

Thanks:

Ed and Charlie Underberg of Arizona R.V. Salvage, Inc. for supplying the theme for my apology. The three dictionaries that were donated to AHA after the last newsletter will come in handy for this newsletter. Thanxs for the hepl.

***.. to promote nonpolluting renewable resources, especially hydrogen fuel made from solar energy; to encourage economic prosperity without pollution
AHA Mission Statement***

The American Dream is Sustainable Liberty

On page 29 of this newsletter is a Jewish-Muslim-Christian-Biblical style of writing known as a lamentable psalm written by David Lowe, a member of AHA. Some of AHA's readers are from other countries, and are seeking religious freedom and may find this style of writing striking. David Lowe writes of deliverance for the Earth. It is a cry to save our planet; for divine help for the people of the Earth to prosper and maintain the Earth. Moses and the Exodus, has stood for centuries as our guiding light of freedom. The fall of Communism and the Berlin Wall are no less important examples of deliverance from oppression in this century. Our U.S. Liberty Bell reads, "Proclaim liberty throughout all the land unto all the inhabitants thereof."

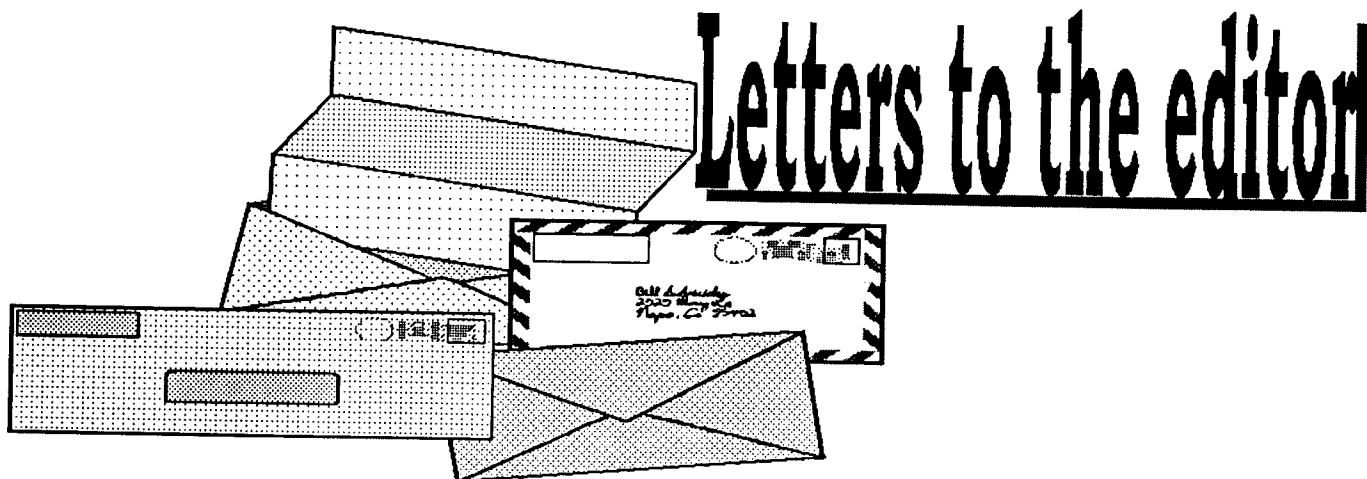
Indeed, we should reflect on the fragile condition of our Earth, and whether what we liberated inhabitants have inflicted on the Earth will cause greater harm than the temporary benefits that we gained by burning fossil reserves, converting the continents to our habitat, and using the oceans as our cesspools.

I remember one of my first trips to the International Hydrogen Conference. I was talking to some Russian Scientists. I was promoting free enterprise as the developer of technologies that could save the planet. He quietly made a little speech and reached over and pinned a small button of Lenin on my dress. Referring to Lenin he said he ment to do good but then he said, "Some white knight will come along and save the Earth." Clearly, we both were talking about future technological developments by the people (a white knight - a hero who will lead the way) instead of governments... capitalism vs. communism. God, technology or a white knight - I did not have the answer at that conference!

When I read Dave Lowe's "Lamentations of Future Children of God," I realized that freedom cannot come to our children, if our planet is driven to compromise and destruction by our generation. Technology, white knight, or responsibility gained through prayer, we all know that Mother Nature has been a ruling factor in our lives and can not be mistreated. Earth has had more violent times in its history that shows us how fortunate we are to live at this time of relative calm. We must not force the carbon in the fossil reserves back into the atmosphere, or we will experience the severe weather and catastrophic events of past times.

So is it technology, a white knight ... divine intervention, what is the answer? Finding the answers is why AHA started in the first place. We started to help the average person change from participating in a wealth-depletion oil economy to a wealth-addition hydrogen economy. We believe that scientific research and educating the public would bring prosperity without pollution. It will be people changing for a better future. You see, I am counting on you to demand the change.

Freedom is being able to change. Freedom is working together to speak out against energy abuse. Freedom is learning...gaining wisdom. It is being able to think for yourself. Freedom is being able to say thank you for all of our blessings and for the hardships that can be taken as lessons. (The school of hard knocks.) Freedom is not hurting other people, yourself, or your planet. Freedom begets love of life. Yes, I think it will be the freedom to change that will save our planet. Is freedom running an uncontrolled experiment with fossil fuels like the oil companies are doing? This is the real question that all of us must answer!!



HEAR US NOW, O GOD
Lamentations of Future Children of God
Palo Cristi Presbyterian Church (reprint)
David Lowe

Hear us, almighty Creator who sustains all creation with a steady hand. Hear us in this urgent matter before it is too late. Listen attentively to our fervent prayers, the voices of generations of your children waiting to be born.

You have blessed us, your children, with prosperity and we have been fruitful and multiplied as you desired. But in recent times our number has doubled and again and again, yet the living space on the face of the earth remains the same.

How long, O Lord, can we continue to double our number and yet prosper?

Now your children are encroaching on the habitats of your other creatures large and small. If they are to be extinguished, how can we live well without them? How long can our kind continue without them?

Now your children are filling the air with unhealthy and unsightly things. Are we, to, condemned to live in a brown cloud? What have we done to deserve this?

Now your children are squandering precious treasures which cannot be replaced. Already half the oil which you put into the ground for us has been burned. Are we to have no oil in our time? Surely oil is too valuable to burn. And half the fertile top soil you laid on our land has washed into lakes and seas. How will you feed us when the land no longer yields grain enough to feed our doubling number?

O Lord, who is able to make galaxies, who delivered us out of Egypt and from Babylon, and restored our temple in Jerusalem, surely you will hear our plea and deliver us from the path leading, we fear, to our extinction. Verily our trust in your righteousness and power is not misplaced.

Please, O Lord, discipline your children.
Speak to them that they may care
For your creation and sustain it.
Show them how to *prosper and maintain* it.
Please, O Lord, deliver us from our apparent fate.
We need not be born too late.
We pray it is your will.
There is time to do it, still.
Please let us see that wondrous work we all do share.

Praise be to God throughout all the generations. May they enjoy the Lord and all creation's splendor, even unto the very last days of the earth. Let every living thing praise the Lord forever.

PROSPERITY WITHOUT POLLUTION
(Poets Wanted)

By: Roy E. McAlister

Ten times ten times ten new utterances are needed every day to:

Remind us of our ancestors hopes and dreams for our happiness and long-term success.

Give us inspiration to stand tall and do the right thing.

Help our souls rejoice in the knowledge that we are making it possible for civilization to be sustainable.

Lift our spirits to the task of achieving more than short term profits, and the wisdom to strive for sustainability... help us become determined to achieve *prosperity without pollution*.

Join AHA in its Psalm of saving Grace
for all of mankind.

To: Joe Dillard

Re: Rethinking Courage

Fm: Jon Dierenfeld

Anchorage, AK

The line between courage and stupidity is not just thin: it's hazy; shaded with hope and false hope, information and misinformation, certainty and delusions of grandeur. Your sincerity, nor mine, is any guaranty for truth, but truth, in the end, does speak for itself.

The hazy horizon line with H₂ looming just on the other side is evident, but as stated in the letters section of the **Economist** last August, "The most versatile and applicable solution...is liquid hydrogen ...

Unfortunately, the foremost problem facing such benign technology is political ill will."

Politics is nothing more than a tool of business. Thorston Veblan said, "Technology is benign, but business is evil." Evil because of it's maleficent exploitation of food, shelter, transportation, and communication. Therefore a major paradigm shift - - similar to that of Technocracy which was offered in the 1930's - - is prerequisite to the hydrogen based economy

Respectfully annoyed,

Jon Dierenfeld

Editor's note: The writer is referring to Joe Dillard's article (Vol. 8, No. 1) on Rethinking Courage. The paradigm shift Mr. Dierenfeld longs for is indeed taking place. Evidence of this fact abounds in every issue of Hydrogen Today.

Dear AHA,

Finally I have found some sensible, practical, information that I can believe and have confidence in. Energy is one of the most fundamental and all pervasive subjects which is relevant to every aspect of physical existence. I have been quite depressed for several years to a large extent as a result of my view on humans in general clinging dogmatically to beliefs and values which I perceive as false, short sighted, superficial and destructive. I feel a surge of hope within myself in response to reading the information posted on the web by the AHA. I truly hope that I will find a way to make a constructive contribution to improving the quality of life for all life on this planet through bringing my awareness and activities into alignment with the principles and goals expressed by organizations such as the AHA. Would you please send me an application for membership? I am a Canadian citizen.
Sam Post.

Editor's note: Just as Sam Post experiences a "surge of hope" from reading our message on the web, so we too experience a surge of hope from his expressions of gratitude and sensitivity to our renewable philosophy.

***The National Marketplace for the
Environment***

A project of Eco Expo and Environmental Education Group
Nov. 18-20, 1997 - Washington Convention Center -
Washington D.C.

The conference and trade show will be devoted to the marketing of environmental products, programs and services to federal, state and local governments, key segments of the private sector and potential buyers from around the world. It will also be promoting the government programs and the technologies, products and services related to those programs, and introducing government to new environmental technologies.

For more information on exhibiting or attending, please call 800-334-3976 or fx: (818-906-0367

Success

To laugh often and much;
to win the respect of intelligent people
and affection of children; to earn the
appreciation of honest critics and
endure the betrayal of false friends;
to appreciate beauty, to find the best in others;
to leave the world a bit better, whether by a healthy
child, a garden patch or a redeemed social condition;
to know even one life has breathed easier because
you have lived. This is to have succeeded.

-Ralph Waldo Emerson

Events Events Events Events

October 18-19 - Tempe, AZ - AHA Hydrogen Auto Conversion Class; Contact: Kathy 1-(602) 921-0433. Registration is accomplished by returning a form and a deposit of \$50 or full payment of \$225 (payable to AHA) or \$400 for non-members of AHA. Reference materials will be supplied including: Jay Storer, *Propane fuel conversions* (S.A. Design Books, 1986 and Roy McAlister, *The Philosopher Mechanic*, AHA's class notes, 1996. The propane book can be purchased for \$18.00 plus shipping, and the class notes are \$35.00 plus \$3.00 shipping. Class starts at 8:30 a.m. and continues to 4:00 p.m. each day. On the second day, lunch will include a hydrogen BBQ.

Aug 18-20, Grimstad, Norway - Second HYPOTHESIS (Hydrogen Power, Theoretical & Engineering Solutions, International Symposium)

Aug 24-29, Edmonton, Alberta, Canada - APEC Energy Week; Ph. (613) 995-7184; fx (613) 992-7699, e-mail khartlan@nrcan.gc.ca Kerri Hartland.

Aug 18-22, Grimstad, Norway, Call for Papers: *Hypothesis II, Hydrogen Power, Theoretical & Engineering Solutions, International Symposium.*

Aug 24-30, Taejon, Korea - Solar World Congress of ISES. Fax: 822-3476-8800-02

Aug 21-Sept. 10, Southampton, UK "Development of Effective Solar Power Generation," (+44) 1865-316636, fx: (+44) 1 8 6 5 - 5 5 7 3 6 8 / 5 1 6 5 9 0 , e m a i l Seminars@britcoun.org

Sept 2-8, Katsiveli, Greater Yalta, Ukraine - Hydrogen Materials Science & Chemistry of Metal Hydrides, fx: 044 444 2078

Sept 3-5, Tucson, AZ, *US Global Change & Climate Control*: dh59393@goodnet.com

Sept 4-5, Graz, Austria - Engine & Environment, fx: 43 316 987 903

Sept 8-13, Kazan, Russia - Third International Conference on New Energy Systems & Conversions, Fx 84 32 366 032

Sept 16-19, Steamboat Springs, CO - 13th Annual Mobile Sources/Clean Air Conference, Phone (970) 491-0542 USA.

Sept 22-25 - London, UK - Fifth Grove Fuel Cell Symposium, fx 44 1865 843 958

Oct 11-12 - Tempe, AZ -Short-course "Gensets" production of electricity and hydrogen - Taught by Roy McAlister. Deposit is \$50.00. Total price is \$495 which includes a working model of a Solar Dish Engine & other co-generation technologies.

Oct 14-16, Jakarta, Indonesia — Asia-Pacific Initiative for Renewable Energy & Energy Efficiency, Phonex (202) 383-2561 (USA)

Oct 20-22, Frankfurt, Germany - Commercializing Fuel Cell Vehicles '97, Phone (207) 781-9800 (USA)

Oct 28-30, Research Triangle Park, NC - The Emission Inventory: Planning for the Future, Phone (412) 232-3445 (USA)

Nov 10-12 - San Diego, CA - World Photovoltaic Power 1997: (207) 892-2210 or gorham@goradv.com

Dec 1-12, Kyoto, Japan — UN Framework Convention on Climate Change: Third Conference of the Parties, fx: 49-228-815-1999 Germany.

June 13-18, 1998 Albuquerque, NM, "Solar 98 Conference - ASES National Solar Energy Conference & ASES Passive Conference" Contact: American Solar Energy Society, 2400 Central Ave., Ste G-1, Boulder, CO 80301 USA (303) 443-3130 fx: (303) 443-3212 email: ases@ases.org, Website: www.ases.org/solar

June 21-25, 1998 - Buenos Aires, Argentina - 12th World I.A.H.E. Meeting. Fx: (54) 1 328-8640/-890.

cont'd from 26. **Making Contacts:**

- * Comments to the Author: Richard Jennings, Phone/Fax: (505) 986-1719 email ezentrix@aol.com
- * Greenpeace International Climate Campaign: Amsterdam, The Netherlands) phone 011/31/20/523-622. Fax: 011/31/20/523-6200 <http://www.greenpeace.org/nl>
- * Marlec wind and solar generators: <http://dialspace.dial.pipex.com/marlec>
- * Southwest Windpower: Tehachapi WInd Farm in Southern California. <http://www.windenergy.com>
- * The World Resource Foundation focuses on solid waste, has environmental links and waste management links. <http://www.wrf.org.uk>
- * Free Play Radios (Tilburg, The Netherlands) Frank Govers, Phone: 011/31/13/542-4749; Fax 011/31/13/542-4049
- * Hydrogen storage tanks and hydrides (Nuremburg, Germany) Gfe Metalle und Materialien GMBH Mr. Lutz Fischer, Toll Free Phone 1/800/811/6008
- * DeNora Fuel Cells: (Milan, Italy) Phone: 011/39/2/21291, Fax: 01139/2/2154953.

* Marcia Greenshields has dedicated her new book and proceeds to AHA: Vow of Chasity. (602) 994-9407

FALL GREETINGS FROM AHA

As we each partake of the pleasures that come with the fall season, it is appropriate to remember the freedom to enjoy, travel, visiting friends and family or partaking in sports are all made possible by virtue of utilizing precious fossil fuels.

Please, in moments of relaxation and contemplation, give some thought to the clean revolution that AHA promotes.

- Yes, I want to join AHA, or give a gift to help make a transition to clean Hydrogen energy.
- Yes, Enroll me in the automotive conversion class. [Dates currently being offered: Oct. 18-19, 1997]
- Yes, Enroll me in the Genset - Short Course. [Date currently being offered: October 11-12, 1997]
- Yes, I want to buy Hydrogen Hannah, at the pre-published price of \$9.95, plus \$2.00 postage: check enclosed...Expected Shipping date: Oct/Nov. 1997.
- Yes, I want to buy "Renewable Energy Experts & Advocates," pre-published AHA price & shipping of \$11.00: check enclosed...Expected Shipping date : Oct/Nov. 1997

Name _____

Address _____

City _____

State _____

Zip _____

Telephone - Home (____) _____ - _____ Office (____) _____ - _____

- Regular membership (\$39/year) Corporate/ Institutional/Membership (\$2,500) Life Membership (\$1,000)
- Student & Senior (\$25/year) Sustaining Membership (\$100/year) Auto Conversion or Genset Class \$50 Deposit
- American Hydrogen Association Foundation donation: \$ _____

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For details contact George O'Connor, Fund Director

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The Hydrogen Association

216 South Clark Drive, Suite 103

Tempe, AZ 85281

USA

