

FUTURE ENERGY ***Annual*** ***2005***

featuring

Highlights from Future Energy eNews

&

IRI Annual Report for 2004

Thomas Valone, Editor



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Table of Contents

IRI OFFICERS AND DIRECTORS - 2004 4

President’s Letter..... 5

INTEGRITY RESEARCH INSTITUTE HIGHLIGHTS 2004..... 6

ENERGY INVENTIONS ADVOCATED BY INTEGRITY RESEARCH INSTITUTE 9

A Look Back at Nikola Tesla’s Accomplishments in the Niagara Falls Region 10

ARTICLES & PAPERS 16

Glen A. Gordon, MD, Speaks on Pulsed Electromagnetic Healing Developments 22

Gigahertz Stimulates DHEA in Elderly Patients 24

System Converts Smokestack Heat To Electricity 25

Directed, Gravitational-Wave Impulse Energy Produces Force..... 27

Tom Valone speaks on “Feasibility of Zero-Point Energy Extraction from the Quantum Vacuum for Useful Work” 29

Has Dark Energy Been Measured In The Lab? 31

Skepticism Greets Pitch To Detect Dark Energy In The Lab 31

New Light On Dark Energy 32

Mining The Imagination For New Energy: Scientists Call For A Research Blitz Targeting Extreme Possibilities 33

Solar PV Can Provide 10% Of U.S. Power By 2025, Says Report..... 36

Biophan Announces Development of Breakthrough Long-Life Biothermal Battery 37

Movement from Nothing..... 38

To the Stars..... 40

Nanobulbs Make Their Debut 45

Nanopulses Tweak the Innards of Cells 45

A Sweet Way to Fuel Cars 47

California Unveils Solar Initiative 49

IRI Financial Report 2004 50

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President's Letter

We are pleased to present the best breakthroughs in the energy of the future in this annual report, *Future Energy Annual 2004*. The year 2004 was especially significant for the 10th anniversary of the B-2 bomber and also the 10th anniversary of the book, *Electrogravitics Systems*. A new dynamic cover was created, courtesy of the Northrop Grumman Corp. who also received review copies of the book. The principles expounded in this book became even more understandable when new scientific discoveries emerged that made the second volume possible. We are therefore inexorably approaching the day when field propulsion will replace fuel combustion as a means for transportation.



You will notice that this *Annual* also includes more articles about zero-point energy than before. This is because a marked increase in physics discoveries in this area began in 2004. Dr. Feigel's breakthrough is a good example where the "Movement from Nothing" article wrestles with the forbidden concept of "cheat the Universe and get free energy." Instead, zero-point energy, the author points out, "draws on the well-established notion that empty space does contain a little bit of energy." My DVD lecture on the subject has also had wide circulation and will be marketed (two years later) by Knowledge 2020 media.

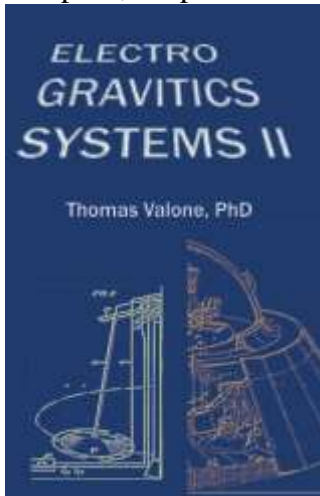
No one said that the work of being a pioneer is easy. However, looking at those who are true pioneers, and learning their techniques is my way of making this job easier. We stand on the shoulders of giants who can see the future of energy and share that vision with you.

Sincerely,

Thomas Valone, PhD, PE
President

INTEGRITY RESEARCH INSTITUTE HIGHLIGHTS 2004

- **Electrogravitics II: Validating Reports on a New Propulsion Methodology (2nd Ed.) Volume II in the series - New Book by Thomas Valone, PhD.** Our latest book contains the scientific validation of a science that connects gravity to electricity usually could face an uphill, skeptical battle. This has been true of the 1994 publication of *Electrogravitics*



Systems: Reports on a New Propulsion Methodology by Thomas Valone. However, eleven years later, a follow-up second volume called *Electrogravitics II: Validating Reports on a New Propulsion Methodology* has just been released which contains journal articles by the Army Research Lab and Honda Corporation on their experiments and theory of how electrogravitics can work, besides patents by NASA and others. In addition, the author introduces the subject with a discovery that the classical "electrokinetic field" equation can predict how and why pulsed electrogravitics will work best. He also explains in his article that the historic T. Townsend Brown experiments which led to the "Biefeld-Brown Effect" actually comprise electrogravitics and electrokinetics, which differ from each other. With Science, Historical, Testimonial

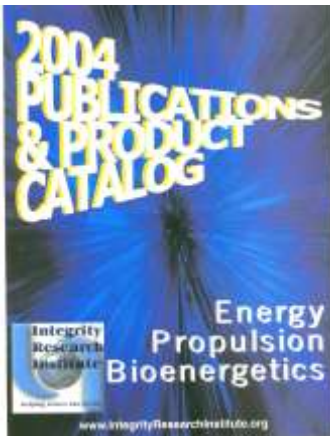
and Patent Sections, the book appeals to various audiences very well. For those who are interested in the details of the history, a complete reproduction of the three-part series on "Conquest of Gravity: Aim of Top Scientists in the U.S." is included, which appeared in the N.Y. Herald Tribune, November 20-22, 1955. Overall, the book is interesting and scientific. The historical articles and the first-person testimonials are also intriguing. More compelling and convincing than first book in the series, it is possible that the discovery of pulsed electrokinetics will now be declassified as a result of the publication of *Electrogravitics II*.

- **Bioelectromagnetics Program.** Many new exciting developments took place in this program. The bestselling "**Premier Jr.**" (Photonic Rejuvenation Energizing Machine & Immunizing Electrification Radiator Junior) was developed by our bioenergy team under the direction of Dr. Valone. Compact and portable, this machine has a T-shaped or round-shaped noble gas tube and a Tesla coil which is a great way to increase cellular energy and receive biophotons, whether at home or on the road. This bioelectromagnetic machine is especially helpful for

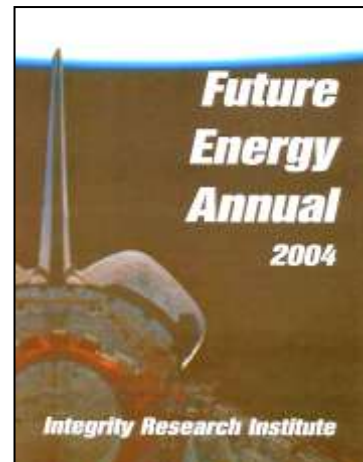


sore muscles and to increase the body's immune system, quickly and efficiently. Also we continued to study the effects of high voltage and pulsed fields on the human body also known as PEMF. A complete report with scientific papers that include data on the beneficial effects of PEMFs is now available in our catalog called "***Pulsed Electromagnetic Fields Health Effects***". Another wonderful addition to our catalog is the Bioelectromagnetics CD which includes the complete *Bioelectromagnetic Healing: A Rationale for its Use* book in electronic form, a narrated slide show on the health benefits of PEMF's and many other scientific papers. Also a new addition is our ***Medical Electricity CD***, which includes the use of high frequency currents, Tesla Coils, and other modalities, for beneficial health effects.

- **Future Energy Program.** IRI continued to research and promote future energy technologies. We were pleased that for the first time, a book bound format of our ***Future Energy Annual Report*** became available this year, free to our members and available to the public for only \$10. The Booklet is complete with our Highlights, Financial Reports and selected articles. Another first was the publication of



our ***IRI Publications and Product Catalog*** with a full color cover and 20 pages filled with our books, reports, DVD's CDs Videos and bioelectromagnetic products. Another impressive report produced this year is the "***Permanent Magnetic Motors Report***", now available to the public with over 80 pages of scientific data and information. Our ***Future Energy eNews***, the monthly electronic newsletter, which is distributed free of charge, continues to grow in popularity with over 4,000 subscribers worldwide.



- **Zero Point Energy Program.** IRI continued to research the latest findings and papers on Zero Point Energy. Due to the overwhelming demand from members and the public alike, "***Practical Conversion of Zero-Point Energy: Feasibility Study of Zero-Point Energy Extraction from the Quantum Vacuum for the Performance of Useful Work***," was made available in printed form, besides the free electronic file available from our website. This printed report designed for serious ZPE researchers, now includes a Toolkit for Vacuum Engineers, which summarizes all the key points of ZPE. The layman's version of the Zero Point energy Feasibility Study is still being developed in a book form and will be titled "Zero Point Energy, The fuel of the Future". Adventures Unlimited Press, has bought the rights to publish this book and want a 500-page edition. It will be available for purchase through our online catalog and their catalog after Summer of 2006.

- **Research on Nikola Tesla’s achievements in the Buffalo-Niagara Falls Region.** The area where Nikola Tesla first proved his incredible genius by producing AC electricity with the awesome power of the Niagara Falls River was researched by our Institute in 2004. A nostalgic and poignant walk back in time, uncovered many interesting facts and tidbits of history relating to Tesla and the original power plants built there. For the full story, please see our article elsewhere in this report.



- **Dr Andrija Puharich Preservation Project.** IRI has started to preserve the laboratory notes and works of the great physician and scientist, Andrija Puharich, M.D. relating to his seminal research on the creation of amino acids from basic electrolytes which included transmutation of elements. A Japanese firm, which is now replicating his experiments, has made this work possible by providing a grant to our Institute.



- **Lecture Appearances.** IRI officers kept very busy in 2004. There were many conference presentations along with exhibit booths that helped educate the public and professionals on emerging energy technologies and groundbreaking theories such as Zero Point Energy and Bioelectromagnetics. A milestone was Dr Valone’s “Emerging Energy Technologies” presentation at Portland State University sponsored by the newly formed New Energy Movement. A comprehensive and detailed account is posted at www.newenergymovement.org and click on conferences link.



Dr Valone also became a Member of the New Energy Movement Board of Directors. Another milestone was our participation in the Materials Research Science Symposium sponsored by Penn State University at The Marriot Copley in Boston, Massachusetts. Dr. Valone presented his findings on the History of High Voltage Bioelectromagnetics as applied to healing through the use of Pulsed Electromagnetic Fields. The audience was filled with health and academic professionals, interested in the latest findings. Another appearance was at the United States Psychotronics Association www.psychotronics.org where both Dr Valone and our Board Adviser Dr. Beverly Rubik presented new findings on Electromagnetic fields and effects of Pulsed Electromagnetic Fields. Other presentations included a “Zero Point Energy Conversion” presentation at the Extraordinary Science Conference www.teslatech.tv in Salt Lake City and a presentation at “The Natural Living Expo” sponsored by *Pathways* magazine.

ENERGY INVENTIONS ADVOCATED BY INTEGRITY RESEARCH INSTITUTE

- 1) **FocusFusion.org** – Controllable hot fusion project that is compatible with electricity extraction. Makes the Tokamak obsolete. Eric Lerner has already achieved the necessary billion-degree threshold demanded by nuclear physics while funded by a small NASA grant. An environmentally safe, abundant energy source: decaborane. Hydrogen-boron fusion uses a plasma focus device. A recent simulation confidently predicts the LPP reactor can reach break even at 1.5 MA (MA = megamps = million amperes) and produce net energy at 2 MA. Low risk and high payback. Contact: Eric Lerner, Lawrenceville Plasma Physics, 973-736-0522, email: elerner@igc.org
- 2) **Pre-Seismic Earthquake Predictor & Triangulator** – Patented invention (US Patent #4,724,390) by a university physics professor, provides days of advance warning before a major earthquake or volcanic eruption. Published in several journals, texts and conference proceedings, the T-1050 has had several trials and successful predictions of earthquakes. Contact Dr. Elizabeth Rauscher, 480-982-2285 email: FlyingWG@msn.com
- 3) **Magnetic Energy Converter (MEC)** – A robust power-generating device that can produce electricity and a propulsive force. Business plan brings this amazing invention to market within three years. The MEC converts a known energy source that quantum physicists call zero point energy (ZPE), into conventional electromagnetic energy, which can be harnessed as electricity, used to turn wheels, turbines, etc. Inventors Godin and Roshchin (US patent #6,822,361) have published several journal articles, with proof-of-principle prototypes to their credit. Contact Ivan Kruglak, 818-681-0091 email: ivan@ionsky.com, website: www.ep-systems.net
- 4) **Wireless Electric Power Transmission** – Over 10 years of experimental and theoretical work by university professor that confirms all aspects of this revolutionary invention, pioneered by Nikola Tesla. Two articles reprinted in Valone's *Harnessing the Wheelwork of Nature* by the inventors describe more details of the safe and highly efficient (95%) electricity transmission method. Contact Dr. James Corum, 304-291-0466 email: jcorum@ieee.org
- 5) **Rife Technology Beam Ray Therapy Device** – Company already has an IRB for research and clinical trials proving efficacy and completing FDA approval. The best Rife technology available today. Program includes upgrading several dozen clinics in the US for treatment of chronic pain (once approved by FDA) as well as a wide range of diseases. Contact Lynn Kenny, 205-841-6554 email: beamray@mailcity.com
- 6) **Electrotherapy Teslatron** – Installation in a CA clinic of a successful million volt Tesla coil therapy machine in a room-size treatment protocol for stubborn and terminal disease patients. Several medical doctors routinely work with this inventor and send patients for treatment. 10-patient study ongoing. Contact Guy Obolensky, 845-753-2782 email: soliton@optonline.net
- 7) **EM-Probe.com** – Pocket-size magnetic pulser cured inventor of congestive heart condition. Endorsed by doctors and the subject of a NASA four-year study. Contact Glen Gordon MD, 360-297-8736 email: DrGordon@em-probe.com website: www.em-probe.com
- 8) **Transformative Energy Projects:** (1) *Spiral Magnetic Motor* which uses a magnetic gradient to achieve torque. The motor can be configured into a car motor which will use voltage without current to spark each cycle. The finished prototype will be incorporated into a Bitterly Flywheel vehicle for a followup Phase II project. No fuel is required since the increasing magnetic attraction (gradient) performs useful work. A microturbine powered by magnets is another spinoff project. (2) *Electricity-Generating Shock Absorber* for electric cars that can be prototyped within an 18-month period. (3) *Zero Point Energy* solid-state diode electricity generator rectifying vacuum fluctuations, which can be mass-produced into panels similar to LED panels for TV and video. (4) *Planetary Protector* for incoming meteors, tsunami amelioration, and tornado/hurricane dispersion, uses a Podkletnov projectable gravity impulse device. Journal articles published on collimated beam experimental results. Contact Dr. Thomas Valone, 301-513-5242 email: iri@erols.com Integrity Research Institute, 202-452-7674, 800-295-7674

A Look Back at Nikola Tesla's Accomplishments in the Niagara Falls Region

By Jacqueline Panting



“It will not be long before we can transmit that power [of Niagara Falls] by means of a wire...over great distances...I believe the time will come when we shall transmit that energy without any wire.” – Nikola Tesla

These prophetic words from the great scientist Nikola Tesla stated in 1893, show how he never doubted his ability to transform the world by transmitting electricity over long distances by means of a wire with the awesome power of the Niagara Falls River. He was so far ahead of his time, that his belief in transmitting energy without wires is still not a reality today, but certainly feasible in the near future¹. One only has to see the ability of worldwide wireless communications to see that the next natural progression will be to transmit energy without wires around the whole world. The dream of harnessing the power of Niagara Falls for generating electricity was something Tesla thought of when he was only a child. Seeing pictures of the awesome power of the Falls, he stated “Someday I shall harness it.” He set huge ideas and forces in motion years before this work ever started. With his unique genius and sheer volition, he knew he could accomplish his dream. And what a great accomplishment indeed! Thanks to Tesla’s invention of the AC induction motor, which allowed electricity to be transmitted long distances (DC electricity could be transmitted only for very short distances), Niagara Falls was the first city in the world to have commercial alternating current generation of electricity. The city of

¹ See President Valone’s book, *Harnessing the Wheelwork of Nature, Tesla’s Science of Energy* for more info.

Buffalo, New York, was the first city in the world to receive electric power generated from a long distance away (22 miles), in 1896. Then, power lines were extended to Syracuse in 1905. This application of long distance power transmission eventually led to the present Niagara Mohawk Power Co. that distributes electricity throughout western and central New York. Soon, the whole world was lit by his genius just as he predicted in his statement above.



Bird's eye view of Goat Island, on the American Side of Niagara Falls, where Tesla's statue stands

The *Niagara Gazette* (the foremost paper of the area at the time) had nothing but praise for the man they described as the “greatest living electrician.” Scientists, politicians, financiers, men and women alike wanted to meet and hear him speak of his amazing inventions and discoveries. He was one of the most famous celebrities of his time.

Wanting to record all that we could relating to Tesla history in the Niagara/Buffalo area, a group of us researched all the landmarks still existing today that stands as witnesses to his incomparable genius by taking a trip back in time, when the excitement and thrill of Tesla's fame was felt by everyone.

We started our trip from the city of Buffalo, New York and headed to the Niagara Falls region. We decided to first go to Goat Island, a landmass between the Falls, and on the American side. Here is the beautiful Niagara Falls State Park, where a bigger than life-size bronze sculpture of Nikola Tesla towers over the plaza. The statue created by a Yugoslavian sculptor, was unveiled on July 25, 1976 commemorating the 120th anniversary of Tesla's birth. Behind it, is the only remaining part of the original Adams Power Station (Number One), the ornate entrance archway, which has at the top center, a medallion that features a Mohawk Indian traveling the Niagara River by canoe. The Edward Dean Adams Hydro-Electric Power Station Number One was inaugurated on August 26, 1895 by the Niagara Falls Power Company. The building was designed by Mr. Stanford White, one of the foremost architects of the time who used the Richardsonian Romanesque style then favored for churches, universities and public buildings. The Station's nameplate is currently on this entrance archway along with other commemorative plaques, are described further in this article.



Adams Plant Number One Entrance Archway, the only remnant of this building, located behind Tesla's statue



As we walked toward the Niagara Falls River, the thundering power of this rushing water was so loud that we were easily able to understand why Tesla was inspired on tapping some of it for the large-scale generation of electricity. This river has an average of 202,000 cubic feet per second of water flow. The gusting winds along with the heavy mist that the falls produces, visible hundreds of feet away, are really quite a unique experience. This untamed power and energy of Niagara Falls was revered by Tesla even as a child and we have to be forever grateful of his tenacity and perseverance in fulfilling his

childhood dream of “Someday I shall harness it.”

After experiencing the inspiring beauty of the river and falls, we started to look for the original generating Stations. We wanted to find the areas where the original plants were erected, so we headed to the Niagara Falls Library to see what they had in their archives. As we looked at the old Niagara Falls maps, showing the Adams plant site, we realized that we could find them if we would go out and look for them. Talking with the Librarian, she mentioned that one of the plants was still there. Armed with maps and our digital camera, we headed toward the Robert Moses Expressway. Once there, by hiking down the side of it, we reached the ground and then realized that we were now standing on the site of the original Adams Plant Number One. As we looked around, on the ground still remain large pieces of stone, probably parts of the original Station building. Sadly, there are no plaques or signs



Photo of the area where the original Adams Plant Number One was erected



Adams Plant Number One - Courtesy, Niagara Falls Library

commemorating the site. This Plant contained ten 5000 horsepower Tesla AC generators yielding 37,000 kilowatts. The second Adam’s Plant (Number Two) doubled that output. The original plant at that time was designed for 25Hz. however, the subsequent expansion included conversion to 60 Hz.

As we continued to walk along we saw the Niagara Falls Sewage Treatment facility. Here is where the Adams Building Number Two once stood. Then adjacent to the canal, as we continue to survey the landscape, there it was, the Adams Plant Number Three. Still intact, this building was the original transformer house and is all that remains of the three original buildings. Over 100 years ago, this trio comprised the world’s first complex of Alternating Current Power Generating Stations. The Tesla alternating current generators housed in this particular building were still working in 1961. At that time they were shut down, due to the opening of the new Robert Moses Power Plant. We have been told that at least one is stored at the Smithsonian Museum in Washington DC, although not on display. The Moses plant has a capacity of 1,950,000 kilowatts enough to supply a city the size of Chicago. Tesla was right when he



Adams Plant Number Three. The only original building out of the three still standing today.

foresaw the enormous potential of Niagara Falls! Sadness and nostalgia came over us, as we saw what was left of Tesla’s magnificent achievement in Niagara Falls. As we sat and talked we realized something: Yes, the buildings are gone, the generators shut off, but we had overlooked the most important fact, that is, thanks to Tesla, we have the ability of transmitting electricity anywhere in the world, no matter how far away from the generating plant. Electricity has become necessary for our existence, as Tesla predicted back in 1893 during an interview by the Niagara Gazette: *“Electricity is becoming more and more an important factor in our lives...after a considerable amount of time it will become practically necessary for our existence.”*



Replica of the Inaugural Plaque that was on the Adams Plant (#1)

Today, a replica of the plaque that commemorated the accomplishment of the generation of electricity using alternating current is on the Original Adam’s Plant Archway, behind Tesla’s statue. (The original plaque was lost). It states, “To the engineers, financiers, scientists whose genius, courage and industry made possible here the birth of hydro-electric power and created the first five thousand horse power water turbines directly connected to alternating current generators and inaugurated in America long distance transmission of power by electricity”.



Plaque Honoring Tesla as the Inventor of the AC Induction Motor

Also on this archway is a large plaque honoring Tesla and crediting him as the inventor of the AC induction motor which made possible the long distance transmission of electricity that so many had dreamed of up till then, but that only he could accomplish. The plaque was erected and dedicated on July 25, 1976, the same day as his statue was, on occasion of the 120th anniversary of this genius's birth. On the plaque, next to his name, on the right side are etched replicas of the original towering AC generators invented by him and placed in the Adam Plant Stations in 1896. On the left side are etched huge wire tower transmitters, which symbolize the long distance

transmission, made possible by these AC generators. How wonderful to see that here in The Niagara Falls State Park on Goat Island, is a monument to Tesla's genius as the inventor of AC electricity. Visited by hundreds of thousands from all over the world, every year, we were very happy to see so many people reading the plaques, climbing the statue and becoming acquainted with how Tesla changed the world.

Leaving nostalgia behind and totally overwhelmed by the magnitude of Tesla's accomplishment here, we decided to walk up once again to his magnificent statue. As we walked toward it, my heart was filled with reverence and gratitude. I thought what a different world this would have been without Tesla's inventions (and he has so many). Most likely, we would have much more expensive DC electricity since Edison fought AC continually. Fortunately for us, Tesla changed forever the way we all live on the Earth.

I decided to climb up the statue as many people do, and feel what its like to be next to him. I was thrilled to be so close to the statue of an incredible genius! I started to think how it must have felt to be next to the real Tesla. I remembered how many celebrities of his time



worked with him, Westinghouse, J.P. Morgan, his famous friends like Mark Twain, Sara Bernhardt. How wonderful it must have been to be able to be with him, hear him speak of his many new inventions yet to come.

After a long day, filled with the excitement of visiting all the places related to Tesla in this area, we were ready to sit and relax at the Top of the Falls restaurant, on top of the Niagara State Park gift shop, which has a magnificent view of the falls. As we dined, the sun started to set and the falls were no longer visible by its rays. What a shame that no longer we could enjoy the white cascading falls. At least, I thought, I could still hear the mighty rumble. Then, suddenly the beautiful colored beams of light were turned on and the falls were visible again! Beams of pink, blue, red, purple, green and white flashed giving the falls a different and breathtaking look. I smiled and thought to myself: To be able to see these beautiful falls, by AC electricity, even at night is yet another never-ending gift of Tesla to the whole world!



Niagara Falls at night, lit by the legacy of Tesla's genius

For further information

Tesla's history, biography, magnifying transmitter, wireless electricity, Niagara Falls history....get the book: *Harnessing the Wheelwork of Nature*, available on www.Amazon.com

ARTICLES & PAPERS

Including

Highlights of

Future Energy eNews

Restoring Proper Electrical Potential and Ion Flow with Silver Fabric

Thomas Valone, PhD, PE

Recently presented at an electrotherapy seminar that this author attended at Penn State University, Silverlon was invented to restore the -40 mV potential in a wound area that normally exists on the skin, besides providing antibacterial action. The inventor worked with Dr. Robert Becker (author of *The Body Electric*). Benefits are that Silverlon cloth bandages (1) re-establishes a -40 mV potential to the wound by electrical conduction, (2) are a local antibiotic, (3) exhibit tissue penetration effect in glove and shirt designs.

For severe wounds and burns, a blend of nylon fiber and silver coated nylon fiber demonstrates advantages that are safe, convenient and long lasting, including faster healing time and extended use. A unique infusion of silver throughout a comfortable, flexible fabric delivers pure ionic silver to the wound site longer than other silver-impregnated products on the market. "Studies of the kinetics of ion release suggest that silver nylon may be an effective, sustained release antibacterial agent." (MacKeen, P.C., Person, S., Warner, S.C., Snipes, W., and Stevens, S.E., "Silver-coated nylon fiber as an antibacterial agent," *Antimicrob. Agents Chemother.*, 31, 93, 87)

Electrically generated silver ions have been shown previously to be a potent antibacterial agent with an exceptionally broad spectrum as indicated by in vitro testing. The present study reports on clinical experience using electrically generated silver ions from Silverlon® fabric as adjunctive treatment in the management of chronic osteomyelitis.



In tests conducted by a multi-site home health agency, Silverlon® was found to heal wounds rapidly, and decrease nursing visits and costs. "In one case, a diabetic patient in renal failure with a sacral wound, was showing no improvement after 20 skilled nursing visits. The physician was planning surgery. After a trial using Silverlon®, the wound healed completely in three nursing visits." ("Treatment of Orthopedic Infections with Electrically Generated Silver Ions." *J. Bone Jt. Surgery.*, 60-A, 871, 1978, Becker, R.O. and Spadaro, J.A.)

"The combination of NPT and elemental silver contact dressings represents an exciting new method of securing STSG's in colonized wounds. Patient education and compliance in this more sophisticated method are issues to be addressed." (Sigler T, Patterson GK, Loehne HB, Sawyer A, Johnson P, Farmer M, "The Use of Negative Pressure Therapy and Elemental Silver Contact Layer in Increasing the Survivability of Split-Thickness Skin Grafts," Presented at the 16th Annual Clinical Symposium on Advances in Skin and Wound Care September 20-23, 2001) Silverlon® Advanced Antimicrobial Wound Care, Burn Care and Surgical Products are available as Contact Dressings, Island Dressings, Pads, Packing Strips, Elastic Wraps and Gloves.

<http://www.silverlon.com/>

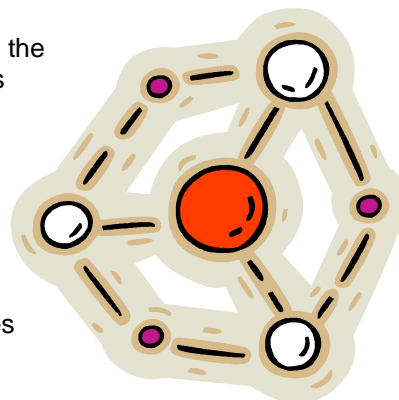
Nanotechnology for Clean Energy and Resources

Stephen L. Gillett* and Ralph Merkle

<http://www.foresight.org/conferences/advnano2004/Abstracts/Gillett/index.html>

Summary of a presentation given at the 1st Conference on Advanced Nanotechnology: Research, Applications, and Policy

Soaring oil prices have recently put resource issues back in the public eye. In fact, conventional technology is exhausting its resource base at an accelerating rate, an acceleration exacerbated by the revolution of rising expectations in the less-developed world due to the global communications revolution. Nanotechnology is the only way to provide something like a sustainable First World standard of living for the entire world. Fortunately, furthermore, many resource-related nanotechnology applications involve nanostructured materials rather than full molecular machines and so are accessible in the near term.



Applications include:

Greatly increased energy efficiency

- **Non-thermal energy use.** Burning a fuel wastes most of its energy. However, utilizing chemical energy without thermalizing it, as in fuel cells, requires molecular structuring.
- **Focused processing.** Highly specific catalysts that would generate only the desired product require nanostructuring.
- **Distributed fabrication.** Supplanting the massive importation of raw materials into conventional factories, and their re-export as finished products, by nanoscale fabrication from local materials will make the enormous present transportation infrastructure obsolete,.

Information-intensive energy extraction

- **Diffuse sources.** Cheap large-scale fabrication of nanostructured materials will lead to: *direct use of solar power*, via photovoltaics or artificial photosynthesis; *thermoelectric materials* to exploit small thermal gradients; *piezoelectric materials* to convert mechanical stress directly into electric potential. Distributed fabrication will make energy collection from diffuse sources practical, such as low-head hydropower, tidal currents and surf, "at wellhead" geothermal power.
- **Efficient energy management** applications include *materials for passive energy management*, such as "smart windows"; *efficient energy conversion devices* such

as "white LEDs"; *electrosynthesis* for fuel manufacture and electricity storage; *better electricity storage devices* such as intercalation batteries and high-performance "ultracapacitors."

Superstrength materials

- As materials having strengths approaching the limits set by chemical bonds become available, they will make transportation considerably more efficient through savings in vehicle mass.

Molecular separation

- Element separation, whether for pollution control or resource extraction, is not intrinsically energy-intensive. The enormous energy costs of present-day pyrometallurgy largely result from the application of heat to force phase changes. Biosystems achieve their efficiencies by using direct molecular separation via specialized molecular machinery. "Biomimetic" molecular separation will have the effect of blurring the distinction between a "pollutant" and a "resource." The 5000 year-old paradigm of digging up and "cooking" anomalous geologic deposits to extract desired materials is coming to its end.

Change of materials mix

- As nanoscale fabrication makes accessible the ultimate materials strengths set by covalent chemical bonds, the structural metals that dominate present technology will become obsolete. The carbonate rock that forms the bulk of the crustal carbon reservoir will become an important backstop resource, as will even the silicates that make up most of a rocky planet.

Off-Earth resources

- By vastly decreasing vehicle and payload mass, nanotechnology will make near-Earth space access considerably more economic in the relatively near term, so that solar power satellites and asteroidal metal become more attractive.

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http://www.foresight.org/impact/whitepaper_illos_rev3.PDF

Tom Valone Reviews a Myriad of Alternative Energy Technologies

by [T. Cullen](#) and [Susan M. Carter](#), PORTLAND, OREGON, USA, *Pure Energy Systems News*

http://www.pureenergysystems.com/events/conferences/2004/NewEnergyMovement/6900056_ThomasValone/index.html

The travesty is that the global warming we are experiencing is entirely unnecessary -- if we would but just pursue these alternatives that have been available for so long.



Tom Valone, President of Integrity Research Institute (IRI), speaking at the New Energy Movement conference was a powerhouse of knowledge and facts and gave a thorough overview of where we are currently at with energy needs and where we could go in the future to meet those needs.

His first blockbuster fact caught the audience's attention immediately; 85% of energy today comes from the combustion of dead fossils, forcing the world's atmosphere to overheat. We are likely seeing the results of global warming in our weather such as the four hurricanes in Florida. Valone commented that Hubbard's Peak – the peak of oil production – is right on the projected mark for the US. Most alarming is that the carbon dioxide in the atmosphere is at three hundred parts per million (ppm), the highest it has been in 400,000 years and may reach six hundred ppm by 2050.

Further evidence of global warming are the liquid lakes at the North Pole. The ice cap is rapidly disappearing, which effects the reflected solar radiation, causing other global weather changes. Valone warned ominously that a sixth to eighty percent reduction in carbon emissions is required to stop global warming. The most frustrating fact of all, he stated, was that two thirds of all the electricity produced in the US is wasted.

IRI is researching the following energy solutions:

- atmospheric electricity
- nuclear
- quantum vacuum zero point

- space propulsion energy
- magnetic motors

Atmospheric Electricity

Ben Franklin almost had it clear back in the 1700's. Electrostatic motors have been known about since the beginning of this country. One motor has been operating for eighty-six years and counting. Reference was made to the *American Journal of Physics*, 1971, pg. 778, regarding the 200 Gigawatt potential in the atmosphere. The most promising technology has been known about nearly one hundred years: Tesla's Wardencliff tower and scalar waves. Valone has researchers that have analyzed every part and verified each component of Tesla's system to broadcast power worldwide. IRI is currently working to rebuild a Wardencliff tower.

Nuclear

Nuclear power is about more than just nuclear power plants. Valone told the NEM audience about nuclear batteries and the work by Betavoltaics and Nuclear Solutions. He mentioned Paul Brown's patents for extracting energy safely from radioactive materials without nuclear power plants. A very promising development in the works is the photo-remediation of nuclear waste, and a method of using iodine to produce power. The studies in this field are showing one Megawatt in produces twenty Megawatts out. Proton – Boron fusion was mentioned, where the reaction between a proton and Boron produces Helium with no radioactivity. Dense plasma is focused in a unique device which produces the 1 billion degrees necessary to make Hydrogen and Boron fuse together into Helium without high energy neutrons being released. A garage-sized fusion reactor would produce energy ten times better than the Tokamak Reactor currently does (See www.focusfusion.org for more information).

Quantum Vacuum Zero Point

Valone next spoke about the controversial quantum vacuum and zero point energy, pointing out that zero-point energy is NOT conserved. The energy density of zero-point energy is debatable. Many areas in this field are being studied: the Casimir Force, electron-positron production, electron charge cluster technology, toroidal fields, solid state diodes, and other devices. Electron charge clusters are showing nine times over unity. Electric Arc Discharge Accelerators also have more potential energy out than electrical energy in. We may someday rectify thermo-electric noise with diode circuits

On the positive side of this debate, over unity (and its synonyms) are being mentioned in mainstream literature. Dr. Peter Graneau is getting 150% efficiency outputs and has been published in peer reviewed journals. Pinto actually mentioned "free energy" in his abstract published in *Physical Review Rev. B*, 60 21, 1999 p. 4457. He uses micro lasers and nanotechnology to get huge improvements in the Casimir force (one Kilowatt per meter squared). Valone further mentioned that Feigl was the first physicist to use ZPE to satisfy energy conservation.

Space Propulsion Energy

Quantumfields.com discusses a hydrodynamic model of vehicle interactions with zero-point energy as it loses its drag at 0 degrees Kelvin. Valone described the works of Paul H. Hill on inertial control, and how the apparent 90 degree right hand turns by UFOs can be explained with knowledge of zero-point energy and inertia. A discussion on space propulsion energy would not be complete without discussing the gravity work of T.T. Brown and John Searl. Valone briefly mentioned his own past work on homopolar generators, and the current work by Roshin and Godin. He reminded the group that homopolar generators produce a seven degree drop in temperature in the area around the generator.

Magnetic Motors

Valone is currently most interested in a magnetic motor design by South African, Mike Brady. Because he could not find any patent information, he said he supposed the design is public domain. (See freeenergynews.com for more information about Mike Brady). Valone hopes to have his replication of this motor done within a month. Other magnetic motor designs were covered such as the Hartman Patent #4,215,330, a Spiral Magnetic Motor and a flywheel vehicle power project. He referred to the June 1979 issue of *Popular Science* and the March 2004 issue of *Aviation Week* magazines.

Conclusion

Tom Valone, true to his reputation, packed his time with innovative developments in the energy field. He made the point well that there is no reason to depend so heavily on fossil fuels; from Franklin to Tesla we have had all the technology we need. With new inventions there are even fewer excuses. The travesty is the global warming we are now experiencing, because of fossil fuels, has been unnecessary.

Glen A. Gordon, MD, Speaks on Pulsed Electromagnetic Healing Developments

Review by Sterling D. Allan, T. Cullen, Susan Carter of Pure Energy Systems

http://www.pureenergysystems.com/events/conferences/2004/teslatech_SLC/GlenGordon/ElectroMagneticHealing.htm

Addressed the ExtraOrdinary Technology conference in Salt Lake City on Friday, July 30, 2004, 8:00 am. Reviewed scientific literature that proves that the mode of action of PEMF devices is to align anti-oxidants with free radicals, which are the primary culprit in disease and injury.

Dr. Gordon spoke on exploring the limits of pulsed electromagnetic healing. This technology uses very fast (8 nanosecond) pulses of electromagnetic energy to help the body heal. Dr.

Gordon stated he was the first physician in the US to use pulsed electromagnetic fields (PEMF) on soft tissues in humans. The technology has been studied by NASA at the LBJ Center and written about by Tom Goodwin. Another quoted reference was *The Body Electric* by Robert O. Becker. Since the 1980's, PEMFs have been used in Russia and Hungary and now are used worldwide. The United States is the only major industrial country not currently using PEMFs.

In 1980, his team received the first investigational device exemption issued in the US to study low level laser effects in soft tissue injuries. After physicists convinced them that the light was not penetrating the tissue, they went on to show that a pulsed EM field of slower frequencies than the laser light could be responsible for the results they were seeing. This led to the development of the hand-held battery operated device Dr. Gordon demonstrated at the conference. The device retails for around \$200 USD.



They investigated different wave forms including sine-wave, square-wave, and dc triangle pulses. They found that that best results came from very fast nanosecond pulses with high bioefficiency rates of change.

He reported the pulsed EM fields would stimulate neurons to grow faster. It also helped to line up the body's natural antioxidants with free radicals to neutralize them much more rapidly. Free radicals have a role in aging, illness, and death; and antioxidants help counter free radicals. Stopping free radicals stops inflammation. "Healing won't take place until inflammation stops," he said. Dr. Gordon cited several scientific papers from mainstream journals that have documented that the EM pulses accelerate healing by acting as a catalyst to correct the alignment, making it easier for the antioxidants to connect with the free radicals.

Dr. Gordon also spoke of the first critical 12 hours in a "stunning" situation in which a person is on the brink of death. During that time, the body has to call upon what he calls a "constitutive response" – based on what is present –whereas after that first 12 hours, the body has had time to produce additional elements, called the "transcriptive response," being transcribed from the DNA and produced into building blocks of regeneration and healing.

Thus, the most crucial time in which the PMF technology can make the most difference – even life and death, is in the first 12 hours in which the PMF can help the body manage the overwhelming release of free radicals as a result of the stunning trauma. He also addressed the phenomenon of stress from a physiological perspective, citing that the mitochondria cranks out free radicals when in a stress situation.

His apparatus showed a 40% increase in growth hormones by controlling the electron spin in free radicals. He said it has been measured to penetrate the skin 4-5 cm but that there could be other

phenomenon at work because he is seeing effects clinically much deeper than that. He has treated over 20,000 patients using this technology. Dr. Gordon cited a Stanford study that showed “onboard antioxidants 100 times more effective”. It can treat inflammation, illness, and aging symptoms with no side effects. Several times in his presentation he recommended a recent review by NASA compiled over 4 years with \$3.5 million dollars in funding that he called a “watershed paper” on the subject.

He states his frustration with the politics of the American Medical Association and the U.S. Drug Lobby who have stonewalled this technology from being able to achieve acceptance by the mainstream of U.S. medicine. There are 2.5 million deaths a year from hospital-administered drugs. 200,000 of those are from gastric bleeding. Dr. Gordon believes the Electromagnetic Pulse technology may eventually nearly eliminate the need for the pharmacological industry.



At the conference, he demonstrated the device and answered questions from the audience. One attendee asked if it is possible that approaches like Reiki work because they impose from one person to another the appropriate electromagnetic stimulus. He replied that “phenomenologically” he would tend to see credence in this hypothesis, though he knows of no hard evidence to support it. He attended the entire event and was found often in congenial conversation with various conference-goers. After his presentation, he told a group about a personal application of the technology. He

said he a massive heart attack several years ago – five valve bypass. Soon thereafter, his doctors told him that he needed a transplant or he would be gone. He put the PEMF device in his pocket next to his heart, and he never had the transplant. Later he did a 2,500 mile solo bicycle trip to show himself and the world that he was healed. He’s gearing up now for another trip.

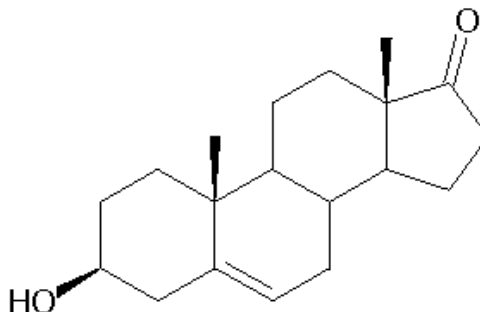
For further information on Dr Gordon and his healing device go to: <http://www.em-probe.com>, tor Call (888) 697-9996. For info on the ExtraOrdinary Technology Conference: www.teslatech.tv

Gigahertz Stimulates DHEA in Elderly Patients

Thomas Valone PhD

Excerpt from Bioelectromagnetic Healing, 6th Edition, p. 23

A medical doctor who worked with Nobel Prize winner, John C. Eccles, Dr. Norm Shealy has a journal publishing history extending back to his first papers in 1957 and neurophysiology papers with Eccles in the 1960’s. He is the inventor of the transcutaneous electrical nerve stimulation (TENS) device in 1967, as well as the recent Shealy

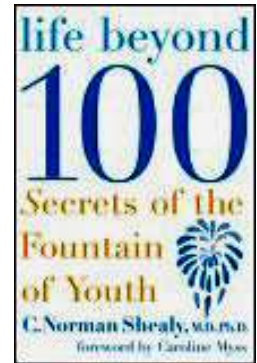


Molecular form of hormone DHEA

RelaxMate II. He is also noted for BEMS procedures that include Dorsal Column Stimulation - The control of pain by electrically stimulating the dorsal column of the spinal cord, and Facet Rhizotomy - The permanent, safe numbing of an irritating spinal joint nerve.

However, the most impressive achievement for longevity, that he discussed at a recent conference which I attended, is his Five Sacred Rings. These are different energetic circuits associated with acupuncture points which specifically optimize DHEA, Neurotensin, Beta-Endorphin, Aldosterone and markedly reduce Free Radicals. The one that stimulates the youth hormone, DHEA, is called the Ring of Fire and involves a 50 gigahertz signal device (GigaTENS) that touches the skin, one at a time, at several points in the circuit. Through repeated laboratory testing for careful monitoring of DHEA levels, Dr. Shealy was able to confirm the protocol that restores youthful levels of the master hormone DHEA by stimulating the pituitary gland to produce it. Shealy describes the unit as a Trip-Modulated GigaTENS with Optional Bipolar Spike as covered in his US Patent No. 5,851,223. The product has been incorporated into the ShealyTENS which is available by prescription for \$695 from Self-Health Systems <<http://www.selfhealthsystems.com/> (417-267-2900).

His new book, *Life Beyond 100: Secrets of the Fountain of Youth*, contains the details of this amazing life-extension BEMS discovery. He also has a holistic university that offers degrees related to integrative health care. Dr. Shealy is also responsible for organizing the first accredited Energy Medicine program in the country, which is available at Greenwich University.



References

1. Dr. Norm Shealy Website: <http://www.normshealy.net/bibliography.htm>
2. Holistic University: <http://www.hugs-edu.org/>

System Converts Smokestack Heat To Electricity

Bob Holmes, New Scientist, 31 May 04

<http://www.newscientist.com/news/news.jsp?id=ns99995039>

A system designed to capture waste heat from industrial smokestacks and turn it into electricity could significantly boost the efficiency of power stations, drastically cutting carbon emissions, its inventors claim. It could also reduce the amount of toxic pollution released into the atmosphere.

The key to the efficiency of the heat-scavenging system is that it uses propane vapor rather than steam to turn a turbine and drive an electricity generator. This allows it to be driven by low-temperature waste heat. When steam is used to turn a generator, it must be pressurized and raised to around 650 °C. Below 450 °C, the process no longer operates efficiently because the steam

pressure drops too low. This means that the heat in flue gases below 450 °C cannot be used to generate electricity, and so is lost to the atmosphere.

This is one of the reasons why fossil-fuel-powered generating stations have an overall efficiency of only around 35 per cent. Many other industrial processes, such as chemical plants and oil refineries, also vent waste heat. Unlike water, propane's properties are much more suited to electricity generation at lower temperatures. After pressurising in its liquid state, propane's lower boiling point means it can be vaporised at much lower temperatures than water. But this propane still contains much useful heat after it passes through the turbine, so a lot of heat is still vented, and the small increase in efficiency usually does not make it worth the investment.

But now Daniel Stinger, a turbine engineer, and Farouk Mian, a petroleum engineer, have developed a surprisingly simple way to harness almost all this waste heat. They calculate that a second turbine, driven by the waste heat from the first, would capture almost all the remaining energy. The first turbine's waste heat would vaporise and pressurise still more propane to drive the second. The pair calculates that flue gases will then emerge at a relatively cool 55 °C. They have set up a company, called Wow Energy, <<http://www.wowenergies.com/> based in Sugar Land, Texas, to license the technology to industry once a pending patent is granted.

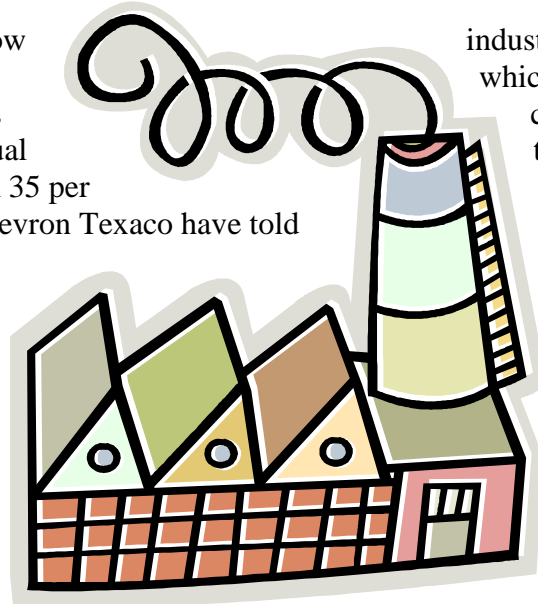
Wow's concept should allow sources below 450 °C - waste heat. The company's power stations adopting dual boost their efficiency from 35 per cent to 60 per cent. BP and Chevron Texaco have told Stinger they are interested in adopting the heat in their industrial

Closed loop

If even 20 per cent of waste heat could be converted to electricity in this way, Stinger estimates the US could add over 200 gigawatts of generating capacity - almost 20 per cent of its power needs.

would be cheap: it would produce electricity at about the same cost per megawatt as electricity from conventional steam turbines. But more power from the same fuel means less CO₂ emissions. Promising as it sounds, Wow Energy's scheme, called a cascading closed loop cycle (CCLC), remains untested. But engineers who have studied it say it makes sense. "It certainly looks very feasible, and the numbers seem to pan out," says James Prochaska, an engineer with turbine maker GE Aero Energy in Houston, Texas.

If CCLC can be shown to work, says Joseph Roop, an economist at the US Department of Energy's Pacific Northwest National Laboratory in Richland, Washington, it "opens a vista of



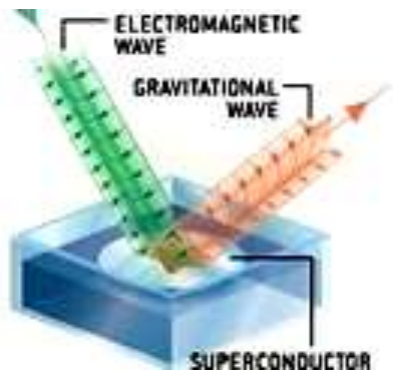
industry to make use of heat which includes most industrial calculations suggest that turbines should be able to capture almost all the remaining energy. New Scientist they are systems to harness waste heat in their industrial plant.

industrial waste heat, say, alone could add over 200 gigawatts of generating capacity - almost 20 per cent of its power needs.

possibilities for capturing low-grade heat that we don't currently try to exploit at all." CCLC also has another potential advantage. Because it cools smokestack emissions to about 55 °C, many pollutants that enter the atmosphere today, such as mercury oxide and cadmium oxide, would instead condense inside the stack, from where they could be disposed of safely through chemical treatment.

Directed, Gravitational-Wave Impulse Energy Produces Force

Thomas Valone, Future Energy magazine, Fall, 2004.



For years, science fiction has entertained the fantasy of force fields and directed "phasor" or "photon torpedo" weapons. Even levitating vehicles, using a force field concept, constantly are featured in even the latest futuristic movies (e.g., "I, Robot") and insurance company television ads (e.g., New York Life). However, what progress has science made in producing these effects?

It is widely accepted that the US government has advanced field-generation propulsive technology in classified and unacknowledged projects, shared with only a few aerospace companies. The second "Billion Dollar Secret" television special in 2005 by Jane's Defense Weekly editor, Nick Cook, will explore details of these programs. In a recent correspondence, Nick says, "Current plans should see us delivering the film early next year for airing on TV (the History Channel in the US) in the early spring." Nick is also the author of *The Hunt for Zero Point* (Random House), a book exploring the history of field propulsion technology. In the US Patent and Trade Office, there are over 4000 "secretized" patents in the PTO vault, never to see the light of day, that mostly deal with energy and propulsive force inventions, carefully selected by PTO representatives of government agencies like DOE, NASA, USAF, DARPA, etc. At least a few civilian advocacy groups have called attention to this prolonged sequestering of advanced technology that could be used for civilian purposes (e.g. Dr. Steven Greer, author of *Disclosure*, www.disclosureproject.org <<http://www.disclosureproject.org/>).

In the unclassified arena, directed energy pulse launchers have been patented by the Department of Energy (e.g.#4,959,559) which are a "physical realization of wave propagation equations, such as Maxwell's equations and the scalar wave equation, to produce localized pulses of wave energy..." while even giving credit to Star Trek's photon torpedo in the patent disclosure.



In an audio-interview reported on June 26, 2004 by Tim Ventura with Dr. Robert Baker Jr., the creator of www.gravwave.com/, corroborates the subject of Podkletnov's latest research (www.americanantigravity.com/interviews.html). Dr Baker has done an excellent job collecting and categorizing several different approaches to creating what Dr. Ning Li calls "AC-Gravity" and he's applied an engineer's eye to reducing the complex science to easily understandable techniques for testing these concepts.

Regarding artificially-created gravity force, Ning Li recently chaired an unclassified DOD-sponsored, Gravitational-Wave Conference at the Mitre Corporation in Virginia on May 6-9, 2003 www.mitre.org <<http://www.mitre.org/>> as part of the International High-Frequency Gravitational Wave (HFGW) Working Group. (A CD-Proceedings of the Mitre conference papers is available from IRI on a donation basis). Beams of directed gravitational-wave energy at high-frequencies, designed to produce tons of force, are currently under study by both the government and private entities, says Baker. These can be produced through electrical & magnetic jerks, as well as continuous-mode effects from high-amplitude RF-signals.

In the public mind, the work of Eugene Podkletnov is arguably the beginning of this type of research. His "Impulse Gravity Generator Based on Charged Superconductor with Composite Crystal Structure" from 2001 is posted on the Los Alamos National Lab website: www.arxiv.org/abs/physics/0108005. The achievements since his early experiments are considerably more impressive (and much less well known) than the mainstream media ever realized. He describes the achievement of a "focused beam without noticeable attenuation through different materials and exerts a short repulsive force..." Published a year after this impulse gravity paper, Podkletnov describes further research on the collimated beam from high voltage discharges of about 1MV and 10KA in his "Investigation of High Voltage Discharges in Low Pressure Gases Through Large Ceramic Superconducting Electrodes" available online at : www.arxiv.org/abs/physics/0209051. Here the measuring systems of pendula were place 150 meters away and shielded by 80 cm brick walls and still registered brief deflections. "It acted on small interposed mobile objects like a repulsive force field, with a force proportional to the mass of the objects." Interestingly, trapped magnetic flux in the superconductive emitter increased the impulse strength by approximately 25%. Dr. Baker speculates about the theoretical possibilities of this technology: "Utilizing a HTSC lens for concentrating HFGW power the theoretical ten-megawatt pulse output predicted in HFGW -03-107, 380-kilowatt continuous power predicted in HFGW -03-117, 11-kilowatt continuous power predicted in HFGW -03-106, and the over one-kilowatt pulse power predicted in HFGW -03-113 could be concentrated to provide HFGW fluxes in excess of 1020 [watts/m2]."

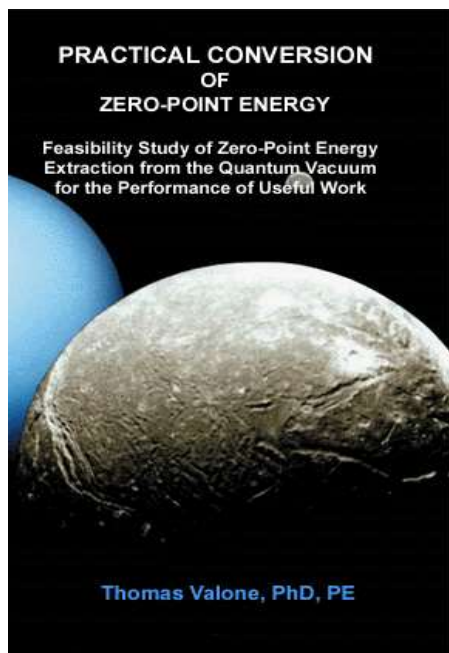
Though NASA spent millions researching a 2% loss in weight, this technology is much more robust. In fact, the limits on this technology are so promising that it conceivably could be utilized for planetary environmental defense, such as giant tidal wave abatement and incoming meteor deflection. The experiments described often require sensitive equipment to measure, but more often than not can be conducted using very common materials. Baker also discusses microwave-oven elements & cell-phone emitters as a potential means of transducing MW-frequencies into a superconductor, somewhat like Podkletnov. It is reasonable to expect that as Earth's competing

factions eventually choose to cooperate, that planetary defense using gravitational-wave impulse energy will be a high priority to ensure the survival of the species.

Tom Valone speaks on “Feasibility of Zero-Point Energy Extraction from the Quantum Vacuum for Useful Work”

Review by [T. Cullen](#), [Sterling D. Allan](#), [Susan Carter](#) *Pure Energy Systems*, August, 2004
http://www.pureenergysystems.com/events/conferences/2004/teslatech_SLC/TomValone/ZPE_Extraction_Quantum_Vacuum.htm

To kick off his talk, he cited a recent article² in the *Los Angeles Times* (July 25, 2004) that stated that our only hope for solving the energy crisis is to be willing to consider "extreme possibilities." With that introduction, he then cited numerous instances in which mainstream journals of science have been dabbling in a discussion of zero point energy.



He discussed how the vacuum used to be considered empty, but now it has been shown that the vacuum contains an enormous amount of energy. Even when you remove all sources of energy and cool a region to very close to absolute zero (the zero point), there is useable energy present in abundance. He said that this is why Helium stays liquid at fractions of a degree Kelvin. Dr. Valone described an experiment by Koltick that shows the effect of virtual particle "dressing" that shrouds an electron. The Quantum Vacuum text by Milonni, he says, estimates the ZPE energy density at 220 erg/cc in optical regions. These measurements were able to be made because of science's ability to study matter at the nanoscopic level. He also

reported that gravity and inertia are proven to be effects of ZPE, by none other than Dr. Hal Puthoff at the Institute for Advanced Studies at Austin.³

Dr. Valone described the Casimir Effect, and how it can be used to tap ZPE. This is the slight attraction seen in metal plates when placed very close (atomic distances) to each other. The attraction can be shown to come from ZPE. Valone cites evidence that the ZPE is not conserved, and does not follow the normal laws of energy conservation. He also showed documented research that sometimes the Casimir Force is repulsive due to magnetic or thermal conditions. In

² This article "Mining the Imagination for New Energy" is reprinted elsewhere in this *Future Energy Annual 2005* -Ed. note

³ Inst. for Adv. Studies' website is www.earthtech.org

some cases, the force changes sign as the temperature increased. This can lead to ways to manipulate and control ZPE. In his presentation, Dr. Valone cited several mainstream science journals that are now publishing works by ZPE researchers (Some examples: Phys. Review Letters #92, 2004; Aviation Week March 1 2004; Science v. 299 issue 5608: 2003 p. 862.) He talked about Robert L. Forward's early work proposing to extract energy from the Casimir Effect and how he made an electron storage battery instead. He said that now that we have the ability to work with nanotechnology, we have the tools to extract energy from the zero point field.

Valone also discussed toroidal EM fields. He said that a ZPE field loses its drag when the temperature nears 0°K, according to Fronig's research. He also cited references that show that we can now explain how it is possible to extract useable energy from a single heat source (not from a temperature difference), which challenges the First Law of Thermodynamics.

Valone also talked about quantum coherence and micro laser cavities. He cited the works of Pinto (Phys Rev. B 60, 21, 1999 p. 4457) and how he was able to use a micro laser cavity to change the properties and increase the Casimir force - like turning on a light and getting a force out. He also spoke about the fluctuation driven electricity experiments by Crooks (Phys Rev. E. 60, 1999) where he is able to get motion from zero input force. He described this as like a "quantum ratchet". The research by Linke in Science magazine was also cited. Valone described a report in the July 8, 2004 issue of Nature about how the "Dark Energy" of astronomy is ZPE, and is why the universe is accelerating. He said that when he confronted astronomer Reba Goodman about this nomenclature, and that they are describing Zero Point Energy, so why didn't they just call it ZPE, the astronomer replied that they "wanted to keep it vague."

He said spectral density for ZPE is Plank's 2nd radiation law, which has now been also measured in superconducting tunnel diode noise and reported in a journal article entitled "Has Dark Energy Been Measured in the Laboratory?" Where superconducting circuits are concerned, it is interesting to point out that "Perpetual Motion Machines of the Third Kind," as he put it, have been achieved with superconducting currents that won't stop, even after ten years of operating with no further energy input, such as those used in MRI machines.

Valone listed the following patents as the most significant in ZPE research: "Rectifying Thermal Electric Noise" by Charles Brown, by Yater; and by Capasso, which actually acknowledges ZPE. He mentioned that metal-metal nanodiodes probably hold the key to ZPE usage with millipore sheets. He also cited the work of Yasamoto, et. Al. (2004, Science, 304:1944) covering peptide molecular photodiodes just 1 nm across – another example of a molecular tool for studying this zero point energy that shows up on the molecular level.

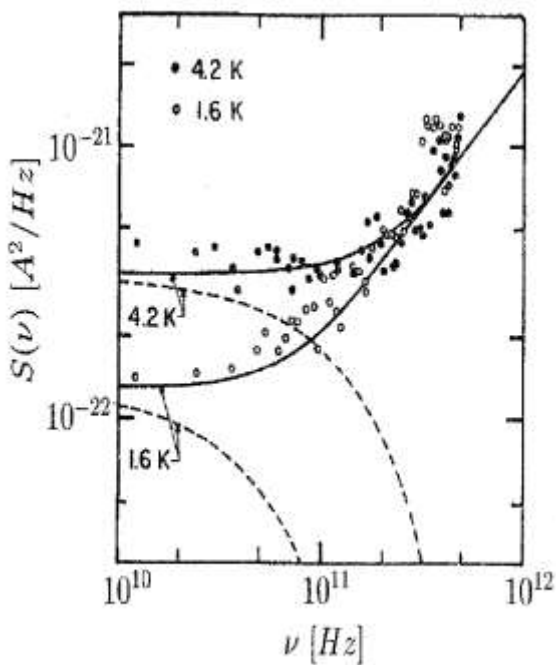
Dr. Valone's report makes one realize that experiments tapping ZPE are now starting to be researched and discussed by the respected scientific community's peer-reviewed journals. Referenced Patent of note U.S. #3,890,161, a chip which absorbs heat directly while producing electrical power.

Has Dark Energy Been Measured In The Lab?

Christian Beck, Michael C. Mackey

Astrophysics, abstract, preprint, 23 Jun 2004, astro-ph/0406504 <http://xxx.arxiv.org/abs/astro-ph/0406504> (complete paper)

A cosmic force that is thought to drive the accelerating expansion of the Universe could be probed using desktop electronics, two researchers have claimed. The force -- usually known as dark energy -- seems to oppose gravity, making galaxies fly apart with increasing speed. Detected eight years ago, it presents one of the biggest puzzles in cosmology. But we may not need high-powered telescopes to study it, according to Christian Beck, a mathematical physicist at Queen Mary, University of London, and mathematical biologist Michael Mackey of McGill University in Quebec.



The experimentally measured spectral density of current noise in Josephson junctions provides direct evidence for the existence of zero-point fluctuations. Assuming that the total vacuum energy associated with these fluctuations cannot exceed the presently measured dark energy of the universe, we predict an upper cutoff frequency of $\nu_c = (1.69 \pm 0.05) \times 10^{12}$ Hz for the measured frequency spectrum of zero-point fluctuations in the Josephson junction. The largest frequencies that have been reached in the experiments are of the same order of magnitude as ν_c and provide a lower bound on the dark energy density of the universe. It is shown that suppressed zero-point fluctuations above a given cutoff frequency can lead to $1/f$ noise. We propose an experiment which may help to measure some of the properties of dark energy in the lab.

Dr. Beck's graph above proves that zero-point energy fluctuations, matching the spectrum of dark energy, manifest in solid state Josephson junctions as noise in the gigahertz frequency range, since the data points follow the upper lines instead of the lower dashed lines. The implications are upsetting the experts. – Ed. note

Skepticism Greets Pitch To Detect Dark Energy In The Lab

by Philip Ball

Nature 430, 126 (08 July 2004); www.nature.com

(Excerpt)

A cosmic force that is thought to drive the accelerating expansion of the Universe could be probed using desktop electronics, two researchers have claimed. The force – usually known as dark energy – seems to oppose gravity, making galaxies fly apart with increasing speed. Detected eight years ago, it presents one of the biggest puzzles in cosmology. But we may not need high-powered telescopes to study it, according to Christian Beck, a mathematical physicist at Queen Mary, University of London, and mathematical biologist Michael Mackey of McGill University in Quebec.

New Light On Dark Energy

Belle Dumé is Science Writer at PhysicsWeb, 24 June 2004

<http://physicsweb.org/article/news/8/6/14>

Cosmologists in the US have made the most accurate measurements ever of how dark energy varies with time – and found that it remains perfectly constant. Yun Wang at the University of Oklahoma and Max Tegmark at the University of Pennsylvania performed numerical simulations on observational data from supernovae, the cosmic microwave background and galaxy clusters. The results, which agree with Einstein's predictions for a non-varying cosmological constant, lend further support to the existence of dark energy (Phys. Rev. Lett. 92 241302).

The acceleration of the universe is driven by a force that has repulsive rather than attractive gravitational interactions. But although this so-called "dark energy" is thought to account for around two-thirds of the universe, no one knows what it is made of. Possible explanations for dark energy include a "cosmological constant" – which remains unchanged with time – that was first predicted by Einstein in 1917.

But there are also more exotic explanations for dark energy – such as quintessence, modified gravitational theories that include extra dimensions, or string physics – that suggest that dark energy could change with time. If dark energy became progressively weaker, the universe would eventually tear apart in a "big rip". If it became stronger, on the other hand, the universe would collapse in on itself in a "big crunch".

Tegmark and Wang used a novel model-independent approach to measuring the dark-energy density. They analysed data from type 1a supernovae, recorded with the Hubble Space Telescope; the cosmic microwave background (CMB) taken with the Wilkinson Microwave Anisotropy Probe (WMAP) and the Sloan Digital Sky Survey (SDSS); and from large-scale galaxy cluster observations. The results agree with previous data on supernovae observations that suggested that dark energy remains constant with time and fit well with Einstein's cosmological constant. Moreover, the physicists calculated that if the dark energy density were to change with

time, a big crunch or big rip could not occur for at least 50 billion years for models that allow such events. These findings could lead to these theories being widely reassessed.

"I'm struck by the fact that the dark energy seems so 'vanilla'," Tegmark told PhysicsWeb.

"Theorists have invented scores of elegant models where it increases or decreases its density over time, yet even with this new improved measurement, it remains perfectly consistent with Einstein's Lambda model where its density is a mere constant."

Mining The Imagination For New Energy: Scientists Call For A Research Blitz Targeting Extreme Possibilities

Alan Weisman, Los Angeles Times, July 25, 2004. pg. M.3

<http://pqasb.pqarchiver.com/latimes/669323311.html>

To allay concerns over dwindling oil and mounting carbon residues, President Bush has proposed relying on "clean" coal, a revived nuclear industry and hydrogen cars, which he says could be widely available by 2040. Critics denounce these ideas as either impractical or environmentally outrageous, calling instead for intensified renewable energy development.

Both visions are naive. getting enough clean enough energy, period. As quadrupled last consumption With China and India industrialized feeding current usage will Bush nor know how to meet

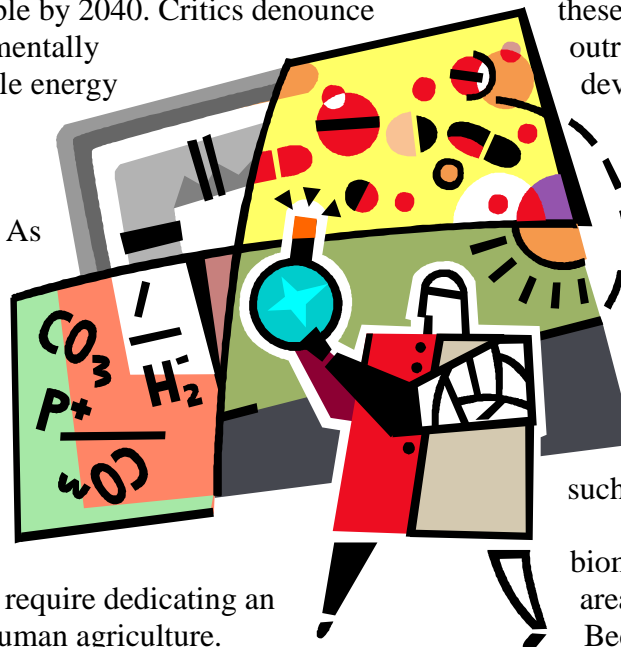
To run the world on of John Kerry's) would require dedicating an all land now used for human agriculture.

energy aren't constant, tapping them on a massive scale not

The dilemma isn't just energy, but getting world population century, power increased sixteenfold. joining the frenzy, by 2050 our triple. And neither environmentalists such demand.

biomass fuel (a favorite idea area comparable in size to

Because sun and wind only means huge arrays of solar panels and turbines but redesigned grids with vast new storage mechanisms.



Atmospheric scientist Ken Caldeira of Lawrence Livermore National Laboratory calculates that if we somehow built 900-megawatt, zero-emissions plants each day for the next 50 years, we'd barely double our current output. Even if we embraced universal nuclear power, there's far too little uranium -- unless we again accept breeder reactors, which proliferate weapons-grade fuel.

Writing in the journal Science, Caldeira and 17 other eminent American and Canadian scientists conclude that the only hope for solving the world's looming energy shortage is to consider things

we've barely imagined. They propose a research blitz of previously unimagined proportions, far beyond what any politician is currently suggesting, in search of entirely new carbon-free technologies.

One of them, New York University physicist Martin Hoffert, has resurrected a notion broached during the first Arab oil crisis: orbiting solar collectors in space, where the sun appears eight times brighter, and beaming it to Earth via microwaves ("probably no stronger than your cell phone's"). In 1978, the concept involved a mirror the size of Manhattan; today the idea is smaller reflectors - - possibly balloons made of shiny Mylar -- strung around the Earth. David Criswell and John Lewis, of the universities of Houston and Arizona, respectively, set their sights higher: on the moon, where reflectors could be made from silicates and metals mined on site, rather than hauled expensively into orbit. The moon might also hold the key to practical, clean nuclear fusion, still elusive on Earth but reportedly more promising if He-3, a helium isotope found on the lunar surface and in the atmospheres of Jupiter and Saturn, is used.

Or, they write, if we can't wean ourselves from coal, then seed our own atmosphere with sulfate particles, which would form an artificial cloud cover to counteract greenhouse warming. Or hang a 2,000-kilometer-wide screen in space, which, like a permanent sunspot, might block enough solar flux to compensate for a doubling of carbon dioxide in the atmosphere. Or try to somehow harness the explosive, fleeting potential energy of antimatter. The idea, Hoffert says, is to imagine everything, however outlandish, in hopes that something proves possible. At Chicago's 1893 World's Columbian Exposition, he notes, technology exhibits for the coming century failed to predict airplanes or television.

But to go from imagination to reality requires commitment and investment. Hoffert proposes spending several hundred billion dollars a year over the next 15 years on an Apollo-scale project to force technology for clean, abundant energy. Although both Bush and Kerry declare that market incentives like emissions trading will produce solutions, Hoffert argues that major technologies of the last 50 years, from space travel to atomic power to the Internet, sprang from government mandates, not markets. "Markets only react to short-term opportunities. They're not equipped to address long-term problems like this one," he said.

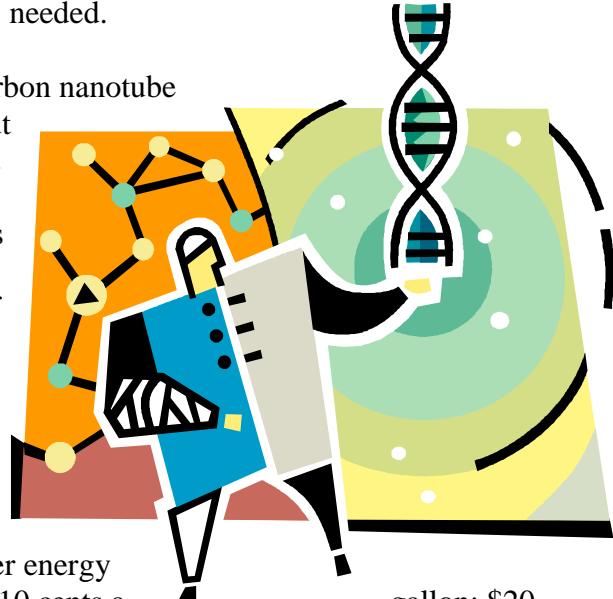
Last July, Hoffert and his coauthors gathered in Aspen, Colo., with other scientists to brainstorm. Discussions included a proposal by high-altitude-wind specialist David Shepard for suspending turbines on giant kites at 30,000 feet, where jet-stream power is enormous. UC Irvine physicist and science fiction novelist Gregory Benford had a low-tech, low-cost plan: Instead of using crop wastes for biomass energy, we'd save even more carbon buildup in the atmosphere by simply burying them at sea. Much talk involved revolutionizing the electrical grid, possibly with superconductors, or by connecting the entire world so the off-peak side could power the half in shadow, as Buckminster Fuller once proposed.

The keynote speaker was Rice University's Richard Smalley, a Nobel laureate and discoverer of the fullerene, the geodesic carbon molecule named for Fuller. When these "buckyballs" align to form carbon nanotubes, they are the strongest substance known – possibly strong enough to send

a tether into space. An elevator moving along such a nanotube cable to a satellite in a fixed geosynchronous position 22,500 miles above Earth could ferry materials for space-based solar collectors far more cheaply than space shuttle launches.

On Earth, the highly conductive nanotubes might form lighter, more flexible grids, vast enough that we could move all our energy through wires rather than with tank trucks. To these grids, Smalley would connect all kinds of storage, ranging from wind compressed into airtight caves to appliance-sized home units that might be batteries, flywheels, hydrogen tanks – whatever would let us both tap and feed the total power supply as needed.

Of course, all this is speculative – the longest carbon nanotube produced so far measures barely half an inch. But Smalley concurs that another Apollo-like project is crucial. Not since then, he notes, have our universities been filled with engineering students inspired by a great challenge. A line graph he projected at Aspen showed the sobering result of subsequent generations diverted to Wall Street or Silicon Valley: As numbers of science and engineering PhDs plummet in the United States, in China and India they've soared. "Suppose" he said, "from 2004 through 2009 we collect 5 cents from every gallon of oil. We invest the resulting \$10 billion per year in frontier energy research. Maybe for the decade after, we collect 10 cents a billion a year. At worst, we'll create a cornucopia of new technologies and new industries. At best, we'll solve the energy problem before 2020 and lay the basis for peace and prosperity worldwide."



gallon: \$20

An expensive long shot, but, as Hoffert noted, the U.S. went from the Wright brothers to the first atomic pile in less time than from now to 2050 – when either we'll have carbon-free energy or face temperatures the Earth hasn't seen for 100,000 years.

"To continue more than another century, we'll have to do all this stuff," he said. "Otherwise, we'll use up all the coal, then maybe methane hydrates on the ocean floor. When we've completely exhausted fossil fuels, civilization will collapse. We'll go back to being hunter-gatherers. It will be much harder for the next intelligent species that evolves because they won't have cheap fossil fuel like we did. They'll have to go directly to fusion and photovoltaic cells. That may not be so easy."

No easier, probably, than imagining Bush's or Kerry's political handlers daring to float so bold a vision. The only thing harder to contemplate is what will happen if some leader doesn't, and soon.

Credit: Alan Weisman teaches journalism at the University of Arizona and is the author of the memoir *An Echo in My Blood*.

Solar PV Can Provide 10% Of U.S. Power By 2025, Says Report

Joel Makower, Refocus Weekly, December 10, 2003

http://www.sparksdata.co.uk/refocus/fp_showdoc.asp?docid=31608218&accnum=1&topics

The installed base of solar photovoltaic in the United States remains "frustratingly small," and a Report outlines measures to "move solar energy beyond a small, niche market into a thriving industry able to contribute significantly to America's energy and national security needs."

"This report illuminates what the current industry players think it will take to sustain or double current total cumulative installation projections by 2025, as well as outlining a far more ambitious path of capturing 10% of total U.S. electricity production by 2025," says Alisa Gravitz of the Solar Catalyst Group, which produced the 'Solar Opportunity Assessment Report' with the research consulting firm Clean Edge. The report examines what is needed to incrementally grow the U.S. solar industry into a "thriving industry" through "bold audacious measures that could dramatically accelerate the transition to a clean-energy future."

Interviews with 30 PV manufacturers and industry officials identified key challenges in the solar marketplace to include its small production scale which keeps quantities low and prices high, the on-again off-again government funding of solar research, a dearth of financing solutions which prices solar out of reach of most users, and a lack of standardized plug-and-play systems that would greatly reduce the complexity and cost of designing and installing a solar-energy system.

New installations of solar PV have experienced a compounded annual growth rate of 24% over the past decade in the U.S., but the report suggests various strategies to double projected installations from 35 GW to 70 GW by 2025, while its SHINE (Solar High-Impact National Energy) proposal calls for 290 GW of cumulative installed PV in the U.S. by 2025, providing 10% of total U.S. electricity.

The industry needs "breakthrough" improvements in technology, "not just incremental ones," to dramatically reduce the cost of solar and improve its efficiency and reliability, the report notes, and there is a "wealth of untapped opportunities that could significantly improve solar's appeal," such as improving economies of scale by building larger plants, improving the 'balance of system' components of a solar installation, and better integrating components so solar can be more cost-effective.

"Despite growing investments by some of the larger players, decreased government funding and relatively meagre venture capital investments in the earliest-stage solar start-ups undercut the chances that the market will see a technological breakthrough in the near term," it explains. "PV

technology will continue to improve and steadily drop in cost, but it will be an incremental evolution" and a major government-sponsored R&D push could greatly accelerate the process.

"To rapidly bring solar to scale requires a simultaneous, coordinated ramping up of both supply and demand," it explains, to overcome the "chicken-and-egg problem of high prices depressing demand, which keeps corporate and institutional Government and military national incentive incentives, utility local building codes.

"There is much work to outlines three pathways accelerated growth and "represent critical, by the solar industry, alike."



prices high." Large purchases from the federal are needed, along with programs, manufacturer cooperation and changes in

be done," and the report of current growth, hypergrowth which strategic choices to be made political leaders and citizens

Among the companies Evergreen Solar, PowerLight, Sharp and Shell Solar.

surveyed were BP Solar,

Clean Edge, Inc., based in the San Francisco Bay Area, is a research and strategic marketing firm that helps companies, investors, policymakers, and non-profits understand and profit from clean-energy technologies. Through its research reports and publications, distributed generation intelligence services, strategic marketing services, and conferences and events, Clean Edge's mission is to accurately track clean-energy trends and identify market opportunities. Founded in 2000 by environmental and high-tech business pioneers Joel Makower and Ron Pernick, Clean Edge and its growing network of partners and affiliates offer unparalleled insight, intelligence, and analysis on clean-energy technologies and markets.

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Complete article in pdf format: <http://www.solarcatalyst.com/soar.pdf>

Biophan Announces Development of Breakthrough Long-Life Biothermal Battery

ROCHESTER, N.Y., May 14, 2004 (BUSINESS WIRE)

Company Acquires Majority Interest in Biothermal Battery Nanotechnology Venture Targeting Approximately \$500 Million Global Market

Biophan Technologies, Inc. (OTCBB: BIPH) a leading developer of next generation biomedical technology, announced today that it has acquired a majority interest in TE-Bio, LLC, a company developing a breakthrough, long-life power source for use in implanted medical devices, such as pacemakers, defibrillators, neurostimulators, and drug pumps.

The technology is based on a patented innovation in the utilization of thermoelectric materials, using nanoscale-based, thin-film materials to convert thermal energy produced naturally by the human body into electrical energy. The resulting power can be used to "trickle charge" batteries for medium-power devices such as defibrillators, or directly power low-energy devices like pacemakers. The Company will be displaying the technology to over 6,000 healthcare professionals at the NASPE—Heart Rhythm Society's Heart Rhythm 2004 Conference, May 19-22, 2004 in San Francisco, CA.

TE-Bio is developing an implantable power system that has the potential to provide as much as a 30-year life--a five-fold increase in service life compared to existing technology. The technology is anticipated to dramatically extend the service life of neurostimulators and drug pumps that are used for treatment of tremors, diabetes, and chronic pain. Furthermore, since these devices can be implanted in young patients, the combination of TE-Bio technology and extended device life may reduce the number of replacement implants needed throughout a patient's life. For further information or to view the patent, please visit www.biophan.com/biothermal.php

Movement from Nothing

Philip Ball, Nature, Feb. 2004

<http://www.nature.com/Physics/Physics.taf?g=&file=/physics/highlights/6974-3.html>

Empty space can set objects in motion, a physicist claims. The empty space between stars contains energy from virtual particles. Motion can be conjured out of thin air, according to a physicist in Israel.

Alexander Feigel of the Weizmann Institute of Science in Rehovot says that objects can achieve speeds of several centimetres an hour by getting a push from the empty space of a vacuum. No one has yet measured anything being set in motion by emptiness. But Feigel thinks it should theoretically be possible to make use of the effect to shunt tiny amounts of liquids around on a lab chip, for example. Such small-scale experiments could be useful for chemists interested in testing thousands of different drugs at the same time, or for forensic scientists who need to do analyses on tiny amounts of material.

The whole idea of getting movement from nothing sounds like a gift to advocates of perpetual-motion machines. But there's nothing in Feigel's theory that violates the fundamental laws of physics, so this doesn't provide a way to *cheat the Universe and get free energy*.

Heisenberg's Uncertainty Principle Formula.

$$\Delta x \Delta p \geq \frac{\hbar}{2}.$$

Instead, Feigel draws on the well-established notion that empty space does contain a little bit of energy. This vacuum energy is a consequence of the uncertainty principle - one of the cornerstones of quantum mechanics. Because of the uncertainty principle, subatomic particles or photons can appear spontaneously in empty space - provided that they promptly vanish again. This constant production and destruction of 'virtual particles' in a vacuum imbues the vacuum with a small amount of energy.

Moving in a Vacuum

Feigel considered the effects of virtual photons on the momentum - a property defined as mass multiplied by velocity - of objects placed in a vacuum, and came to a surprising conclusion. He started with the fact that electrical and magnetic forces between objects are mediated by photons that flit between them. So an object placed in strong electric and magnetic fields can be considered to be immersed in a sea of these transitory, virtual photons.

Feigel then showed that the momentum of the virtual photons that pop up inside a vacuum can depend upon the direction in which they are traveling. He concludes that if the electric field points up and the magnetic field points north, for example, then east-heading photons will have a different momentum from west-heading photons.

So the vacuum acquires a net momentum in one direction - it's as though the empty space is moving in that direction, even though it is empty. It is a general principle of physics that momentum is conserved - if something moves one way, another thing must move the other way, as a gun recoils when it shoots a bullet. So when the vacuum acquires some momentum from these virtual photons, the object placed within it itself starts to move in the opposite direction.

Feigel estimates that in an electric field of 100,000 volts per metre and a magnetic field of 17 tesla - both big values, but attainable with current technology - an object as dense as water would move at around 18 centimetres per hour.

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To the Stars

William B. Scott, Aviation Week & Space Technology, 3/01/2004, page 50

www.AviationNow.com/awst

Zero point energy emerges from realm of science fiction, may be key to deep-space travel
Advanced Technology.

At least two large aerospace companies and one U.S. Defense Dept. agency are betting that "zero point energy" could be the next breakthrough in aerospace vehicle propulsion, and are backing those bets with seed money for ZPE research. If their efforts pay off, ZPE-driven powerplants might enable Mach 4 fighters, quiet 1,200-seat hypersonic airliners that fly at 100-mi. altitudes as far as 12,000 mi. in about 70 min., and 12.6-hr. trips to the Moon.

ONE OF THOSE companies, BAE Systems, launched "Project Greenglow" in 1986 "to provide a focus for research into novel propulsion systems and the means to power them," said R.A. Evans, the project leader, in a technical paper last year. Although funding levels have been modest, Greenglow is exploring ZPE as one element of the program's "project-directed research," according to John E. Allen, a consultant to BAE Systems.

At least one large U.S. aerospace company is embarking on ZPE research in response to a Defense Dept. request, but the company and its customer cannot be identified yet. National laboratories, the military services and other companies either now have or have had low-level ZPE-related efforts underway.

The concept of zero point energy is rooted in quantum theory, and is difficult for even the technically minded to grasp. But theories validated by meticulous experiments have confirmed that so-called "empty space" or what scientists call the "quantum vacuum" actually is teeming with activity. Tiny electromagnetic fields continuously fluctuate around their "zero-baseline" values, even when the temperature drops to absolute zero (0 K) and all thermal effects have ceased.

A leading researcher in this realm of new physics, Hal E. Puthoff, director of the Institute for Advanced Studies here, explains zero point energy this way: "When you get down to the tiniest quantum levels, everything's always 'jiggly.' Nothing is completely still, even at absolute zero. That's why it's called 'zero point energy,' because, if you were to cool the universe down to absolute zero—where all thermal motions were frozen out—you'd still have residual motion. The energy associated with that 'jiggling' will remain, too."

For most technologists, quantum theory conjures up images of extremely minuscule particles and field effects. Why would aerospace companies and governments invest in researching "jiggles" that defy measurement? Because those quantum or vacuum fluctuations—the "jiggles" of zero point energy—if tapped somehow, could produce stupendous amounts of energy and enable deep-space voyages that are impossible for today's propulsion methods.

Spacecraft capable of interstellar travel will approach the speed of light, and may have to extract energy from the vacuum of space. However, researchers could be years or decades from achieving the breakthroughs necessary to build such a propulsion system. "Human transportation within the Solar system will only become technologically practical if there is a breakthrough in terms of speed, coupled with an adequate energy/fuel supply," Evans said.

Energy densities (the amount of energy per unit volume) of the quantum vacuum are comparable to those of nuclear energy—or even greater. Consequently, its potential as an energy source is absolutely enormous. Quantifying the potential of ZPE is difficult, and scientists are reluctant to translate the huge numbers predicted by quantum theory into terms easily grasped. Puthoff's explanation is particularly graphic, though: "It's ridiculous, but theoretically, there's enough [zero point] energy in the volume of a coffee cup to more than evaporate all the world's oceans," Puthoff said. "But that's if you could get at all of it, and you obviously can't. So, when it comes to a practical amount of ZPE [that might be extracted from the vacuum], you're still talking about maybe 1026 joules/cubic meter.

"The potential is practically limitless; way beyond what can be conceived. But until we learn what ZPE embodiment to use [an engineering process to extract ZPE], and to what frequency we can effectively extract the energy, it's really hard to make a practical statement about how much you can actually use," he cautioned. "So far, the embodiments are pitifully small. [Experiments] have produced about the same amount of energy as a butterfly's wing—picowatts or so. But the potential is there."

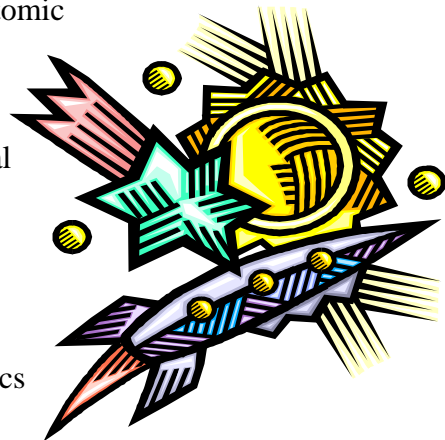
That staggering potential has kept researchers pursuing a "new physics" that some critics classify as near-science fiction. Still, respected scientists and government agencies believe the quest is worth investing time, effort and money. In 1986, the U.S. Air Force's then-Rocket Propulsion Laboratory (RPL) at Edwards AFB, Calif., solicited "Non-conventional Propulsion Concepts" under a Small Business Innovation Research program.* One of the six areas of interest was "Esoteric energy sources for propulsion, including the zero point quantum dynamic energy of vacuum space"

In particular, the late Robert Forward, a respected scientist consulting for RPL (now part of the Air Force Research Laboratory system), recommended additional research of the "Casimir effect," which had suggested the existence of ZPE decades earlier. This phenomenon is attributed to H.G.B. Casimir, a Dutch researcher, who, in 1948, confirmed the reality of quantum vacuum energy by calculating the value of a small force between two uncharged metal plates.

"IF YOU PUT TWO metal plates very close together, they partially shield some ZPE frequencies," Puthoff explained. "That means the energy bouncing back and forth between the plates is less than the energy outside, so the plates get pushed together. Radiation pressure outside the plates is greater than radiation pressure in the somewhat-shielded area between the plates. The plates coming together convert vacuum energy to heat."

In 1997, Steve K. Lamoreaux, a University of Washington atomic physicist at the time, conducted precise measurements of the Casimir effect. His results almost perfectly matched the predictions of quantum electrodynamics theory, according to a peer-reviewed paper in the Jan. 6, 1997, issue of Physical Review Letters (<http://prl.aps.org/>).

A manned space probe powered by ZPE could, theoretically, make a trip to Mars in 7-40 days. Credit: ERIK SIMONSEN



When NASA established the Breakthrough Propulsion Physics (BPP) program in 1996 to research advanced forms of space transportation, it focused on three objectives:

- *Propulsion that required no propellant mass.
- *Propulsion that attained the maximum transit speeds physically possible.
- *Breakthrough methods of energy production to power such devices.

Marc G. Millis, founder and former project manager of the BPP effort, said the program sponsored G. Jordan Maclay, chief scientist for Quantum Fields LLC, was "to look at getting more empirical evidence to flesh-out what this vacuum energy 'stuff' really is." Maclay performed a precise measurement of attractive Casimir forces, and was working to quantify repulsive forces when BPP funding was deleted from NASA's Fiscal 2003 budget (www.quantumfields.com). The BPP program has been on hold since then.

Through private funding, Puthoff and his team have secured patents based on converting ZPE to "miniature ball lightning—micron-size lightning— using a very small traveling wave tube," he said. "It appeared to demonstrate the principle [of ZPE extraction], but we were never successful in scaling it up to useful levels. We're now working on various engineering embodiments to do that, but we're not there yet."

"As to where we stand on energy exchange [research], the force levels and amount of energy are piddly--real, but extremely small," Millis added. "We're still [asking]: Is there any way to interact with this vacuum energy to create forces without rocket propellant? Can we [develop] a form of propulsion that needs no propellant . . . for very deep-space travel?"

So far, the answers have been "no" or, at best, "maybe." But there are striking and encouraging parallels between the evolvment of ZPE and the history of nuclear energy research. Albert Einstein's equations showed that an infinitesimal amount of mass could be converted to a tremendous amount of energy via nuclear reactions. Initially, scientists insisted something was wrong; the numbers were just too large. They didn't make sense. But the mathematics were incontrovertible. Then natural radioactivity was discovered, validating Einstein's equations. However, energy releases found in nature were so small that even Einstein believed radiation could never be harnessed as a useful energy source.

"At that time, it looked like [nuclear] fission was going nowhere," Puthoff said. "The big breakthrough came when [atomic physicist Enrico] Fermi did his famous experiment at the University of Chicago. He found that a material releasing lots of neutrons could act as a catalyst and start a runaway reaction. Fission would take off and cause a big effect--eventually the atomic bomb in the weapons [arena] and nuclear reactors in the energy [production] area."

Zero point energy has a similar history. Predictions from quantum mechanics said ZPE existed, but the huge numbers associated with it prompted questions about the mathematics' validity and suspicions of errors in quantum theory. "Then the Casimir effect was found to be a natural embodiment of natural principles," Puthoff said. "The [general] reaction was: 'OK, but it's a small effect. It's never going to be useful for making energy'--just like what was said about nuclear energy. So, we're now at the stage of looking for the equivalent of Fermi's neutron-source catalyst--something that ignites the ZPE process."

If that "catalyst" is ever discovered, and a ZPE powerplant is developed, how would it affect aeronautics and space travel? Allen, a BAE Systems consultant and engineering professor at London's Kingston University, explored that question in a comprehensive paper published last year by Progress in Aerospace Sciences (www.sciencedirect.com) Entitled "Quest for a Novel Force: A Possible Revolution in Aerospace," the paper included a "what-if" study, based on "a novel force engine." Allen assumed four sizes of the powerplant, referred to as a "mass-dynamic engine," with thrusts in the 5-500-metric-tons (11,000-1.1-million-lb.) range. A likely source of energy for them would be ZPE.

Allen is no stranger to cutting-edge projects, having been involved in the preliminary designs of a transonic nuclear weapon (Blue Danube), an early supersonic guided missile (Blue Steel), early space shuttle work, and several advanced fighter and trainer aircraft at Hawker Siddely. "I am familiar with bringing novelties into successful aerospace hardware, and am well aware of the qualities required to make a successful product," he wrote.

Through a systematic process he calls "imagineering," Allen conceived of several air and space vehicles powered by mass-dynamic engines:

1. A heavy-lift freighter capable of carrying a 1,000-metric-ton payload more than 20,000 km. (10,792 naut. mi.) at speeds of Mach 0.7-0.9.
2. A Mach 4 vertical takeoff/short-takeoff and landing fighter.
3. A 600-1,000-seat airliner powered by two 250,000-lb.-thrust engines.
4. A Lunar craft that would climb slowly to a 36-km. altitude to minimize aerodynamic effects, then accelerate to a maximum velocity of 10-km./sec. (19,440 naut. mi./hr.) until slowing for a landing on the Moon. "This trajectory provides a flight time of 12.6 hr.," Allen suggested.
5. A quiet hypersonic "megaliner" capable of climbing vertically to a 100-mi. altitude, then flying a curved flight path at satellite-like speeds. Allen selected a point-design of 1,200 passengers and a range of 12,000 mi. With upward accelerations limited to 0.5g, flight time would be about 70 min.
6. A Mars transporter that could take a 20-person team to the red planet in 7-40 days, depending on the separation distance between the Earth and Mars.

Allen's analyses showed the performance of these craft is within the realm of feasibility, if using a breakthrough powerplant running on fuel with ZPE-like energy densities.

But is harnessing ZPE feasible, and, if so, how soon? If the expectations of cutting-edge scientists are any guide, a ZPE power source with aerospace applications could be in sight.

"I'd say our confidence level [of a breakthrough] is 50% or better. We have some ideas that we're exploring, but we're not ready to talk about them," Puthoff hedged. "The big hurdle is finding an embodiment that will permit scale-ups to useful levels of energy--finding the catalyst for accelerating currently known processes. If our [research] is successful, almost assuredly there'd be no problem with small units—a few cubic centimeters of ZPE—providing enough energy to power spaceships."

As to when a breakthrough might occur, "We're definitely not stumbling around in the dark any more," Puthoff continued. "It's been shown that zero point energy is real and has real consequences. It's definitely a technology that's not ready for prime time, but it's definitely ready for serious scientific investigation."

Based on an historical cycle of breakthroughs in transportation technology, the human race is due for another big leap in about 2012. Last year, Allen predicted one could occur "within a decade or two. This stage is equivalent to where aeronautics was in the 1890s."

Still, NASA's Millis urges caution. "I really don't want to raise people's expectations too much," he said. "To get overly excited causes more damage [in the field of ZPE research] than skeptics do. We need to make sure we're not extending our claims beyond what the evidence points us to today. To be impartial, I'd say we're not on the verge of grandiose breakthroughs. But we have another embryonic field opening up to us."

Ed. Note: Many of us participated in this famous 1986 SBIR solicitation, proposing to evaluate existing non-conventional energy technologies -- a term coined by engineer George Hathaway.

Nanobulbs Make Their Debut

J. Wei et al., *Physics Web*, 4 June 2004, *Appl. Phys. Lett.* 84 4869,
<http://www.ece.lsu.edu/bwei/webpage.htm>

Light bulbs have not changed much since they were invented by Thomas Edison 125 years ago. However, physicists in China have now made a light bulb in which the conventional tungsten filament is replaced by carbon nanotubes. The new design has several advantages over traditional light bulbs and could be available in less than five years.

Jinquan Wei and colleagues from Tsinghua University and Louisiana State University started by using highly pure nanotubes. Next they soaked the resulting bundles of structures into long filaments as the alcohol evaporated. Finally they replaced the tungsten filament in the bulb under vacuum.



University and Bingqing Wei at chemical vapour deposition to soaked the resulting bundles of structures into long filaments as replaced the tungsten filament in the nanotube filaments and sealed

The team found that the nanotube filaments emit light across their length and that they have a lower threshold voltage for light emission than tungsten filaments -- 3 to 5 volts compared with 6 volts. More importantly, the nanotube filaments ***emit more light than tungsten filaments at the same applied voltage.*** The light is a combination of black body radiation and electroluminescence.

Wei and colleagues were surprised to find that, unlike tungsten filaments, the resistance of the nanotube filaments did not change with temperature up to about 1750 Kelvin. This means that the nanotube filaments could be used to make precision resistors that work at high temperatures. Moreover, they found that the bulbs could operate continuously at 25 volts for more than 360 hours, and that they continued working after being turned on and off more than 5000 times.

"More work needs to be done but I would say the bulbs could be available within three to five years," Bingqing Wei told *PhysicsWeb*.

Nanopulses Tweak the Innards of Cells

Anil Ananthaswamy, 06 February 04, New Scientist

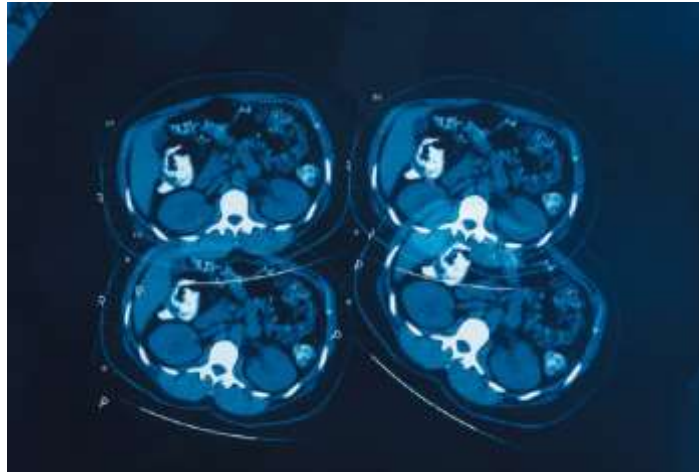
<http://www.newscientist.com/news/news.jsp?id=ns99994635>

A method that would allow doctors to tweak the innards of cells without even touching a patient's body is being developed in the US.

The technique is still in its infancy, and it is still not clear exactly what it does to cells. But initial experiments suggest it might one day be possible to use the technique to treat cancer, speed up healing or even tackle obesity.

The method involves exposing cells to an extremely powerful electric field for very brief periods. "The effects of these pulses are fairly dramatic," says Tom Vernier of the University of Southern California in Los Angeles, who will present some of his team's results at a nanotechnology conference in Boston in March. "We see it as reaching into the cell and manipulating intracellular structures."

Applying electric pulses to cells is not new. In a technique called electroporation, electric fields that last hundreds of microseconds are applied to cells. The voltage charges the lipid molecules in the cell membrane, creating transient holes in the membrane. The method can be used to help get drugs or genes into cells.



Major physiological event

But the latest technique involves more powerful electric fields, with gradients of tens of megavolts per metre, applied for much shorter periods. These nanosecond-pulsed electric fields are too brief to generate an electric charge across the outer membrane of cells, but they do affect structures within cells.

One of the main effects seems to be calcium release from a cellular structure called the endoplasmic reticulum. "In a nanosecond, we cause this major physiological event in the cell," says Vernier. "It's completely indirect and remote, and it's an extremely rapid transition."

The nanopulses can also trigger cell suicide. Teams led by Vernier, Karl Schoenbach of Old Dominion University and Stephen Beebe of Eastern Virginia Medical School, both in Norfolk, Virginia, have shown that nanopulsing can kill tumour cells in culture.

The pulses do not just fry cells, but lead to changes such as the activation of enzymes called caspases, an early step in cell suicide. How the pulses do this is not clear, but Vernier says the effect is not related to calcium release.

Cell suicide

So could nanopulsing help treat cancer? In a preliminary test, Schoenbach and Beebe used needle-like electrodes to generate pulses near tumours in mice. Nanopulsing slowed the growth of tumours in four mice by 60 per cent compared with tumour growth in five untreated mice. The researchers hope that with better delivery systems they could make the tumours shrink.

Beebe's team has also found that the pulses can trigger suicide in the cells that give rise to fat cells, possibly opening up a new way of treating obesity, Beebe speculates. And Vernier is working with doctors at the Cedars-Sinai Medical Center in Los Angeles to see if nanopulses can speed up the healing of wounds. "We do see an effect, but that's about all I can say now," he says.

The next step is to develop a way to deliver the pulses to cells and organs deep within the body. Theoretical models suggest that nanosecond pulses of broadband radio signals could do it. "An array of such antennas would create, through superposition of electric fields, a very high electric field right where we need it," says Schoenbach.

A Sweet Way to Fuel Cars

By TERESA RIORDAN, New York Times, June 21, 2004

<http://query.nytimes.com/mem/tnt.html?tntget=2004/06/21/technology/21patent.html&tntemail1>

YOU may not be able to refuel your car with corn syrup or charge your computer by plugging it into a bottle of Coca-Cola anytime soon. But to Stanley H. Kravitz and a group of researchers at Sandia National Laboratories, sugar looks like the new oil. Dr. Kravitz and his colleagues have begun to apply for patents covering ways to convert glucose, a basic form of sugar, into energy.

Glucose seems an obvious potential source for fuel. Unlike hydrogen, for example, it is renewable, cheap and abundant. "The problem with hydrogen is that it isn't just found in the air or lying around," Dr. Kravitz said. "You have to do something quite energy-intensive to break apart some molecule in order to get hydrogen. That's the Catch-22."

So why aren't other researchers trying to power their fuel cells with glucose rather than hydrogen? Glucose molecules, it turns out, are not easily persuaded to give up their energy. Over time, naturally occurring enzymes have turned mammals into glucose-burning machines. The human body, for example, metabolizes glucose in a delicately



choreographed dance. Twelve different enzymes partner in succession with the glucose molecule, each enzyme sending two electrons spinning offstage into cellular power sources and thereby fueling the body. (If the body does not need this energy when it is made, the body stores it as fat.)

One approach that Sandia researchers are taking is to genetically engineer enzymes that mimic those in the human body. "If evolution figured it out, we should be able to figure it out," Dr. Kravitz said. Another approach is nonbiological, using metals like platinum to liberate electrons.

Early potential applications of glucose fuel cells would require only small amounts of energy. For example, security systems to detect movement or the presence of chemicals could use sensors that would be plugged into trees, siphoning glucose from sap for energy. "They could be put in covertly and left for months in places that are risky, where you don't want to have to be changing batteries," Dr. Kravitz said.

The Sandia researchers are not the only ones who are converting glucose to energy. Adam Heller, a professor at the University of Texas and a founder of TheraSense, a manufacturer of blood-glucose monitoring devices that was acquired in April by Abbott Laboratories recently received patent 6,531,239 for a glucose fuel cell.

Last year, Professor Heller and colleagues published a paper in *The Journal of the American Chemical Society* describing the tiniest fuel cell ever built in a living organism -in this case, a grape, whose sap provided the glucose fuel. Professor Heller said he might use a similar fuel cell to run a continuous glucose monitor that he is developing. Embedded in a patient's skin for three days, the device would eliminate the daily pricking that most diabetics endure to keep track of glucose levels. The device would generate minute amounts of electricity from the patient's own glucose as a measuring tool, to track blood sugar levels. By contrast, Dr. Kravitz said, the Sandia researchers are "making electricity for electricity's sake - as a power source."

Dr. Kravitz and fellow Sandia researchers are developing an array of tiny glass needles, as slim and sharp as a mosquito's proboscis, that could, for example, be imperceptibly "plugged in" to a soldier's arm and used to convert glucose from the human body into energy. "Suppose you could make a patch that went on the arm and had little micro needles that didn't hurt," Dr. Kravitz said. "Now the soldier just needs to eat an Oreo cookie to keep his radio going." Such a device could also siphon excess glucose out of the blood of a diabetic, Dr. Kravitz speculated. So this research could solve both the world's energy problem and the obesity epidemic simultaneously? "That's sort of a wild and crazy idea," Dr. Kravitz said. "But then again, maybe not."

In any case, the Sandia researchers have a lot of work to do. A three-year, \$6.4 million grant will end in September, and the researchers are looking for new financing. "The efficiency stinks right now," Dr. Kravitz acknowledged, noting that so far Sandia researchers were able to produce power in the milliwatt range, enough to power a tiny light-emitting diode - while a car would require kilowatts of power. "We've increased the efficiency by a factor of a thousand in a period of three years," he said. "But we need to go up by a factor of a million."

Note: Patents listed in this **Future Energy Annual** may be viewed on the Web at www.uspto.gov or may be ordered through the mail, by patent number, for \$3 from the Patent and Trademark Office, Washington, 20231.

California Unveils Solar Initiative

Environmental Media Services, Aug. 3, 2004 www.ems.org
<http://environmentcalifornia.org/envirocaliftoxics.asp?id2=13122>

The California EPA announced a "Million Solar Homes Initiative" this week to achieve Governor Schwarzenegger's campaign promise of building half of all new homes with solar power. Environmental groups are now urging Schwarzenegger to endorse the plan.

In May 2004, California's state senate [passed legislation](#) that would require 55 percent of new homes to be built with solar panels installed by 2010. The panels would provide about half the power needs for the homes.

The EPA plan would achieve a similar goal as the senate plan, but would give builders until 2020 to include solar panels on half of new homes.

> L.A. Times, Aug 3, "[State Seeking to Boost Use of Solar Energy](#)"
<http://www.latimes.com/news/local/la-me-solar3aug03,1,6452392.story>

> Environment California press release, Aug 3, "[Administration Proposes Strong Initiative To Achieve Governor's Solar Homes Goal](#)"
<http://environmentcalifornia.org/envirocalifenergy.asp?id2=13999>

IRI Financial Report 2004

Figures from IRS Form 990-EZ

Revenue and Expenses: Fiscal Year Ending December 31, 2004

| Revenue | |
|---------------------------|-----------------|
| Contributions | \$17,186 |
| Program Services | \$0 |
| Investments | \$0 |
| Special Events | \$0 |
| Sales | \$22,219 |
| Other (Memberships) | \$2,810 |
| Total Revenue | \$42,215 |
| Total Expenditures | \$42,068 |
| NET GAIN/LOSS | \$147 |

Balance Sheet: Fiscal Year Ending December 31, 2004

| Assets | Jan 1, 2004 | Dec 31, 2004 |
|---------------------|--------------------|---------------------|
| Cash & Equivalent | \$4,492 | \$3061 |
| Land and Buildings | \$0 | \$0 |
| Other | \$4,675 | \$5020 |
| Total Assets | \$9,167 | \$8,081 |

| Liabilities | Jan 1, 2004 | Dec 31, 2004 |
|--------------------------|--------------------|---------------------|
| Total Liabilities | \$6,948 | \$5,715 |

| | | |
|---------------------|----------------|----------------|
| FUND BALANCE | \$2,219 | \$2,366 |
|---------------------|----------------|----------------|