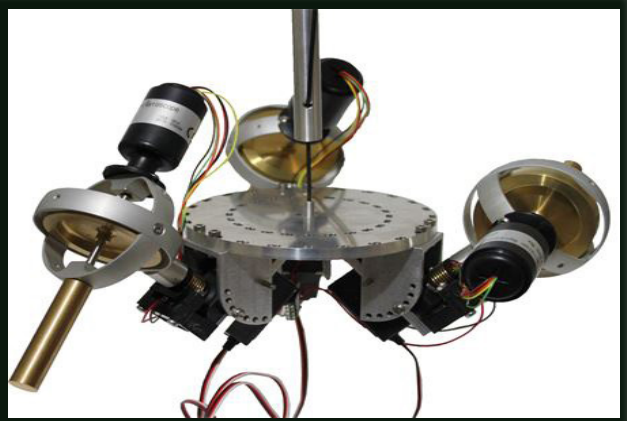
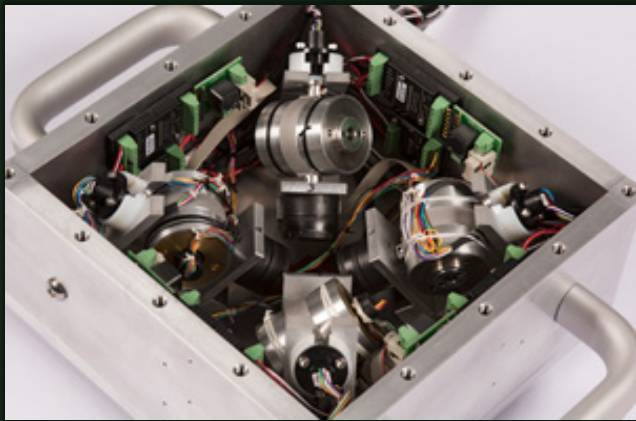


Integrity Research Institute Annual 2016

*A Review of IRI's Projects and
Financial Report*



Energy, Propulsion, Bioenergetics

COVER: IRI-funded materials for the Control Moment Gyroscope (CMG) Research Project on the right, with the gracious volunteer labor of engineer Mike Gamble, formerly with Boeing, where he worked on similar two and four gyro projects for keeping satellites in orbit, using forced precession gyros in a scissoring mode. Another four gyro balance stabilizer is shown on the left.

CREDITS

Integrity Research Institute wishes to acknowledge the following for this IRI Member's Annual Report

Jacqueline Panting, ND
Mike Gamble
Bob DeBiase
Dr. Norm Shealy
Linda Moulton Howe
Dr. Jim Hansen



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PRESIDENT'S LETTER

This past year was very important for IRI since we pioneered an apparently lasting collaboration for our conferences with Steve Elswick at TeslaTech, LLC with COFE8, which was successful in attracting high quality speakers and authors, with DVD creation and Proceedings going into print and online for our IRS-mandated public education service. My 2017 retirement from the government will make COFE9 even better.

We are looking forward to promoting the Spiral Permanent Magnetic Motor since it needs very little innovation to be self-sustaining. It also is a low risk and high pay back project. Some interested benefactors are also contacting us for this and the Diode Energy Array Converter (DEAC), also familiar to our Members, based on my two zero-point energy books, with a higher amount of investment required and more complexity for its fabrication but possessing no moving parts.

IRI now has intellectual property with the assigned rights to US patent #8,825,174 on Antioxidant Electric Clothing by Dr. Jacqueline Panting, a naturopathic doctor on our staff and will be seeking funding for prototyping the product. We also have been successful in producing an OsteoPad which was patterned after three medical doctors' research who I used to know in the 1980s but never produced a commercial product for reversing osteoporosis, osteopenia, and cartilage loss, even though their patients benefitted from half the time for bone knitting of fractures. Our clients have been obtaining Bone Density tests before and three months after using the OsteoPad each night and their doctors are amazed stating "statistically significant improvements" in bone density www.OsteoPad.org. We might also be interested in patenting the EM Pulser or EM PulsePad products that have been developed based on another doctor's work (Dr. Glen Gordon) who reversed his congestive heart failure and bicycled across the US afterwards with his prototype model (EMPulse) which obtained FDA approval for a time. www.BioenergyDevice.org

I may have mentioned in the past newsletters the two propulsion projects that were just started last year with Mike Gamble (Control Moment Gyro for electrically powered unidirectional force as Boeing has been doing for years on their satellites) and with Robert DeBiase (Casimir Force Generator for unidirectional force on a microscopic scale). Both have been presenters at our Conference on Future Energy in the past, so we have DVDs and papers and/or slideshows from them as well. Both projects are also progressing along very well and should result in presentations at future COFE events. www.futureenergy.org

Lastly, our IRI Annual Report for 2016 is the most future energy news that can be packed into one report, including updates from 2014's Annual Report which had numerous IRI advocacies that have been vindicated. See future energy in person...attend COFE9!

Thomas Valone, PhD, PE
President

INTEGRITY RESEARCH INSTITUTE HIGHLIGHTS 2016

Conferences and Appearances

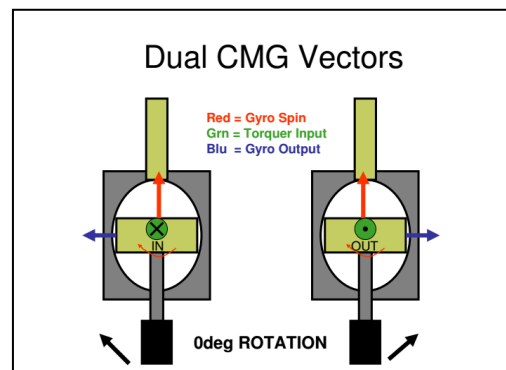


We held our 8th Conference on Future Energy (COFE8) on July 30- Aug 1 at the Embassy Suites In Albuquerque NM. It featured 14 speakers who presented on a wide array of new-energy technologies, emerging renewables, advanced future energy concepts, advanced propulsion concepts and bioelectromagnetics. This conference was educational, entertaining and useful to all attendees, who included government, military, academic delegates as well as energy scientists,

entrepreneurs and inventors from all over the world. Then on September 21-23rd, Dr Valone presented at the Annual World Engineering and Energy Conference (WEEC), in Washington DC. His presentation featured our latest findings on Emerging Energy Technology. Dr. Valone also appeared on 3 radio interviews this year: The Linda Moulton Howe Radio Show, in January 28th; The AuroraTek Radio Show on April 7th; and the 21st Century Radio Show on December 4th 2016.

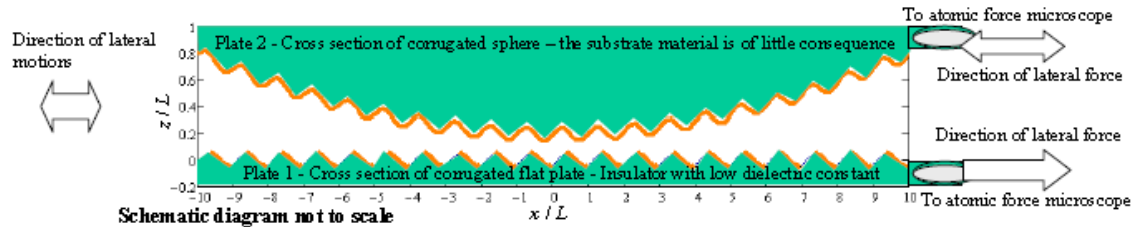
Propulsion Program

The Control Moment Gyro Project (CMG) was started this year. Dr Valone is the principal director and Mike Gamble the Chief Investigative Engineer. For years, Inertial Propulsion has been advocated by IRI and now we are sponsoring with a small grant, the replication of a table-top model. The purpose of this experiment is to show that thrust is possible by scissoring gyros. Initial funding has been provided by our Institute and as we move forward will be seeking more. Engineer Mike Gamble will be presenting at COFE9 with his results and data.



The Casimir Force Project with Robert DeBiase is another propulsion project which seeks to utilize the quantum vacuum Casimir force with a unique design that has been theoretically predicted by DeBiase to *rectify the Casimir force* and move one corrugated plate laterally with respect to the

other one, as diagrammed below. Dr. Thorsten Ludwig has volunteered the use of his Scanning Electron Microscope in Germany for the testing of an experimental setup, which is progressing along fairly well on a limited budget. Bob DeBiase presented at COFE8 on the realistic quantum force producer based on the Casimir force, which IRI has facilitated a collaboration with Dr. Thorsten Ludwig to create a nanotech-size proof of principle. DVD.



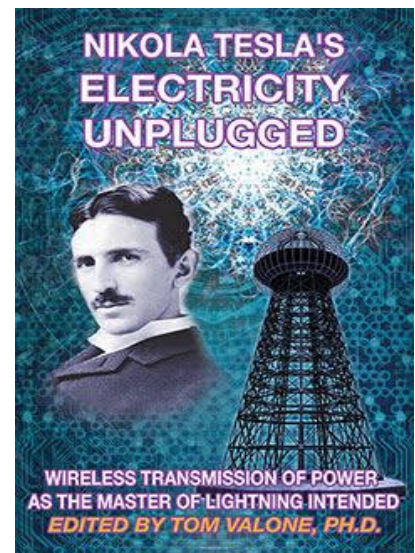
Future Energy Program

Research of new emerging technologies; public appearances, free newsletters, brochures, and reports that include the latest news on energy developments, discoveries and research given to the public. “Future Energy eNews” is sent via email, monthly, to over 8000 recipients worldwide, free of charge through Constant Contact email service. This electronic newsletter showcases all the latest emerging eco-friendly new energy technologies that are being developed worldwide each month and published in Journals, Magazines and Newspapers. IRI also published the “**Future Energy**” Quarterly Magazine, and mailed it to all members for free. This magazine contains all the latest articles relating to emerging energy technologies. We continue to upgrade our IRI website including more information on emerging energy technologies, climate change, and are committed to improving it mainly with a bunch of video uploads and press releases, which will help make our www.IntegrityResearchInstitute.org website a knowledge-based resource for information.

IRI Publications and Books

We are most proud of our new Publications and books in 2016

- 1). IRI is now the US publisher of the book “**MindBending: The Hutchison Effect**” written by George Hathaway, originally in Canada. The book was edited by Dr. Valone and some additional data and findings were added to the original text.
- 2: “Future Energy Annual 2015” was published and mailed free to our membership. Includes our latest papers on Energy, including Zero Point Energy, Electrogravitics, Energy generation, Bioelectromagnetics, as well as the **IRI Annual Report** for 2015 and financials.
- 3: The new book “Tesla Electricity Unplugged, Wireless energy as the Master of Lightning Intended” edited by Dr. Valone are published by Adventures Unlimited Press. With over 500 pages, it includes a Foreword by Dr Valone, several



historical articles and a groundbreaking paper by the Corum brothers on surface waves that will revolutionize the market.

Zero Point Energy

The research continues on the possibility of tapping zero point energy through zero biased diodes. A new study with Robert DiBiase and in partnership with Veden Akademie is being mapped out based on his paper presented at COFE7 and 8. IRI will be seeking funding for this study as well. In our lab, we continue to research and journal papers are being prepared for submission to several physics journals including one for the Institute of Physics Journal which will propose the use of zero biased diodes arrays as thermal electric noise rectifiers and non-thermal energy harvesters. We are currently working with several students who are designing ways to harvest energy with zero biased diodes. Much research is still being done for this paper and completion is slated for 2019.

Bioenergetics Program

We are remarkably busy with this program that includes research on equipment, electrotherapy machines and providers of electrotherapy. We have two new products: the **EM PulsePad**, which is similar to the **EM Pulser**, with a small flexible pad that can easily be placed anywhere on the body and the OsteoPad **MaxiMat** which increases bone healing and production just like the OsteoPad but is now 5 feet long for a total body treatment. Exciting results have been obtained from these products by our clients, including avoiding black and blue from an impact sprain, reversing angina, increasing bone density, to name a few. Testimonies are on www.BioEnergyDevice.org. The Microcurrent



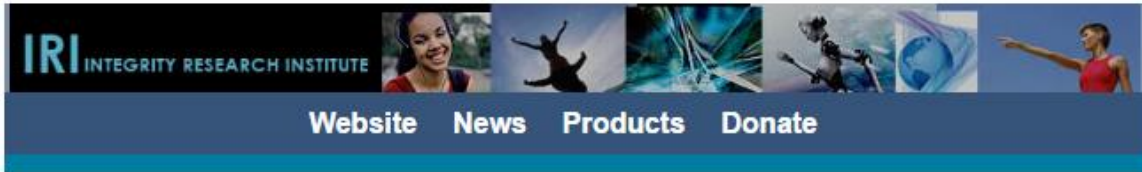
Electrotherapy clothes project is moving forward with licensing efforts since we have the Patent #8,825,174 by the US Patent and Trademark Office. The preserving of the invaluable, Puharich Laboratory Notes by Dr. Andrija Puharich will continue through 2017. Our line of PREMIER electrotherapy devices continue to be improved and sold on a regular basis from www.BioenergyDevice.org.

The Control of Electron Spin in a Magnetic Field Experiment Project

We continue with this program that we are doing together with Veden Akademie, a charitable research institute like IRI, in Kränzlin, Germany. The experiment aims to study single quantum events with a single electron spin under different subtle influences. The experiment is suitable to discover new interactions with energy fields, including consciousness. The study will continue to at least 2020.

Future Energy News Program

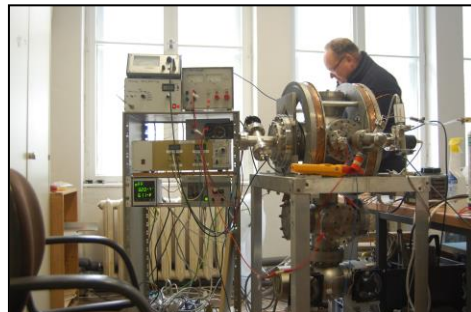
Three public events stand out from the past year: October 14, 2016, Dr Valone presented at the Annual **World Engineering and Energy Conference (WEEC)** in Washington DC. His presentation featured our latest findings on Emerging Energy Technology. In November, Dr Valone appeared on the **21st Century Radio Show** and discussed PEMF healing devices. July 30 – August 1, 2016, COFE8 was held in Albuquerque, NM.



Future Energy eNews

Research of new emerging technologies; public appearances, free newsletters, brochures, and reports that include the latest news on energy developments, discoveries and research given to the public. We are delighted in our re-designed *“Future Energy eNews”* template that is now mobile friendly!. Future Energy eNews is sent via email, monthly, to over 8000 recipients worldwide, free of charge through Constant Contact email service. This electronic newsletter showcases all the latest emerging eco-friendly technologies that are being developed worldwide and published in Journals, Magazines and Newspapers. Also we published the *“Future Energy Quarterly Magazine”*, and mailed it to all members for free. This magazine contains all the latest papers and articles relating to emerging energy technologies. Also we continue to upgrade our IRI website including more information on emerging energy technologies, climate change, and video uploads and press releases.

The Single Electron Spin in a Magnetic Field Experiment Program. This program that we are doing together with Veden Academie, a charitable research institute like IRI, in Kränzlin, Germany continues to research and capture data. The experiment aims to study single quantum events with a single electron spin under different influences and is suitable to discover new interactions with energy fields. In order to make experiments with a single electron spin, a Magnesium-Ion will be stored



in a linear Paul Trap. The Ion-Trap has been machined and set up in Kolberg, Germany. An ultra high vacuum chamber was purchased in December as well as a 280 nm Laser beam with a line width of 1-3 MHz will be used to study the energy state of the electron spin via fluorescence. A UV-camera is taking pictures of the stored ions in the energetic higher spin state. When an external influence

changes the spin state of the electron the ion will disappear on the picture and will be seen again when the state is flipped back to the higher state. We hope to have a paper published on this experiment in the next 2-3 years.

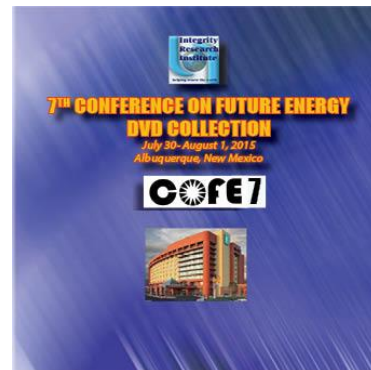
Bioenergetics Program. We are truly busy with this program that includes research on equipment, therapy machines and providers of electrotherapy. The Microcurrent Electrotherapy Antioxidant clothes project is moving forward with different prototypes and possible licensing clients. We hold a US Patent on it and expect to start selling or arranging a license for it in the next year or so. We now have the newly



designed device EM-PULSER with a new battery compartment, easier to use and AC plug adapter. The preserving of the invaluable, Puharich Laboratory Notes by Dr. Andrija Puharich will continue through 2017. Dr. Puharich developed, among other achievements, the cure of nerve deafness with his unique TransDermal (TD-1000) device, which has been acquired by IRI. The OsteoPad and OsteoPad Deluxe MaxiMat are

selling well and have a new circuit design which has a stronger signal that has given greater health benefits. Our line of **PREMIER** electrotherapy devices continue to be improved and sold.

IRI Publications: “Speaking of your Injury” DVD which features Dr Glen Gordon is now being published by us. It features an hour length discussion on nanosecond PEMF healing. Also, the Complete COFE7 Conference DVDs are now available for sale and include all 14 speakers plus speakers from the joint Sessions with Tesla Tech Conference. The Proceedings of COFE7 and COFE8 are also being edited for online publication and FREE download for the public access to all of the great discoveries from that conference on future energy. Dr. Nick Simos’ presentation at COFE7 on Tesla’s wireless provoked President Valone to fulfill his promise to edit such a book for publisher Adventures Unlimited Press, which is now in print! Visit Amazon.com to get the 457 page book, *Nikola Tesla’s Electricity Unplugged* or order online from Integrity Research Institute.



Conference on Future Energy. As a vital part of our IRS-mandate for public education in keeping with our mission centered on emerging energy in all of its forms, such as new energy, propulsion production, and bioenergetics, IRI conducts a groundbreaking Conference on Future Energy (COFE) each year in New Mexico. Besides the Casimir force producer experiment pioneered by Robert DiBiase, COFE8 in 2016 also

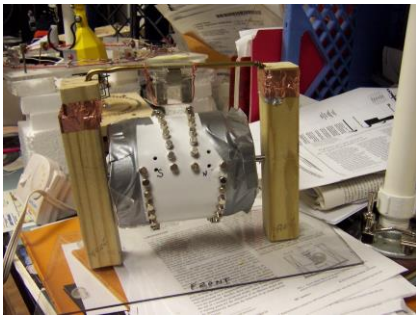
featured plenary speaker, Linda Moulton Howe who presented a two hour marathon autobiographical slideshow and the most compelling evidence for captured UFO craft as well as unexplained laminated Electrogravitics material (her DVD will be sent to members). Another plenary speaker, Norm Shealy, MD was also gracious enough to present at both conferences, COFE8 and ExtraOrdinary Technology, with his inspiring slideshow on achieving longevity – highly recommended. Other researchers who presented at COFE8 included William Alek #1 - Inertial/Gravitational Mass Modification for FTL



Deep Space Applications and #2 - Constructing Free Energy - Overunity Devices using Spin-Zero Core Technology; Mike Gamble - former Boeing engineer presenting on BATTERIES NOT REQUIRED - The Real Tesla Electric Car

Motor; Thorsten Ludwig - physicist from Germany presenting on Energy Extraction and Detection with Zero Point Energy, Magnetism and Consciousness; Moray King - The Nanobubble Revolution and Nanocavity Plasma; Stefan Weigandt - New Technology for a Better Life Quality - New Solution for You; Don Reed - Stueckelberg Off-Mass Shell Model for Particle Interaction and Hidden Dimensions of Time and Mass; Dr Tom Valone - physicist and engineer presenting on Applications of Electrogravitics for Advanced Propulsion; H. David Froning - physicist and faculty member of University of Adelaide presenting on Faster than Light experiments (book); Tim Wilson - corporate CEO and successful entrepreneur presenting on Monopole Magnet Dumbell Atom Model with Demo; Dr. Elliott Maynard - BRAVE NEW MIND: Future-Science Transformation of the Global Biosphere (latest book)

Zero Point Energy Program. The research continues on the possibility of tapping zero point energy through zero biased diodes. In our lab, we are currently researching this ability and many journal papers are being prepared for submission to several physics journals including one for the Institute of Physics Journal which will propose the use of zero biased diodes arrays as thermal electric noise rectifiers and non-thermal energy harvesters. We are currently working with several students who are designing ways to harvest energy with zero biased diodes. Much research is still being done and our hope is that a paper for publication in the Energy Harvesting Journal will be ready and accepted in the next 2 years. One of the most exciting areas of zero point energy harvesting is with the



Spiral Magnetic Motor Project (see COFE7 presentation by Valone) IRI is advocating a journal article to update the physics of the quantum vacuum to lay a firm foundation for the access to *angular momentum of the vacuum* in the sustaining magnetic field of permanent magnets since it is created from spinning electrons that are accessing zero point energy. Secondly, IRI is negotiating a collaborative development program with a well-known custom magnet company to design the

optimum magnets for the Permanent Magnet Spiral Magnetic Motor. With such a two-prong approach, the completion of a self-sustained permanent magnet motor will be feasible in this decade.

Tesla Wireless Geoengineering Power Transmission Review

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Abstract

The concept of wireless transmission of power, as proposed by Nikola Tesla in 1903 with the erection of the famed Wardencllyffe Tower on Long Island (seen on this page), has largely been ignored for the past century until recently. The Witricity Company, citing Tesla's concept, received a MacArthur Foundation grant only to explore inductive coil coupling for short distance power transfer. However, Nikola Tesla is well known to have stated the remarkable difference of his long distance electrical power transmission method: "When there is no receiver there is no energy consumption anywhere. When the receiver is put on, it draws power. That is the exact opposite of the Hertz-wave system...radiating all the time whether the energy is received or not." Thus, with Tesla's futuristic and efficient transmission of power, source dissipation will only be experienced when a load is engaged in a tuned, resonant receiver somewhere on the earth. This fact alone represents a major leap forward in electrical transmission efficiency, even now, one hundred years later.¹ This research report is a survey article that serves to provide the only update available today on the status of realizing Nikola Tesla's greatest dream of providing the world with wireless electrical power, over one hundred years after he invented it.

Introduction

Nikola Tesla's discovery of pulsed propagation of energy does not resemble the standard transverse electromagnetic waves so familiar to electrical engineers everywhere. Many engineers and physicists have dismissed Tesla's wireless energy transmission as unscientific without examining the unusual characteristics and benefits of *longitudinal waves*. As a result of sponsoring the Nikola Tesla Conference & Expo (Nov. 8-9, 2003) in recognition of the Centennial of the Wardencllyffe Tower (1903-2003) the group of scientists in attendance agreed that an explanation of Tesla's superior energy transmission discovery is warranted, to help educate the public. An anthology, *Harnessing the Wheelwork of Nature: Tesla's Science of Energy*², edited by this author, was published to honor the Centennial. It documents the unusual method of pulsing a broadband Tesla coil at a repetition rate of 7.5 Hz to resonate with the Earth's Schumann cavity as Dr. James Corum explains, in one of his papers in the book (HWN, p. 198) entitled, "Tesla & the Magnifying Transmitter: A Popular Study for Engineers," that a mechanical analog of the lumped circuit Tesla coil is an easier model for engineers to understand. From mechanical engineering, the "magnifying factor" can be successfully applied to such a circuit. "The circuit is limited only by the circuit resistance. At resonance, the



The 187-foot Wardencllyffe Tower in 1903 which stood unfinished for the next 14 years. The two-story power plant, by comparison, is in the background.

current through the circuit rises until the voltage across the resistance is equal to the source voltage. This circuit was a source of deep frustration to Edison because voltmeter readings taken around the loop did not obey Kirchoff's laws!" As a result, Edison claimed such a circuit was only good for electrocution chairs.

"All that is necessary," says Corum, "is that his transmitter power and

¹ Tesla, Nikola, "The True Wireless," *Electrical Experimenter*, May, 1919, p. 28

² Valone, Thomas, editor, *Harnessing the Wheelwork of Nature*, Adventures Unlimited Press, 2002 (hereafter: "HWN")

carrier frequency be capable of round-the-world propagation." In fact, Tesla stated, "With my transmitter I actually sent electrical vibrations around the world and received them again, and I then went on to develop my machinery" (*L.A. Times*, Dec., 1904), which was verified by Corum.

The power loss experienced by this pulsed, electrostatic discharge mode of propagation was less than 5% over 25,000 miles. Dr. Van Voorhies says, "...path losses are 0.25 dB/Mm at 10 Hz", which often is difficult for engineers to believe, who are used to transverse waves, a resistive medium, and line-of-sight propagation modes (HWN, p. 151). The *capacitive* dome of the Wardencllyffe Tower is a key to the understanding of Tesla's unique longitudinal waves (like audio pressure wavefronts), also called scalar waves in various electromagnetism textbooks. Dr. Rauscher quotes Tesla, "Later he compared it to a Van de Graaff generator. He also explained the purpose of Wardencllyffe...one does not need to be an expert to understand that a device of this kind is not a producer of electricity like a dynamo, but merely a receiver or collector with amplifying qualities" (HWN, p. 235).

Nikola Tesla, the father of AC electricity, is famous for recognizing that an atmospheric and a terrestrial storage battery exists here on earth, just waiting to be tapped for the good of mankind. This is the *wheelwork of nature* that Tesla was referring to.³ The visionary scientists who have contributed to the *Harnessing the Wheelwork* book offer a collective argument of what Tesla meant by that phrase. Dr. Andrija Puharich, whose biography of Tesla (HWN, p. 89) is rich with personal insights, also develops with great care, the background and unexpected uses for Tesla's Magnifying Transmitter (TMT), another phrase for Tesla's wireless transmission of electrical power, as distinguished from wireless telegraphy for which he is also famous. It is surprisingly practical, even today, as the brilliant minds in this book prove. Tesla was at least a century ahead of his time, however, so people stole his ideas, left him penniless, and ignored his saintly concern for the human race. It is projected that, as global community consciousness expands in the 21st century, Tesla's ideas about sharing energy with the whole world will be more understood and appreciated.

Today we are faced with the consequences of the fateful decision in 1905 by J. P. Morgan to abandon Tesla's Wardencllyffe Tower project on Long Island, once he learned that it would be designed mainly for wireless transmission of electrical power, rather than telegraphy. He is reported to have complained that he would not be able to collect money from the customer in any feasible way. This mercenary attitude by the world's richest man forced the nation to pay for thousands of miles of transmission line wires, just so an electrical utility meter could be placed on everyone's house. In the same vein, the U.S. Energy Association in Washington, DC trains representatives from the former Russian states how to reliably do the same in their countries, in order to ensure monthly payments for electricity delivery.

History and Development of Theory

No one, except for the few great physicists like Drs. Corum, Simos, Rauscher, Van Vlaenderen, Meyl, and Van Voorhies, has realized that Tesla was very practical when he proposed the resonant generation and wireless transmission of useful electrical power, after returning from his experiments at Colorado Springs in 1900. For example, Professor Rauscher shows that the earth's ionosphere and magnetosphere contains sufficient potential



energy (at least 3 billion kilowatts each) so that the resonant excitation of the earth-ionosphere cavity can reasonably be expected to increase the amplitude of natural "Schumann" frequencies, facilitating the capture of useful electrical power⁴. Tesla knew that the earth could be treated as one big spherical conductor and the ionosphere as another bigger spherical conductor, so that together they have parallel plates and thus, comprise a "spherical capacitor." Dr. Rauscher calculates the capacitance to be about 15,000 microfarads for the complete earth-ionosphere cavity capacitor. W.O. Schumann is credited for predicting the "self-oscillations" of the conducting sphere of the earth, surrounded by an air layer and an ionosphere in 1952, without knowing that Tesla had found the earth's fundamental frequency fifty years earlier.⁵

In comparison to the 3 billion kW available from the earth system, it is possible to calculate what the U.S. consumed in electricity. In

³ "...it is a mere question of time when men will succeed in attaching their machinery to the very wheelwork of nature." –Tesla addressing the Amer. Inst. of Elec. Eng., 1891

⁴ Rauscher, Elizabeth, "Harnessing the Earth-Ionosphere Resonant Cavity" in *Harnessing the Wheelwork of Nature*, p. 233

⁵ W.O. Schumann, *Z. Naturforsch*, 72, p. 149-154 and 250-252, 1952, (in German)

2000, about 11 Quads (quadrillion Btu) were actually used by consumers for electrical needs, which is equal to 3.7 trillion kWh. Dividing by the 8760 hours in a year, we find that only 425 million kW are needed on site to power our entire country. This would still leave 2.6 billion kW for the rest of the world, which only needs 1.7 billion kW (by 2001 US DOE estimates). In the US, out of the total electrical power generated using wire transmission (about 31 Quads), a full 2/3 is totally wasted in “conversion losses.”⁶ (Ref.: *Electricity Flow Chart 1999*, which contains US DOE/EIA data, updating the Toby Grotz article in this book.) No other energy production system of any kind in the world has so much wastefulness. Instead of trying to build 2 power plants per week (at 300 MW each) for the next 20 years (only to have a total of additional 6 trillion kWh available by 2020), as former V.P. Dick Cheney wanted to do, we simply need to eliminate the 7 trillion kWh of conversion losses in our present electricity generation modality. Tesla’s wireless transmission of power accomplishes this goal, better than any distributed generation.

As Tesla himself said,

“In the near future we shall see a great many uses of electricity...we shall be able to disperse fogs by electric force and powerful and penetrative rays...wireless plants will be installed for the purpose of illuminating the oceans...picture transmission by ordinary telegraphic methods will soon be achieved...another valuable novelty will be a typewriter electrically operated by the human voice...we shall have smoke annihilators, dust absorbers, sterilizers of water, air, food and clothing...it will become next to impossible to contract disease germs and country folk will go to town to rest and get well...”

“If we use fuel to get our power, we are living on our capital and exhausting it rapidly. This method is barbarous and wantonly wasteful and will have to be stopped in the interest of coming generations. The inevitable conclusion is that waterpower is by far our most valuable resource. On this humanity must build its hopes for the future. With its full development and a perfect system of wireless transmission of the energy to any distance, man will be able to solve all the problems of material existence. Distance, which is the chief impediment to human progress, will be completely annihilated in thought, word, and action. Humanity will be united, wars will be made impossible, and peace will reign supreme.”⁷

The same article which contains this prophetic quotation from Tesla also notes that his “World System” was conceptually based on three inventions of his:

1. The Tesla Transformer (Tesla coil)
2. The Magnifying Transmitter (transformer adapted to excite the earth)
3. The Wireless System (economic transmission of electrical energy without wires)

Tesla states, “The first World System power plant can be put in operation in nine months. With this power plant it will be practicable to attain electrical activities up to 10 million horsepower (7.5 billion watts), and it is designed to serve for as many technical achievements as are possible without due expense.”⁸ (Note that Tesla’s calculated power levels are conservatively estimated, compared to Rauscher’s calculations.)

The essay by Toby Grotz on the wireless transmission of power is a great introduction to this wireless power system of Tesla. It contains all of the details for a preliminary test of the system. His Figure 5 (HWN, p. 170) also illustrates the transmission of a high voltage pulse of electricity equally around the world where it rebounds at the opposite side and returns to its source, repeating the cycle many times. Grotz also worked with Dr. Corum on “Project TESLA,” which was a business venture designed to implement the wireless transmission of electricity.

Dr. Corum notes in his introductory article on the ELF (extremely low frequency) oscillator of Tesla’s that the tuned circuit of Tesla’s magnifying transmitter was the whole earth-ionosphere cavity. His second article presents probably the most complete article on Tesla’s magnifying transmitter that has ever been written. He explains in great detail the meaning of magnification as Tesla intended, with examples and equations.

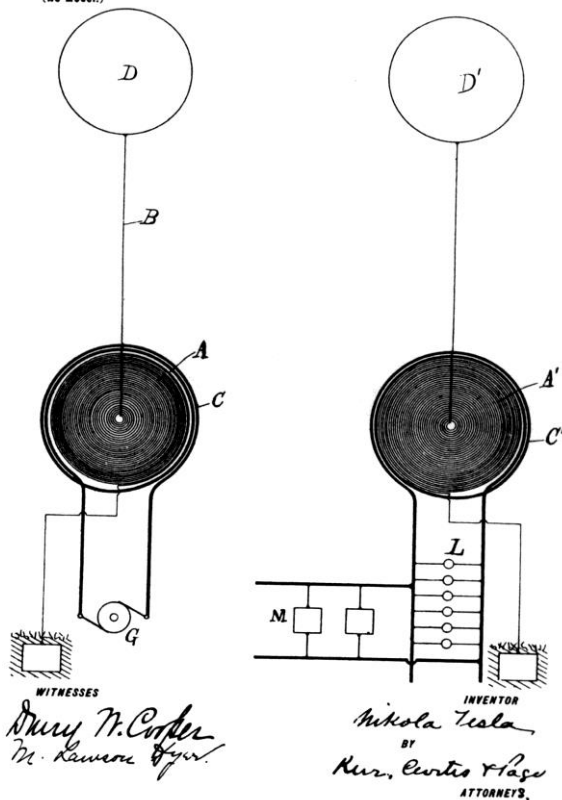
There are two diagrams produced here (Analogy and



⁶ “National Energy Security Post 9/11” U.S. Energy Association, June, 2002, p. 34

⁷ Nikola Tesla, 1900, as quoted in “Great Scientist, Forgotten Genius, Nikola Tesla” by Chris Bird and Oliver Nicholson, *New Age*, #21, Feb. 1977, p. 42

⁸ Nikola Tesla, *My Inventions*, originally appeared in *Electrical Experimenter*, June, 1919, reprinted by Hart Brothers, Austin, 1982, p.88



Realization) from the turn of the century to help explain in simple terms Tesla's wireless transmission of electrical power. The first is a mechanical "Analogy" that is described in Corum's ELF disclosure article. The second is the "Realization" which illustrates the usefulness of the power transmission concept.

Tesla wrote, "That electrical energy can be economically transmitted without wires to any terrestrial distance, I have unmistakably established in numerous observations, experiments and measurements, qualitative and quantitative. These have demonstrated that it is practicable to distribute power from a central plant in unlimited amounts, with a loss not exceeding a small fraction of one per cent in the transmission, even to the greatest distance, twelve thousand miles – to the opposite end of the globe."⁹

As Tesla experimented with a 1.5 MW system in 1899 at Colorado Springs, he was amazed to find that pulses of electricity he sent out passed across the entire globe **and returned with "undiminished strength."** He said, "It was a result so unbelievable that the revelation at first almost stunned me."¹⁰ This verified the tremendous efficiency of his peculiar method of pumping current into a spherical ball to charge it up before discharging it as a pulse of electrical energy, a "longitudinal" acoustic-type of compression wave, rather than an electromagnetic Hertzian-type of transverse wave.

It is also understood that Tesla planned to include stationary resonant wave creation as part of the wireless transmission of power. Examining the pair of 1900 patents #645,576 and #649,621 each using the same figure on the first page, we find in the first patent that Tesla has designed a quarter-wave antenna (50 miles of secondary coil wire for a 200 mile long wavelength). More importantly is the sphere on the top which is supposed to be a conductive surface on a balloon raised high enough to be radiating in "rarefied air." As Tesla states,

"That communication without wires to any point of the globe is practical with such apparatus would need no demonstration, but through a discovery which I made I obtained absolute certainty. Popularly explained it is exactly this: When we raise the voice and hear an echo in reply, we know that the sound of the voice must have reached a distant wall, or boundary, and must have been reflected from the same. Exactly as the sound, so an electrical wave is reflected, and the same evidence which is afforded by an echo is offered by an electrical phenomena known as a 'stationary' wave – that is, a wave with fixed nodal and ventral regions. Instead of sending sound vibrations toward a distant wall, I have sent electrical vibrations toward the remote boundaries of the earth, and instead of the wall, the earth has replied. In place of an echo, I have obtained a stationary electrical wave, a wave reflected from afar."¹¹

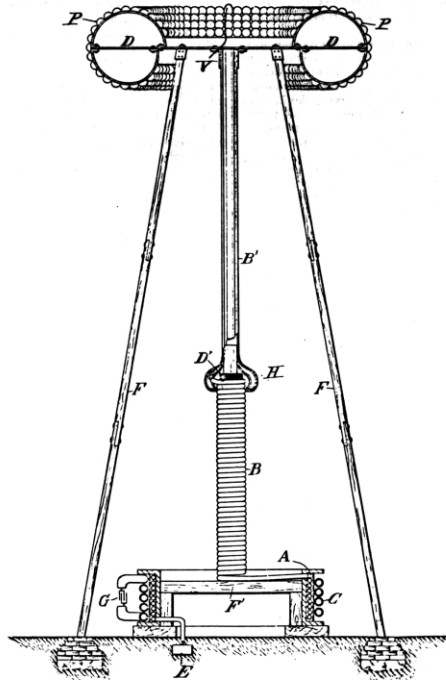
It is also worth calling attention to Corum's disclosure article on the operation of an ELF oscillator, he proposes that Tesla's x-ray patents were designed for the switching of high voltages in the charging and discharging of the dome of the Wardencllyffe tower (patent #1,119,732). Dr. Bass' article elaborates on the details of longitudinal waves that would be created by such discharges. They have superior properties of transmission which normal radio and television waves today do not possess. Nikola Tesla was very familiar with their benefits and designed the tower accordingly.

⁹ Nikola Tesla, "The Transmission of Electrical Energy Without Wires as a Means for Furthering Peace," *Electrical World and Engineer*. Jan. 7, 1905, p. 21

¹⁰ Nikola Tesla, "World System of Wireless Transmission of Energy," *Telegraph and Telephone Age*, Oct. 16, 1927, p. 457.

¹¹ Nikola Tesla, "The Problem of Increasing Human Energy," *Century*, June, 1900

N. TESLA.
 APPARATUS FOR TRANSMITTING ELECTRICAL ENERGY.
 APPLICATION FILED JAN. 19, 1902. RESEVED MAY 4, 1907.
 1,119,732. Patented Dec. 1, 1914.



WITNESSES:
M. Lawson
Benjamin Miller
 Nikola Tesla, INVENTOR,
 BY *Ken. Page & Cooper*
 his ATTORNEYS.

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As Tesla states, “As to the transmission of power through space, that is a project which I considered absolutely certain of success long since. Years ago I was in the position to transmit wireless power to any distance without limit other than that imposed by the physical dimensions of the globe. In my system it makes no difference what the distance is. The efficiency of the transmission can be as high as 96 or 97 per cent, and there are practically no losses except such as are inevitable in the running of the machinery. *When there is no receiver there is no energy consumption anywhere. When the receiver is put on, it draws power. That is the exact opposite of the Hertz-wave system.* In that case, if you have a plant of 1,000 horsepower (750 kW), it is radiating all the time whether the energy is received or not; but in my system no power is lost. When there are no receivers, the plant consumes only a few horsepower necessary to maintain the vibration; it runs idle, as the Edison plant when the lamps and motors are shut off.”¹²

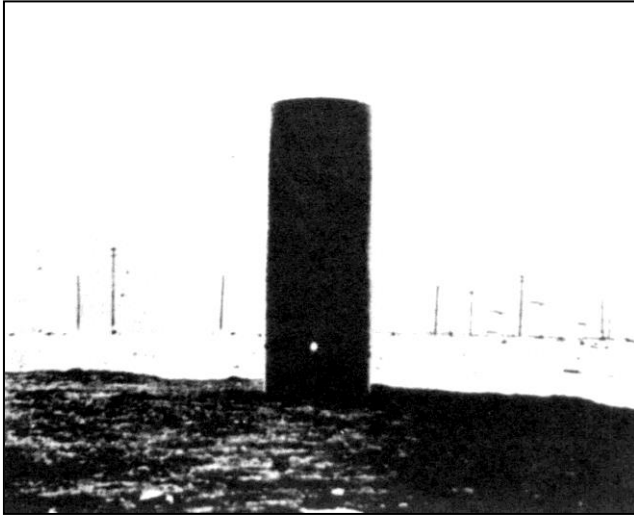
These incredible facts are explained by Dr. Corum and Spaniol elsewhere, “...the

distinction between Tesla’s system and ‘Hertzian’ waves is to be clearly understood. Tesla, and others of his day, used the term ‘Hertzian waves’ to describe what we call today, energy transfer by wireless transverse electromagnetic (TEM) radiation...no one wants to stand in front of a high power radar antenna. For these, E and H are in phase, the power flow is a ‘real’ quantity (as opposed to reactive), and the surface integral of $E \times H$ (Poynting vector) is nonzero. The case is not so simple in an unloaded power system, an RF transformer with a tuned secondary, or with a cavity resonator. In these situations, the fields are in phase quadrature, the circulating power is reactive and the average Poynting flux is zero – unless a load is applied. They deliver no power without a resistive load. These are clearly the power systems which Tesla created. The polyphase power distribution system was created by him in the 1880s and inaugurated at Niagara Falls in 1895. The RF transformer was invented and patented by him in the 1890s. Terrestrial resonances he experimentally discovered at the turn of the century. And, for the next 40 years he tried to bring through to commercial reality this global power system. Today, millions of us have working scale models of it in our kitchens, while the larger version sits idle.”¹³ Even our cars have been using miniature Tesla coils to power the spark plugs.

In the same “Cavity Q” article, the authors also settle the most common criticism of the Tesla wireless power system regarding biological effects. Calculating the circulating reactive power, they find a density of a microVAR per cubic meter at 7.8 Hz to be quite small, while it is well-known that the frequency is very biologically compatible. The authors also look at the present 100 V/m field and again find that raising it by a factor of 4 to 10 will pose no ill effects. (Thunderstorms do it all of the time around the world.)

¹² Nikola Tesla, “Minutes of the Annual Meeting of the AIEE,” May 18, 1917.

¹³ Corum, Corum, and Spaniol, “Concerning Cavity Q,” *Proceedings of the International Tesla Symposium*, 1988, p. 3-15



Receiving coil a great distance from the transmitter lighting a light bulb (white spot) in a test of Tesla's wireless transmission of power in 1899.

In 1925, an electrical engineer, John B Flowers, developed a proposal to test and implement Tesla's Wireless Power System. He drafted the entire scheme for the Wardencllyffe project and presented it to H. L. Curtis, physicist, and J. H. Dillinger, head of the Radio Laboratory at the Bureau of Standards in Washington, DC. In a carefully worded 10-page document, complete with schematic drawings of the earth imbued with Tesla standing waves, Flowers unveiled a plan for operating cars and planes powered by wireless electricity (Sketch A). The plan was declined even though the mechanical test in Sketch B actually worked. Below is a report on the test results of the mechanical model of Tesla's wireless system:

"Using the concepts in Sketch B, a mechanical oscillator arm was fastened to the tied opening of a rubber balloon 20 inches in diameter. The oscillator arm was operated with an electrical motor at 1750 RPM by means of an eccentric on the motor shaft. The balloon hung free in the air.

The rubber surface of the balloon represented the earth's conducting surface and the air inside its insulating interior. The waves were propagated in the rubber surface at the rate of 51 feet per second, the frequency of transmission was 29 cycles per second and the wavelength was 21 inches. The mechanical oscillator was used in place of Tesla's electrical oscillator as it presents an almost perfect analogy. Standing or stationary waves of the rubber surface replace the electromagnetic waves of Tesla's system. By the test of this analog, the operation of Tesla's system can be forecast. When the oscillator arm was set in motion by operating the motor, there were three standing waves having six loops on the 'earth's surface' all having the same amplitude of vibration! When the finger was pushed against one or more loops, all the loops were reduced in amplitude in the same proportion showing the ability to obtain all the power out at one or more points! The waves extended completely around the 'world' and returned to the sending station."¹⁴

Modern Research in Geoengineering Tesla's Wireless Power

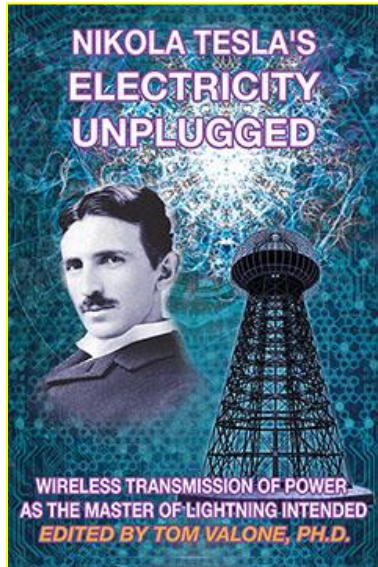
An aspect of the Tesla wireless theory refers to a pulsed, electrostatic discharge (longitudinal) acoustic type of compression wave. That is why the Wardencllyffe Tower has a sphere on top like Tesla's patent #645,576. A conductive sphere charged to millions of volts will have an E field radially outward. If we pulse the sphere with a high voltage, the Poynting vector (S) and the E field are in the same direction. S still is in the direction of propagation but now the wave is a nonlinear, compressed bunch of charges moving radially outward. Some physicists who have analyzed this phenomenon, rarely known in EM physics (even though the solutions appear in Maxwell's equations), report that the magnetic B field is spiraling in a helical fashion around the radial direction, since the moving charges constitute a radial current pulse. This behavior is quite different than Hertzian, transverse waves that most engineers know about.

Dr. James Corum's primer for engineers (HWN, p. 193), explains the voltage magnifier section where, the transmission line resonator and the cavity resonator--potential magnification is tied into the MONOCHROMATIC carrier "Case I" section and the Beat Frequency modulation section "Case II" thus creating standing waves with zero envelope velocity. Corum further explains the charging cycle for the Wardencllyffe Tower (HWN, p.226) very well where we find the important conclusion that the "tuned circuit of his magnifying transmitter was the whole earth-ionosphere cavity resonator." Very few scientists have studied James and Kenneth Corum who present a wealth of knowledge about Tesla.

¹⁴ J. B. Flowers, July 16, 1925, as quoted in *Exotic Research Report*, July, 1999, p. 48

Dr. Nick Simos (from Brookhaven National Labs) also has presented¹⁵ on “Tesla Unplugged” with an explanation of nature’s available longitudinal wave coupling between the ionosphere and the earth using what are known as “cavity modes” (earth-ionosphere cavity) based on Maxwell’s Equations. Simos also derives the 11.78 Hz resonant frequency for transmission (NTEU, p. 125), independently from Corum’s work (NTEU, p. 375).

The latest research update is still accredited to the Corum team, in *Nikola Tesla’s Electricity Unplugged*,¹⁶ offers the most modern development in the evolution of scientific analysis of Tesla’s wireless transmission of power, with theory and experimental corroboration on the history of a rediscovered geoeengineering “surface wave” theory and experiment which includes the famed Bell Telephone Laboratory experiment (NTEU, p. 375). Gary Peterson offers an overview first *Tesla* magazine (V. 1, No. 1, July 10, 2013)¹⁷ to address the



Corum discovery of the Zenneck surface wave and put it in perspective (NTEU, p. 355). After studying the graph of Figure B1 (NTEU, p. 422), it occurs to anyone of ordinary skill that as the frequency of transmission is *lowered*, the range for the Zenneck wave *increases*, which is in keeping with the “The Seneca Lake Experiment Repeated” appended article of the Corums, proving the theory and distance-frequency relationship (NTEU, p. 440). This insight into the value of this discovery relates directly to this available manipulation of attenuation if worldwide transmission is desired, with minimum attenuation. The Corum US patent application #20140252886 (par. 144) also *confirms* the observation made above:

“Another way to state that is that the higher the frequency, the smaller the region over which the energy is spread, so the greater the energy density. Thus, the ‘knee’ of the Zenneck surface wave shrinks in range as the frequency is increased. Alternatively, the lower the frequency, the less the propagation attenuation and the greater the field strength of the Zenneck surface wave at very large distances from the site of transmission...”

This insight is brought to an exciting conclusion in the same patent application with the Corum observation, “Note that if the frequency is low enough, it may be possible to transmit a guided surface wave around the entire Earth. It is believed that such frequencies may be at or below *approximately 20-25 kilohertz*” (par. 148). With that ideal frequency range, the flat surface model can be modified to become a sphere, just like the earth, “where the propagation distances approach the size of the terrestrial medium” (par. 148). Needless to say, such a clear breakthrough in both the theoretical and experimental confirmation of Tesla’s original wireless transmission records, leading to a practical conclusion with much more precision than ever before, should expedite the implementation of wireless energy for mankind. Just the number of patent applications that the Corums have filed¹⁸ is a good indication of intellectual property that we all hope will lead to a more secure and stable electrical transmission virtual “grid” for this 21st century. Contrast this picture with the present aging and problematic national electric grid we currently struggle with, which has trouble accepting large renewal energy input surges, lest a grid section becomes unbalanced. Our hope must be that renewable, carbon-free energy can be exclusively used to generate the electrical input. Then the true, wirelessly powered Tesla automobile may quite possibly be resurrected, besides distributing electrical power wirelessly with modest geoeengineering through excitation

¹⁵ Simos, Nick, “Wireless Energy Transmission: Nikola Tesla Unplugged”, Seventh Conference on Future Energy (COFE7), DVD available from www.futureenergy.org and *Proceedings of COFE7* (Integrity Research Institute, 2016).

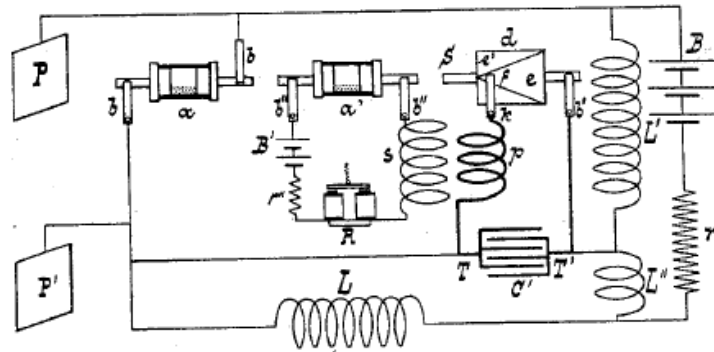
¹⁶ Valone, Thomas, editor, *Nikola Tesla’s Electricity Unplugged: Wireless Transmission of Power as the Master of Lightning Intended*, Adventures Unlimited Press, 2016 (hereafter: “NTEU”)

¹⁷ Visit www.teslainfo.org to obtain this collector’s edition of *Tesla* magazine or to subscribe. On one of their webpages http://www.teslainfo.org/view_tesla_magazine.html is posted a free PDF of a few articles, including one on Tesla’s wireless energy.

¹⁸ Corum US patent applications include 20160079643, 2016007944, 20160079645, 20160080034, 20140252886, 20140252865 and Corum patents 4622558, 4751515, 5442978, 5654723 related to Tesla wireless transmission.

of the earth's crust and its earth-ionosphere cavity, thus enabling resonant, stationary electrical receivers all over the globe to couple to the Tesla transmitter(s) located even thousands of miles away.

Speaking of wireless transmitters and receivers, it is worth mentioning the Leyh and Kennan's *Lightning On Demand* company article on efficient wireless transmission of power with two large Tesla coils which was published in an IEEE Power Symposium proceedings in 2008.¹⁹ They are also building the world's largest lightning generator pair with ten story high Tesla coils, which is also on their website. Also interesting information for wireless transmission designers is the fact that more than just another Tesla coil is recommended for good reception. Tesla has disclosed some information about the receiver design "synchronizing" with the transmitter, in his US patent #685,954 (see Tesla's receiver circuit diagram below), which is available through www.uspto.gov and elsewhere. However, apparently *there is more* to the specific design that is surprisingly still classified. For those with clearance, this editor has learned that the Tesla classified records are stored and available at the National Archives Library in College Park MD.



All of us who are part of the Tesla community hope that we will see Tesla's dream of wireless electrical power manifest within our lifetime, so that we may truly be "unplugged" from the umbilical cord that J. P. Morgan forced upon us, through the electrical utility grid, when he denied Tesla's request for further funds to finish the Wardencllyffe Tower. It is hoped that the new literature review *Nikola Tesla's Electricity Unplugged* will help that process along so wireless electricity will be as commonplace as wireless telephones and wireless television have become, about a century, more or less, after their inception.

In terms of economic theory, many countries will benefit from this service. At first, receiving stations will be needed. Just like television and radio, only an energy receiver is required, which may eventually be built into appliances, so no power cord will be necessary! Just think, monthly electric utility bills will be optional, like "cable TV." Tesla was an electrical genius who revolutionized our world in a way that DC power could never have accomplished, since the resistance of any transmission lines, (except perhaps, superconductive ones), is prohibitive for direct current. He deserved much better treatment from all three of the tycoons described above, than to spend the last 40 years of his life in abject poverty. However, he was too much of a gentleman to hold a grudge. Instead, regarding the magnifying transmitter, Tesla wrote in his autobiography, "I am unwilling to accord to some small-minded and jealous individuals the satisfaction of having thwarted my efforts. These men are to me nothing more than microbes of a nasty disease. My project was retarded by laws of nature. ***The world was not prepared for it. It was too far ahead of time. But the same laws will prevail in the end and make it a triumphal success.***"²⁰ The Wardencllyffe Tower Centennial, (1903-2003) to many, signifies an extraordinary cause to remember and resurrect. The scientists who have contributed to the geoeengineering research are available to make such a global wonder a reality. The benefits, immediately alleviating electric power shortages everywhere, are too numerous to count.

¹⁹ Leyh and Kennan article <http://ieeexplore.ieee.org/xpl/abstractKeywords.jsp?arnumber=5307364> but is free from the authors' website <http://lod.org/misc/leyh/papers/naps2008final.pdf>

²⁰ Nikola Tesla, *My Inventions*, p. 91

Energy-Efficient Engine: Waste Hot Water into Electricity

By James Randerson, *New Scientist*, 16 November 2016

A new engine that generates electricity from waste hot water could reduce energy consumption and carbon emissions for thousands of different businesses, from cargo shipping to data centres.

So says Exergyn, a firm based in Dublin, Ireland, which plans to run the first industrial trials of its technology next year.

Globally, Exergyn estimates that the heat lost in waste hot water from industrial processes amounts to around twice the energy in Saudi Arabia's annual oil and gas output. "There's just so much waste hot water in the world," says Exergyn CEO Alan Healy. "In most cases [companies] are actually spending energy to cool it."

Cut carbon emissions

Cargo ships, for example, typically pump waste hot water from the engine around the vessel to cool it down. And in data centres, electricity-hungry fans are used to dissipate the heat generated by rows of servers. Finding an efficient way to capture and use this wasted energy would both reduce costs and cut carbon emissions.

The Exergyn Drive uses the quirky properties of an alloy of nickel and titanium called **nitinol**. You can bend nitinol out of shape, but when heated it undergoes a phase transition and reverts to its original crystal lattice structure. This "shape memory" property makes nitinol desirable in a wide range of applications, including medical devices, unbreakable sunglasses and **NASA's Mars rovers**.



It also has another unusual quality. Unlike most materials, nitinol expands when cooled, rather like water does when it turns to ice (think of the mess in your freezer when you leave a bottle of beer to cool in there too long).

"There aren't many materials in the universe that do that," says Mike Langan, Exergyn's head

of product management.

These two properties drive the Exergyn engine. Inside the device, a bundle of metre-long nitinol wires are attached to a piston. Hot and cold water is alternately flushed over the wires every 10 seconds, which causes them to rapidly expand and contract by 4 centimetres, driving the piston up and down. A hydraulic system converts that forceful linear motion into rotary motion, which in turn drives a generator. The engine produces 10 kilowatts of electricity from around 200 kW of thermal energy in the waste hot water.

Free energy

That might not be hugely efficient, but this is “free” energy that would otherwise be wasted. And often, money and energy would be spent actively cooling down the waste water.

The company has spent three years perfecting the design and modifying the material so that it will keep working for millions of cycles. It was awarded 2.5 million euros from the European Commission’s Horizon 2020 fund last year to help bring the technology to market and is now planning three industrial tests in 2017, at Dublin Airport and two landfill sites. In all three cases, the Exergyn technology will use warm water at 90 °C or less – from a gas engine at the airport and from biogas generators at the landfill sites – to produce electricity on-site.

In addition to harnessing waste heat from industry, the company hopes that the engine could expand the geothermal energy market. At the moment, generating electricity from geothermal sources in a cost-effective manner requires very hot water at high flow rates. That typically means digging very deep wells with a wide diameter, which hugely increases drilling costs. Langdon says that Exergyn’s technology makes a broader range of geothermal sites viable, as it works with water at a lower temperature and flow.

John Blowes, a past president of the Institution of Diesel and Gas Turbine Engineers, who has seen the technology but has no stake in the company, agrees there is a “massive” range of applications. But he says that only a small percentage of these will be viable unless the company can produce the technology cheaply. “It comes down at the end of the day, for me, to commercial viability,” he says.

Langan says the combination of no fuel costs and the mechanical simplicity of the machine means that Exergyn will be able to keep costs down. He says it can currently generate electricity at £40 per MWhr – cheaper than gas and coal (\$50 per MWhr – Ed. Note).

Beyond Batteries: This Technology Could Revolutionise Energy

By Mark Harris, New Scientist, 9 November 2016

Forget lithium battery fires: a safe, turbo-charged alternative way to store power could boost everything from smartphones to smart grids

AGAINST the backdrop of the Nevada desert a gigantic factory is taking shape. Look at the artist's impressions of the finished building and you could mistake it for a Martian colony, its ranks of solar panels stark against the reddish dirt. But this is the Gigafactory, a sprawling edifice covering around 600,000 square metres. Here, electric car company Tesla Motors plans to make a single component of its vehicles: the battery.

A good rechargeable car battery will set you back around \$10,000, for a product that is toxic, degrades substantially after a few years and must be carefully designed to avoid catastrophic overheating. The Gigafactory represents Tesla CEO Elon Musk's drive to make better batteries and so realise his dream of affordable electric cars.

Others are similarly exercised. Samsung's recent woes with exploding batteries in its Galaxy Note 7 smartphone caused it to recall all the devices and cease production. "It will cost us so much it makes my heart ache," said Koh Dong-Jin, president of Samsung's mobile business. Better, cheaper batteries are top of the wish list for almost any technology that's not powered by fossil fuels.

Yet as Musk and others are finding, it's proving a long, hard road. Might there be a better way? That's the claim of researchers championing a long-overlooked device to store and supply energy. They think it could actually stand more of a chance of delivering the power we need, how we need it – and so revolutionise the way we use energy. Is it time to look beyond batteries?

Rechargeable batteries store energy by performing a reversible chemical reaction in which ions are stored in and flow between positive and negative electrodes. The right materials, such as the lithium compounds common to both Tesla and Samsung's batteries, can store lots of energy, but are slow to charge and discharge, and heat up when they do. What exactly caused the Note 7 fault is not yet clear, but lithium ion batteries need tiny separators to keep components apart. If these are poorly designed or damaged they can fail, creating a short circuit that heats and damages other parts of the battery causing a runaway reaction. Such safety concerns, plus the sheer cost of lithium batteries, have long had chemists casting around for something better.

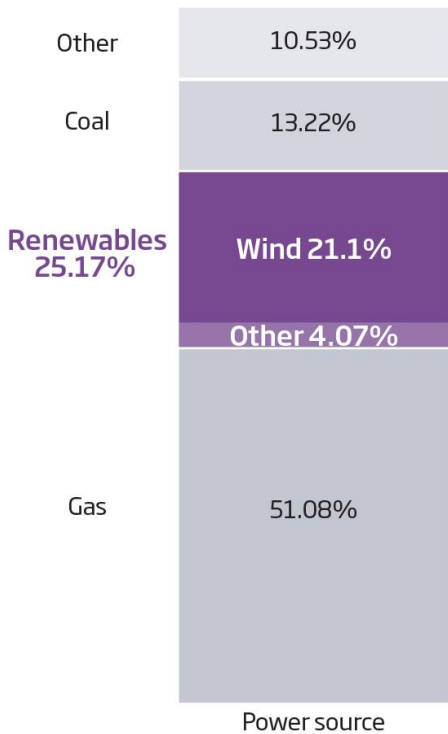
But chemistry isn't the only way to store electric charge. In devices known as capacitors, energy is physically stored in an electric field between metal electrodes. Capacitors are sprinters to the battery's long-distance runner, charging and discharging in a blink, and doing this over and over again without their performance suffering. They are already used to power the flash on a camera.

But you can't run a car on a camera flash. A kilogram of petrol contains about 4000 Watt hours of useful energy, 30 times as much as the batteries in Tesla's current crop of vehicles. Traditional capacitors hold 1000 times less again, just 0.1 Watt hours per kg. If your car could drive 500 km on a tank of petrol, it would run little more than 16 metres using the same weight of capacitors.

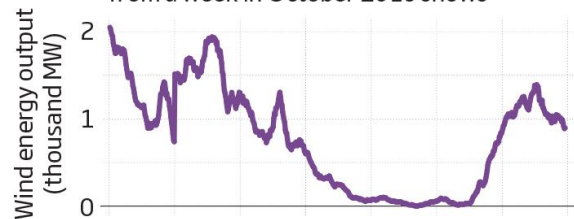
It's unthinkable, then, that a traditional capacitor could ever compete with a battery. But many have had that exact thought – even Musk. “If I were to make a prediction, I'd think there's a good chance that it is not batteries but capacitors” that will deliver a breakthrough, he said in 2011. In that reading, it's just a case of guiding the continuing evolution of the capacitor.

Supply and demand

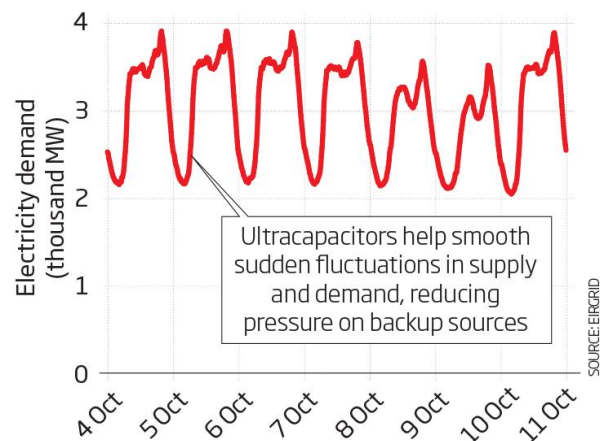
In Ireland, wind power now accounts for almost a quarter of energy supply



But it's highly intermittent, as this data from a week in October 2016 shows



Demand also fluctuates by the hour and day, requiring a large backup capacity in the form of batteries or fossil and nuclear sources



That evolution stretches back to 1966, when Robert Rightmire at Standard Oil of Ohio was part of a team considering the future of fuel storage. He knew that the charge a capacitor could store depended on the surface area of its electrodes. So why not make these surfaces more spongy, the better to cram in charge? He produced a capacitor where the electrodes were coated with thin layers of carbon chemically punctured with millions of tiny holes. This so-called activated carbon is typically used for jobs like decaffeinating coffee, and has an internal area about 100,000 times larger than its outside surface. And it worked. Rightmire's “supercapacitors” stored 10 times as much energy as traditional capacitors.

Ditch the coconuts

By the 1990s, small supercapacitors had become a commercial reality. They provided instant, short-lived back-up power to computers if the mains supply failed, so they could shut down safely. That's still a long way from powering a car. For a long time, not much changed. This was partly down to the curious source of that spongy carbon: coconuts.

“Badly designed batteries can explode, but that's the least of their problems“

“It’s pure luck,” says Aaron Feaver, chief technical officer at EnerG2, an energy storage company based in Seattle. “The coconut didn’t evolve to be an ultracapacitor electrode material, but it just happens to work pretty well.” Leftover husks are heated to 600 °C in an oxygen-free oven to get rid of all elements except carbon, a process known as pyrolysis. The carbon is then treated with chemicals to etch in the tiny pores.

Coconuts were so cheap and convenient a source of carbon that no one thought much about other possibilities. At some point in the late 1990s, supercapacitors were rebranded “ultracapacitors”, but the principle remained the same.

Graphs showing proportion of Ireland's energy supplied by wind power
And they’ve continued to find new uses. Some wind turbine companies use them as an emergency alternative to batteries. Turbine blades need to be constantly adjusted to face the wind. If their electricity supply fails, the blades must quickly return to a neutral position to avoid strong gusts damaging or even destroying the turbine. That calls for a short power splurge – what ultracapacitors excel at. Plodding batteries are heavier and eventually need replacing. “Once you’ve put something into a turbine you’re not going to want to go up and service it. You just want to forget it,” says Kim McGrath from Maxwell Technologies, an ultracapacitor manufacturer.

That special ability of ultracapacitors to provide a short zip of power is useful in other places too. In China, fleets of hybrid diesel buses are equipped with ultracapacitors that charge up swiftly from regenerative braking systems, and later accelerate the bus until the diesel engine can take over.

Meanwhile, material innovations suggest ways to store more juice in capacitors. In the mid-2000s Joel Schindall, John Kassakian and Riccardo Signorelli at the Massachusetts Institute of Technology began to explore whether other types of carbon might perform better than the coconut husks. It just so happened that a nearby lab housed Mildred Dresselhaus, known as the “queen of carbon science” for her work on exotic forms of the stuff. She helped the trio build a forest of tiny carbon nanotubes, cylinders of pure carbon 10,000 times smaller than a human hair, that could boast over 2000 square metres of area per gram.

Ultracapacitors using nanotubes have gone on to be a success, notably through FastCap Systems, a firm founded by John Cooley, also from MIT. **FastCap** have produced capacitors that will help power NASA missions to Venus and deep space. Its best model can hold 10 per cent of the charge of one of Tesla’s batteries, about twice as much as the next best commercial product.

Such nanotube designs are expensive, and in general ultracapacitor capacity is still not enough to put the Gigafactory in jeopardy – but that might not be the point. “We do not ever expect ultracapacitors to be the primary energy storage device in an electric vehicle,” says Cooley. But if they can play the role of trusty sidekick, reducing the peak power load on tired batteries – the very thing that shortens their life – we could all benefit.

How so? While the idea of driving an electric car may or may not appeal to you, no one can ignore the problems facing electricity grids. We want energy supplies to be not just affordable, but reliable and green too. Ticking all those boxes is getting tougher, even for nations with highly developed economies. In October, for example, the UK fell out of the top 10 nations in the World Energy Council’s Trilemma Index, an energy security ranking.

We have become serious about cheap green energy in recent years; renewables accounted for two-thirds of new generating capacity in the US last year, and over half worldwide, according to the

United Nations. But on the one hand, demand for electricity varies widely and on the other, the supply of energy from renewables is intermittent. The wind doesn't always blow and the sun doesn't always shine (see "Supply and demand").

This problem has been met with the concept of the smart grid, where networks of sensors and switches constantly monitor and adjust the flow of energy from all sorts of generators to consumers. But this inevitably means storing the electricity, and those sluggish batteries are once again where we trip up.

Using batteries as the sole storage medium isn't ideal for two reasons. First, constant charging and discharging shortens their life. Second, batteries can't release all their energy quickly, so grids need excess battery capacity to cope with short surges in demand over and above normal fluctuations. Adding ultracapacitors instead of supersizing the battery is a vast improvement. "The net effect is a reduction in the upfront expenditure and lower operating costs," says McGrath. "And the technology has now gotten to the stage where it blows the market open for us."

This year, **Maxwell** deployed two test ultracapacitor storage systems. One is in North Carolina, where the ultracapacitors are connected to a photovoltaic solar farm and a battery with a saltwater electrolyte. When the solar panels' output fluctuates due to passing clouds, the ultracapacitor goes to work. It can quickly supply nearly three times the power of the battery pack, but is exhausted in a couple of minutes. At that point, the battery, which holds about 40 times as much energy, steps in. The test is being carried out by Duke Energy, a utility company in the US with more than 7 million customers. It says the system is 10 to 15 per cent cheaper than a battery-only setup. "It should also slow down any degradation of the battery," says Duke's Randy Wheelless.

"It would be unwise to bet against ultracapacitors ousting batteries entirely"

Wind power is just as intermittent as the sun, and in the less balmy climes across the Atlantic it is the go-to renewable power source. In Ireland, wind power accounts for almost a quarter of electricity generation, and the country wants that to be 40 per cent by 2020. It is here that the second test is taking place, in an experimental smart grid in Tallaght, near Dublin. Ultracapacitors connected to local government office buildings have proved able to compensate for changes in frequency of the electricity supply within a fraction of a second. Klaus Harder of FreqCon, a German firm that supplied the ultracapacitor-battery hybrid storage unit, says the ultracapacitors are so far living up to their promise.

FreqCon is planning to test a larger ultracapacitor-battery unit on the west coast of Ireland soon. But there is an ongoing challenge for the technology. Batteries may be imperfect, but they are still gradually improving. Ultracapacitors need to keep pace by increasing their capacity in tandem.

There is plenty of scope for that. Firms like EnerG2 say they will further improve the technology by using new sources of carbon to coat the electrodes. "Coconuts are cheap but they come with lots of natural contaminants and the activation process is toxic and expensive," says Feaver. EnerG2 designs its own carbon based polymers, similar to the resins used for laminating plywood. It then pyrolyses and activates them using a simpler, greener process.

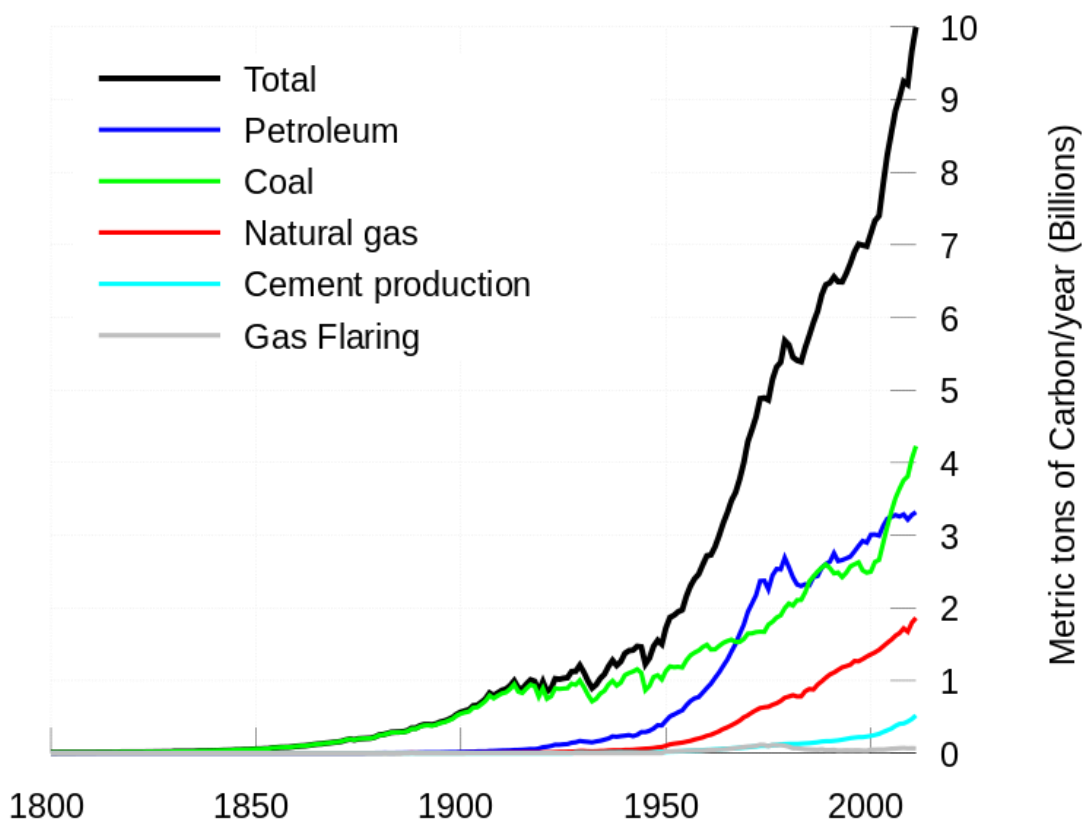
EnerG2's carbon can also be tailored to different types of ultracapacitor. Those designed to quickly stop and start a car's petrol engine to improve fuel efficiency need a quick burst of power, but for smoothing a domestic solar panel's output, capacity might be more important than speed. Coconut carbon has pores whose size matches common electrolytes such as ammonium salts. But by adjusting its chemistry, says Feaver, EnerG2 can produce carbon with pores to match electrolytes designed for high power density, high energy density, or any combination of the two.

Practically invincible

Some think there could be greater leaps ahead if we break our attachment to carbon. William Dichtel, a chemist at Northwestern University, Chicago, has developed polymer networks called covalent organic frameworks to work directly in ultracapacitors without needing pyrolysis. His team succeeded in producing a porous ultracapacitor material that approached the performance of a nanotube device but potentially at a fraction of the cost. “The caveat is that we’re chemists doing basic research, not Tesla trying to put this in a car in a profitable fashion,” says Dichtel.

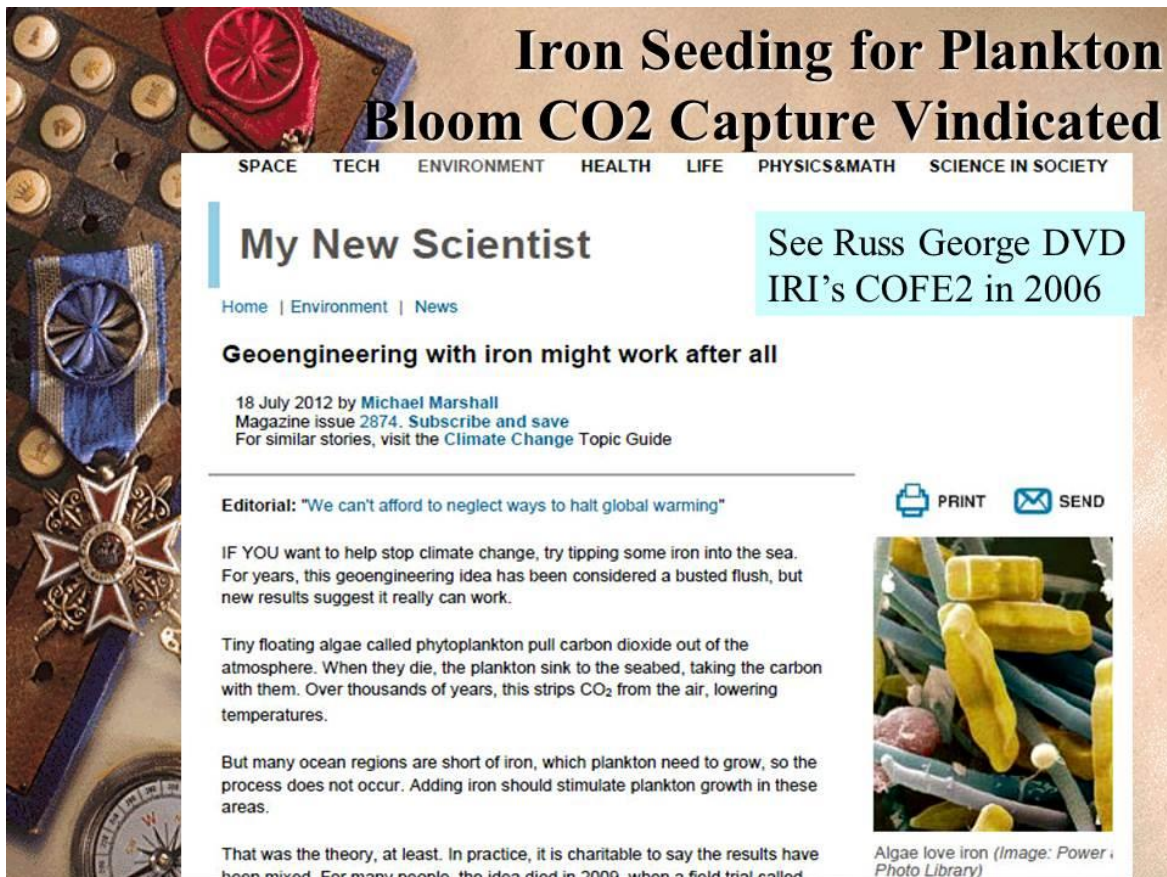
There are concerns that exotic polymer-based ultracapacitors might not have the longevity of today’s carbon systems. True, these ultracapacitors are not invincible, says Feaver. “But when you compare them with batteries, they might as well be.” The battery in a cellphone or electric car is designed for 1000 charge-discharge cycles, whereas even Dichtel’s experimental ultracapacitor was stable for at least 10 times as many cycles.

Ultracapacitors have come so far from their humble beginnings that it is tempting to wonder if they might graduate beyond their sidekick role and oust batteries entirely. We’re far from that day, but perhaps it’s unwise to bet against it ever arriving. We know that Elon Musk toyed with a PhD studying ultracapacitors before quitting for his first Silicon Valley start-up. And Tesla Motors’ patents still make tantalising references to ultracapacitors. The man once so enamoured with ultracapacitors hasn’t entirely lost faith, then. Maybe they are still evolving behind the doors of that huge factory in Nevada.



IRI Advocacy for Iron Seeding of Plankton to Sequester Millions of Tons of CO2 in 2006 Defended Six Years Later with Field Study

In 2006, COFE2 presented **Russ George**, President of Planktos, who described his ocean studies with iron seeding to stimulate algae blooms of plankton that are calculated to absorb millions of tons of CO2. All of the “experts” and environmental groups, including Greenpeace, fought against him and criticized the method, which actually occurs naturally. **Then six years later in 2012** a field study published in Nature magazine and carried by New Scientist found that the majority of plankton did indeed fall to the bottom of the ocean with the captured carbon, thus vindicating the largest scale carbon sequestration concept ever conceived. IRI is proud to have been an early advocate of this **amazingly effective process for bringing down atmospheric levels of CO2** once a carbon-free power source has been mass marketed to replace the fossil fuel burners worldwide. Though it is a herculean task, it has to be done in order to save mankind from approaching 1000 ppm of CO2 by the end of this century, which is known to cause “**cognitive impairment**” from closed *classroom studies of CO2 levels and thinking ability*. Climate experts have already been predicting the exponential growth of atmospheric CO2 levels at present rates of increases in coal, gas, natural gas, wood, and oil burning that are predicted to reach 1000 ppm of CO2 **by 2100** unless drastic measures are introduced, including attractive low cost carbonless engines and carbon sequestration.



The image is a screenshot of a New Scientist article. On the left side, there is a vertical strip of images including a wooden chessboard, a red fan, a blue and silver medal, and a compass. The main article content is on the right. At the top, the title "Iron Seeding for Plankton Bloom CO2 Capture Vindicated" is displayed in large, bold, black font. Below the title is a navigation bar with categories: SPACE, TECH, ENVIRONMENT, HEALTH, LIFE, PHYSICS&MATH, and SCIENCE IN SOCIETY. The article title "My New Scientist" is in a large, bold, black font. To the right of the title, there is a light blue box containing the text "See Russ George DVD IRI's COFE2 in 2006". Below the title, there is a sub-header "Geoengineering with iron might work after all" in bold black font. The byline reads "18 July 2012 by Michael Marshall" and "Magazine issue 2874. Subscribe and save". Below the byline, there is a link to "Climate Change Topic Guide". The main text of the article begins with "Editorial: 'We can't afford to neglect ways to halt global warming'" and "IF YOU want to help stop climate change, try tipping some iron into the sea. For years, this geoengineering idea has been considered a busted flush, but new results suggest it really can work." The text continues: "Tiny floating algae called phytoplankton pull carbon dioxide out of the atmosphere. When they die, the plankton sink to the seabed, taking the carbon with them. Over thousands of years, this strips CO2 from the air, lowering temperatures." and "But many ocean regions are short of iron, which plankton need to grow, so the process does not occur. Adding iron should stimulate plankton growth in these areas." The article concludes with "That was the theory, at least. In practice, it is charitable to say the results have been mixed. For many people, the idea died in 2009 when a field trial called". To the right of the text, there are two icons: a printer icon labeled "PRINT" and an envelope icon labeled "SEND". Below the text, there is a photograph of yellow and green algae. Below the photograph, there is a caption: "Algae love iron (Image: Power i Photo Library)".

COST

\$250K+

\$100K+

\$10K

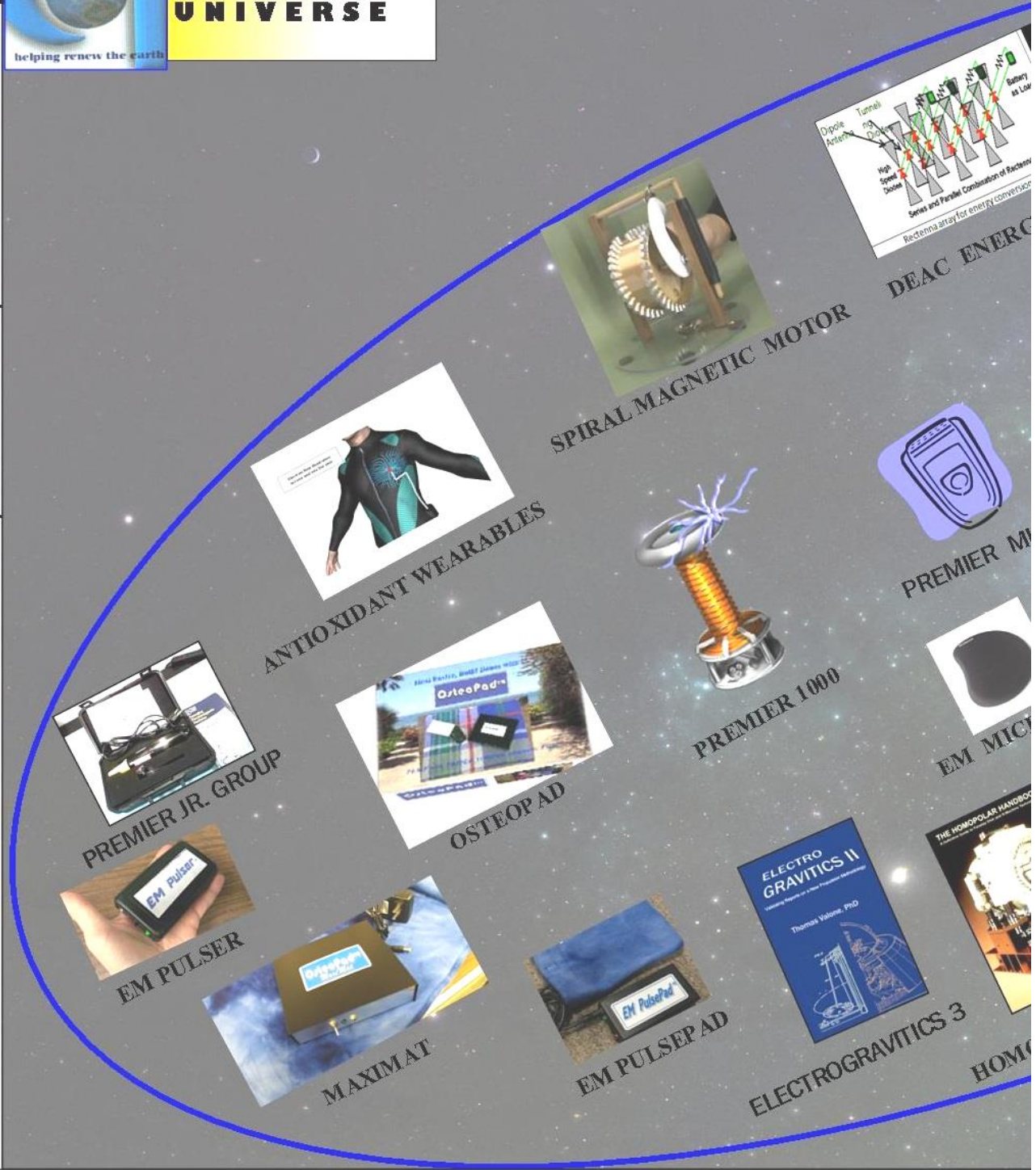
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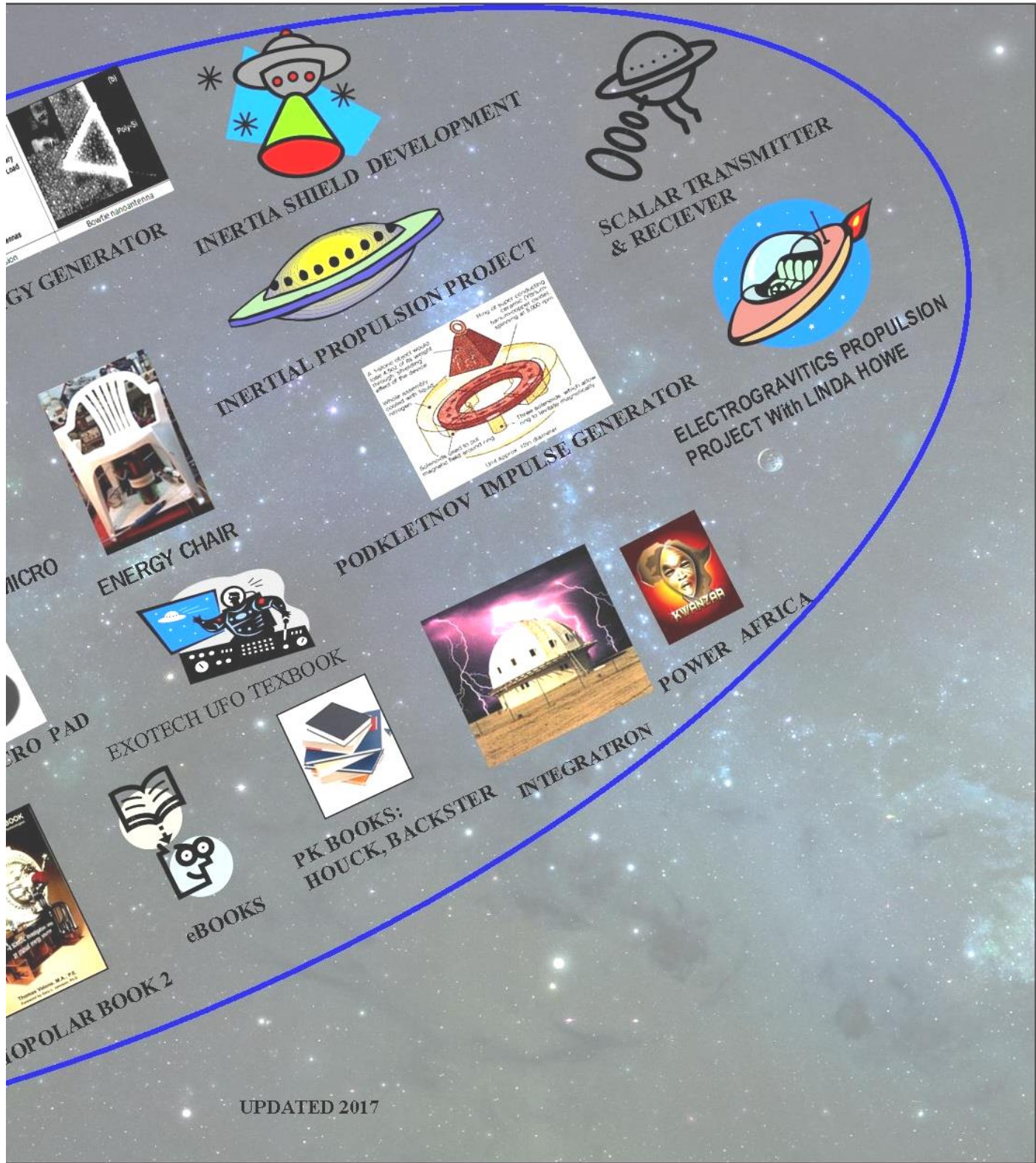
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LEADING SCIENTISTS AND THINKERS ON ENERGY – THOMAS F. VALONE

Radio & Internet Interview by Futurist DAVID HOULE, Host of Evolutionshift
<http://davidhoule.com/evolutionshift-blog> September 21, 2007

(This interview still is valuable today as these issues are now even more urgent – Ed. Note)

In this eighth installment of our ongoing series of interviews with some of the leading thinkers and scientists on the subject of energy, we interview Dr. Thomas Valone.

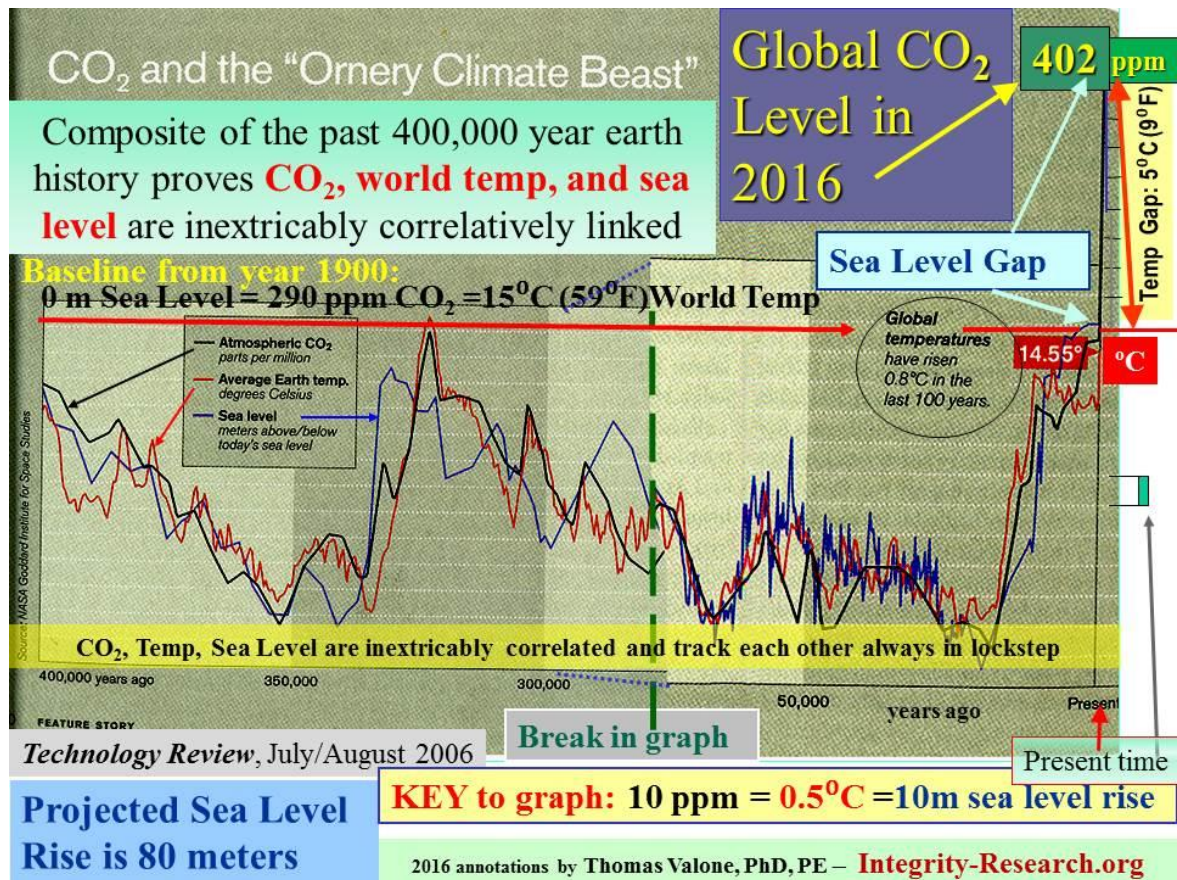
Facing and solving the multiple issues concerning energy is the single most pressing problem that we face as a species. There is a lot of media coverage about energy, alternative energy and global warming, but what has been missing is the knowledge and point of view of scientists, at least in the main stream media. I met Tom at the Foundation for the Future conference in Seattle WA on the future of energy and was taken with his positive outlook and the fact that he has been a patent examiner.

1. Evolutionshift: As a scientist and patent examiner you are in superlative company. Any other similarities with Albert Einstein? Seriously, how does your work with the government patent office compliment your scientific work and research?

VALONE: Any comments that I make in this regard do not reflect the views of the US Patent and Trademark Office and are only my personal viewpoints as a private citizen. Of course, when a recent biography of Einstein was aired on the PBS channel, I was happy to watch, being a physicist and patent examiner. However, I learned from the narrator that “Einstein was employed at a dead-end job at the Swiss Patent Office” before he was freed by publishing three seminal journal articles and receiving other job offers. The work at the US PTO often feels like a dead-end, repetitive job since it is piecemeal, production work with no job security. However, I have tried to follow in Einstein’s footsteps, who was born in the same month as I was, by taking General Relativity as a physics graduate student years ago, using it for analyzing non-inertial reference frames in my physics Master’s thesis on the homopolar generator, and recently by buying the book “How to Think Like an Einstein”, and also writing a PhD thesis on zero point energy performance of useful work from the quantum vacuum. This last work, which I hid in my drawer at the Patent Office just like Einstein did, has evolved into the popular book, ***Zero Point Energy: The Fuel of the Future***, which presents practical suggestions for converting ZPE into electricity. That’s where the ability to search the scientific and patent literature comes in handy...finding science and engineering inventions in a particular field and thus doing ‘due diligence.’

2. Evolutionshift: Your presentation at the Foundation for the Futures’ future of energy conference was one of the more urgent presentations about the need for alternative energy sources. How urgent is the global energy situation?

VALONE: To answer the urgency question, we have to realize just one of the IPCC findings. That is, with every single degree of global temperature increase, there is a whole category on the average of increase in hurricane strength. We have already experienced this in our lifetime. A category 5 hurricane now will suck enough energy from the ocean to become a category 6, etc. The melting of the Antarctic and most importantly, the Greenland ice sheets is not only inevitable, according to a climate chart published by MIT's *Technology Review* in July, 2006, but roughly equals the 80 meters of extraordinary sea level rise that is predicted by that calibrated chart. As fossil fuels continue to push carbon dioxide levels past the 400, 500 and the expected 700 ppm levels, we are entering new, uncharted territory on an earth that has not exceeded such levels in 400,000 years. We really need to introduce a completely clean and inexpensive source of energy for electricity, such as a zero point energy diode generator, in the next ten years to have any hope of revolutionizing the climate and energy usage. (Since this interview, a study of classrooms found "cognitive impairment" results when CO2 reaches 1000 ppm, which will be the level worldwide in only about 100 years, if we do nothing or worse, increase CO2 emissions. Updated MIT climate graph is below, annotated by Valone, posted on IRI website. – Ed. Note)



3. Evolutionshift: Do you believe in Peak Oil? When will we be passing through it and when might the planet run out of oil?

VALONE: Peak Oil is not a matter of belief. It is a fact that Hubbert established to everyone's satisfaction by predicting the United States' peak of oil production twenty five years before it happened. His prediction for the world oil production has all the experts arguing about the give-or-take of only a couple of decades! That's how close the tolerance is for Hubbert's Peak. In other words, we are actually experiencing the maximum oil production that the world can sustain at the present time: about 72 million barrels of oil per day. This black, dead fossil liquid consumption by living human beings is on the same order of magnitude as the water flow over the American Falls in New York State, where I grew up. The only direction for this rate is downward. Saudi Arabia presently is preparing for their Peak Oil by investing heavily in tourism resorts and by building islands in the ocean with mansions on them. Technically, to answer the second question, the planet will never run out of oil. However, as Nikola Tesla pointed out, we won't be able to continue burning it for fuel for the sake of our future generations.

4. Evolutionshift: What are the best sources of alternative energy for the next 20 years?

VALONE: The best sources of alternative energy for the next 20 years depends upon what application is in mind. The top of the list has to include photovoltaic solar electricity. I recently wrote an article in the Integrity Research Institute's Annual Report about a "Revolution in Solar Energy" which summarizes the latest discoveries. The ability to generate more than one electron from a photon of light, has now been demonstrated by Los Alamos labs. Alan Heeger < <http://www.ipos.ucsb.edu/ajh.html> >, who won the 2000 Nobel Prize for his codiscovery of electrically conducting polymers, and his colleagues at the University of California, Santa Barbara < <http://www.ipos.ucsb.edu/> > (UCSB), have recently created process for multiple layers of plastic PV material with flexibility and high efficiency. The company Konarka based in Lowell, MA is the one to watch. Their polymer PV cells can even generate electricity with background room lighting. Another source of alternative energy that is on my "best" list is the permanent magnet motor, utilizing the 'magnetic gradient.' IRI has a spiral stator design that improves upon the old Kure Tekko Japanese patents of the 1970's with several innovative magnetic pulsing techniques. We can foresee the day when a magnetic car will compete favorably with the electric car, since it will not need recharging. Geothermal energy is another 'best' and ubiquitous source of energy that has been highly recommended for municipalities and centralized power. Another favorite of mine is zero point energy, since I have performed a feasibility study and found that 'zero bias' diodes are manifesting the rectified electricity which we all desire for a generator. The quantum vacuum continually generates random nonthermal noise (called 'zero point energy') in solid state devices, causing tunneling and electron flow. It is time to start using this free energy source in a big way. The end product will have a construction, much like the tiny LEDs in our flat screen televisions, with millions of diodes all transducing zero point energy into electron current. For the application of medium to large industrial plants, I recommend the conversion of waste heat into electricity. The company, Primary Energy, headed by Tom Casten, has a wonderful offer they cannot refuse: allow him to build the electrical generation plant on site and they save about half on all future electricity bills. Other promising alternative energy sources include off-shore wind generators, tidal generators, and ocean current electrical generators. For the transportation sector, I advocate compressed air cars and

plug-in electric cars, which are making their debut in every other country but the US. The US, as you might remember, is the country and GM is the company “Who Killed the Electric Car.” This debacle of purposely crushing every leased EV-1 electric car by GM is now recorded on DVD (by SONY Classic Pictures) for historical posterity. As Europe, Iceland, and other countries become energy independent and non-polluting, our EPA has yet to declare CO2 an environmental pollutant.

5. Evolutionshift: [Depending on your answer to #4] How soon do you these sources significantly impacting the world’s use of fossil fuels? What can be done to accelerate the timelines?

VALONE: As mentioned above, the US EPA is at fault, just as the California Air Quality Board was in 2002, for not standing up to the most problematic greenhouse gas and limiting its emission rate. Once legislation has been passed, the industrial sector has proven its ability to adapt, which will accelerate the timelines. As was the case in the 1970’s after the first Mid-East Oil Embargo, the US has the will power and the resourcefulness to put into practice the conservation mandates that are recommended by government. For example, conservation has not been advocated recently but back then it was and the US responded by almost a 50% savings in energy consumption. Today the Alliance to Save Energy here in DC is famous for “Energy Efficiency” forums, awards and programs. As Amory Lovins points out, it is easier and cheaper to save energy than to generate it. Therefore, to answer the question, in the short term, we can significantly impact this country’s use of fossil fuels, while the 5 to 10 year lag of development of zero-fuel devices takes place.

6. Evolutionshift: What might be the sources of alternative energy longer term? What do you see that is promising?

VALONE: As mentioned above, for the longer term, zero point energy devices will be developed and are foreseen by many experts to permanently solve the energy problem, also making practical space travel possible. Cold fusion devices will also become available, along with other exotic sources of energy, such as the pB-11 plasma focus fusion under development at the University of Illinois. Still, the biggest breakthrough for the future has to be the Konarka multi-layer polymer solar cell which is predicted to be inserted into almost everything, since it generates electricity from ambient room light.

7. Evolutionshift: [Assuming how you answered #6 and based upon knowledge of your thinking] Why is cold fusion so promising? Hasn’t the scientific community at large ridiculed it? Please explain to my readers why significant resources should be directed toward developing this type of energy?

VALONE: The International Conference on Cold Fusion is scheduled for Washington DC in 2008 for the first time and I look forward to participating in it. My nonprofit www.IntegrityResearchInstitute.org has sponsored one cold fusion seminar (LENREW-2000) and has consistently featured one “token” cold fusion speaker at both Conferences on Future Energy (COFE and COFE2). Suffice it to say, nature creates transmutation of

elements at the cellular level, well documented in peer-reviewed journal articles, and reported by Dr. Ed Storms at COFE in 1999 and elsewhere. Cold fusion also achieves similar transmutation of elements through tabletop electrolysis, which is not so strange once we realize that nature does this consistently. It is so promising because the fact that transmutation means a nuclear reaction has to take place. Repeatable experiments of cheap, efficient heat production have been demonstrated in over a dozen government labs, which also indicates its promise. To answer the second question, we only have to thank the American Physical Society for creating enough obfuscation in 1989, mainly by Dr. Robert Park who for years fulfilled the role of public affairs director. He took it on himself to raise the skeptics flag and has waved it ever since. My removal from the Patent Office in 1999 was credited to him by the arbitrator who reinstated me. He acknowledged the bad publicity he created for my first COFE and the phone calls he made to the Commerce Department to discredit me, all for having one cold fusion speaker at COFE, which might have taken place at the State, Energy or Commerce Department. The ridicule mainly comes from a lack of understanding and, as my arbitrator pointed out, the fear that if successful, cold fusion will draw from the same limited pot of funding that hot fusion now enjoys. I know that once we become aware of the billion-dollar fusion boondoggle called “magnetic confinement” or the “tokamak,” which the DOE admits will not become commercially viable for electricity generation even by 2050 (always 30 years or more in the future), the urge to include plasma focus fusion, cold fusion, electrostatic confinement fusion, and even bubble fusion becomes much more defensible.

8. Evolutionshift: Are you optimistic that humanity can replace fossil fuels in time to avoid an environmental cataclysm?

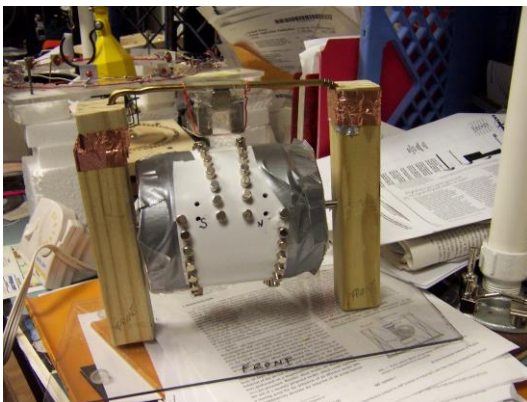
VALONE: Every time there is an administration change in DC, I generate great optimism for energy policy change. I have given several slide shows for Congressional staffers and even advised Senator Kerry’s office when he was running for President. The question of avoiding the inevitable tidal wave from a number of likely causes (including the Canary Island landslide), the inevitable eruption of the Yellowstone caldera, or the unavoidable increased heat waves and stronger hurricanes due to global warming, as well as the inevitable sinking of most of Louisiana and Florida as the sea rises in the next century, all depend upon the next 20 years of preparation. If we as private scientists and entrepreneurs can break through the development and production barriers, while China manufacturing is still cheap and their currency has not been devalued, then the world will hopefully receive the cheap, inexpensive, one cubic foot box which I have repeatedly envisioned as the container powering the local home or business. Yes, I am optimistic, mainly from my belief in a benevolent Higher Power. However, some environmental changes are necessary, just like Katrina, to replace the impotent government agency leaders (e.g. FEMA) who often stop progress and instead, maintain inefficiency.

9. Evolutionshift: Any final thoughts or comments?

Everyone can do his or her part to conserve energy and reduce their personal carbon dioxide emissions, including recycling their waste, installing passive solar in their homes and buying a hybrid, if they can afford to do so. Writing their Senator and Congressman to

include green legislation like the 10% renewable portfolio for each state is vital. Right now, Europe has a 20% renewable portfolio for their energy production and the US lags behind, even though we are the biggest consumer (20 million barrels per day) of oil and the biggest polluter in the world. It is up to the US to change its ways if we believe the world can change for the better. Supporting and buying stock in Planktos, Inc., which has a wonderful plankton-feeding program for the ocean to sequester millions of tons of CO₂, is also very important for the short term. The world's temperature and sea level are being driven (thermally forced) by the present heat-trapping 400 ppm of CO₂ in the atmosphere. Planetary wide modifications by the human race united for a common cause will solve this problem for the better.

Spiral Magnetic Motor – An IRI Investment in Our Clean Energy Future



Most people may not realize that spinning electrons are the cause of magnetism. Some physicists remind us on science documentaries that electrons in the mountains have been spinning for millions of years. Perhaps this is the elusive perpetual motion of fantasies. Yet, the key to unlocking zero point energy and the negative energy of the quantum vacuum could just be the “**Magnetic Gradient.**” While we use the voltage gradients, thermal gradients, and even gravity gradients all of the time to perform useful work, our world has not mastered the magnetic gradient (a change in magnetic field intensity over a distance of space). The Spiral Magnetic Motor (SMM) is just the kind of magnetic gradient motor which is ripe for scientific research today because the practice of energy harvesting is gaining a wide range of possible options. Capitalizing on an ambient source of energy, such as a passing magnet causing a voltage spike with Wiegand wires, can lead to a viable method of magnetic switching for the SMM rotor so that the cycle can be repeated. This is very exciting for the serious inventor since 90% of the cycle is already powered by permanent magnets. IRI has built many SMM models and published the results in peer-reviewed journals.²¹

Wearable Electric Antioxidant Clothes

²¹ E.g., “Permanent Magnet Spiral Motor for Magnetic Gradient Energy Utilization: Axial Magnetic Field” Presented to the Space, Propulsion & Energy Sciences International Forum (SPESIF), February 23-26, 2010, Applied Physics Laboratory – Johns Hopkins University, sponsored by the American Institute of Physics

(12) **United States Patent**
Panting

(10) **Patent No.:** **US 8,825,174 B2**
(45) **Date of Patent:** **Sep. 2, 2014**

(54) **THERAPEUTIC ELECTRIC ANTIOXIDANT CLOTHING APPARATUS AND METHOD**

(75) Inventor: **Jacqueline Panting**, College Park, MD (US)

(73) Assignee: **Integrity Research Institute**, Beltsville, MD (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 96 days.

(21) Appl. No.: **13/135,140**

(22) Filed: **Jun. 27, 2011**

(65) **Prior Publication Data**
US 2012/0016446 A1 Jan. 19, 2012

Related U.S. Application Data

(60) Provisional application No. 61/358,916, filed on Jun. 27, 2010.

(51) **Int. Cl.**
A61N 1/00 (2006.01)
A61B 5/04 (2006.01)
A61N 1/20 (2006.01)
A61N 1/04 (2006.01)
A61N 1/32 (2006.01)

(52) **U.S. Cl.**
CPC *A61N 1/205* (2013.01); *A61N 1/0484* (2013.01); *A61N 1/32* (2013.01)
USPC 607/62; 607/2; 600/386; 600/388

(58) **Field of Classification Search**
USPC 607/2, 62; 600/386, 388
See application file for complete search history.

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Primary Examiner — Nicole F Lavert

(57) **ABSTRACT**
A process for introducing therapeutic doses of electric antioxidants to the human skin with conductive portions in clothing for electrically contacting the skin, for applying direct current, pulsed direct current, or alternating current electricity of various voltage and current levels, for conductive wiring fiber interwoven in clothing, and for electronically controlling the doses of electric antioxidants in microcurrent doses applied percutaneously or transcutaneously to the human skin. A preferred embodiment includes the process for applying clothing that is skin tight, with or without a control module imbedded in the clothing or optionally, a wireless and remote control module for administering the therapeutic doses of electric antioxidants to the skin of the head, feet, legs, hips, or upper torso.

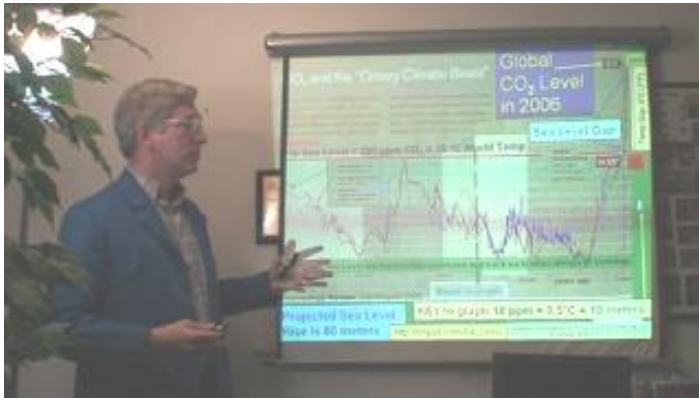
13 Claims, 9 Drawing Sheets

This exciting new IRI project is moving forward and we are thrilled that Dr. Jacqueline Panting was finally granted U.S. Patent #8,825,174 by the US Patent and Trademark Office on September 2, 2014 and assigned to IRI. We have had multiple offers in 2016 to present the details of the invention to manufacturers with the help of facilitators we know and trust. Our next task is to produce a working prototype that is durable and washable, using the latest conductive fibers and piezoelectric microcurrent generators. Soon sports competitors and Olympians will be wearing our product since it will quench the free radicals developed by “exhaustive exertion” and allow the performer to fight fatigue much more easily. Electrons are antioxidants, as proven by Dr. Valone and Dr. Oschman.²²

In keeping with the Bioenergetics Program that includes the EM Pulser, OsteoPad, Premier Junior, and the latest EM PulsePad products, the development of Therapeutic Electric Antioxidant Clothing, in accordance with the patented process, is predicted to push IRI into a higher level of achievement, with the steady royalty income. Other patent filings are also in the works, on behalf of Integrity Research Institute.

²² Oschman, James. *Energy Medicine: The Scientific Basis*, Churchill Livingstone, 2000

IRI's 2006 Prediction of Future Earth Temperature Increase Based on CO2 Levels is Echoed by Climate Experts in 2009 and 2016



Here is a snapshot from the short “Climate Changes” video on the IRI website of Dr. Valone explaining the NASA climatologist Jim Hansen’s graph which combines a half million year history of the earth’s average temperature, sea level and carbon dioxide (CO2) levels (see Dr. Jim Hansen’s “Climate Beast” MIT *Technology Review*

graph annotated by IRI on [page 29](#)). The surprise to Drs. Hansen and Valone is the unanticipated close correlation between the three variables which follow each other inextricably, thousands of years before the present. Dr. Jim Hansen, who Valone met, was persecuted through the Bush years for predicting global warming trends but now is recognized as a whistle blower. The most important trend revealed in comparing the amount of CO2 increase (up to 400 ppm now) with the amount of temperature increase anticipated to match it is the 5 degrees Celsius or 9 degrees Fahrenheit that are predicted from the analysis. The ONLY uncertainty is how fast the climate will warm. Dr. Valone announced this finding at COFE2 in 2006 and gave the entire audience color copies of the annotated graphic above. Three years later in 2009 the climate experts on both sides of the Atlantic started publishing the same findings as seen in the slide below.

SPECIAL REPORT / CLIMATE CHANGE

A WORLD 4°C WARMER

It may happen in our lifetime. **Shanta Barley** investigates what life will be like

By 2055, climate change is likely to have warmed the world by a dangerous 4°C unless we stop pumping greenhouse gases into the atmosphere the way we do now. This is the startling conclusion of a study by the UK Met Office, unveiled at a conference in Oxford this week.

Why so soon? Because temperature rises caused by greenhouse gas emissions are expected to trigger dangerous feedback loops, which will release ever increasing amounts of greenhouse gases. The nature and scale of these feedback loops is a subject of vigorous debate among climate scientists, but warmer oceans, for instance, may liberate more dissolved CO₂, and plants may decay faster in a warmer climate. The Met Office ran 17 different models with these feedbacks. All concluded a 4°C rise by 2055 was likely if emissions continue to rise. Even if we are lucky, we are still likely to hit 4°C by 2070.

at the less pessimistic estimate of a 0.85-metre rise by 2100, would put at least 150 million people a year at risk from floods, says Rahmstorf's colleague Jochem Hinkel.

The Amazon - gone
In a 4°C world, climate change, deforestation and fires spreading from degraded land into pristine forest will conspire to destroy over 80 per cent of the Amazon rainforest by 2100, according to climatologist Wolfgang Cramer at the Potsdam Institute for Climate Impact Research in Germany. His climate feedback research that research in Germany.

PRIZE FIGHT
Time to revamp the Nobels

New
WEEKLY October 3 - 9, 2009

Future Earth
New Scientist, 10/3/09

Then in 2009, TWO DIFFERENT CLIMATE GROUPS: SAME PREDICTION

The Nation Washington Post, 9/25/09, p. A4

New Analysis Brings Dire Forecast Of 6.3-Degree Temperature Increase

By JULIE EILPERIN
Washington Post Staff Writer

Climate researchers now predict the planet will warm by 6.3 degrees Fahrenheit by the end of the century even if the world's leaders fulfill their most ambitious climate pledges, a much faster and broader scale of change than forecast just two years ago, according to a report released Thursday by the United Nations Environment Program.

The new overview of global warming research, aimed at marshaling political support for a new international climate pact by the end of the year, highlights the extent to which recent scientific assessments have outstripped the predictions issued by the Nobel Prize-winning U.N. Intergovernmental Panel on Climate Change in 2007.

Robert Corell, who chairs the Climate Action Initiative and reviewed the UNEP report's scientific findings, said the significant global temperature rise is likely to occur even if industrialized and de-

Warming Trend
Researchers say global temperatures as likely to rise more than six degrees by the end of the century even if every country enacts all climate legislation it has promised to enact to date.

Temperature increases, in degrees Fahrenheit

■ Degrees the average global temperature is likely to increase if all countries continue as they are now . . . 8.13

□ . . . likely to increase if all countries enact the policies they have promised. 6.29

SOURCE: Sustainability Institute
THE WASHINGTON POST

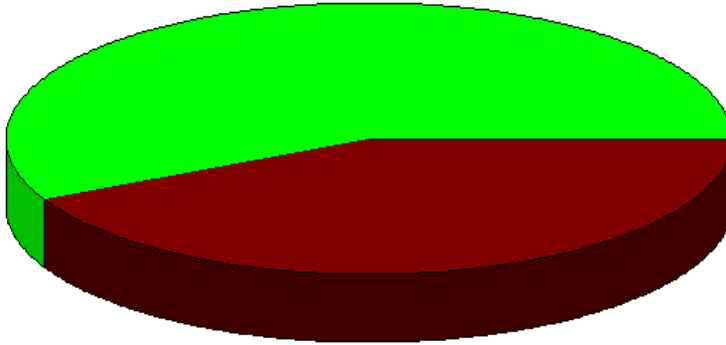
Farmers are overshadowed by a smoke-belching cement factory outside Hanoi. Even with sharp emissions curbs, temperatures may rise disastrously.

IRI FINANCIAL REPORT 2016

INCOME

Income Summary
January through December 2016

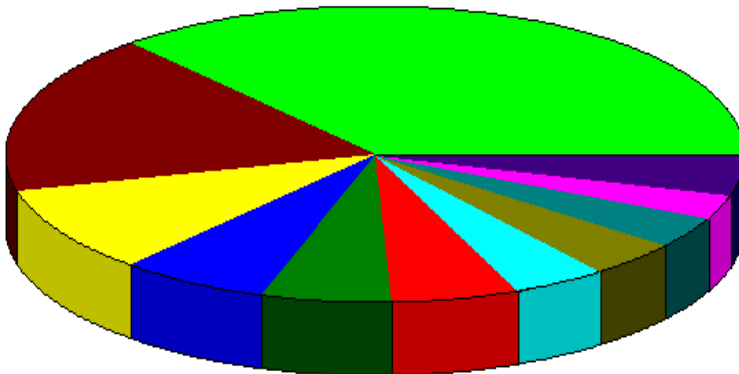
Sales	57.49%
Direct Public Support	42.51
Total	\$143,723.40



EXPENSES

Expense Summary
January through December 2016

Awards and Grants	36.49%
Equipment parts	17.77
Facilities and Equipment	9.49
Operations	6.54
Parts for products	5.86
Business Expenses	5.59
Shipping costs	4.26
Other Types of Expenses	4.11
Travel and Meetings	3.61
Printing supplies	2.77
Other	3.50
Total	\$147,947.85



BALANCE SHEET AS of 12-31-2016

ASSETS	<u>\$ 28,861.62</u>
LIABILITIES & EQUITY	
Total Liabilities	\$ 10,106.65
Equity	\$ 38,968.27
TOTAL LIABILITIES & NET WORTH	<u>\$ 28,861.62</u>



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