Number 4, January 2005

New Solutions

The Community Solution SM

Community, a solution for saving the environment and conserving resources with equity for all.

Peak Oil – Peak Technology

As the energy crisis intensifies, a myriad of technical solutions are being proposed. Most were investigated in depth during the first two energy crises of the 1970s. There is a wealth of information available from that period, plus all the results of research in the ensuing 25 years.

A serious societal problem is the lack of understanding of the energy options, their history and their limitations. History gives a sense of the possible speed and cost of implementation, as well as the limits of the technologies themselves. Governments, corporations and scientists are not offering new creative solutions, not because they are failing to make strong efforts, but because energy itself is a very mature industry.

It would seem that – in addition to Peak Oil – we are at a time of Peak Technology... there are no new technologies we can look to for solutions to the end of fossil fuels.

Finding a New Source of Energy

It is frequently stated in the press that "we must find a new source of energy," preferably one that is both clean and inexhaustible. Although this seems to be a reasonable statement, it is somewhat equivalent to saying that we must find a new continent – it is no more likely that we will find some new mineral or mineral combination to replace the vast volume of hydrocarbons we have consumed. Minerals exist in the earth and water and new ones were found over the course of several centuries. But like the continents, there are a fixed number of them.

It is useful to review the discovery history of the basic elements of our planet. Within the Periodic Table of Elements, it appears that 12 elements were known since ancient times. The number of elements discovered every 50-year period since 1650 is as follows:

1650-1699: 1	1700-1749: 3
1750-1799: 15	1800-1849: 25
1850-1899: 24	1900-1949: 14
1950-1999: 16	

But this does not tell the whole story. The web site *www.chemicalelements.com* shows that 20 of the 30 elements discovered in the 20th century are man-made. Of the remaining six, most require complex manufacturing processes. The great majority of the 20th-century discoveries were from nuclear research and the use of high-speed particle accelerators of various types. Many of these elements only exist for a fraction of a second.

Some of these man-made elements (rutherfordium, dubnium, seaborgium, bohrium, meitnerium, ununnilium, unununium, neptunium, plutonium, americium, curium, berkelium, californium, einsteinium, fermium, mendelevium, nobelium, lawrencium) include those of which only a few atoms were ever made and, if used, they are created in quantities of a few grams per year.

A few are made from exotic materials such as hafnium (*from zircon*), rhenium (*from gadolinite and molybdenite*), francium (*from decay of actinium*), ununbium (*from fusion of zinc and lead*), neodymium (*from electrolysis of salts*), promethium (*from fission products of uranium, thorium, and plutonium*), lutetium (*from gadolinite, xenotime*), and protactinium (*from fission products of uranium, thorium, and plutonium*).

Although most last only a few seconds or minutes, one – plutonium (possibly the most deadly material known to man) – will last centuries.

Have there been any fundamentally new elements (other than those made in nuclear processes) discovered in the past 100 years or, like the continents, is the age of material discovery long past?

Our brief review leads to the conclusion that the discovery age is definitely past. The hope that we can discover new elements that could be sources of power is as naïve as wishing we could discover new continents to resolve the population crowding on the existing ones.

The Solar Photovoltaic Option – A Brief History

It is also useful to review the histories of the main options being proposed as replacements for fossil fuels, beginning with the solar photovoltaic option. The following section (*) is excerpted from *pvresources.com*, an independent web site devoted to promoting photovoltaic applications and technologies. (*http://www.pvresources.com/en/history.php*)

*In 1839 the French physicist A. E. Becquerel discovered that conductance rises with illumination. Willoughby Smith discovered the photovoltaic effect in selenium in 1873. In 1876, William Adams discovered that illuminating a junction between selenium and platinum has a photovoltaic effect. These last two discoveries were the foundation for the first selenium solar cell construction, which was built in 1877. Albert Einstein provided the most comprehensive theoretical work about the photovoltaic effect in 1904, for which he was awarded a Nobel Prize in 1921. In 1918, Polish scientist Czohralski discovered a method for monocrystalline silicon production, enabling monocrystalline solar cells manufacturing. The first silicon monocrystalline solar cell was constructed in 1941. In 1932, the photovoltaic effect in cadmium-selenide was observed, an important material for solar cells production.

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In 1954, RCA Laboratories published a report on the CdS photovoltaic effect. AT&T Bell Laboratories next designed a solar cell with 4.5 percent efficiency. In 1957, Hoffman Electronics introduced a solar cell with 8 percent efficiency. In 1958, the first satellite powered by solar cells, Vanguard I, was launched. In 1960, Hoffman Electronics introduced another solar cell with 14 percent efficiency.

A United Nations conference on solar energy application in developing countries took place in 1961. In 1962, the first commercial telecommunications satellite Telstar, developed by Bell Laboratories, was launched using a photovoltaic system for power. In 1963, Sharp Corporation developed the first usable photovoltaic module from silicon solar cells.

In 1970, Solar Power Corporation was established for applications of photovoltaic technologies on Earth. In 1973, Solarex Corporation was established. In 1974, the Japanese Sunshine project commenced. In 1975, Solec International and Solar Technology International were established. The American government encouraged JPL Laboratories research in the field of photovoltaic systems for application on Earth in the same year.

In 1977, the world production of photovoltaic modules exceeded 500kW. In 1979, ARCO Solar built the biggest solar cells and photovoltaic systems production plant. In 1980 ARCO Solar was the first to produce photovoltaic modules with peak power of more than 1MW per year and built a 105.6kW system in Utah.

The world production of photovoltaic modules was 9.3MW in 1982. In 1983, the world production of photovoltaic modules was 21.3MW peak power. In that year the Solar Trek vehicle with photovoltaic system of 1kW drove 4,000 km in twenty days in an Australia race. ARCO Solar built a 6MW photovoltaic power plant as a subsystem of the public electricity grid for Pacific Gas and Electric Company in California. In 1984, a 1MW photovoltaic power plant was completed in Sacramento, California. Shortly after, ARCO Solar introduced the first amorphous modules and BP Solar Systems built a 30kW photovoltaic system connected to public electric grid near Southampton, Great Britain.

In 1990, Energy Conversion Devices Inc. (ECD) and Canon Inc. established a joint company, United Solar Systems Corporation, for solar cells production. In the same year Siemens bought ARCO Solar and established Siemens Solar Industries, which is today one of the biggest photovoltaic companies in the world. In 1991, BP Solar Systems was renamed to be BP Solar International (BPSI), and became an independent unit within British Petroleum. In 1994, the National Renewable Energy Laboratory (NREL), an important institution in the field of renewable energy sources in USA, launched its web site on the Internet. In the same year, ASE GmbH from Germany purchased Mobil Solar Energy Corporation technology and established ASE Americas, Inc.

In the period 2002-2003, several large power plants were built in Germany. On April 29, 2003 the world's largest photovoltaic plant was connected to the public grid in Hemau near Regensburg (Bavaria), Germany. The peak power of the "Solarpark Hemau" plant is 4MW.

*End of Excerpt

The Solar Photovoltaic Option – Prognosis

Solar power is not a new concept. It does not represent a new dynamic and technically innovative industry. Progress has been decades in the making. Costs have dropped significantly, but at a far slower rate than comparable technologies that existed in the same time period such as computers chips and cell phones.

The solar cell is almost a century old in concept and half a century in implementation. There is little reason to expect a dramatic improvement or cost reductions of the type seen in electronic products.

The Wind Turbine Option – A Brief History

The following is excerpted (*) from Telosnet, a Colorado web site which includes a focus on alternative energy, *http://telosnet.com/wind/20th.html* and a Danish Wind History Site, *http://www.vindhistorie.dk/English.htm*. Wind turbines are more successful and have been deployed in much larger numbers than solar PV systems; thus their history is more detailed.

*U.S. Wind Power History

The first use of a large windmill to generate electricity in the U.S. was a system built in Cleveland, Ohio, in 1888 by Charles F. Brush. It was the first windmill to incorporate a step-up gearbox (with a ratio of 50:1) in order to turn a direct current generator at its required operational speed (in this case, 500 RPM.)

In 1891, a Danish scientist, Poul La Cour, developed the first electrical output wind machine to incorporate the aerodynamic design principles (low-solidity, four-bladed rotors incorporating primitive airfoil shapes) used in the best European tower mills. By the close of World War I, 25 kilowatt electrical output machines were used throughout Denmark.

> The solar cell is almost a century old in concept and half a century in implementation. There is little reason to expect a dramatic improvement or cost reductions

The first small electrical-output wind turbines used modified propellers to drive direct current generators. By the mid-1920s, 1- to 3-kilowatt wind generators developed by companies like Parris-Dunn and Jacobs Wind-electric found widespread use in the rural areas of the Midwest. These systems were first installed to provide lighting for farms and to charge batteries used to power crystal radio sets. But their use was extended to an entire array of direct-current motor-driven appliances, including refrigerators, freezers, washing machines, and power tools.

While the market for new small wind machines of any type had largely eroded in the United States by 1950, the use of mechanical and electrical systems continued throughout Europe and in windy, arid climates such as those found in parts of Africa and Australia.

The development of bulk-power, utility-scale wind energy conversion systems was first undertaken in Russia in 1931 with the 100kW Balaclava wind generator. This machine operated for about two years on the shore of the Caspian Sea, generating 200,000 kWh of electricity. Subsequent experimental wind plants in the United States, Denmark, France, Germany, and Great Britain during the period 1935-1970 showed that large-scale wind turbines would work, but failed to result in a practical large electrical wind turbine.

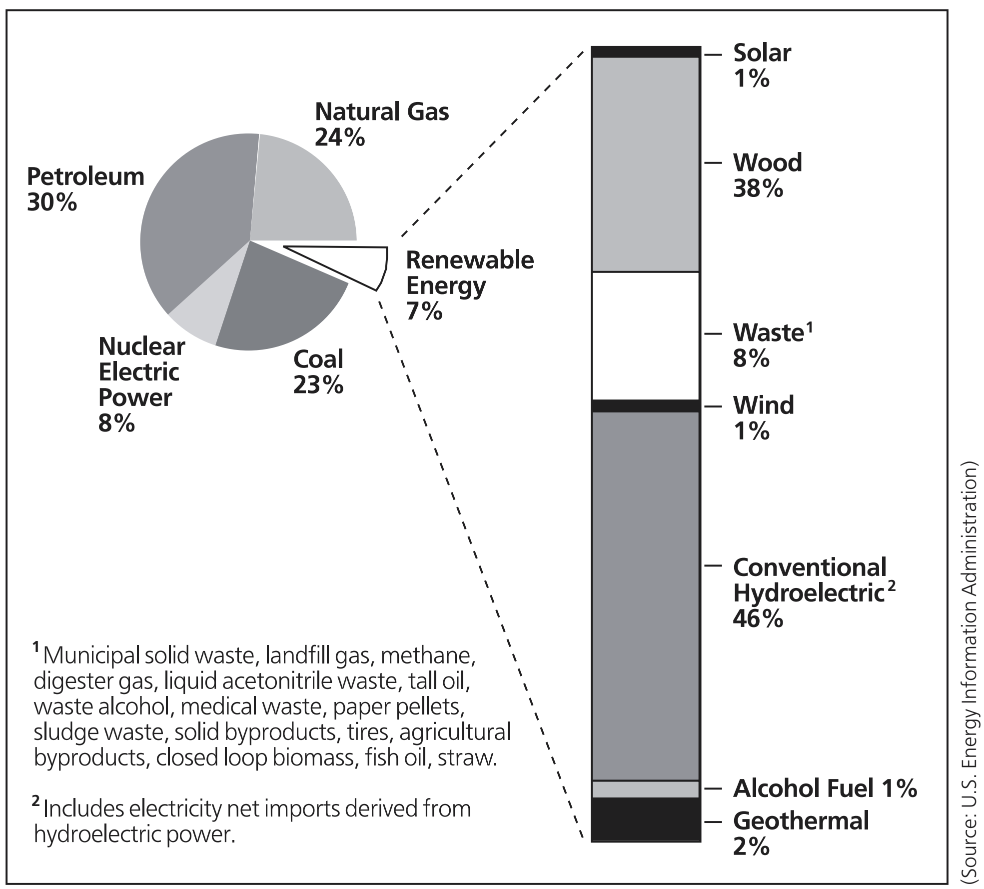
In Denmark, the 200 kW Gedser Mill wind turbine operated successfully until the early 1960s, when declining fossil-fuel prices once again made wind energy uncompetitive with steam-powered generating plants. This machine featured a three-bladed upwind rotor with fixed pitch blades that used mechanical windmill technology augmented with an airframe support structure. The design was not that far removed from Poul La Cour's final 1920-era windmill design.

Post-war activity in Denmark and Germany largely dictated the two major horizontal-axis design approaches that would emerge when attention returned to wind turbine development in the early 1970s. The Danes refined the simple, fixed pitch Gedser Mill design, utilizing advanced materials, improved its aerodynamic design, and added aerodynamic controls to reduce some of its shortcomings. The engineering innovations of the light-weight, higher efficiency German machines, such as a teeter hinge at the rotor hub, were used later by U.S. designers.

U.S. Government Contributions to Wind Energy Development

The U.S. federal government's involvement in wind energy research and development began within two years of the "Arab Oil Crisis" of 1973. Federal research and development activities resulted in the design, fabrication, and testing of 13 different small wind turbine designs (ranging from 1kW to 40kW), five large (100kW to 3.2MW) horizontal-axis turbine (HAWT) designs, and several vertical axis (VAWT) designs ranging from 5kW to more than 500kW.

Most of the funding was allocated to the development of multi-megawatt turbines, in the belief that U.S. utilities would not consider wind power to be a serious power source unless large, megawatt, "utility-scale" systems were available. The development of 1-3 megawatt giants



Renewable Energy as Share of U.S. Energy Consumption, 2000

Even if new technology were to dramatically improve the efficiency of such alternatiave energies as soloar and wind, they in no way would be able to replace petroleum and natural gas.

in Europe have shown that this view was fundamentally correct.

In 1981, the biggest successes of the federal program were not measured in hardware, but in the number of designs shown to be unfeasible and in the amount of expertise developed in both the federal programs and in their private industry subcontractors.

In the subsequent seven years, between 1981 and 1988 – despite hundreds of millions of federal tax credits – only four new wind turbine designs were developed in the U.S. All but one (the Bergey 10kW) were based on spin-offs of technology developed by companies supported by the previous federal development effort. And even the Bergey relied for its flexible blades on a pultrusion manufacturing technique developed under government sponsorship.

During the years 1973-1986, the commercial wind turbine market evolved from domestic and agricultural applications of small machines in the 1 to 25 kilowatt range to utility-interconnected wind farm applications of intermediate-scale machines of 50 to 600 kilowatts. Wind farms in California made up the majority of wind turbine installations until the early 1990s. In California, over 17,000 machines, ranging in output from 20 to 350 kilowatts, were installed in wind farms between 1981 and 1990. At the height of development, these turbines had a collected rating of over 1,700 megawatts and produced over 3 million megawatt hours of electricity, enough (at peak output) to power a city of 300,000.

Among the key economic factors were the federal energy credit of 15 percent, a 10 percent federal investment credit, and a 50 percent California state energy credit. These, together with attractive rates offered by utilities for power produced by alternative sources (mandated by state regulations), were packaged into an attractive investment product by private financial firms and investment houses.

Danish Contributions

By 1982, it was obvious to most observers that the U.S. wind farm market would soon be dominated by the Danish turbine manufacturers. In contrast to American companies, Danish firms offered three-bladed upwind machines derived from the Gedser mill design, a primitive and inefficient, but relatively well-understood configuration, modernized with the addition of fiberglass blades. These machines were certified from the Danish test center at Riso and included statistics that showed their designs were more reliable (in terms of availability for energy production) than their U.S. counterparts. By 1986, the Danes had captured 50 percent of the U.S. wind farm market. However, quality and long-term reliability were low.

The U.S. wind farm market's demand for intermediate-size wind machines continued despite the end of the federal energy credits in 1984 and the phase-out of the California state credits shortly thereafter. Artificially high buy-back rates continued into the 1990s, when many machines had long since been paid off.

There were many apparent success stories. For example, U.S. Windpower (after re-engineering their early units) manufactured and operated more than 4,100 one-hundred-kilowatt wind turbines in Northern California. And several large U.S. wind energy utilities operated turbines of Danish, Dutch, German, Japanese, English, Irish, and U.S. origin in a profitable fashion all during the 1980s – supported by attractive "buy-back" rates for power in California.

U.S. Small Wind Machines

A small machine development effort was belatedly started in 1976, when a federal test center established at Rocky Flats, Colorado found that available machines were neither properly-sized, nor reliable enough, to do the jobs envisioned by federal application studies. Within four years, 13 wind turbine designs in five application-based size ranges were procured, designed, fabricated, and tested:

- 1-2kW High Reliability
- 4kW Small Residential
- 8 & 15kW Residential and Commercial
- 40kW Business and Agricultural

Successes of this program included 1-3kW and 6kW small turbines commercialized by Northern Power Systems and still being sold for remote power uses, and installed by the hundreds in California wind farms by Enertech.

Sales of small wind turbines have been slow, but sufficient to provide business for several manufacturers of wind turbines designed for water pumping and remote installations. In general, however, the U.S. market lagged and gradually declined during the 1980s and into the 1990s.

The World Wind Power Market

In northern Europe and Asia, wind turbine installations increased steadily through the 1980s and 90s and into the 2000s. The higher cost of electricity and excellent wind resources in northern Europe created a small, but stable, market for single, cooperative-owned wind turbines and small clusters of machines.

> The major technology developments enabling wind power commercialization have already been made, although there will be many refinements and improvements.

After 1990, most market activity shifted to Europe and Asia. Driven by high utility power purchase rates, the installation of 50kW, then 100kW, then 200kW, then 500kW and now 1.5 (and larger) megawatt wind turbines by cooperatives and private land-owners in the Netherlands, Denmark, and Germany has been particularly impressive. This wind interest has helped support a thriving private wind turbine development and manufacturing industry.

A large international market has long been predicted for small village power or "wind-hybrid" installations. Despite some promising pilot projects, the apparent interest of many countries and of many nongovernmental organizations (NGOs), and significant commitments from several wind turbine manufacturers and U.S. research laboratories (including Sandia National Laboratories and the National Renewable Energy Laboratory) this market has yet to emerge.

Recent Advances

In the 1990s, the California wind farm market began to be affected by the expiration or forced re-negotiation of attractive power purchase contracts with the major California utilities, Southern California Edison and Pacific Gas and Electric. U.S. wind energy development resumed in 1999, with a much broader geographical base. A variety of new wind projects were installed in the U.S. in the late '90s and early 2000s.

The cost of energy from larger electrical output wind turbines used in utility-interconnected or wind farm applications has dropped from more than $1.00 per kilowatt-hour (kWh) in 1978 to under $0.05 per kWh in 2004. The hardware costs of these wind turbines have dropped below $800 per installed kilowatt in the past five years. Cost per kilowatt hour figures of $0.04 or less are now commonly projected for advanced U.S. wind turbines in 17 mph or better wind speeds, where capacity factors of more than 0.40 can be achieved.

Costs of smaller systems vary widely, with installed costs from $2,000 to $3,000 per installed kilowatt. Energy costs for small turbines of $0.12 to $0.20 per kWh are still the norm in the U.S. market.
* End of Excerpt

Future Projections

In the future, when we deplete fossil fuels, wind energy may be the most cost-effective source of electrical power we have. But we will certainly be paying a great deal more per kW than we are now. The major technology developments in wind power commercialization have already been made, and although there will be many refinements and improvements, it is doubtful any significant advancements can be made which would dramatically reduce costs.

Danish Wind Power and Hydrogen

Denmark has been a leader in windmills of all kinds for centuries. In the late 1800s, systematic and scientific tests of wind turbines were conducted at the Askov Folk High School in Southern Jutland in Denmark by the meteorologist and teacher Poul la Cour. His work was revolutionary for understanding the aerodynamic conditions of wind turbine blades.

La Cour performed experiments with blade models in a wind tunnel as early as 1896-99. He worked with the windmill-manufacturers of the time to develop the "ideal turbine," and his work was supported by the Danish government. He built two test turbines, the first one in 1891 and the second in 1897.

His most significant work was his experiments with electrolysis of water to make hydrogen and oxygen. The hydrogen was used for lighting at the school. When we speak of a new "hydrogen economy" it is important to remember that hydrogen was being generated by electrolysis from wind turbines and used in a practical application over a century ago. In 1902, La Cour started training electricians to erect and operate rural wind power plants. By 1908, there were 30 rural power plants using wind turbines.

The Wind Turbine Option – Prognosis

Like solar photovoltaics, wind generation of electricity has a long history. Billions of dollars of investment have been made. The wind turbine industry has reached a level of maturity where its future costs can be projected. Furthermore, enough installations have been made on a world-wide basis to accurately measure wind availability and the effectiveness of various wind speeds.

Wind power has a major disadvantage in that wind is intermittent and thus cannot be counted on to produce a constant level of electricity. The term that describes the variable nature of wind used in the electricity generating industry is dispatchability; that is, wind electricity cannot be dispatched with the same consistency of a coal or natural gas powered turbine. Wind turbines require back up fossil fuel plants which must always be running so that they can be brought online quickly if wind speeds decline. As a result, wind experts suggest that wind electricity can never completely replace fossil fuel plants to meet the world's electricity needs.

Wind Electricity and Hydrogen

As previously noted, wind turbines were generating electricity used to make hydrogen from water via electrolysis 100 years ago. An astute observer might be concerned that the future of wind energy is based on old technology. This concern is legitimate and reflects the main thesis of this article, which is that the technologies that deal with sources of energy have passed their development peak. From this point on, major improvements are unlikely.

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This does not mean there will be no improvements. Other mature technologies, such as passenger jets, show consistent improvement in performance (about 1 percent a year in efficiency). But these improvements can't compare with the increases in power and speed and rapid price reductions we've seen in the electronics industry over the past 20 years.

Because the characteristics of wind turbine electricity generation are well known, as is the manufacturing of hydrogen by electricity from wind turbines, it is not difficult to establish a storage system for wind based on hydrogen. Although this has been discussed for decades, there has been little effort to model a system. Ulf Bossel[1] has examined the risks and costs of a wind turbine/hydrogen system in various papers. Ted Trainer[2] has provided a model of wind turbine/hydrogen systems for Australia as well as the United States. Both note the impracticality of basing an energy strategy on a solar- or wind-based hydrogen system.

These practical analyses bring a balance to the almost hysterical reference to the so-called "Hydrogen Economy," a projected way of life based on supposedly infinitely clean renewable energy. Certainly hydrogen can be generated from wind-driven electricity and there is no doubt that hydrogen can be shipped through a pipeline; these capabilities have been available for decades.

Nor is there any doubt that hydrogen can be burned in an internal combustion engine. The first automobile that burned hydrogen in a conventional internal combustion engine was demonstrated by a 22-year-old college student in 1972. And a fuel cell-driven tractor (developed by Harry Ihrig of Allis-Chalmers) was demonstrated in 1961.

These examples further illustrate the maturity of the technology. More complex examples are available. Both the U.S. and Russia have flown airplanes short distances using hydrogen fuel. Why then have we not already converted the world to hydrogen powered by wind turbines and solar cells? One answer is that these technologies show no promise of being able to provide energy in an amount at all comparable to that of fossil fuels. The technologies are not complex and their possible ranges of improvements are fairly well proscribed. It's clear to scientists, however, that there are limitations.

More research money will not change the situation, just as more research money will not find new mineral elements or continents. Of course, some scientists are quick to claim the opposite. Often, however, their incomes are derived from government and industry funding. For those pointing out possible limits, such funding is in short supply.

The Limits of Technology

It is vital that we understand the limits of technology. Although science has provided an amazing variety of new products, it has also shown the associated limitations. And these limitations are not simply a matter of political will but include limitations of technology itself or of natural barriers that apparently cannot be overcome.

Science is also limited by the problems that science itself causes. Treatment of cancer has progressed significantly since Richard Nixon declared a "war" on cancer in the 1970s. But overall cancer has increased rapidly on a worldwide basis. One reason is that while one set of scientists are trying to cure cancer, another set are busily developing new products (mostly based on some version of fossil fuels) that are extremely toxic and which probably cause cancer. Oddly enough, the cure for cancer may be to stop certain scientists from continuing their work.

Similarly, scientists have been unable to develop defenses against nuclear missiles. Should other scientists who design the missiles stop their work, then possibly a defensive weapon could be built. But offensive weapons scientists seem to outdo defensive weapons scientists.

In terms of fossil fuels, one set of scientists have discovered a wide variety of new technologies which allow the extraction of fossil fuels faster and more completely than ever before, while those scientists looking for new sources lag far behind.

The probability of a "technofix" becomes less and less as time goes by. And, as always happens with technologies that are oversold, unforeseen problems begin to arise, tarnishing the "miracle."

The limitations of wind power, as it becomes more widely distributed, also become more apparent. Two recent papers illustrate this. One paper[3] suggests that wide distribution of wind turbines in the U.S. could cause a temperature increase. The other paper[4] is a summary of the experiences of a large German power company which is a heavy user of wind turbines, pointing out major implementation difficulties.

Many writers suggest that the "hydrogen miracle", and its fuel cell partner, are fading rapidly. It is becoming apparent that the electric car is a better option than the fuel cell car.[5] California's decision to replace electric cars (developed in partnerships with car manufacturers) with fuel cell vehicles looks more and more questionable. And the misleading idea that hydrogen will benefit the environment is now being challenged.[6] Fortunately, the media are no longer following the hydrogen herd but are beginning to articulate the serious problems.[7]

Summary – Post-Peak Technology

Sometime in the mid-20th century, the Western world became increasingly fixated on technology. World War II is often selected as the point at which technology became something separate from human experience. The post-World War II period was a time of tremendous growth in per capita fossil fuel consumption that resulted in the deployment of hundreds of millions of innovative machines.

This technical euphoria continues today, even as Peak Oil illustrates the shaky foundation on which modern technological society is built. Prudence of any kind has been rejected. Sustainability as a concept has fallen into disrepute. But now we must deal with our infatuation and consider the possibility that technology may well have caused more problems than it has solved.

Worshiping the god of technology has blinded us to the reality of our situation and the hugely negative consequences that have come from this intoxication…

Western man can continue a few more decades on this path. Worshiping the god of technology has blinded us to the reality of our situation and the hugely negative consequences that have come from this intoxication, including degradation of soil, air and water as well as the diminishing of biological diversity.

It is vital that we recognize the limitations while there is still time. It is equally vital that we begin to look upon institutional science not as simply the creator of miracles but as representative of a world view that has always argued for technological advance no matter what the cost to planet and people.

Wisdom is now needed to overcome the ignorance caused by an almost religious fixation with science and technology.

"Historic" – The First U.S. Conference on Peak Oil and Community Solutions

More than two hundred people from around the U.S. and Canada attended The First U.S. Conference on Peak Oil and Community Solutions, held in Yellow Springs, Ohio. It began Friday night, November 12, with an opening talk by Richard Heinberg, author of *The Party's Over* and *PowerDown*, who spoke at Kelly Hall Auditorium to attendees and 150 additional people from around the area. He summarized the eventual tone and focus of the conference as he ended his speech:

"Peak oil is the greatest challenge of our lifetimes; and anything that we can do to prepare for this, anything we can do to knit together our local economic infrastructure, anything we can do to support each other through this period of transition will be extremely meaningful. Not only for ourselves, but also for the next generation and the generation after that."

Saturday sessions began with a talk by Pat Murphy, Executive Director of Community Service, entitled "The Geopolitical Implications of Peak Oil." He described the colonial history of European powers in the 20th century, the changing policies in Russia and China, and various scenarios, from war to drastically cutting back our energy use while working together as part of the world community, concluding:

"I think oil depletion, in a certain sense, could be a blessing. It could curtail the rampant consumption which is just driving us all crazy. We can avoid constant war; we can save the climate. And finally we get to save our freedoms."

He was followed by David Blume, founder and director of the Institute for Ecological Agriculture, who discussed the use of alcohol as an alternative fuel for automobiles and other machinery. David lit up the discussion not only with his precocious wit, but also his analysis of alternative fuels:

"There's no doubt at all that we have to implement severe conservation, really examine how we use materials and products, and limit the way we go about that. But we are clever monkeys. And there are things we can do working with nature to be able to alleviate some of these problems."

In the afternoon, Richard Register of EcoCity Builders, San Francisco, presented a fresh vision of ecologically–friendly cities, specifically using density to aid ecology and de-paving to heal the land:

"I think we need a big sea change – cultural perspective change – that says 'We can live on a beautiful earth, we don't have to wait for heaven. We can have a wonderful place here.' But we're going to have to re-design it."

He was followed by Dr. Charles Stevens, a Miami University professor. He explained the history and importance of the Agrarian movement in dealing with upcoming energy shortages, citing Wendell Berry and other noted agrarians:

"I think that what we can do with this agrarian philosophy that may appear to be romantic is to realize that we have now good scientific as well as anthropological information that will tell us that we can turn that vision into a reasonable, cooperative, communitarian way of getting to the world post-carbon."

Sunday began with a talk on permaculture by Patricia Allison from Earthaven Eco-Village in North Carolina. She explained how permaculture is more than growing plants – that it is a whole system of sustainable living:

"Recognizing that humans are an inextricably linked part of the magnificent web of life, recognizing that I am connected to every single other living entity on this earth, and so the only way I can take care of myself and my people, is to recognize those sometimes very fragile threads that connect me and my people with everything else on earth."

Next, Harvey Baker, of Dunmire Hollow Tennessee and the Fellowship for Intentional Communities, described the interpersonal problems and opportunities of these small highly integrated groups. He left the audience with a heartfelt and resonant plea:

"Be patient with yourself and others as you and they confront the difficulty of a changing world. Understand and empathize with inevitable resistance: there is some resistance, some claim to the ways of unsustainability, within each of us. Include everyone in the new world. Everyone will be needed. "

In the afternoon Julian Darley, author of *High Noon for Natural Gas* and founder of Global Public Media, spoke on Global Relocalization, and ended with a call for immediate action:

"This is going to require structural thinking, structural operations, and it's going to require lots of planning. So let's concentrate on those things, and particularly on the planning part."

Next, Stephanie Mills, author of Turning Away from Technology described the dangers of living in an increasing high tech world:

"I think technology tends to undermine sense of place. Our society has almost never felt empowered to ask, 'what is this going to do to our community? What is going to be lost with the introduction of this technology?'"

This year's conference, without question, was one of the most successful and important in recent Community Service, Inc. memory. In January, the AP released a story on the weekend in which a conference attendee, Mel Hutto, was quoted as saying:

"It really is a historic conference. I think we're going to look back at this little event in Yellow Springs, Ohio, as a starting point."

The story appeared in the *Cleveland Plain Dealer*, among other publications. Though we agree with Mel, we at Community Service, Inc. know that the work has been going on for sometime. Still, we take solace in the fact that we shall forever know that we attended such a beautiful, heartwarming, and altogether important event.

To read the full text of each conference prsentation, visit our website at www.communitysoluiton.org.

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Events

The First U.S. Conference on Peak Oil and Community Solutions, November 12-14, 2004, Yellow Springs, Ohio. Keynote speaker Richard Heinberg. Information at www.communitysolution.org

Resources

Peak Technology References

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