

# **Rapid and Decisive Solution of the World Energy Crisis and Global Warming**

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## **Foreword**

### **The Problem:**

The present energy paradigm—that one must almost always consume fuel {1} and dirtily provide EM energy and power—has failed.

Applying it *has caused*—and thus *cannot solve*—(a) the escalating world fuel crisis (b) hence the escalating energy crisis, and (c) its accompanying and escalating global warming, climate change, and biospheric pollution crises.

Catastrophic national economic collapses and more intensive global changes {2} are looming—with additional severe drought and water shortages, and increasing changes and violence in climate and weather. Yet the worldwide demand for energy rapidly escalates while the world’s fuel shortage is also rapidly increasing.

Worldwide there is a century of investment in the present totally inadequate electric power structures, grids, and systems. These must somehow be “altered” so as to be clean, but then can still be used, since their financial replacement costs are just not possible.

Most energy is presently obtained by “dirty” methods {3}. Hence as energy production increases, so do harmful combustion byproducts, nuclear wastes, and biospheric contamination—as well as global warming. This is totally because of (a) the present obsolete energy paradigm and (b) the abject failure of our scientific community to change it.

Climate changes are already starting {4} {5} {6}, and moving much swifter than expected {7}. By 2030, the combination of these factors will increasingly spell worldwide economic and biospheric chaos if the present “dirty energy” paradigm continues to be followed. Eventually the collapse of Western Civilization itself may loom as a possibility.

### **Summary of the Problem**

- (1) Most of our EM energy production also produces lots of “dirt” in the process of obtaining the energy.
- (2) The solution has to be to produce our EM energy without producing dirt at all.
- (3) Other than small contributions by wind, hydro, geothermal, and solar power, presently there is no really “clean energy” process in widespread usage {8}.
- (4) Science has no truly effective way to “clean” the dirt (or dispose of it) that is produced to get the energy, even if we “catch” the dirt and hold it. Catching carbon byproducts from the combustion of coal, e.g., and then calling for “sequestration” *does not* get rid of the dirt. Putting the carbon dirt in the ocean merely acidifies the ocean (its acidity is already beginning to harm and kill ocean life forms) and eventually puts it right back into the atmosphere again {9}.
- (5) The central problem is: *We presently produce most of our EM energy by simultaneously producing harmful dirt that we simply cannot render harmless.*

- (6) The only real solution is: *We must produce all the EM energy we need, cheaply and cleanly, essentially without the production of any dirt at all.*
- (7) Ironically, all EM energy is *already* produced cleanly from the vacuum via the source dipolarity of the generating system itself. It *is not* produced by consuming fuel to crank the shaft of the generator, although a hundred years of electrical engineers and professors have taught and been falsely taught that it is {10}. So burning the hydrocarbon fuel or consuming nuclear fuel rods has nothing to do with the *direct production of EM energy* {11}.
- (8) Hence *the specific problem is to catch and use the free EM energy flowing from its universal vacuum source, without consuming fuel and without cranking the shaft of the generator—and without depending on the wind, sun, or water.* Any dipole already does exactly this, because of its proven broken symmetry known since 1957 and the award of the Nobel Prize to Lee and Yang {12}.
- (9) This now surfaces the real problem: *Our electrical engineering process has to be doing something “diabolical” that deliberately forces each and every EM energy system to destroy its source dipolarity faster than it powers its load.* Otherwise, no further physical input of mechanical shaft energy to the generator would be necessary, once we had initially forced the generator to form its own internal source dipole {13}. Instead, the EM energy would flow freely and forever from the sustained dipole, without ever another “cranking” of the generator shaft.

#### **Facts Bearing on the Problem:**

- (1) *One does not have to consume fuel in order to obtain energy!* Spacetime/vacuum itself is the greatest energetic source in the universe, with more energy in a cubic centimeter of space than the Earth consumes in a million years {14} {15}.
- (2) Modern physics proves that the energetic vacuum indeed has this high energy activity, and that it (the active vacuum) continuously interacts with every charge {16} (magnetic or electric) in the universe, freely and continuously providing the normal EM fields *and all their EM energy.*
- (3) Yet our energy models—such as the more than a century-old and crippled electrical engineering (EE) model—still falsely assume an *inert* spacetime/vacuum environment.
- (4) The archaic, seriously flawed 1880s/1890s electrical engineering model {17} is thus a—and perhaps *the*—major cause of the escalating world energy problem, although this fact is completely ignored.
- (5) Every observable joule of observable EM energy in the universe—including in every EM system and circuit—is (and has always been) directly extracted from the seething virtual state vacuum via the broken symmetry of the system’s internal source dipolarity {18}.
- (6) Every simple piece (few inches) of copper wire, lying on the shelf alone, with no “circuit current” running in it, involves enormous ongoing energy and power sufficient to power a major nation if it were tapped {19}.
- (7) Since the archaic old EE model was formed in the 1880s and 1890s, modern physics—including special and general relativity, quantum mechanics, quantum electrodynamics, gauge field theory, quantum field theory, and particle physics—has been born and developed. Physics has made a century of progress since the old

EE model was “frozen” in 1892. Modern physics assures us that the vacuum/spacetime has enormous energy, and that it continually interacts with every charge in a circuit, system, and the universe, continually exchanging enormous—even *mind-boggling*—energy with it. Indeed, all forces in all our systems are produced by the interaction and exchange of virtual particles of the vacuum {20}.

- (8) The EE’s term for “potentialization” (as, to “potentialize” a circuit), actually means to form a potential gradient in the local vacuum dynamics {21} in which that circuit is embedded {22}. In turn, that alters the ongoing interaction of that vacuum with the circuit charges {23}, thereby freely “collecting” in the circuit (on the free charges  $q$ ) the potential energy  $W$  given by  $W = Vq$ . All that is needed to collect the necessary potential energy on the charges in a given circuit is to independently supply the voltage. This can be done absolutely work-free while current is deliberately pinned and kept zero during the brief potentializing process.
- (9) To correct the horribly flawed EE problem, the escalating world energy problem, and the escalating global warming and climate-changing problem, physicists in several disciplines—not just EEs and environmental scientists—must be directly involved. Trying to use electrical engineers to solve the problem—that their own discipline and model create in the first place—is utterly useless.
- (10) Eminent scientists—including Nobelists such as Feynman—have pointed out the major EE falsities {24}, but to no avail. The scientific leadership has no intention of correcting that terrible 1880s EE model {17}.
- (11) So a major “Manhattan Project” with maximum effort is required to quickly and forcibly give us a dramatic new replacement of the old paradigm {25} {26}.
- (12) Since the present scientific establishment adamantly refuses to correct the sadly flawed old 1880s/1890s classical electrodynamics model {27}, the new project must be powerfully ordered and controlled from above the scientific orthodoxy {28}, as was the Manhattan Project in WW II. We shall have to force our scientists to do science! A highly concentrated project is required.
- (13) Such a concentrated project is doable in a very few years (about five or six), just as the Manhattan Project demonstrated historically. There we went from almost a zero start to a fully operational atomic bomb, in about 5 years {29}. We can do the same thing now for the energy crisis if we implement such a crash program.
- (14) We also advance a proven but novel mechanism—negative resonance absorption of the medium or NRAM—which can be rapidly adapted to produce self-powering heat amplifiers {30}, to be applied to electrical power plant steam boilers worldwide to make the boilers “self-heating”. This will dramatically reduce combustion byproducts and nuclear wastes world-wide almost immediately, while capitalizing on the huge sunk costs in almost all our present major electrical power systems {31} {32} {33} {34}.
- (15) We advance another novel mechanism, whereby one deliberately uses negative EM energy (obtained by using sharp gradients to provoke Dirac holes in the local interacting vacuum) in one’s circuits {35}. If a flow of negative EM energy passes down a conductor into an impedance in series, then the active vacuum medium freely inserts additional negative energy into that impedance, so that along the

conductive path leaving the impedance there is a greater flow of negative energy out of the impedance and along the flow path, than the negative energy the operator inputs into it from the input side.

- (16) A set of such “amplifying impedances” in series along a negative energy flow path can provide as much negative energy flow from the active vacuum as one wishes (or is able to control by the state of the technology at the time)—starting from a single flashlight battery powering a very small negative energy source {36}.
- (17) Bedini has been using this effect in his battery chargers for 20 years, with excellent results and proof of  $COP > 1.0$ . With *positive energy* flow, an impedance produces a “scattering” of energy from the flow into the external environment—hence is a system loss and the energy is “dissipated” (from the circuit path out into the environment) from the system. With *negative energy* flow, an impedance produces/receives a “free gathering” of additional input negative energy from the active vacuum, and so negative energy flow is freely “gained” by the circuit and system due to the free input from the active environment. In short, the “dissipation” is then from the external vacuum environment into the impedance and therefore into the system as a system gain, whereas with normal positive energy the “dissipation” is out of the system and back into the external environment as a system loss.
- (18) Indeed, *working, experimentally tested, independently replicated, and proven Bedini free energy systems are available now and are already in limited production and marketing* {37} {38}. At least a dozen other systems such as self-powering permanent magnet motors are also available from Bedini, requiring only the funding for a little further production engineering and then dramatic production and marketing.
- (19) From other researchers and research groups worldwide, other systems still in the “bench demonstrator” category are also available for more extensive R&D completion and then for production and deployment {39}.

### **Solution Required:**

- (1) We need a prompt and massive shift to a new energy paradigm that provides the necessary energy without consumption of fuel, taking the energy freely from the energetic vacuum/spacetime and thus producing no “dirt”.
- (2) We must have it and implement it as rapidly as is humanly possible.
- (3) Electrical engineering already deliberately excludes the new paradigm {40}.
- (4) It is not an “electrical engineering” problem, but a *physics* problem {41} {42}.
- (5) The new paradigm shift *must* also be economically frugal, and it *can* be {43}.
- (6) Bits and pieces of the suitable new paradigm are available in the various compartments of physics, primarily needing “combining and finishing” {44}.
- (7) We urgently need a *Manhattan-type “energy from the vacuum” project* to produce and implement the new energy paradigm area. We need it *now*.

### **Advantages That Accrue:**

- (1) There are known but ignored legitimate prototype COP>1.0 solutions already available worldwide, but rather rigorously suppressed {45} {46}. These can be substantially funded for their more rapid completion.
- (2) With the proper crash program we will quickly get clean, cheap, economical solutions to the world energy crisis at all levels {47}.
- (3) We will get prompt, dramatic reduction in (a) global warming emissions etc., (b) nuclear wastes production and storage, and (c) present harmful pollution and despoiling of the biosphere {48}.
- (4) We will get prompt, dramatic reduction in (a) burning of fossil fuels, (b) consumption of nuclear fuel rods, and (c) production of harmful wastes (nuclear and other contaminants) *by specially adapting most power plants already on site, including nuclear power plants* {48}.
- (5) We will also get dramatic solutions for curing and reversing most present medical diseases as well, including those now considered incurable—and also including the major debilitation effects of aging. This will follow from the development of *precursor engineering* and production of the proven Fogal semiconductor, in the latter program of the Manhattan-type Project.
- (6) Practical antigravity systems and space propulsion systems will be made possible very quickly {49}. This follows from developing systems—as Bedini has done—that use *negative* energy (which Tesla discovered and called “radiant energy”).
- (7) Instant noise-free communications will be available almost immediately {50} using the Fogal chip {51} and the beginning of the very novel *precursor engineering* that it accomplishes. A description of the functioning of the Fogal chip is given in the seventh program of this Solutions paper.
- (8) With the final program (precursor engineering) we also get the ability to engineer mind and life {52}, and indeed we engineer *spacetime/vacuum* and its structuring and dynamics {53} {54}.
- (9) With precursor engineering, we gain the ability to directly engineer *reality itself*, dramatically extending the present standard scientific method which uses models fitted to experimental observation only and is thus limited {55}.
- (10) Under rigorous independent laboratory tests, when “idled” at light loading, the Fogal semiconductor {51} has already demonstrated its ability to settle into precursor engineering and engineer the energetic vacuum/spacetime directly {56}. Nonetheless, Fogal and his chip have been resoundingly suppressed for nearly two decades.

### **Requirements for Deploying a Solution to the Energy Crisis:**

- (1) The source of energy in the new paradigm must be from a new and clean aspect of the active environment—*from spacetime itself*.
- (2) The source must be ubiquitous, inexhaustible, and clean. It must be applicable and available to homes, factories, cities, automobiles, airplanes, ships, electric power systems, propulsion systems, etc.
- (3) *Extracting and using* the energy must also be cheap, simple, and clean.

- (4) The new power systems should be “self-powered” by the energetic environment, analogous to a windmill-driven generator or a solar cell array, taking their EM energy “input wind” freely from this new environmental energy source.
- (5) Once the system is built and deployed, self-powering should be automatic and free, by adding use of clamped positive feedback. As with any other technical system, minimal normal maintenance and upkeep is expected and permissible.
- (6) Ideally there should be no harmful emission byproducts—such as CO<sub>2</sub> and nuclear wastes {57}—at all.
- (7) Carbon sequestration (a special form of environmental pollution) must not be required, so CO<sub>2</sub> emissions must not occur.
- (8) Altering and adapting the dirty-powering of the established centralized electrical power systems and grids—of the U.S. and other nations—to clean-powering is the first and highest priority requirement.
- (9) Altering and adapting the powering of automobiles, trucks, trains, ships, aircraft, etc. is the second highest requirement.
- (10) Instead of initial total replacement, the present centralized electrical power systems must be quickly adapted, dramatically cleaned up, and their sunk costs capitalized upon, while the other new, clean power systems are being developed and phased in over time.

**An Example Indicator:**

- (1) It is ridiculously easy and cheap to evoke a steady, free flow of real EM energy, anywhere, anytime. This “free EM energy wind” flow will last forever if its simple source is left undisturbed.
- (2) One way is to simply lay an electret on a permanent magnet, so that the electret’s E-field is orthogonal to the H-field of the magnet. Then just leave it alone.
- (3) By every present EE textbook’s Poynting energy flow theory, that silly gadget will sit there and freely and steadily pour out a real Poynting energy flow  $S$ , given by the simple equation  $S = E \times H$ . If the gadget remains unmolested, it will freely and unceasingly pour out real, usable Poynting EM energy until the end of time.
- (4) So getting a cheap, absolutely clean, unending EM energy “wind” is easy.
- (5) But to use some of it freely (as a windmill freely uses the wind), one must build an asymmetric system a priori.
- (6) The problem is that our electrical engineers since 1892 have used a deliberately-crippled, “symmetrized” model. It does not allow an asymmetrical EM system to be built, but requires that only symmetrical EM systems be built {58} {59}.
- (7) Hence the electrical power engineer does not even understand how to build a “proper electrical windmill” to catch and utilize the free EM energy of that wind from the vacuum/spacetime—because such a system is asymmetrical a priori, and is totally excluded from the EE’s theoretical model and from his thinking.
- (8) The free flow of real EM energy “wind” from the gadget is being extracted directly from the virtual state vacuum by the broken symmetry of each of the two dipoles {60}.
- (9) If the arbitrary symmetrization of the Heaviside equations—done by Lorentz in 1892 at the bidding of J. P. Morgan—is eliminated, there is already rigorous proof in the hard physics literature that such free energy currents from the vacuum

become available and are now usable by the proper asymmetric system {42}. Hence COP>1.0 EM systems are made feasible and practicable.

- (10) By removing the artificial Lorentz “symmetrization” and again including the asymmetrical systems contained in Maxwell’s original model {40}, one is then free to design and build “proper EM windmill systems”. Such a system can collect some of the free EM wind energy from our “silly gadget” and then *separately* dissipate the collected free EM potential energy to power loads “for free”.
- (11) It is also possible to input a certain amount of energy to a subsystem of a bigger system of multiple such subsystems, and have that energy do more work in joules than the energy input by the operator. Electrical power engineers do not seem to understand this at all, and even many thermodynamicists do not understand it. But it is true. There is a *conservation of energy* law, but there is *not* a conservation of work law {61}.
- (12) It is not necessary to burn a single gallon of oil, a liter of coal, or consume any nuclear fuel rods in order to obtain all the usable EM energy one wishes—cheaply, cleanly, anytime, anywhere {62}. The result is a dramatic reversal of the present contaminating and global-warming electrical power technology to self-powering, clean, economical systems that are fuel-free or almost entirely fuel-free.
- (13) Seven typical programs are listed which should be part of the intense Manhattan project to be launched. Others such as solid state self-powering “batteries” {46} may be added readily, but the seven listed will suffice to do the job—quickly, cleanly, and inexpensively.

## RECOMMENDED MANHATTAN PROJECT: EXAMPLE PROGRAMS

### Introduction

We note that others such as Nobelist Gore {25} are calling for a Manhattan Project to solve the global climate warming, pollution, and escalating energy problem. However, most of our political leaders—fed by our scientific community which has its head firmly buried in the sand in the ostrich position—still are thinking only in terms of the “standard paradigm”—*the very one that has already failed so miserably*. As an example, see the 2006 report {63} that the President’s Council of Advisors on Science and Technology (PCAST) provided to President Bush—and observe its severe limitations and total omission of energy-from-the-vacuum systems, *even though every joule of observable EM energy in every EM field and circuit and system in the universe is and has been extracted directly from the seething vacuum via the broken symmetry of the source dipolarity*.

The blunt truth is that PCAST itself has no inkling of what *really* powers an electrical circuit! It *is not* cranking the shaft of the generator, because that only restores the source dipole and its broken symmetry (that the silly symmetrical systems built by our EEs destroy faster than the systems power their loads). To prove it, in one of the seven recommended programs we reveal how to extract and use all the real EM energy one wishes, from any very cheap static voltage source that is never depleted.

To show the nature of what has to be done to tackle and solve the energy and climate problems, and to develop a new technology of “energy from the vacuum” systems, here is an elementary example of the several parts of *one* fundamental requirement:

(1) There has to be developed a major math model. It must be fitted to a very large number of phenomenology experiments in everything from quantum field theory, gauge field theory, particle physics, higher group symmetry electrodynamics, etc. that encompass the vacuum energy interaction phenomenology met with when the EFTV system is asymmetric. *There is no such model today, and producing one is a truly major scientific task in multiple physics disciplines (quantum mechanics, quantum electrodynamics, gauge field theory, quantum field theory, etc.)*. We would estimate this task as an initial \$50 million task to yield a minimally satisfactory initial model as a “starter”. Obviously, however, the task should continue and be further funded as the rest of the Manhattan Project programs continue, since it supports them all and since its refinement is necessary *if we are to develop a fitted technology*.

(2) The new model has to encompass the differences encountered in different locations (due to difference in arrangement of the charged matter, its atoms, nuclei etc.—and thus to the differences in the local vacuum interactions from place to place.

(3) The “fitting” to the differences must also be extended to electronic parts. E.g., in an EFTV COP>1.0 *asymmetric* system, a capacitor (certain size, certain rating) made in China may react differently in a given local vacuum area, from the “same” capacitor made in India. Symmetrical systems rule this out because they self-cancel the differences in the vacuum interactions, deliberately enforcing the net interaction to be zero—but *asymmetrical systems do not*. In fact, such systems have to include it in the model, because it is directly experienced in real life for such systems.

(4) This task alone (formulating and fitting a new model) is a many-million dollar effort, requiring several different specialists in various compartments of physics

(quantum field theory, gauge field theory, particle physics, etc.) along with many thousands of carefully designed and controlled phenomenology experiments, changing as the model develops and improves slowly. The team of specialists and experimentalists also has to re-insert negative energy (arbitrarily and improperly discarded by Dirac and others as shown by Solomon etc.), and work all that out as well.

(5) They also have to do a complete “retranslation” of the 1880s/1890s lingo of normal electrical engineering to modern physics terms and concepts. E.g., to “potentialize a circuit” is an erroneous concept. What is actually done is to potentialize the local vacuum (change one or more constituent potentials and its/their dynamics, comprising the local vacuum) in which the circuit is embedded, so that there is a difference in potential (energy density of the ongoing vacuum interaction with a standard charge) between the “high” side of the external circuit and the “low” or ground side of it. This means there is a difference in the ongoing interaction (between vacuum and charge) in the “top” of the circuit versus in the “bottom” of the circuit. This *spatial difference in the ongoing vacuum interactions* (top and bottom) is what is actually produced by “potentializing the external circuit”. In short, we must also “spell out” the *vacuum engineering* processes.

(6) Similarly, the astounding errors in the hoary old electrical engineering model—pointed out by Nobelists such as Feynman and others—must be corrected. A listing of these known falsities and errors in the CEM/EE model has been given by the present author {17}. That horribly flawed old model—presently taken as the “holy gospel”—is what must be corrected and severely updated and expanded to include the asymmetrical Maxwellian systems that it presently artificially excludes.

(7) Presently most scientists and engineers keep thinking (from our century-old singularized symmetrical circuits and applications experience with the highly crippled but well-fitted electrical engineering model) that asymmetrical EFTV  $COP > 1.0$  EM systems are simple. In that odd and ill-informed view, if an EFTV inventor really “has it” and knows what he is doing, then all he has to do is run down to Radio Shack, get some standard parts (fitted to the “self-enforced symmetrical system” case only) and whomp them together, and then he’s ready to put his system or systems directly into production and marketing. That entire prevailing viewpoint is a colossal joke. *If it were that simple, our sharp young doctoral candidates and post doctoral scientists at our leading universities would have done all this about 80 years ago. They didn’t, and they haven’t done it since then either.*

(8) The problem is that what has failed is an old long-outdated and error-riddled energy paradigm dating from the 1880s and 1890s. We have to develop a completely new energy paradigm, not just whomp up a kit of parts in the old one. Because it self-enforces symmetrical Maxwellian systems, we already know that the old model arbitrarily eliminates all asymmetrical  $COP > 1.0$  EFTV Maxwellian systems.

## **Conclusions**

Thus one sees the reason we are speaking of a Manhattan Project with very substantial funding (hundreds of millions of dollars) and competent and highly selected staffing.

This is not just another exercise for some electrical engineers and the presently failed old EE electric power paradigm.

Try finding a single EE textbook that simply lists and discusses the major assumptions in the present old CEM/EE model. There are none to my knowledge.

Try finding a single EE textbook that discusses the significance—and profound ramifications—of Lorentz’s 1892 symmetrization of the already sharply curtailed Heaviside equations (already only a pale subset of Maxwell’s theory). There are none to my knowledge.

Thus the major nature of the necessary program to correct the presently flawed and failed paradigm is obvious. In this paper, we outline merely what would be one such “Manhattan-type program” that would do the job. We do not discuss every potential COP>1.0 EFTV process or system; but we discuss the ones which (1) are absolutely necessary regardless of difficulty, (2) are already showing sufficient promise and progress to insure a very high probability of success, and (3) can be done in five years or less, assuming an all-out and well-funded and staffed program.

## **PROGRAM I**

### **Convert Static Voltage to Any Amount of Electrical Power Required**

Program I will be the conversion of a static voltage (available world wide) from a simple static source to furnish (freely) any amount of electrical power desired. It is simple and very cheap to provide a static voltage source—indeed, one may take the necessary “source static voltage” directly from the earth-electrosphere vertical voltage gradient anywhere and everywhere on Earth. This “charged earth-to-electrosphere” voltage gradient averages about 300,000 volts {64}. When standing, its voltage difference between one’s head and one’s foot may thus reach about 250 volts or even more.

As a “source” for the proper asymmetric circuit or system, a static voltage can be made to potentialize the charges in a briefly-connected external circuit (or a great number of them) *without drawing current*.

The freely-potentialized external circuit can then be *disconnected* from the source (with circuit charges still pinned and zero current), and its gap recompleted (as, e.g., by adding a diode and a resistor in series, with the diode oriented in the “current pumped around the loop” direction). This makes the freely potentialized external circuit complete again, but as a *separate system* entirely separated from the original static voltage source.

Once the separated external circuit is recompleted, its charges are allowed to come unpinned and current will flow in it, powering the load while the freely-potentialized circuit dissipates its potential energy. Then the process is iterated; the gap is re-opened and the static source is reconnected with the charges again pinned, to again freely potentialize the external circuit.

So one potentializes freely and statically with original source connected, *and then* dissipates the collected excess potential energy dynamically and separately from the original source.

In this manner the static voltage source will iteratively furnish all the electrical power in a specific circuit that one wishes, literally without limit, and without having to do work just to continue having the source. If one uses *only voltage input* from the static voltage source to one’s external circuit, then no change in the source’s static voltage occurs,

because no current flows from or through it, and hence no electrical power is drawn from it or used to destroy it.

Use of a static voltage source in this current-free fashion is beyond simply repeating the WW II use of the known difference of potential (between a jungle treetop and the earth's surface) to draw sufficient *power* (both current and voltage) to power a small radio in the South Pacific. There the troops used only the standard symmetric EM circuit, which has to draw *power* (both voltage and current) from the earth-electrosphere voltage difference source utilized and thus has to do work in getting the radios powered.

The overall *power* that can be drawn directly from a segment of the static earth-electrosphere capacitor's voltage and charge is very small, but if one draws only voltage (with  $dq/dt = 0$ ) and uses the proper asymmetric circuitry to collect and flow (shuttle) that voltage onto pinned charges  $q$  in a collecting circuit, then one can take and use *just the voltage*. Using this free static voltage to potentialize the external circuit will produce the desired amount of free potential energy  $W$  in the asymmetric collecting system (on those pinned charges  $q$ ) that one requires, by the simple equation  $W = Vq$ . If we do not allow any *current* from the external circuit and load to flow back through the dipolar voltage source, then all we continually need from the source is the voltage  $V$  itself. That can and will be sustained indefinitely by the source. Freely! Forever!

“Static voltage” is actually a dynamic set of ongoing bidirectional EM energy flows (longitudinal waves), as rigorously shown by Whittaker in 1903 {65}. Hence so-called “static” voltage will indeed flow (without doing work) onto a “statically connected” collection circuit containing pinned charges  $q$ , “potentializing” that receiving circuit so that stored potential energy  $W = Vq$  appears in it.

This “statically potentialized” (excited) collection circuit is then separated from the static voltage source. The gap left by the disconnected primary static source is recompleted (say, by a resistor and diode in series across the gap) as a separate external circuit and system, and *then* this separated circuit's freely collected EM potential energy is dissipated in its loads to power them. This results in delivering a fixed amount of free power to the loads to power them, *completely independently of the primary static source* (the electrosphere, in this example) {66}. *Any convenient and very cheap static voltage source can be substituted.*

This type of *asymmetric* system and circuitry is a part of the Heaviside model equations that Lorentz {59} deliberately discarded in 1892 by arbitrarily symmetrizing the equations for the specific purpose of eliminating all such systems, insuring that electrical engineers build only  $COP < 1.0$  power systems insofar as taking the energy from the local vacuum potential is concerned. Since then, EEs have always built and used only *symmetrized* power systems, thus directly generating the world's present energy crisis.

## **PROGRAM II**

### **Easily Build and Use Self-Powering Permanent Magnet Motors**

Program II is developing the “easy” self-powering permanent magnet motor, built by using specially-produced permanent magnets each having an asymmetric field laterally (deliberately produced by applying nanocrystalline technology).

The broken symmetry of the source dipole is what actually powers (furnishes the EM energy for) an EM circuit or system; it is *not* the cranking of the shaft of a generator. We have explained how a circuit or system is actually powered by energy extracted from the seething virtual state vacuum by the circuit or system's broken symmetry. As Nobelist Lee points out, *when we have a broken symmetry then something previously virtual becomes observable* {60}.

To achieve the broken symmetry in a normal permanent magnet motor, electrical engineers normally place a coil strategically, so that in the back mmf region between rotor and stator magnets they introduce a timed current and additional magnetic field that overpowers the back mmf and *reverses* the net field in that region temporarily. But this costs the operator heavily for the power (voltage × current) produced in the coil, so that *we pay more to break the symmetry than we will obtain from the resulting rotation of the motor and acceleration of shaft and flywheel rotation*.

However, if the field symmetry inside the permanent magnet motor is broken by the composite asymmetric field magnets themselves, in the proper geometric regions, then we *freely* obtain the broken symmetry for “powering the system by converted vacuum energy”. Such asymmetric-field permanent magnets can be produced by nanocrystalline engineering techniques. Then they can be arranged in a system to furnish its *self-powering*, using the freely introduced power from the converted virtual state vacuum energy. Thus the energy to power the motor is continually extracted freely from the vacuum, via the proven broken symmetry of a magnetic dipolarity (separation of opposite poles and therefore separation of opposite magnetic charges), known since 1957 and the award of the Nobel Prize to Lee and Yang for predicting such broken symmetry. *Instead of continually paying for the broken symmetry ourselves, the materials will do it “for free.”*

Again, by Lorentz's arbitrary *symmetrizing* of the Heaviside equations in 1892 {67}, all such asymmetric permanent magnets were discarded from the theory and from the electrical engineering textbooks—as well as from the resulting electrical engineering technology and practice. Consequently, for a century all our permanent bar magnets have been produced with *symmetrical* fields to left and right.

The prohibition of self-powering permanent magnet systems has thus been a direct decree of our electrical engineers, rigorously practicing symmetrization as dogmatically ordained, in their highly restricted theoretical model, by Lorentz and J. P. Morgan more than a century ago.

### **PROGRAM III**

#### **Adapt NRAM to Produce and Use Self-Powering Steam Boilers**

Program III is the adaptation of the NRAM (negative resonance absorption of the medium) technique from optical physics {31} {32} {33}, to produce self-powering heat amplifiers across most of the heat bandwidth. The heat amplifier should have an expected COP = 4.0 or so. A self-powering (vacuum energy powered) heat amplifier is then added to our present electric power plant steam boilers worldwide. Once the self-powering heat

amplifier is operational, then with clamped positive feedback the steam boiler itself becomes self-powering and needs no further consumption of fuel or nuclear fuel rods to continue to heat the water in the boiler and power the steam-turbine-powered generators.

The *self-powering steam boiler* allows direct capitalization and conversion of most of our present on-site fuel-guzzling electric power systems to systems that burn only a tiny bit of fuel to initially jump-start a single self-powering steam boiler and then cease all further consumption of fuel. Once a single self-powering steam boiler is in operation, it is then used to heat and jump-start—one by one—all the other required self-powering steam boilers. As large a system of self-powering steam boilers as desired can thus be “jump-started” from only a tiny bit of initial fuel consumption to get one steam boiler up and running, ready for “jump-starting” to self-powering operation.

The NRAM process was released by Russian researchers in 1967 (see Letokhov’s work {32}). Since then, optical physicists at all our leading university physics departments have routinely performed NRAM experiments where—for optimized experiments—a self-resonant charged medium emits 18 times as much Poynting energy flow as it absorbs from its input laser by normal (special relativistic) Poynting theory. The reason is that such a process uses an additional *general relativistic* feature not present in normal absorption, and thus it absorbs more “Poynting” (diverged) input energy flow than is contained in the normal *special relativistic* calculation of Poynting input energy.

Optical physicists working in this area, however, have been ruthlessly muzzled. None is allowed to use the term “excess emission”, but must use the deliberately mind-numbing phrase “negative absorption”. The physicists are not allowed to discuss the thermodynamics of the process, since that would introduce the fact that the self-oscillating NRAM medium exhibits  $COP = 18$  in the optimized experiments. The optical physicists are forced to speak only of “increase in the reaction cross section”, and are not allowed to point out this also means *excess emission*, effectively and literally.

Removing the iron censorship imposed on optical physicists in this area, one then simply “widens the bandwidth” in the IR and heat area by laterally adding additional NRAM sections (each tuned a bit differently to cover its part of the introduced heat spectrum). This allows covering the required bandwidth of the input heating. This increase in bandwidth {33(c)} by multiple parallel heat NRAM heat amplifiers will also result in some loss of overall “optimized narrow band heat amplifier” COP, perhaps reducing it from the standard  $COP = 18$  for the optimized IR laser experiments to  $COP = 4$  for the new assembly of paralleled NRAM “heat amps” to cover the desired heat spectrum.

By adding clamped positive feedback of one part (to replace the normal input by the operator), the entire heat amplifier process becomes “self-powering”, taking all its input energy directly from the seething vacuum.

At any rate, a self-powering “heat amplifier” is practicable for developing and incorporating in the input heating section of existing steam boilers, *making the boilers self-powering also*.

Since most of our present on-site electric power plants (including nuclear power plants) actually just heat steam boilers to provide steam to power a steam-turbine-powered generator, then—once developed—the NRAM heat amplifying process can be applied to most presently installed systems with rather minor effort and costs.

Once the steam boiler is up to its heating and powering operational mode, the heat amplifiers are switched in—along with clamped positive feedback of enough of the heat output of the boiler system, fed back to the input, to accomplish “self-powering” (actually, total powering from the active vacuum which is furnishing the necessary heat energy input to the heat amplifier system). Once done, this is no more “mystical” than a windmill-powered generating system. We are just using the active vacuum to furnish our necessary “free EM energy wind flow” for our use to provide the necessary initial “heating” of the boilers.

So after jump-starting one heat-amplified steam boiler and switching it to self-powering mode, thereafter it powers its own steam-turbine-driven generators—and also freely furnishes the power to individually jump-start as many other heat-amplified steam boilers as needed. In turn, these power their conventional steam-turbine-driven generators, already in manufacture and widely available.

The fuel-consuming giant electric power plant (or other initial power source) can be shut down as soon as the first self-powering boiler is up and running. *This has immediate and profound applications!*

E.g., take a large and very expensive and cantankerous windmill farm, and replace the entire ensemble with one smaller and much cheaper windmill whose generator furnishes electric power to heat the input of a modified heat-amplifying (self-powering) steam boiler. Once this steam boiler is up and running and switched into self-powering (clamped positive feedback) operation, the windmill can be shut down. Everything from then on is just a matter of adding more jump-starting self-powering steam generators and their steam turbine driven generators, and it matters not whether the wind is blowing or not.

In this fashion, very expensive and cantankerous windmill farms are replaced by a single much smaller windmill “jump-starting” component. And yet as much power as desired can be produced, just by adding additional jump-starting self-powering steam boilers and their generators.

A similar thing can be done with presently very expensive solar cell array electrical power systems. Simply use a single much smaller and much cheaper solar cell array for “jump starting”, and from then on one is using self-powering heat-amplifying steam boilers whose input energy comes directly from the active vacuum. *Once self-powering is achieved in the first steam boiler, it does not matter then whether the sun shines or not, or whether the original solar cell array is energized or not.*

A similar thing can also be done in the hydroelectric area. By using a much smaller flowing stream and a single much smaller and cheaper water-turbine-driven generator, one gets the initial self-powered steam boiler up and running. Then from it one individually jump-starts as many additional self-powering steam boilers (with their steam-turbine-powered generators) as needed. This allows the hybrid “hydroelectric power initiated” self-powering steam boiler systems to be much more universally deployed and used throughout the world, with far less effect on streams and far less expense—and with independence of drought, stream depletion, etc.

It also allows the ready use of even very small streams to power a single small hydroturbine and its generator for the “jump-starting” function, which is all that is externally needed to jump-start as many self-powering steam boilers as necessary.

Changes in consumer demand, requiring changes in the amount of power required to be furnished by the grid's source generators, are also easily met by simply jump-starting more standby steam boilers to increase electric power, or cutting off some of the self-powering steam boilers to reduce electric power. This allows ready adjusting to the necessary power production level needed as it fluctuates over time.

As we have previously pointed out, accompanying every accounted Poynting energy flow in or from an electrical circuit or source, there is also a mind-boggling curled Heaviside giant energy flow component that is trillions of times greater than the accounted but diverged Poynting energy flow component. In addition to his 1892 symmetrization of the Heaviside equations to eliminate all  $COP > 1.0$  and "self-powering" systems freely taking their energy from the active medium {59}, Lorentz in 1900 also imposed a little integration trick {68} to get rid of that bothersome giant Heaviside curled energy flow component {69} {70} (again at the impetus of J. P. Morgan). In this way, *electrical engineers would never be taught that every generator and other electrical power source already outputs trillions of times more EM energy flow than is in their textbooks* in the accounted meager Poynting energy flow component that their systems normally diverge and utilize.

In any special relativistic situation (the norm in EE), the giant Heaviside curled energy flow component is totally wasted because then vector analysis applies and the divergence of the curl is zero. This led to Lorentz's sly statement that this giant energy flow component "had no physical significance" because it did nothing. But that sly statement is true *only in a special relativistic situation*. Nonetheless, it is erroneously repeated today by leading classical electrodynamicists, even by Jackson {71}.

However, in a *general relativistic* situation, vector analysis no longer applies, and the divergence of the curl is not necessarily zero. So in that case, a little of that ubiquitous and enormous curled energy flow can also be diverged into the circuit to help power it after all, resulting in "energy from the active vacuum/spacetime medium" and achievement of  $COP > 1.0$  in a generating system which has and maintains a thermodynamic efficiency less than 100%. With a  $COP > 1.0$  heat amplifier, self-powering is easily achieved by clamped positive feedback.

In the NRAM self-oscillating medium, charged particles (of insulator material, for the IR spectrum and heating) oscillate laterally to and fro since they are tuned and synchronized to the input frequency of the IR laser. The velocity of the particle thus speeds up, slows and then reverses, etc.—synchronized to the input energy frequency. When the particle is altering its velocity to and fro, it is altering its spacetime curvature to and fro—which is a *general relativistic* situation. Further, this general relativistic alteration violates the usual conservation of energy law—conservation of energy or momentum itself is special-relativistic as pointed out by Penrose {72} and other eminent theoreticians {73} {74}. And they also point out that energy conservation itself can be violated in a properly correlated general relativistic situation.

This means that the general relativistic *to-and-fro frame rotations* of the absorbing charges in the NRAM medium are perfectly synchronized with the input frequencies of the heat input. Hence each section of the paralleled heat amplifier does the same for its individual frequency spectrum input. So the paralleled "heat amplifier" permissibly outputs more Poynting (diverged) energy than the operator's *accounted* special relativistic Poynting energy flow input. With this extra and significant general relativistic

energy input from the spacetime/vacuum itself, the *operator's* paid-for input itself can also be replaced by clamped positive feedback from the amplifier's output.

However, physicists also tend to always apply the Killing vector symmetry to any general relativity situation so even then the conservation of energy law applies. But rigorously the conservation of energy law is a *special relativistic* situation, and need not apply to a properly synchronized general relativistic situation.

Our electrical engineers are usually taught only a bit of special relativity (SR), and are never taught anything suggesting violation of the SR energy conservation law itself in a proper GR situation that is synchronized with the primary SR frame rotations when they are being generally used by the system and the operator.

And thermodynamicists are still grappling with GR violation of energy conservation—and have not yet made truly significant process in digesting and understanding it.

## **PROGRAM IV**

### **License, Produce, and Use Proven Bedini Overunity and Self-Powering Systems**

Program IV is a clarion call for the immediate worldwide licensing and use of the proven Bedini technology (by Energenx Inc). Additional funds (we recommend \$50 million or so) should immediately be pumped into his company, Energenx, to provide a much larger development team and quicker production of a wide range of Bedini's overunity battery chargers.

Bedini's first production systems are presently going into large warehouses to charge large materials handling equipment. The final prototype units have previously been tested in this application, and they performed beautifully—saving the warehouse owner lots of money and lots of EM energy from the “wall plug” normally required to charge the large, expensive batteries. This technology is also going into limited production and marketing for other COP>1.0 battery powered processes, including large battery-powered materials handling equipment, electric golf-carts, electric scooters for the handicapped, electric automobiles, etc. Simply Google the Energenx website and examine the products being produced or to be produced shortly and marketed {75}.

The battery chargers use negative energy (which Tesla discovered and called “radiant energy”). The unusual characteristics of charging a battery with negative energy is that (a) sulfation is reversed, dramatically extending the lives of these expensive batteries, and (b) the battery is charged with much less power being required from the electrical power company. The reason is that negative energy, in flowing across an impedance, causes the active vacuum environment to automatically insert (input) additional excess negative energy into the impedance and into that flow across it. This action by the environment *freely amplifies the actual charging energy flow input to the impedance by the operator.* This is a legitimate COP>1.0 process, perfectly permitted by the laws of physics and the laws of thermodynamics of nonequilibrium steady state systems, but possible only by utilizing negative energy.

Self-powering Bedini motors are also available in the independently replicated bench demonstration stage and can rapidly be finalized, produced, and used—e.g., for true

“environmentally clean” and practical electric automobiles with great range and durability. The second generation of Bedini-augmented electric automobiles will be self-powering. They will freely recharge their batteries as they are being driven—thus yielding unlimited range without paying for *any* externally-purchased recharge energy.

More than two dozen successful replications of Bedini’s overunity processes have been independently accomplished by other researchers worldwide, under Bedini’s tutelage. Thus he has fulfilled the final requirement of the scientific method: *independent validation*.

The epochal implications of the Bedini work and developments are obvious, and these systems will directly and favorably impact and substantially reduce the world energy crisis by directly reducing harmful emissions, producing clean and cheap electrical power with most of the input energy taken from the active vacuum rather than from consumption of fuel and nuclear fuel rods, dramatically lowering the consumption of fuel to provide power, and significantly reducing the present harmful global warming emissions and biospheric pollution, etc.

## **PROGRAM V**

### **Complete, Produce, and Use the Motionless Electromagnetic Generator (MEG)**

Program V calls for the final rapid development and widespread production of the MEG {39}, including a clamped positive feedback version capable of being converted to self-powering.

The MEG uses the thoroughly proven Aharonov-Bohm effect to freely over-potentialize and excite the local vacuum in which an appropriate MEG nanocrystalline layered-construction transformer core is embedded {76}. Many such nanocrystalline transformer cores of layered construction do freely self-evolve the Aharonov-Bohm effect, Berry phase, etc. {77} to localize the B-field inside the core while the extra uncurled A-potential appears in space outside the core. This is now experimentally well established in the scientific literature, independently of the MEG group itself. There are of course more than 20,000 papers in the hard literature on the proven Aharonov-Bohm effect, its extension to the Berry phase {78}, and the further extension to the geometric phase {79}.

By freely potentializing and exciting the local vacuum with additional uncurled A-potential energy, the pulse rise time and decay time of the input signal to the transformer are used to deliberately generate additional strong pulses of E-field energy arising from within that external excited vacuum, by the equation  $E = - dA/dt$ . Because of the minus sign, when the disturbing input pulses with their engineered rise time and decay time travel from inside the core outside into the local vacuum, the amplified return E-field pulses are generated in the outside vacuum and travel from outside back into the core {76}.

With proper funding the MEG will require about a year to a year and a half of intense work to go from its present “bench demonstrator” form to a set of “ready for production” models. At that time, the completed MEG units can be placed into worldwide production and marketing, with additional units of various sizes coming along later at periodic

intervals.

Since the MEG is electromagnetic in both energy input and energy output, it is readily adaptable to self-powering by use of clamped positive feedback of the COP>1.0 basic unit.

## **PROGRAM VI**

### **Retranslate 1880s/1890s EE Concepts Into Modern Physics**

Program VI of the new Manhattan-type Project consists of translating present EE lexicon and jargon (from the 1880s and 1890s) into modern physics terms, so the electrical engineers will at least finally understand exactly what they are doing, in terms of modern physics.

As an example, contrary to the present EE model, the local vacuum is active and it is always interacting continuously with every charge that is present in our circuits and systems. This follows directly from quantum field theory, where the ubiquitous interaction of the vacuum with the charge cannot be eliminated {16}. It also reveals that any “isolated” charge actually polarizes its surrounding virtual state vacuum, so that a dipolarity results and therefore a proven broken symmetry.

As presently recognized in physics, any simple “isolated charge” actually involves two infinite charges and two infinite energies {80}. The “bare” charge in the middle is infinite, as is the energy of its associated fields and potentials. The surrounding polarization charge of opposite sign in the surrounding vacuum is also infinite, as is its energy. These two infinite charges have a finite difference, and thus the energy associated with the “pair” is also finite.

So our instruments, peering through the infinite “screening” external charge at the infinite bare charge inside, are dealing with two infinite charges, each of infinite energy. However, the *difference seen* by the instrument is *finite*—and that “observed finite difference between the two infinite charges and their two infinite energies” provides the value of the charge that is recorded in the “classical” texts where vacuum effects are deliberately omitted.

Thus a steady flow of real EM energy can and will occur from any “isolated” charge (from its asymmetrical dipolar ensemble). This is a specific flow of energy density {81} for the particular asymmetrical situation. Hence any source charge or dipole can provide a finite rate of real EM energy flow for any finite time, because of the infinite nature of the two conflicting infinite processes and the availability of infinite energy by each one.

As can be readily shown by real measurement, any isolated “classical charge” continually radiates real observable photons at a steady rate, in all directions. But no instrument known to man can measure any *observable* energy input into that source charge (or into a source dipolarity). That is because the energy input from the vacuum is in *virtual state* form. Hence every charge and dipole continually consumes positive entropy of the virtual state vacuum that is interacting with it, and then produces negative entropy in the observable state by its continuous output of real, observable photons—real EM energy flow.

Rigorous theoretical proof that a system is thermodynamically permitted to exhibit such continuous production of negative entropy has been given by Evans and Rondoni {82}. Further, the flawed old Klein geometry, which does not permit such a situation but instead has entropy wired into it, must be replaced by the much more modern and accurate Leyton geometry {83}.

In Klein geometry, if one loses the “information” and ordering at one level, it is lost completely and one drops to the next lower state (one lowers the symmetry) for remaining ordering. That is a *positive entropy production process* a priori.

In Leyton geometry, if the ordering information is lost at one level, it is not actually lost but retained in novel form. And a new ordering is also automatically produced at the next higher level [the observable state level]—which is an *increase* in the level of symmetry! That is a *negative entropy operation* a priori.

Hence in Leyton geometry, the action of the source charge or dipole, in continually consuming entropy at the virtual state level, is able to continually produce negative entropy in the observable state level by the continuous emission of real, observable photons. The source charge and source dipole obey Leyton geometry, not the old Klein geometry.

In one sense the vacuum is simply *a set of all potentials*. So “potentializing a circuit” actually means that one or more of these “vacuum potentials” is/are changed in the local vacuum in which the circuit is embedded. In turn, this alters the interaction of that changed local vacuum with the source charges  $q$  in the “potentialized circuit”. By increasing the directed interaction of vacuum and the charges  $q$ , one has “collected” excess potential energy (ongoing vacuum interactions) upon those charges  $q$ , again by the formula  $W = Vq$  in the case of voltage potentialization between two points.

Many other terms and “definitions” of electrical engineering are obsolete, and must similarly be corrected and updated into modern physics terms.

## **PROGRAM VII**

### **License, Produce and Use Fogal Chips to perform Precursor Engineering**

Program VII is the acquisition and “placing into production” of the proven Fogal chip {50} {51} which allows *precursor engineering* {84}.

Precursor engineering is the direct engineering of spacetime, vacuum, and reality itself, work-free. This forms a specific set of spacetime/vacuum dynamics to form specific “vacuum engines” (precursor force-free engines) for specific tasks. *This is a dramatic extension of the present scientific method itself.*

Then the formed precursor engines are applied to charged matter in an ongoing interaction. That precursor engine, a region of charged matter, and their ongoing interaction *identically is* a set of forces and their dynamics, now acting in that specific charged matter. So it produces *force engines* acting in and of that charged matter—since mass is a component of force by the mechanical equation  $F = d/dt(mv)$ . Contrary to the totally false teaching of electrical engineering, *force does not exist in mass-free space*—as pointed out by Nobelist Feynman {24} and many others, to no avail.

The force engine in that specific interacting mass then produces the physical functioning desired in that mass system.

This allows a remarkable solution to another great and related problem: The problem of the increasing chemical pollution of our rivers, oceans, etc. from industrial processes, factories, etc. {85}. With precursor engineering, one will be able to change matter from one form to another, or in other words to conduct direct transmutation of elements. This allows cleanup of industrial wastes and pollutants, and also allows—at long last!—an actual solution to the burgeoning problem of nuclear wastes, including all those spent fuel rods on nuclear power plant sites, in pools of water and otherwise radioactive for several hundred thousand years.

As a remarkable example: One great bonus of the precursor engineering approach is that one also obtains the ability to reverse all diseases! Any specific disease has a specific “disease precursor engine” that is continually interacting with the body mass and its charges, and that is generating and sustaining all physical (LLLT) aspects of that specific disease in the body. So to directly “cure” it, one simply makes a more powerful but exact specific precursor *anti-engine* for that disease and applies it to that stricken body, forming a net “force anti-engine” acting in that stricken body for that disease. The anti-engine is deliberately made more powerful than the disease engine. This directly reverses the disease physiology down to even the genetics and smallest biological considerations. *Reversal of aging effects is also readily foreseeable and feasible.*

In theory, once precursor engineering is developed, then one can produce gold from quartzite sand (as did T. Henry Moray almost a century ago). Or eventually one can take the same quartzite sand and produce food, flour, meat, iron, or whatever.

The Fogal chip, when idled along at less than half-load, will gradually settle down from the normal preoccupation of *manipulating force fields to kick electrons in the chip and its circuitry*, and instead it will begin directly engineering the precursor engines for those force field engines—and thence to direct engineering of the spacetime itself, to produce other precursor engines. This precursor engineering part is *force-free*, and therefore *work-free*.

As a result of this settling into the precursor engineering mode, the physical current and “power” in the transistor reduces significantly, the frequency width broadens significantly, etc. By dealing directly with the precursors, the chip now has access to any and all presently known “fitted” models (to all their precursors)—and to all other presently unknown but “future” models yet to be discovered! So to understand the very strange phenomenology that becomes capable using the Fogal chip, *one must keep in mind all present physics models simultaneously! And also one must keep an open eye as to what may be developed in the future!*

As an example of one proven result, the chip has direct access to the *multiply-connected spacetime* quantum potential model, and so it can produce communications between any two widely separated locations in the universe, *instantly and without travel through the intervening space.* This capability (and many others) has been rigorously demonstrated in tests of the Fogal chip in independent laboratories.

We may take the following identity set as our fundamental precursive thesis:

$$[\text{VPF}] = [\text{Energy}] = [\text{Spacetime}] = [\text{Mind}] = [\text{Reality}]$$

where VPF is the “virtual particle flux” of the active vacuum.

Note that this startling identity set makes no sense at all *in terms of any single present model*. But if one realizes that the fundamental units (and hence fundamental variables) of any physics model are arbitrary, then the strange identity set is permissible. As an example, each of the four items being identified can be expressed as a function of energy (the joule, one of the items). Or it can be expressed as a function of spacetime. Therefore an idling chip that will “settle down” to begin directly altering and controlling spacetime is a chip that will then do precursor engineering—of anything and everything!

So suddenly we are developing the ability to engineer *reality itself*—including both the observable and nonobservable realms, the mind, thought, personality, and life itself—with all the extreme implications of that technology once it is fully realized.

We emphasize that it is not just the “physical” (3-space) reality of “observation” that can be engineered. One can also engineer any and all things or aspects that occupy the time domain exclusively. This includes mind and mind dynamics, which occupy time and not 3-space. Hence the observation process—which applies a  $\partial/\partial t$  operator to LLLT 4-space, thus discarding the T domain and giving only a series of static 3-space snapshots (from which we must mathematically infer the flow of time, mind, etc.)—does not produce or reveal total reality (i.e., the “living” and “mind” and “thought” part of it. Instead, it only reveals the *3-space effects of coupled mind* upon the 3-space “physical phenomena”—usually on its own physical body.

It is not commonly realized (or taught in science) that the present observation-based scientific method does not yield total reality, because it does not include the non-observable realm! Precursor engineering is a *dramatic extension to the present scientific method*. The present scientific method is based on direct observation. Now with precursor engineering and the new model, the scientific method is dramatically extended and it is fitted both to the observable and the nonobservable realities.

This is the “final engineering” for any intelligent tool-using species. Once it achieves the ability to directly engineer life, mind, spacetime, energy, and the virtual particle flux of the vacuum, the species becomes unlimited by normal physical limitations. If necessary, it will be able to directly engineer the sun, the tectonic plates and their movements, and any other aspect of the earth and our surrounding cosmos. Now the species can not only engineer the “observed” 3-space phenomenology, but also the non-observed time-domain aspects of 4-space phenomenology, including the living personality and mind aspects, including Jung’s collective unconscious itself.

Russian/KGB energetics has long been focused on that goal, using the still-highly-classified science of “energetics” that it turned into a superweapons science under Stalin, shortly after WW II. We have written elsewhere on the development of that superweapons science, its potential, and its progress {86} so we will not repeat it here.

Once precursor engineering is mastered, then at that point the intelligent species will either be on the way to blindly increasing the power of its weapons and thus destroying itself (and perhaps its biosphere as well), or on the way to eliminating all “serfdom” and “inhumanity of one human to another”, hence removing the “big monkey” game itself by making every person a “lord of the castle”.

In that case, then at last perhaps this long-suffering intelligent species of ours will engineer its own outgrowth of all physical limitations, thus moving on to the next—and *unlimited*—stage of its being that is the final stage of its evolution.

## BACKGROUND REFERENCES

1. Exceptions—for electrical power systems that utilize input energy freely received from the commonly known active environment—are known and accepted (and used). These electrical power systems include wind-powered systems, hydroelectric powered systems, solar cell powered systems, etc. But strangely, absolutely no consideration of the fact that every joule of EM energy in every EM field and potential in the universe—and in every electrical circuit—already comes from the active vacuum/spacetime via the proven interaction of that active universal medium with every charge and dipolarity in the universe—is being considered at all.

So even when our engineers *do* accept a free environmental energy input, the electrical parts of the system (generator and its external circuit) they build are deliberately constructed to be symmetrized and therefore crippled.

The present hoary old electrical engineering (EE) model taught in all our universities was deliberately “fixed” by Lorentz, at J. P. Morgan’s directions. In the 1880s Heaviside and a few others had sharply curtailed Maxwell’s theory, converting it into the much more limited vector algebra. This was after Maxwell died in 1879. In 1892 Lorentz *symmetrized* the already-curtailed Heaviside vector equations, so that all remaining *asymmetric* Maxwellian systems (which include those systems that could accept and use excess EM energy directly from their active vacuum environment) were arbitrarily eliminated.

Hence from the very beginning of electrical engineering itself, our universities have deliberately taught only a pale shadow and a tiny fraction of nature’s Maxwellian electrical power systems actually available to be designed and built. Specifically, our universities have only taught those systems that deliberately destroy their own free extraction of EM energy from their interactive vacuum/spacetime, and destroy the extraction process faster than they can use a bit of the freely extracted energy to power their loads. In short, the systems self-enforce  $COP < 1.0$  electromagnetically.

Every EM system designed and built by our present EEs is a deliberately “crippled” system that destroys its own true EM energy input source—faster than it uses the freely collected EM energy to power its own loads.

Every such “deliberately crippled” and “modern” EM system then requires that its generator be continually cranked so as to continually restore its source dipole that the system deliberately and continuously destroys. *It is the internal broken symmetry “source” in the generator that freely furnishes all the EM energy—directly from the seething vacuum—that is available and collected in the external circuit in the first place.*

In our present electrical power systems, we are universally using and applying a horribly flawed “present energy paradigm” that is totally inane and that has also been riddled with falsities for more than a century—since before the birth of most of modern physics.

2. E.g., see Seth Bernstein, “Ominous Arctic Melt Worries Experts,” *AT&T News*, Dec. 7, 2007, also an AP release. Quoting Bernstein: “*Last year, two top scientists surprised their colleagues by projecting that the Arctic sea ice was melting so rapidly that it could disappear entirely by the summer of 2040.*” Borenstein then quotes top climate scientist

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Jay Swally: *"At this rate, the Arctic Ocean could be nearly ice-free at the end of summer by 2012, much faster than previous predictions."*

3. Such as coal and oil combustion, consumption of nuclear fuel rods, etc. Particularly “dirty” and polluting are the coal-burning processes. Nuclear power provides nuclear wastes of great threat and lifetimes of many hundreds of thousands of years. Contrary to popular notions, there is as yet no safe way to dispose of, or to store, nuclear wastes.

Another terrible pollution-generating set of combustion systems is provided by the ships of the world, which often are the dirtiest-burning systems on the planet. Ships often burn “bunker” fuel, a very dirty residue from refineries. Ships are responsible for almost 5% of global CO<sub>2</sub> emissions, which is about equal to the CO<sub>2</sub> emissions of the entire U.S. car fleet. Due to soaring population and their increasing needs for goods, the world’s shipping—and its associated great pollution—is also increasing at an impressive rate and is expected to double by 2020.

(a) For a discussion of results of a study by the American Chemical Society, see “Report: Dirty shipping fuel contribute(s) to thousands deaths each year; call for caps,” International Herald Tribune, AP release, Nov. 8, 2007.

(b) See also “‘Marketplace’ Report: Regulating Ship Pollution,” at <http://www.npr.org/templates/story/story.php?storyId=14950326>.

(c) Another great problem is the euphoric assumption that we can continue to burn hydrocarbon fuels—even increasing their consumption—while using “carbon sequestration” to “render this process harmless to the biosphere”. That assumption is totally false; *there are no known real technical solutions to the problem of excess carbon pollutants and wastes that are assumed to be “sequestered”*. Simply put, sequester the carbons in the sea, increasing the acidity of the sea—and then watch the resulting massive destruction of sea life and huge changes in environment and climate that result. The seas are already acidic beyond safety, right now!

(d) What may be the height of foolishness is the making of ethanol fuel from corn. It requires more “dirty” energy than the “cleaner” energy produced by combustion of ethanol. It also drives up corn and grain and feeds prices, removes land from food production to feed people, increases the cost of meats and other foods, and requires about 1300 gallons of water for each gallon of ethanol produced from the corn. Thus this “action to help reduce emissions” actually drives up the already-serious water problems and food costs in an increasingly wide number of areas of the world.

4. See Ross Gelbspan, “Beyond the point of no return,” Gristmill, 7 Dec. 2007. Quoting: *“In Australia, a new, permanent state of drought in the country's breadbasket has cut crop yields by over 30 percent. The 1-in-1,000-year drought exemplifies a little-noted impact of climate change. As the atmosphere warms, it tightens the vortex of the winds that swirl around the poles. One result is that the water that traditionally evaporated from the Southern Ocean and rained down over New South Wales is now being pulled back into Antarctica—drying out the southeastern quadrant of Australia and contributing to the buildup of glaciers in the Antarctic—the only area on the planet where glaciers are increasing.”* ... *“Witness the 1-in-100-year drought in the southeastern U.S., which has been threatening drinking water supplies in Georgia and other states.”*

The United Nations has also warned of serious food shortages already emerging worldwide.

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5. "We are seeing impacts today that we did not expect to see until 2085." [Dr. Paul Epstein, of the Center for Health and the Global Environment of Harvard Medical School, September, 2006, as quoted by Ross Gelbspan, "Beyond the point of no return," Gristmill, 7 Dec. 2007.]

6. "Climate change won't kill all of us—but it will dramatically reduce the human population through the warming-driven spread of infectious disease, the collapse of agriculture in traditionally fertile areas, and the increasing scarcity of fresh drinking water. [Ross Gelbspan, "Beyond the point of no return," Gristmill, 7 Dec. 2007].

7. See environmental scholar Bill McKibben, "Remember this: 350 parts per million," Special to the Washington Post, Friday, December 28, 2007, p. A21. (It is also published in the China Post the next day, titled "This month may be tipping point for global warming," and is published in many news media worldwide.

NASA scientist James Hansen, a leading environmental researcher, has proposed 350 parts per million of CO<sub>2</sub> in the atmosphere as the "tipping point" for accelerating global warming and climatic change. We presently stand at 383, and "it's knocking the planet off kilter". Quoting Hansen: "*The last time the Earth warmed two or three degrees Celsius—which is what 450 parts per million implies—sea levels rose by tens of meters, something that would shake the foundations of the human enterprise should it happen again.*" And it may already be well on the way to happening again.

Quoting McKibben: "*Hansen called for an immediate ban on new coal-fired power plants that don't capture carbon, the phase-out of old coal-fired generators, and a tax on carbon high enough to make sure that we leave tar sands and oil shale in the ground.*"

8. For example, even some environmentalists have begun to tout nuclear power as "environmentally clean". Actually there are more than 50,000 tons of deadly nuclear wastes in the form of spent reactor fuel rods, highly radioactive and requiring hundreds of thousands of years to decay to a safe level, already stored at our U.S. nuclear power plants in 31 states. They are stored under water—where, if the water should fail (accident or terrorist attack) and drain away, there would occur a giant meltdown and a nuclear catastrophe reminiscent of the Chernobyl disaster but possibly much worse. There is simply no known and accepted method of safe storage or "cleaning up" of the nuclear wastes themselves.

So presently one must accept continual growth of such wastes and their storage for hundreds of thousands of years in those 31 states (and more if the expansion of nuclear power is allowed), in order to use the so-called "clean" nuclear power!

For a description of the Chernobyl incident, see "Chernobyl Disaster" at [http://en.wikipedia.org/wiki/Chernobyl\\_disaster](http://en.wikipedia.org/wiki/Chernobyl_disaster).

9. (a) See James C. Orr et al., "Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms," Nature Vol. 437, 29 September 2005, pp. 681-686. Quoting the results of the authors' experimental measurements: "*....conditions detrimental to high-latitude ecosystems could develop within decades, not centuries as suggested previously*".

(b) See also Mark Schrope, "The dead zones," NewScientist, 9 Dec. 2006, pp. 38-42. Hypoxia kills or drives out all but the most primitive life forms, and the resulting dead zones now number about 200—and they are just the ones we know about.

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(c) See also Ken Caleira et al., *Geophysical Research Letters*. September 25, 2007. Quoting: "...*We need to start thinking about carbon dioxide as an ocean pollutant. That is, when we release carbon dioxide to the atmosphere, we are dumping industrial waste in the ocean. ... "About 1/3 of the CO<sub>2</sub> from fossil-fuel burning is absorbed by the world's oceans..."*"

(d) China alone is deploying two new coal-burning power plants every week, usually in very dirty (little or no control of emissions) manner. Thus as the CO<sub>2</sub> emissions into the atmosphere continually increase, we are continually increasing the damage to sea life forms, particularly crustaceans etc.

(e) Coastal upwelling dead zones—where the oxygen in the water is dramatically lowered, killing off much of the wild life, fishes, etc.—are being observed off the coast of the U.S., Chili, Peru, South Africa, and Morocco as well as elsewhere. This dramatic decrease in wild fish caught for food in such region compellingly shows one danger: decreasing the human food supply, often to poor and struggling peoples and areas. But also to other peoples and other areas. E.g., a big hypoxic dead zone, covering over 2,600 square kilometers, has built up off the coast of Oregon in the last five years.

10. Here's how "difficult" it is to form a free outpouring of real EM energy flow, one that can freely continue indefinitely, even until the end of time! Place a charged capacitor or electret on a permanent magnet, so that the E-field of the capacitor or electret is orthogonal to the H-field of the magnet. Then by every EM text we already have, that silly two-dollar gadget will sit there and continuously and freely pour out real Poynting energy flow  $S$ , given by  $S = E \times H$ .

Leave that simple gadget alone and intact, and it will pour out that free flow of real, usable EM energy forever. The energy-flow "system" is a nonequilibrium steady state (NESS) thermodynamic system, freely receiving energy (in virtual form) from the active external environment (the seething local vacuum), and outputting a steady stream of real photons. As a NESS system far from equilibrium, it is permitted to violate the second law of equilibrium thermodynamics, which applies only very close to equilibrium.

We do not have to input any further energy to this "perpetual energy flow NESS machine" ourselves. We do not have to "crank a shaft" or "turn a windmill" or "input solar radiation energy". The broken symmetry of those two dipoles is in fact absorbing virtual state energy of the seething vacuum interaction and converting it into real, observable EM energy steadily pouring out of the gadget. Lee and Yang were awarded the Nobel Prize in 1957 for predicting broken symmetry, which was a giant revolution in physics—ironically, one whose impact and implications have not yet made it across the university campus from the physics department to the EE department, in the 50 years since that Nobel award.

But none of our EE departments, professors, and students has the foggiest notion of how to intercept and extract some of this freely flowing, real, usable EM energy that their own Poynting energy flow theory already prescribes. The reason is that any Maxwellian system that would in fact intercept, collect—and then separately dissipate in loads—some of this freely flowing energy (i.e., the proper type of electrical "windmill" system) is an *asymmetrical* Maxwellian system. In 1892 Lorentz (at the bidding of the ruthless empire-builder J. P. Morgan) arbitrarily symmetrized the Heaviside equations and thereby deliberately discarded all such asymmetrical Maxwellian systems from the EE model.

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To date, it appears that not a single EE professor or department or textbook has had the foresight to recognize the impact of Lorentz's great mutilation of the Heaviside theory that was done. Further, our scientific leadership will not do anything to correct those hoary old 1892 Lorentz-mutilated Heaviside equations and restore Maxwell's asymmetric systems—thereby restoring those missing asymmetric “electric windmill systems” that could freely extract and use energy from that ridiculously simple but eternal free EM energy-flow source.

11. In a “normal” (symmetrical) EE system, the only reason we have to keep cranking the generator shaft to generate EM energy and power the loads is that we insanely use half the energy freely collected in the external circuit to do nothing but destroy the source dipolarity. Again, we have known since 1957 and the award of the Nobel Prize to Lee and Yang, that the broken symmetry of the source dipole in the generator—once the internal opposite charges are forced apart to form that dipole—*freely* absorbs virtual state energy from the seething virtual state vacuum and transduces it into real observable EM energy that is continually and *freely* omitted, pouring out of the generator terminals through space outside the external conductors. As Nobelist Lee stated, “...*the violation of symmetry arises whenever what was thought to be a non-observable turns out to be actually an observable.*” [Quoted from T. D. Lee, Particle Physics and Introduction to Field Theory, Harwood Academy Publishers, Chur, New York, and London, 1981, p. 181].

So in the half century since the discovery of broken symmetry in physics, its profound ramification for electrical engineering has not been recognized or applied. And no one—not even the National Science Foundation—seems to care. After all, our TV set works, doesn't it!

12. The Nobel Prize in Physics was awarded in 1957 to Chen Ning Yang and Tsung-Dao Lee “for their penetrating investigation of the so-called parity laws which has led to important discoveries regarding the elementary particles.” The two Nobelists predicted broken symmetry in physics, and Wu and her colleagues promptly proved it experimentally, publishing the results in February 1957 in C. S. Wu, E. Ambler, R. W. Hayward, D. D. Hoppes and R. P. Hudson, “Experimental Test of Parity Conservation in Beta Decay,” Physical Review, Vol. 105, 1957, p. 1413. This was so great a revolution in physics that the Nobel Committee awarded the Nobel Prize to Lee and Yang in the same year, in Dec. 1957.

13. Nikola Tesla, e.g., had discovered how to “shuttle” the potential energy around in his circuits at will, something our present electrical engineers still cannot do.

(a) See T. W. Barrett, “Tesla's Nonlinear Oscillator-Shuttle-Circuit (OSC) Theory,” Annales de la Fondation Louis de Broglie, 16(1), 1991, pp. 23-41. Barrett—a cofounder of ultrawideband radar—shows that EM expressed in quaternions allows shuttling and storage of potentials in circuits, and also allows additional EM functioning of a circuit that a conventional EM analysis cannot reveal. He shows that Tesla's patented circuits did exactly this.

Barrett was so impressed by the methodology that he extended it and filed two patents. These are:

(b) Terence W. Barrett, “Active Signalling Systems,” U.S. Patent No. 5,486,833, Jan.

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23, 1996. This is a signaling system in time-frequency space for detecting targets in the presence of clutter and for penetrating media.

(c) Terence W. Barrett, "Oscillator-Shuttle-Circuit (OSC) Networks for Conditioning Energy in Higher-Order Symmetry Algebraic Topological Forms and RF Phase Conjugation," U.S. Patent No. 5,493,691. Feb. 20, 1996. These are beginning networks for doing the type of shuttling control that Tesla had uncovered.

14. In mass units, the energy density of the virtual particle flux of vacuum is on the order of  $10^{80}$  grams per cubic centimeter. See R. Podolny, Something Called Nothing: Physical Vacuum: What Is It? Mir Publishers, Moscow, 1986, p. 181.

15. Quoting from Peter Milonni, The Quantum Vacuum: An Introduction to Quantum Electrodynamics, Academic Press, San Diego, 1994. "*The zero-point energy of the vacuum is infinite in any finite volume.*" [p. 56]. "*A charged particle in the vacuum will therefore always see a zero-point field of infinite energy density.*" [p. 53].

16. Quoting from I. J. R. Aitchison, "Nothing's Plenty: The Vacuum in Modern Quantum Field Theory," Contemporary Physics, 26(4), 1985: "*...the concept of a 'single particle' actually breaks down in relativistic quantum field theory with interactions, because the interactions between 'the particle' and the vacuum fluctuations (or virtual quanta) cannot be ignored.*" [p. 357].

17. For a listing of these falsities long pointed out by eminent scientists such as Nobelist Feynman, the great John Wheeler, Margenau, Bunge, and others, see T. E. Bearden, "Errors and Omissions in the CEM/EE Model," available for downloading at <http://www.cheniere.org/techpapers/CEM%20Errors%20-%20final%20paper%20complete%20w%20longer%20abstract4.doc>.

I submitted that paper to Dr. Bement, the Director of the National Science Foundation. He ordered a formal NSF review of the paper, and it passed that review. See the NSF response letter available at <http://www.cheniere.org/references/NSF%20letter%20Bearden.jpg>.

But then for action the NSF turned me over to its top staff responsible for electrical power, communications, etc. These top EE staffers were good people, polite—but absolutely determined to continue with the present archaic electrical engineering model. To sum up their response, it was essentially "*Nothing is wrong with our CEM/EE model! Your TV set works, doesn't it?*"

18. Sadly, electrical engineers are not even correctly taught what actually powers their EM circuits and systems.

(a) E.g., see T. E. Bearden, "Engineering the Active Vacuum: On the Asymmetrical Aharonov-Bohm Effect and Magnetic Vector Potential A vs. Magnetic Field B," available at link <http://www.cheniere.org/techpapers/On%20the%20Aharonov-Bohm%20Effect1.doc>.

(b) To see how the symmetrical system kills its own source faster than it powers its loads, and also to see what actually powers the external circuit in a generator-powered system, see T. E. Bearden, *ibid.*, "Figure 2. Operation of a Symmetrical Electrical Power System."

(c) Most EEs and EE professors still think a "static" EM field actually is "frozen" and

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fixed—and that, from the moment of appearance of a source charge or dipole, its “static field” appears everywhere in space instantly. They believe that the “energy in that field” is thus instant and unchanging once the source charge or dipole appears. To see a classic example of this total confusion, see P. R. Berman, “Dynamic creation of electrostatic fields.” *Am. J. Phys.*, Vol. 76(1), Jan. 2008, pp. 48-54. This is the kind of approach that has driven out any rational discussion of the source charge problem (how a charge once formed can sit there and continuously emit real observable photons at light speed, without any *observable* EM energy input). For a clear recognition of the problem, see B. P. Kosyakov, “Radiation in electrodynamics and in Yang-Mills theory.” *Soviet Phys. Usp.* 35(2), Feb. 1992, pp. 135-142. Quoting Kosyakov, p. 135: “A generally acceptable, rigorous definition of radiation has not as yet been formulated.” Quoting from p. 141: “The recurring question has been: Why is it that an electric charge radiates but does not absorb light waves despite the fact that the Maxwell equations are invariant under time reversal?”

(d) To see what modern physics has to say about a “static” EM field actually being made of finer parts in continuous motion, see Tom Van Flandern, “The speed of gravity—What the experiments say,” *Physics Letters A*, Vol. 250, Dec. 21, 1998, pp. 8-9.

Quoting: “To retain causality, we must distinguish two distinct meanings of the term ‘static’. One meaning is unchanging in the sense of no moving parts. The other meaning is sameness from moment to moment by continual replacement of all moving parts. We can visualize this difference by thinking of a waterfall. A frozen waterfall is static in the first sense, and a flowing waterfall is static in the second sense. Both are essentially the same at every moment, yet the latter has moving parts capable of transferring momentum, and is made of entities that propagate. ...So are ... fields for a rigid, stationary source frozen, or are they continually regenerated? Causality seems to require the latter.”

Also note again that the totally “static” E and H fields of an electret laying on a permanent magnet with E orthogonal to H, yields a steady EM energy flow (a free, steady outflow of real observable photons) S given by the simple equation  $S = E \times H$ .

19. E.g., quoting Swann:

*“Think of the cables which carry the telephone current in the form of electrons. In the absence of the current the electrons are moving in all directions. As many are moving from left to right as are moving from right to left; and the nothingness which is there is composed of two equal and opposite halves, about a million million amperes per square centimeter in one direction, and a million million amperes per square centimeter in the other direction. The telephone current constitutes an upsetting of the balance to the extent of one hundredth of a millionth of an ampere per square centimeter, or about one part in a hundred million million million. Then if this one part in a hundred million million million is at fault by one part in a thousand, we ring up the telephone company and complain that the quality of the speech is faulty.”* [W.F.G. Swann, *Physics Today*, June. 1951, p. 9].

With the newly emerging nanotechnology and its ability to get at very fine though very powerful energy changes and exchanges, probably this incredible “energy in the wire” could be tapped for effect use in powering our loads. But to our knowledge, there is not a single nanotechnology project actually funded and in existence to do it.

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20. Quoting Aitchison: “*Forces, in quantum field theory, are understood as being due to the exchange of virtual quanta... [between masses]*” [I. J. R. Aitchison, *ibid*, p. 372].

21. “Empty” vacuum/spacetime is in fact *an active set of all the potentials and their ongoing dynamics*. “Changing a potential in a circuit” is actually changing one of the local vacuum/spacetime potentials and its interaction dynamics ongoing in that circuit.

22. (a) Hence “potentialization of a system” is a change (a gradient) established in one of the vacuum’s potentials and its dynamics comprising the local vacuum in which the system or circuit is embedded. That “change of a potential” is known as a “field”. The active vacuum is a set of potentials, fields, and their ongoing dynamics. “Voltage (difference) across a dipolar circuit” means that the activity and dynamics of the electrostatic scalar potential portion of the vacuum/spacetime in which the circuit is embedded, are altered to include an activity gradient (a field) between the high side vacuum interchange activity of the circuit and its low side vacuum interchange activity. In turn, this gives (a) a greater rate of vacuum/charge interaction (energy exchange) with electrons in the “high side” of the embedded circuit and (b) a lower rate of vacuum/charge interaction (energy exchange) with charges in the “low side” of the embedded circuit. The difference between these two rates of interaction forms a difference in the interaction forces on electrons in the high side and interaction forces on electrons on the low side.

(b) Because the circuit is deliberately built “symmetrical” by our engineers, there is a “forward emf” force in the external circuit from high side to low side, and there is an equal and opposite “back emf” force in the internal circuit inside the generator, from low side to high side. This specific difference in forces (equal and opposite forward and back emf) freely pumps electrons from high to low side of the external circuit through the losses and the loads of the external circuit, but also must then it must be “fought” to forcibly pump the ground-side electrons back up through the internal circuit (through the generator’s dipolar source inside the generator). This latter action consumes one-half the potential energy collected in the external circuit, and forcibly scatters the separated internal charges of the internal source dipolarity (separation of opposite charges). Hence the silly symmetrized system destroys its own generator’s internal source dipolarity and its broken symmetry.

(c) In short, the silly symmetrical system uses half the free “energy from the vacuum” collected by its external circuit to do nothing but destroy its own source dipole and shut off its free outflow of real EM energy extracted from the vacuum.

(d) The other half of the collected free “energy from the vacuum” in the external circuit is dissipated in the loads and the losses in the external circuit. Thus half the collected free energy is used to kill the source dipole, while less than half is used to actually power the loads (since any external circuit has losses in addition to powering the load). This insane symmetrical circuit thus self-enforces  $COP < 1.0$ .

(e) So in the *arbitrarily* symmetrized system we have to keep cranking the shaft of the generator to rotate the rotor, which by its rotation changes the input mechanical shaft energy to rotating magnetic field energy (courtesy of Nikola Tesla’s invention of the rotating magnetic field). Since the rigorous definition of “work” is the change of form of energy, that change from mechanical shaft energy to internal rotating magnetic field energy constitutes “work”.

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(f) In turn, the rotating magnetic field energy inside the generator is *dissipated inside the generator* to force the internal opposite charges apart in opposite directions, forming the internal source dipolarity (with its proven broken symmetry). And that is all that cranking the generator shaft actually does; it restores the dipolarity (and thus its broken symmetry) that is in fact freely extracting EM energy from the seething virtual state vacuum interaction and pouring it out as real EM energy flow out of the terminals of the generator and through space outside the conductors of the external circuit.

Once formed, *if left alone and intact*, the source dipole would freely pour out its real, usable EM energy flow forever—absolutely without any further mechanical shaft energy input by the operator!

(f) But then the insane “symmetrical” circuit deliberately built by our EEs takes half the freely collected potentialization energy and destroys the internal source dipole, thus continually destroying its own free extraction of EM energy from the vacuum. It does this faster than it powers its loads alone. So to restore the dipole, even with 100% efficiency of conversion (of mechanical shaft power to internal rotating magnetic field power) we have to input at least as much additional shaft input energy to restore the dipole, as was used from the insane symmetrical circuit to destroy it. So in the symmetrized system the operator’s required shaft input energy is always greater than the useful energy dissipated in the external circuit’s loads to power them.

The insanity of building only *symmetrical* Maxwellian systems dooms us to a *system-enforced* coefficient of performance (COP) of  $COP < 1.0$ . So we always have to keep cranking in more mechanical shaft energy to the generator, than the energy we get into the loads to power them. We have to keep cranking that shaft to continually keep rebuilding the deliberately destroyed source dipole in the generator, *not* to power the external loads! *This system  $COP > 1.0$  self-enforcement is not a law of nature, but an act of total insanity in electrical engineering!*

(g) As an analogy: Suppose we had an “insane” windmill engineer come in to build us a great windmill-driven generator power system to power our loads on our big farm. And this engineer puts in two equal-power generators, being driven simultaneously by the rotating shaft of the windmill. One of these generators he connects to our distribution lines and loads on the farm. The other generator he connects to motors on the windmill blades, so that whenever the windmill is rotating the second generator is powering those motors to rotate the blades back parallel to the wind, so that the windmill stops turning and ceases powering the generators. Then he puts a *second* motor on the blades, to power the blade rotation in the opposite direction, away from parallel to the wind, to restore windmill rotation again. And he hands us the electrical connection lines to this second set of motors, so that we can now pay the power line company for the energy continually required to keep rotating the blades back from cutoff, so the windmill will continue rotating.

In short, this stupid windmill engineer requires us—even with nature’s free wind there for easy use asymmetrically—to deliberately pay for more dirty electrical power input to keep the vanes turned correctly, than the clean electrical power we get in our loads from the first generator as long as the windmill is rotating.

I think we would immediately fire that windmill engineer as the most insane windmill engineer we ever saw or heard of!

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(h) Yet that is directly analogous to what every electrical power engineer has been trained to do with building his systems, since Lorentz arbitrarily symmetrized the Heaviside equations in 1892, precisely to prevent the coming electrical engineers from building asymmetrical systems exhibiting COP>1.0 and even “self-powering” systems (taking all their input energy from their active environment, with the operator not having to pay for any of the input energy).

But just ask the usual electrical engineer or EE professor what were the ramifications of Lorentz symmetrization of the Heaviside equations in 1892, and he usually has not the foggiest notion. And even at the National Science Foundation level, the engineers in charge could care less about such a question.

23. I.e., a difference in the “charge’s energy exchange reaction rate” with the vacuum—between that rate for charges at the high voltage side of the circuit and that rate for charges at the “ground” voltage side of the circuit—multiplied by the amount of charge involved, is identically known as the “collection of potential energy” in that potentialized circuit due to the potential difference. Its formula is simply  $W = Vq$ . One can increase the “energy collected in a circuit” *freely* and *at will*, merely by changing the voltage difference (potentialization) while momentarily freezing the interacting charges from moving as electrical current. Allowing for switching, a common source of “static voltage” thus can supply as much free potential energy to external “pinned” circuits as we wish, without requiring any work and without any depletion of the static voltage source at all.

[In the seventh program on precursor engineering, we will find that potentializing a circuit is actually an example of work-free precursor engineering—direct engineering (work-free) of the activity of the spacetime/vacuum itself, with the charges in the circuit].

We then switch this “potentialized” external circuit away from the primary “static voltage” source. The relativity activity of the vacuum with the top and bottom of the circuit has not changed. Hence the “collected potential energy” remains “collected”. We quickly reclose the now-separated potentialized circuit (as with a resistor and a diode). Then when the pinned electrons are allowed to become free and to move as current in the separated external circuit, that previously freely collected potential energy will be dynamically dissipated to provide real, usable power in the loads.

In this case, none of the free potential energy is used to pump electrons back through the *external* (primary) static voltage source, destroying its dipolarity and thus its ability to furnish energy density flow quite freely and without requiring work.

This “switched potentialization and free energy collection” process can be repeated over and over without end, until the end of the universe, and the “switched in and out” static voltage source will provide all the freely collected potential energy to the external circuit that one wishes. By disconnecting and re-completing the potentialized external circuit as a *separate circuit/system*, then dissipating that free potential energy in powering the external loads will not destroy or diminish the primary static voltage source dipolarity or affect it at all.

But electrical engineers are taught never to do such a simple thing, and they are falsely exhorted that they must *draw current* from the source—thereby depleting and destroying its source dipolarity by forcibly pumping the depotentialized electrons from

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the ground side of the circuit back through the source dipole inside the generator, destroying the source dipolarity and its broken symmetry.

24. (a) E.g., Feynman's 1964 three volumes of sophomore physics give some of the major falsities in the EE model. As an example, contrary to the lie taught to all our electrical engineers, *there are no force fields in massless space*. That is because mass is a required component of force by  $F = d/dt(mv)$ . Put in "m = 0" in that equation, and  $F = 0$ . Quoting Feynman:

*"...in dealing with force the tacit assumption is always made that the force is equal to zero unless some physical body is present... One of the most important characteristics of force is that it has a material origin..."* [Richard P. Feynman, Robert B. Leighton, and Matthew Sands, The Feynman Lectures on Physics, Addison-Wesley, Reading, MA, Vol. 1, 1964, p. 12-2].

*"...the existence of the positive charge, in some sense, distorts, or creates a "condition" in space, so that when we put the negative charge in, it feels a force. This potentality for producing a force is called an electric field."* [Ibid., Vol. 1, 1964, p. 2-4].

*"We may think of  $E(x, y, z, t)$  and  $B(x, y, z, t)$  as giving the forces that would be experienced at the time  $t$  by a charge located at  $(x, y, z)$ , with the condition that placing the charge there did not disturb the positions or motion of all the other charges responsible for the fields."* [Ibid, vol. II, p. 1-3.]

As pointed out by Feynman, the field in space is just a "condition of spacetime" itself, without the presence of mass. Hence it is force-free. This is the force-free precursor EM field. When that precursor field and its dynamics interacts with charged matter, then in that charged matter this ongoing interaction identically constitutes (and produces) the familiar EM force field (in that charged matter).

In fact, that ongoing interaction—together with both its participants, the precursor condition and dynamics of spacetime and the interacting mass—identically is force itself. Eerily Feynman did not make this latter connection, and so he despaired of ever being able to accurately define "force". Quoting:

*"One of the most important characteristics of force is that it has a material origin, and this is not just a definition. ... If you insist upon a precise definition of force, you will never get it!"* [Richard P. Feynman, Robert B. Leighton, and Matthew Sands, The Feynman Lectures on Physics, Addison-Wesley, Reading, MA, Vol. 1, 1964, p. 12-2].

(b) Jackson, one of our most noted classical electrodynamicists, reveals how classical electrodynamicists just arbitrarily assume force fields in space. Quoting Jackson: *"Most classical electrodynamicists continue to adhere to the notion that the EM force field exists as such in the vacuum, but do admit that physically measurable quantities such as force somehow involve the product of charge and field."* [J. D. Jackson, Classical Electrodynamics, Second Edition, Wiley, 1975, p. 249].

25. As Nobelist Gore pointed out to Fortune Magazine:

*"What we are going to have to put in place is a combination of the Manhattan Project, the Apollo Project and the Marshall Plan, and scale it globally."* [Nobelist Al Gore, speaking to Fortune Magazine, as cited in the article "Global Warming, Inc.", Wall Street Journal, Tuesday Nov. 20, 2007, p. A18].

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26. Quoting The Nobel Committee, on its awarding the Nobel Peace Prize to Al Gore and the UN's International Panel on Climate Change (IPCC):

*"(Global warming)... may induce large-scale migration and lead to greater competition for the Earth's resources. Such changes will place particularly heavy burdens on the world's most vulnerable countries. There may be increased danger of violent conflicts and wars, within and between states."*

27. E.g., Dr. Paul J. Werbos is the Program Director of electrical and Communications Systems Division for the National Science Foundation (NSF), and thus appears to be one of the scientists largely shaping and driving the energy policy and thinking of the NSF—and therefore of much of our scientific community. Particularly see his impressive Powerpoint briefing, "How Can We Zero Out America's Need to Import Oil and Gas at the Soonest Possible Time?" at [http://www.werbos.com/energy\\_strategy\\_files/frame.htm](http://www.werbos.com/energy_strategy_files/frame.htm). The briefing was updated 2/23/06. In excellent manner the briefing summarizes most of the dire situation and where the situation is headed (to disaster or near-disaster) unless checked. But it proposes use of only standard things and mechanisms—with some expected improvements—to "solve the problem". In short, it applies only the same old flawed energy paradigm that has caused the problem in the first place. In no way will that approach solve the problem, much less solve it in time to prevent the economic collapse of much of the Western world. It also reveals one very important thing: apparently our own NSF really does not yet really understand where the EM energy flowing from the terminals of a generator is obtained, or how. Nor do they understand what "potentialization" of the external circuit really is (it is the change of the electrostatic scalar potential component of the active vacuum in which the system is embedded, and which is constantly interacting with every charge  $q$  in that circuit). We really potentialize the *local vacuum*, which causes a change to its rate of interaction with charges  $q$ , and a difference in that interaction for any segment or any two points having a measurable voltage difference (change of electrostatic scalar potential) between them.

28. (a) Quoting Max Planck:

*"An important scientific innovation rarely makes its way by gradually winning over and converting its opponents: it rarely happens that Saul becomes Paul. What does happen is that its opponents gradually die out, and that the growing generation is familiarized with the ideas from the beginning."* [Max Planck, as quoted in G. Holton, Thematic Origins of Scientific Thought, Harvard University Press, Cambridge, MA, 1973.]

(b) Indeed, the scientific resistance to new discovery is rather *pathological*. Quoting Sigmund Freud:

*"There are three steps in the history of a great discovery. First, its opponents say that the discoverer is crazy; later that he is sane but that his discovery is of no real importance; and last, that the discovery is important but everybody has known it right along."*

(c) This led Clarke to sum it up this way, speaking of energy extracted from the vacuum:

*"If they [quantum fluctuations of vacuum] can be [tapped], the impact upon our civilization will be incalculable. Oil, coal, nuclear, hydropower, would become obsolete - and so would many of our worries about environmental pollution." "Don't sell your oil*

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*shares yet—but don't be surprised if the world again witnesses the four stages of response to any new and revolutionary development: 1. It's crazy! 2. It may be possible—so what? 3. I said it was a good idea all along. 4. I thought of it first.*" [Arthur C. Clarke, in "Space Drive: A Fantasy That Could Become Reality" NSS ... AD ASTRA, Nov/Dec 1994, p. 38].

29. For a summary article on the original Manhattan Project, see "Manhattan Project", at [http://en.wikipedia.org/wiki/Manhattan\\_Project](http://en.wikipedia.org/wiki/Manhattan_Project).

30. An electrical energy process receiving excess input EM energy from the active vacuum so that its COP > 1.0 even though its efficiency is less than 100%, can be made "self-powering" ( i.e., powered totally by the vacuum energy input alone) by properly applying clamped positive feedback from system output to furnish what would otherwise be the operator's EM energy input. E.g., if the COP = 4.0 for the "open loop" system, its output energy is four times greater than the energy input by the operator (the excess energy input is furnished by the active vacuum). By feeding back a carefully controlled fourth of the amplified output, the energy input usually furnished by the operator can be replaced by the feedback input. This still leaves the remaining three parts of output energy still being "poured out" by the clamped positive feedback amplifier (which continues to receive is excess free energy input from the vacuum). So a COP>1.0 *heat amplifier* with appreciable additional energy received freely from the vacuum, can be close-looped to provide total powering by the vacuum input—which system condition is loosely referred to as "self-powering". In that case, the system is said to be "self-powered" or "self-powering".

31. Presently the NRAM optical physicists are severely constrained, and must use the term "negative absorption" to replace the actual "excess emission" that it represents. They are not allowed to discuss the thermodynamics of the actual COP = 18 for the optimized experiments, but must only speak of an "increase in the reaction cross section" without mentioning COP>1.0.

An explanation of the NRAM process—and exactly where and how it gets extra input energy from a vast unknown but ubiquitous Heaviside curled EM energy flow input—is given in Thomas E. Bearden and Kenneth D. Moore, "Increasing the Coefficient of Performance of Electromagnetic Power Systems by Extracting and Using Excess EM Energy from the Heaviside Energy Flow Component". This is a U.S. Provisional Patent Application, filed and obtained in Oct. 2005 and now deliberately released into public domain and freely given away. It is available at <http://www.cheniere.org/techpapers/PPA%20Increasing%20COP%20by%20addnl%20extractn%20from%20flow1a.DOC>.

32. For formal references (much restricted in their discussion of the NRAM process), see:

- (a) V. S. Letokhov, "Generation of light by a scattering medium with negative resonance absorption," Zh. Eksp. Teor. Fiz., Vol. 53, 1967, p. 1442;
- (b) V.S. Letokhov, "Generation of light by a scattering medium with negative resonance absorption," Sov. Phys. JETP, 26(4), Apr. 1968, pp. 835-839;
- (c) V. S. Letokhov, "Stimulated emission of an ensemble of scattering particles with negative absorption," ZhETF Plasma, 5(8), Apr. 15, 1967, pp. 262-265;
- (d) V. S. Letokhov, "Double  $\gamma$  and optical resonance," Physics Letters A, Vol. 43,

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1973, pp. 179-180;

(e) A. V. Alekseev, Yu. A. Zinin, & N. V. Sushilov, "Effect of negative resonance absorption in a weak polychromatic field," Optics and Spectroscopy, 69(6), December 1990, pp.736-739.

33. (a) Craig F. Bohren, "How can a particle absorb more than the light incident on it?" Am. J. Phys., 51(4), Apr. 1983, pp. 323-327. Under nonlinear conditions, a particle can absorb more energy than is in the light incident on it. [Note: A general relativistic operation is involved in the NRAM process; hence the special relativistic energy conservation law can be violated, as discussed elsewhere in these footnotes.] Metallic charged particles at ultraviolet frequencies are one class of such particles and insulating charged particles at infrared frequencies are another.

(b) See also H. Paul and R. Fischer, {Comment on "How can a particle absorb more than the light incident on it?"}, Am. J. Phys., 51(4), Apr. 1983, p. 327. The Bohren experiment is repeatable and produces COP = 18, although it is only referred to as an "increase in the reaction cross section" of the self-oscillating absorbing particles.

(c) For producing equally-spaced frequency bands across the heating spectrum, the new "comb" processes may be useful. E.g., see (1) P. Del'Haye et al., "Optical frequency comb generation from a monolithic microresonator," Nature, Vol. 450, 20/27 Dec. 2007, pp. 1214-1217; and (2) June Ye & Steven T. Cundiff, Femtosecond Optical Frequency Comb: Principle, Operation and Applications, Springer, New York, 2005.

34. Also see V. S. Letokhov, "Laser Maxwell's Demon," Contemporary Physics, 36(4), 1995, pp. 235-243. Letokhov considers a Maxwell's demon based on the use of selective interaction between laser light and atomic particles, including two versions (destructive and nondestructive) of the demon. The destructive version is based on the velocity- and particle-selective resonant ionization of particles in the near field of laser radiation. The non-destructive version is based on the dipole (gradient) light pressure force in near-field radiation effects.

35. Negative energy and negative mass-energy appear as a result of the well-known Schrödinger equation (and whenever a sharp impulsive energy gradient lifts Dirac electrons from the Dirac Sea, leaving Dirac "holes" which are negative mass-energy electrons). Dirac and other scientists hated negative energy, however, because it leads to negative probabilities mathematically. So in his own general relativistic extension to the Schrödinger equation in his electron theory, Dirac (and others) deliberately and arbitrarily discarded negative energy.

(a) Quoting Hotson: "*I think if one had to point to a single place where science went profoundly and permanently off the track, it would be 1934 and the emasculation of Dirac's equation.*" [D. L. Hotson, "Dirac's Equation and the Sea of Negative Energy, Part I," New Energy, Issue 43, 2002, pp. 1-20. Quote is from p. 1].

(b) Quoting Dirac: "*I remember once when I was in Copenhagen, that Bohr asked me what I was working on and I told him I was trying to get a satisfactory relativistic theory of the electron, and Bohr said 'But Klein and Gordon have already done that!' That answer first rather disturbed me. Bohr seemed quite satisfied by Klein's solution, but I was not because of the negative probabilities that it led to. I just kept on with it, worrying about getting a theory which would have only positive probabilities.*" [Conversation

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between Dirac and J. Mehra, Mar. 28, 1969, quoted by Mehra in Aspects of Quantum Theory, ed. A. Salam and E. P. Wigner, Cambridge University Press, Cambridge, 1973].

(c) Again quoting Dirac: “*One gets over the difficulty on the classical theory by arbitrarily excluding those solutions that have a negative E. One cannot do this in the quantum theory, since in general a perturbation will cause transitions from states with E positive to states with E negative.*” [P. A. M. Dirac, Proceedings of the Royal Society A, Vol. 117, p. 610.].

This resulted in discarding negative-mass energy (Dirac negative mass-energy holes—by falsely and arbitrarily calling them positrons with positive mass-energy electrons and positive energy EM fields). This arbitrarily discarded dark matter (the negative mass-energy holes) and dark energy (their negative energy EM fields) by substituting the positive energy and positive charge change that results when the hole moves away and is replaced by a filled Dirac hole with net charge zero and net field energy zero. Negative mass (dark matter) and negative energy (dark energy) have remained arbitrarily eliminated by the scientific community since that time.

Dirac actually argued that the hole could not be observed, but as it moved away its replacement by a filled hole would be observed as a positive mass change (from  $-1$  to  $0$ ) and its field energy change would be observed as a positive-going change in the EM field (from a negative number to zero). He first postulated its replacement would be observed as a proton and its field, but later changed to recognize its replacement would be observed as a positron and its field. The error came in equating the replacement of the hole by a positive-going change as the hole itself—a logical non sequitur.

(d) However, Solomon has rigorously shown that elimination of negative energy is a serious error and is intolerable. See Dan Solomon, "Some new results concerning the vacuum in Dirac's hole theory," Physica Scripta, Vol. 74, 2006, pp. 117–122. Quoting from the abstract: “*In Dirac's hole theory (HT), the vacuum state is generally believed to be the state of minimum energy. It will be shown that this is not, in fact, the case and that there must exist states in HT with less energy than the vacuum state. It will be shown that energy can be extracted from the HT vacuum state through application of an electric field.*”

(e) Our comment is that adding a field (e.g., a gradient or other change of a potential) across a region of space is a violation of Lorentz symmetry, since the “uniformity” of the vacuum energy density is directly altered in that region. Solomon references work in this area, performed for some time (since 1999).

(f) Dark matter and dark energy constantly are created in the earth, the sun, stars, planets, etc. by very impulsive interactions where there are sharp energy gradients across a small region of space. This lifts out electrons from the Dirac Sea, leaving behind the holes (dark matter). These are repelled by ordinary matter and positive energy, so they try to escape in “streamers” avoiding the normal masses. Some succeed, and so there are streamers of dark matter—radiating its dark energy (the negative EM fields of the Dirac negative mass energy electron, or “hole”, as a source charge)—emerging from planets, stars, etc. These streamers are repelled (accelerated) outward, and then are slowed again by approaching repelling ordinary mass and energy clumpings ahead. So the dark matter and dark energy forms “clusters” in space outside and around the normal galactic arms etc. Their negative gravity repels the matter in the galactic arms back toward the center,

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thereby preventing the normal matter from escaping due to its high centripetal forces. The “gatherings” of dark matter and energy also repel all distant matter, as in other galaxies, thereby providing a continual acceleration of the intergalactic expansions.

The effects in our own solar system result in “drag” forces (repulsive gravitational forces) on the Pioneer spacecraft from distant gatherings of negative mass and negative energy. These excess and presently inexplicable drag forces have been measured and certified real.

The Pioneer forces also vary—even changing in sign with respect to direction of motion—as the spacecraft’s position in and with respect to multiple separated dark matter and dark energy “gatherings”.

(g) Thus the astrophysicists are looking in the wrong place for dark matter and dark energy! Bedini has been evoking and using such dark matter and its dark energy EM fields for more than two decades, *in real circuits and real systems on the lab bench*.

Negative energy can easily power the world—but to date it has only been used for highly secret negative energy EMP (electromagnetic pulse) weapons by several nations, to destroy rather than to help.

Here are important additional references by Solomon:

(h) Dan Solomon. “Some differences between Dirac's hole theory and quantum field theory.” Can. J. Phys., Vol. 83, 2005, pp. 257-271;

(i) ----- “Quantum states with space-like energy-momentum.” Central European Journal of Physics (CEJP), Vol. 4(3), 2006, pp. 380-392;

(i) ----- “Some remarks on Dirac's hole theory versus quantum field theory.” Can. J. Phys., Vol. 81, 2003, pp. 1165-1175;

(j) ----- “Mathematical Inconsistencies in Dirac Field Theory,” 1999, available at [quant-ph/9904106](http://quant-ph/9904106);

(k) ----- “A new look at the problem of gauge invariance in quantum field theory,” Physica Scripta, Vol. 76, 2007, pp. 64-71, available at [arXiv:0706.2830](http://arxiv.org/abs/0706.2830);

(l) ----- “Negative energy density for a Dirac-Maxwell field,” July 18, 1999, <http://www.arxiv.org/ftp/gr-qc/papers/9907/9907060.pdf>.

36. To change negative energy into positive energy is easy. Simply charge a capacitor “backwards” using negative energy. Then disconnect the charged capacitor and reconnect it into an ordinary circuit. It will then discharge its energy as normal positive energy.

37. To observe Bedini’s systems and details of his systems and work, see

(a) Energy from the Vacuum™ documentary series, Part 1: Introduction. Perf. Tom Bearden, John Bedini, Walter Rosenthal. Energetic Productions LLC, 2007. DVD.

(b) Energy from the Vacuum™ documentary series, Part 2: John Bedini. Perf. John Bedini, Tom Bearden. Energetic Productions LLC, 2007. DVD.

(c) T. E. Bearden, Energy from the Vacuum: Concepts and Principles, Cheniere Press, Santa Barbara, 2002, Chapter 5: Selective Approaches to Overunity Power Systems, pp. 219-291.

(d) T. E. Bearden and John Bedini, Free Energy Generation: Circuits & Schematics, Cheniere Press, Santa Barbara, 2006. (See <http://cheniere.org/sales/buy-feg.htm> for the abstract).

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38. For a preview of what is going into production and sales by Bedini's company Energenx, see [www.energenx.com](http://www.energenx.com) for products, advantages, etc. The first overunity (COP>1.0) battery-charging Energenx systems are now coming off a small production line and going into large warehouses, to charge the batteries of large materials handling equipment. Charging with negative energy dramatically reduces the positive electric energy one must take from the wall socket (and pay for). It also reverses internal sulfation, and dramatically increases the life and performance of the batteries.

Further, there have been more than two dozen independent replications of Bedini's processes world wide, so he has met the final criterion of the scientific method: *independent replication*.

39. An example is our own motionless electromagnetic generator (MEG) system. We require another year to year and a half of very comprehensive work, to go from the first crude "bench demonstrator" stage to a finished and fully engineered unit ready for mass production. See:

(a) Stephen L. Patrick, Thomas E. Bearden, James C. Hayes, Kenneth D. Moore, and James L. Kenny, "Motionless Electromagnetic Generator," U.S. Patent # 6,362,718, Mar. 26, 2002.

(b) M. W. Evans et al., "Explanation of the Motionless Electromagnetic Generator with O(3) Electrodynamics," *Found. Phys. Lett.* 14(1), Feb. 2001, pp. 87-94. Quoting: "...the fundamental operational principle of the MEG is explained using a version of higher symmetry electrodynamics known as O(3) electrodynamics, which ... has been developed extensively in the literature. The theoretical explanation of the MEG with O(3) electrodynamics is straightforward: Magnetic energy is taken directly ex vacua and used to replenish the permanent magnets of the MEG device, which therefore produces a source of energy that, in theory, can be replenished indefinitely from the vacuum. Such a result is incomprehensible in U(1) Maxwell-Heaviside electrodynamics."

(c) M. W. Evans et al., "Explanation of the Motionless Electromagnetic Generator by Sachs's Theory of Electrodynamics," *Found. Phys. Lett.* 14(4), 2001, pp. 387-393.

(d) M. W. Evans et al., "The Aharonov-Bohm Effect as the Basis of Electromagnetic Energy Inherent in the Vacuum," *Found. Phys. Lett.* 15(6), Dec. 2002, pp. 561-568.

(e) T. E. Bearden, "Energy from the Active Vacuum: The Motionless Electromagnetic Generator," in M. W. Evans (Ed.), *Modern Nonlinear Optics*, Second Edition, 3-vols., Wiley, 2001; Vol. 2, pp. 699-776.

(f) M. W. Evans, T. E. Bearden, and A. Labounsky, "The Most General Form of the Vector Potential in Electrodynamics," *Found. Phys. Lett.* 15(3), June 2002, pp. 245-261. Quoting:

*"It is therefore possible, in principle, to extract electromagnetic energy from the vacuum ..... The surface charges of an intercepting circuit diverge a fraction of the outflowing spatial electromagnetic energy current from the dipole into the circuit conductors producing electromotive force in the circuit. Conservation of energy flow in 3-space is violated, but conservation of energy 4-flow is rigorously maintained, as is permitted in any spatially excited region of spacetime".*

*"... In electrical engineering terms, the dipole acts as a true negative resistor, since it receives EM (electromagnetic) energy in unusable form (in electrical engineering, reactive power form) and outputs it in usable form (real power form)."*

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“... Oddly, to power their external circuits and loads, batteries and generators do not use their available internal energy—the shaft energy we input to the generator, or the chemical energy available in the battery. Instead, neglecting its internal losses, each uses its available energy to perform work upon its own internal charges and force them apart, thereby forming a source dipole connected to the terminals. Batteries and generators expend their internal available energy to make the source dipole, nothing else. None of the internal energy is used to power the external circuit.”

“Once the source dipole is formed, its giant negentropy results in the dipole continuously receiving unusable reactive power from the time domain of the 4-vacuum, transducing the received energy into 3-space energy, and emitting 3-energy flow that pours from the terminals and through space around the circuit.”

(g) T. E. Bearden, Energy from the Vacuum: Concepts and Principles, Cheniere Press, Santa Barbara, CA, 2002, “Chapter 7. Aharonov-Bohm Effect, Geometric Phase, and the Motionless Electromagnetic Generator.”

(h) A very clear explanation of the operation of the MEG is given by T. E. Bearden, “Engineering the Active Vacuum: On the Asymmetrical Aharonov-Bohm Effect and Magnetic Vector Potential A vs. Magnetic Field B,” available at link <http://www.cheniere.org/techpapers/On%20the%20Aharonov-Bohm%20Effect1.doc> and also in Part 1 of the Energy from the Vacuum™ documentary series, DVD available from [Energetic Productions LLC](http://www.energeticproductions.com).

40. The solution systems are *asymmetric* Maxwellian systems a priori, since they accept and use additional excess energy freely received from the active vacuum. Such asymmetric systems are present in Maxwell’s original theory, given in James Clerk Maxwell, "A Dynamical Theory of the Electromagnetic Field," Royal Society Transactions, Vol. CLV, 1865, p 459. Read Dec. 8, 1864. Also in The Scientific Papers of James Clerk Maxwell, 2 vols. bound as one, edited by W. D. Niven, Dover, New York, 1952, Vol. 1, p. 526-597. The paper may be downloaded from:

[http://www.zpenergy.com/downloads/Maxwell\\_1864\\_1.pdf](http://www.zpenergy.com/downloads/Maxwell_1864_1.pdf)

[http://www.zpenergy.com/downloads/Maxwell\\_1864\\_2.pdf](http://www.zpenergy.com/downloads/Maxwell_1864_2.pdf)

[http://www.zpenergy.com/downloads/Maxwell\\_1864\\_3.pdf](http://www.zpenergy.com/downloads/Maxwell_1864_3.pdf)

[http://www.zpenergy.com/downloads/Maxwell\\_1864\\_4.pdf](http://www.zpenergy.com/downloads/Maxwell_1864_4.pdf)

[http://www.zpenergy.com/downloads/Maxwell\\_1864\\_5.pdf](http://www.zpenergy.com/downloads/Maxwell_1864_5.pdf)

[http://www.zpenergy.com/downloads/Maxwell\\_1864\\_6.pdf](http://www.zpenergy.com/downloads/Maxwell_1864_6.pdf)

<http://www.zpenergy.com/downloads/Diagram.pdf>.

41. The U(1) group symmetry electrical engineering model assumes an inert vacuum and a flat spacetime. It is thus limited to a special relativistic system operating in a totally inert environment; hence the assumed *symmetrized* system cannot and will not ever *usably* receive any excess energy from its totally inactive vacuum/spacetime environment. By using closed-loop circulation of all current from the forward EMF of the external circuit, forced back through the back EMF of the primary source, the present EE systems are symmetrical and self-enforce COP<1.0 insofar as use of additional energy from the vacuum is concerned. On the other hand, physics itself already contains higher group symmetry electrodynamics models, such as SU(2)×SU(2), O(3), quaternion electrodynamics, etc. In these models an active vacuum/spacetime does exist, and so dynamics of spacetime (i.e., general relativity effects) also exist and operate. In short,

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*better models already prescribe the very asymmetric Maxwellian systems that are so desperately needed.*

42. As an example, rigorous proof that eliminating the arbitrary Lorentz condition provides systems having free additional energy currents from the vacuum is given by M. W. Evans et al., “Classical Electrodynamics without the Lorentz Condition: Extracting Energy from the Vacuum,” *Physica Scripta*, Vol. 61, 2000, pp. 513-517.

43. See the section **An Example Indicator** on an example of a “free EM energy flow from the vacuum” asymmetrical Maxwellian system. It is ridiculously easy to produce an unending constant flow of real EM energy from the local vacuum, anywhere, anytime, as discussed in the mentioned section. But since 1892 and the very beginning of electrical engineering, our EEs have been trained to build only a *symmetrical* Maxwellian system that continually destroys its universal source dipolarity and therefore its asymmetry—and therefore its extraction of free EM energy flow from the vacuum. The symmetrical EM system does this faster than it uses a smaller portion of the collected energy flow from the dipolar source (inside the generator) of the “free electromagnetic wind” to power the loads in the external circuit.

We therefore have to keep cranking the shaft of the generator—*not* to have the mechanical energy transformed to EM energy to power the external circuit and its loads, but to continually force apart the opposite charges inside the generator to restore the source dipole and its broken symmetry—thereby restoring the free flow of EM energy extracted from the vacuum by the asymmetry of the source dipole.

Obviously, if we do not allow this “symmetrical system self-destruction of the source dipole inside the generator”, we will not need to keep cranking the generator shaft, once the source dipole is established. Just leave that internal dipole alone and do not change it, and it will sit there and *freely* pour out real EM energy flow until the end of time.

Similarly with an electret laid on a permanent magnet, so that E and H fields are orthogonal. Just leave that gadget alone and do not disturb it or change it, and it will freely pour out real Poynting EM energy flow—until the end of time.

44. See endnote {42}. Quoting from Evans et al. (ibid):

*“A demonstration is made of the existence of a time dependent classical vacuum polarization which appears if the Lorentz condition is discarded. Vacuum charge and current appear phenomenologically in the Lehnert equations but fundamentally in the  $O(3)$  Yang-Mills theory of classical electrodynamics. The latter also allows for the possibility of the existence of vacuum topological magnetic charge density and topological magnetic current density. Both  $O(3)$  and Lehnert equations are superior to the Maxwell-Heaviside equations in being able to describe phenomena not amenable to the latter. In theory, devices can be made to extract the energy associated with vacuum charge and current.”*

45. These include at least a dozen different systems by John Bedini himself, some using positive EM energy and others using negative EM energy. His overunity battery chargers are going into production and sales as this paper is being written. He also has several “self-powering” systems powered totally by energy from the vacuum, without energy input by the operator. Other systems by other inventors or groups include (a) the motionless electromagnetic generator (MEG) using the Aharonov-Bohm effect, (b) self-

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powering permanent magnet motors, (c) the NRAM (negative resonance absorption of the medium) process in optical physics that produces COP = 18 for optimized experiments, (d) cold fusion, (e) watergas, etc.

Many other legitimate but struggling inventors have systems that could be completed and readied for production and marketing, given necessary funding and time.

46. (a) It is also possible to build a solid-state self-powering “battery”, where special materials (such as tourmaline wafers made of finely ground crystals) simply exhibit a steady voltage across the material and will sustain a steady little current in any “external circuit” affixed to its opposite sides as “battery terminals”. Like batteries, these wafers can be connected in parallel and in series to produce self-powering batteries of various sizes and power abilities. See a relevant discussion of the DeGeus self-powering battery wafer, in T. E. Bearden, “A Curious Coincidence: Was it Suppression of the Self-Powering Battery?” 28 November 2007, available at link <http://cheniere.org/articles/Coincidence%20or%20Suppression%20of%20the%20Self-Powering%20Battery%202.doc>.

(b) There is even a patent on at least one such legitimate system; see Tetsujiro Kubo, “Permanent Electrode Carrier Using Tourmaline,” U.S. Patent No. 5,601,909 dated Feb. 11, 1997. Kubo also has a European patent on the process, plus a Japanese patent and a German patent.

(c) DeGeus was indeed intent on coming out with his wafer and various assemblies of it, to provide self-powering “batteries” of various sizes and capacities. A European consortium had offered significant funding, and DeGeus was on his way to sign the agreement in Europe and thus get funded quite amply.

47. By developing and making available these cheap, clean “energy from the vacuum” solutions, it also directly enables the rapid economic development of presently downtrodden and suffering countries. The modern national economy is based on cheap energy (and we would hope on cheap energy that is also *environmentally very clean*). Availability of cheap, clean energy to the downtrodden and suffering nations would enable very rapid economic development while dramatically reducing present pollution of the biosphere, thus allowing concomitant infrastructure development, biospheric cleanup, and sharp reduction in global warming emissions. This would directly elevate and enrich the lives of the suffering populations worldwide.

48. As a single example, the proven NRAM (negative resonance absorption of the medium) process in optical physics can be adapted to produce self-powering heat amplifiers and these can be added to existing steam boilers to make the steam boilers self-powering. This will allow rapid modification of most present electrical power systems already functioning, making them “self-powered” by the active vacuum, and thereby *ceasing most of their combustion of fossil fuel or nuclear fuel rods, etc.—which makes them totally clean*.

49. For results of a successful antigravity test of the Sweet VTA (vacuum triode amplifier) device, see Floyd Sweet and T. E. Bearden, "Utilizing Scalar Electromagnetics to Tap Vacuum Energy," Proc. 26th Intersociety Energy Conversion Engineering Conference (IECEC '91), Boston, Massachusetts, 1991, pp. 370-375. The Sweet VTA produced (and output) negative energy at a COP = 1,500,000. The source of the negative

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energy input was self-oscillation induced in the negative binding energy of the barium nuclei in barium ferrite permanent magnets. By merely adding impedances in series and switching them in one at a time, the unit lost 90% of its weight on the bench, smoothly and controllably. Shortly thereafter there was an assassination attempt on Sweet's life, which so frightened him that he would never again experiment with antigravity, but only with the energy aspects of the VTA.

50. By use of the Fogal chip in precursor engineering mode, operating through multiply connected spacetime. In short, the Fogal chip can communicate using what is called a *quantum potential involving multiply-connected spacetime*. Proof that such "instant communication" between previously interacted photons—at a great distance—can be done and does occur is well-known in quantum physics. It has now been experimentally proven for ordinary communications, at any distance, using the Fogal semiconductor.

(a) E.g., see David J. Bohm, B. J. Hiley, and P. N. Kaloyerou, "An ontological basis for the quantum theory," *Physics Reports*, 144(6), 1987, pp. 321-375.

(b) See also Robert Carroll, *Fluctuations, Information, Gravity, and the Quantum Potential*, Springer, 2006.

(c) See particularly B. J. Hiley and F. David Peat, "General Introduction: The Development of David Bohm's Ideas From the Plasma to the Implicate Order," in B. J. Hiley and F. David Peat, Eds. *Quantum Implications: Essays in Honour of David Bohm*, Routledge & Kegan Paul, London, 1987, pp. 1-32. Quoting from p. 13:

*"The quantum potential shows quite clearly that for a certain class of wave function particles that are separated in space with no classical potential connecting them are not really separated but are connected through the quantum potential. They are, as it were, 'together yet apart'. Furthermore the quantum potential contains an instantaneous connection rather than the expected retarded connection. In some ways this is like a reintroduction of a kind of action-at-a-distance, a feature that goes against the whole historical development of physics..."*

51. Fogal's two patents are:

(a) William Jay Fogal, William Jay, "High Gain, Low distortion, Faster Switching Transistor," U.S. Patent No. 5,196,809, Mar. 23, 1993; and

(b) William J. Fogal, "High Gain, Low Distortion, Faster Switching Transistor," U.S. Patent No. 5,430,413, July 4, 1995.

52. Mind and mind dynamics occupy the time domain, but not 3-space. In quantum field theory there are four photons, including the nonobservable time-polarized or "scalar" photon, and the nonobservable longitudinal photon in addition to the two observable transverse photons. The mind and its dynamics are totally electromagnetic, but just in terms of time-polarized photons and time-polarized photon dynamics.

The scalar photon (in the time domain) and the longitudinal photon (in 3-space) are each *individually* nonobservable, but their *combination* is observed as a simple voltage spike. Hence any living system, which must couple its mind and mind dynamics (time-polarized photon dynamics) to its 3-space body and body dynamics (longitudinal photon dynamics), must include lots and lots of "voltage spikes" to do so.

This is why the brain and nervous system cells have so many dendrite endings, and thus so many "spikes"—jillions and jillions of them. It is the only way that the time-

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domain's mind dynamics of a single mind (its scalar photon activity) can be coherently coupled to the 3-space dynamics of a physical body (and vice versa), to produce a "living system".

This can be expanded into a direct engineering technology of the mind, which Russian scientists have secretly done in their superweapons science of psychoenergetics. For the development and types of this Russian energetics superweapons science and its accomplishments, see T. E. Bearden, Oblivion: America at the Brink, Cheniere Press, 2005.

53. The scientific method arbitrarily discards time because experimental observation invokes a  $\partial/\partial T$  operator upon LLLT spacetime, producing a series of static 3-space LLL observations—and we must *infer* the time changes and dynamics, as well as anything that exists in or occupies time only. Since mind and mind dynamics exist in the time domain, then the observation process destroys any direct hint of it, and we must speculate or postulate mathematically as to what mind is, what mind dynamics are, and therefore what the "living" part of "life" is.

By contrast, precursor engineering directly engineers *spacetime itself*, without applying a  $\partial/\partial T$  operator. Thus precursor engineering includes the structuring and changing of time as well as space. It thus constitutes a giant leap of at least 500 years into the future for science, and a dramatic extension of the present limited fundamental scientific method itself. Sadly, the former Soviet Union did the necessary work to go from present "scientific method" to precursor engineering, and called it "energetics"—but kept it highly hidden and used only for the production of superweapons to kill or control more people faster and easier. For an overview of what energetics entails and the superweapons actually produced and deployed, see T. E. Bearden, Oblivion: America at the Brink, Cheniere Press, 2005. We also include the psychoenergetics branch, where mind and mind dynamics are deliberately engineered and used as a very special kind of superweapon.

54. As stated, there is already a special semiconductor—the patented Fogal chip—that will perform early precursor engineering. From time to time there also appear related chips by other inventors that may also accomplish at least some precursor engineering.

55. Kurt Gödel, "Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme" ("On Formally Indeterminable Propositions of the Principia Mathematica and Related Systems)," in Monatshefte für Mathematik und Physik, Vol. 38, 1931. This is the publication in which Gödel's Proof first appeared, which states that within any logical mathematical system there are propositions or questions that cannot be proved or disproved on the basis of the axioms within that system. Therefore, it is uncertain whether or not the axioms of arithmetic will give rise to contradictions, since they can. In short, no mathematical model is perfect and absolute.

To *really* see how convoluted the question of a model is: We reason that Gödel used a model in producing the "proof" of his theorem. So we apply his own theorem to his own model—and the end result changes astoundingly because *now his proof is not absolute*. Now we would have to say that "no mathematical model is perfect and absolute—until one comes along that is!"

56. For a description of how the Fogal semiconductor works, see Program VII.

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57. Nuclear wastes pose an insidious problem, particularly with respect to spent nuclear fuel rod storage and vulnerability to terrorism. See “Nuclear weakness,” NewScientist, Vol. 180, 13 Dec. 2003, p. 4. Quoting from the article:

*“Bob Alvarez, senior energy adviser to the Clinton administration, and colleagues argue that 99 large ponds full of highly radioactive spent nuclear fuel at 65 sites across the US are vulnerable to attack. To save space, the fuel has been densely stacked, and this means it could heat up and catch fire within hours if the ponds emptied, they claim.”*

*“The consequences could be significantly worse than Chernobyl,” Alvarez told NewScientist. “The fuel ponds are the biggest terrorist risk in the US nuclear industry.”*

58. In the latter 1880s, Tesla had discovered that EM energy could be freely taken from the “active medium”, and he was determined to give free energy to the world. He had destroyed Thomas Edison’s and J. P. Morgan’s dreams of a vast DC electric power plant empire, by installing much more practical AC systems at Niagara Falls. Accordingly, the ruthless Morgan recognized Tesla as his mortal enemy, to be destroyed, and he did in fact totally bankrupt Tesla, reducing him to living in a hotel room off the charity of the hotel and a few friends. Morgan also ordered his scientific advisors to check the new Heaviside vector equations—which were to be used as the basis of the new electrical engineering just being formed—to insure the equations did not contain any of those confounded Tesla “energy from the active medium” systems.

Since group theory and analysis was adopted in 1870s, the excellent advisors to Morgan simply did a group symmetry analysis of the Heaviside equations, which showed that the equations still contained some of the asymmetrical systems that were in Maxwell’s original theory. Morgan ordered them to fix the problem, so Lorentz (a great scientist but one who also had a habit of using other scientists’ work and receiving credit for it), was induced to do the fixing. Lorentz simply symmetrized the highly restricted Heaviside vector equations, thereby further curtailing them by discarding all the remaining asymmetric Maxwellian systems. Since any system receiving and using excess EM energy from its “active medium” (the active vacuum/spacetime) is an *asymmetric* system a priori, this “fixed” the new EE equations so that *they discarded all asymmetric systems capable of exhibiting COP>1.0 using free excess EM energy input from the active vacuum/medium*.

For a revealing treatise, see J. D. Jackson and L. B. Okun, "Historical roots of gauge invariance," Rev. Mod. Phys., Vol. 73, July 2001, pp. 663-680. The paper discusses roots and history of gauge invariance, verifies that Ludwig Lorenz (*without* the “t”) first symmetrically regauged Maxwell's equations, although it has been misattributed to H. A. Lorentz (*with* the “t”) as being first. This is an excellent coverage of the history of who did what and when, and who got or took credit for it.

59. For Lorentz’s symmetrization of the Heaviside equations, see H. A. Lorentz, "La Théorie électromagnétique de Maxwell et son application aux corps mouvants," [The Electromagnetic Theory of Maxwell and its application to moving bodies], Arch. Néerl. Sci., Vol. 25, 1892, pp. 363-552. [Also in H. A. Lorentz, Collected Papers, The Hague: Martinus Nijhoff, vol. 2, pp. 168-238, esp. p. 168.] This is the work that Lorentz cites later (in 1895) for his proof of the symmetrical regauging theorems (the two equations of symmetrical regauging).

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60. See T. D. Lee, *Particle Physics and Introduction to Field Theory*, Harwood Academy Publishers, Chur, New York, and London, 1981, p. 181. Quoting Nobelist Lee:

“...*the violation of symmetry arises whenever what was thought to be a non-observable turns out to be actually an observable.*”

61. Consider this question: *What is the most work that an original input of 100 joules of EM energy into a multi-part system can theoretically do?*

The answer is not 100 joules!

Let's suppose that the "system" is made of two subsystems, A and B. And suppose that both subsystems A and B are 100% efficient; i.e., each simply "converts energy in form" to do work, but does not "lose" any of the energy by allowing it to escape from the overall system (it escapes from the subsystem only). The converted energy is dissipated from the subsystem, but not from the entire system.

We also point out that the rigorous definition of work is the change of form of some energy.

So we input 100 joules of energy (in form 1) into subsystem A, which is designed to convert input energy in form 1 into output energy in form 2. Since it's 100% efficient by our thought-experiment, subsystem A takes the 100 joules of input "form 1" energy, and converts that energy (all of it!) into energy in form 2, so that it outputs 100 joules of energy in form 2, *while* it has just done 100 joules of work (conversion of form of 100 joules of energy). It outputs 100 joules of energy in form 2, still (in our gedankenexperiment) not having "lost" (dissipated) the energy completely out of the entire system. Instead, it only "lost" it (output or dissipated it) from subsystem A.

Now—clever devils that we are—we have deliberately designed subsystem B to receive energy in form 2 and convert it into form 1 again, thereby doing work. And it's 100% efficient, so it outputs still-available 100 joules of energy from its input in Form 2 back into form 1 again. And it still remains in the overall system. Subsystem B did 100 joules of work also, and we still have our original 100 joules of energy, now back in form 1 again!

So we can wire the output of subsystem A to the input of subsystem B, and the output of subsystem B to the input of subsystem A. Then we put in 100 joules of energy in form 1 to subsystem A and sit back and watch what happens.

That silly thing will sit there and cycle continually, doing 200 joules of work (energy form-changing) in each cycle, and never losing that original 100 joules of energy—just changing it repeatedly from form 1 to form 2 and back to form 1, etc.

There is no "conservation of work" law; there is a conservation of energy law! If we do not "lose" any of the energy processed by each subsystem, we can use the same energy (in alternating different form!) over and over, continually.

So how much work can our original 100 joules of energy that we input to that "big system" do? Any amount we wish, if we wait long enough. It produces 200 joules of work in each "cycle", and with our assumption of "no losses"—i.e., no dissipation of the energy by its escaping the entire system—it will run forever.

The universe is a very large system made of a great number of subsystems. And energy dissipated from one subsystem is used again to do work in other successive subsystems. The universe works this way all the time. And it always has.

Now in our usual circuits, every time we do work in a component or subsystem, we

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just automatically let the transformed energy escape from our *entire system* (i.e., we allow it to be "dissipated" and "lost" from the entire system). And we build subsystems that are less (often much less) than 100% efficient. In short, we build systems whose subsystems regularly dissipate the energy right out of the entire circuit/system, so that it cannot be "reused". That's really what the term "dissipation of energy as work" means. We have to reinterpret that silly phrase as "dissipation (escape from the entire system) of the converted energy after work (change of form of energy) is produced".

The "magic" simply is in not dissipating the energy out of the entire system, each time that it does some useful work (gets converted in form) in a subsystem. If the energy escapes the system (i.e., *is dissipated* from the system), no further use can be made of it to produce useful work in that system. If the energy *does not* escape the system, then further use can be made of it to produce useful work in that system.

62. (a) See Thomas E. Bearden, "Extracting and Using Electromagnetic Energy from the Active Vacuum," Modern Nonlinear Optics, Part 2. Second Edition, Advances in Chemical Physics, Volume 119, Edited by Myron W. Evans. Series Editors I. Prigogine and Stuart A. Rice, John Wiley and Sons, 2001, pp. 691-192. Quoting:

*"All the hydrocarbons ever burned, all the steam turbines that ever turned the shaft of a generator, all the rivers ever dammed, all the nuclear fuel rods ever consumed, all the windmills and waterwheels, all the solar cells, and all the chemistry in all the batteries ever produced, have not directly delivered a single watt into the external circuit's load. All that incredible fuel consumption and energy extracted from the environment has only been used to continually restore the source dipole that our own closed current loop circuits are deliberately designed to destroy faster than the load is powered."*

(b) See also our recommended Program I. One can take all the electrical energy that one wishes or requires, from the free "static voltage" of common electrostatic voltage sources, freely and essentially forever.

63. The Energy Imperative: Technology and the Role of Emerging Companies, Report of the President's Council of Advisors on Science and Technology, Nov 8, 2006. Available at [http://www.ostp.gov/pcast/PCAST-EnergyImperative\\_FINAL.pdf](http://www.ostp.gov/pcast/PCAST-EnergyImperative_FINAL.pdf). Quoting: *"Our recommendations focus on immediate steps that could be taken to reduce our Nation's reliance on foreign oil and to reduce atmospheric emissions from energy production and use. In the area of electricity generation, we call for steps to accelerate the deployment of advanced nuclear power, clean coal technology, renewable sources such as solar and wind energy, and energy efficiency technologies. In the area of transportation, we suggest steps for a major transition to biofuels and to electric or hydrogen-powered vehicles. With these new transportation technologies, American consumers will have a choice of fuels that previously has not been available."*

As can be seen, PCAST remained immersed in the horribly failed "energy mostly from fuel consumption" present paradigm.

64. For a good description of this earth-electrosphere potential difference see "Lightning—Awesome Force in the Sky," at <http://www.cltskywarn.org/lightning.htm>.

65. (a) E. T. Whittaker, "On the Partial Differential Equations of Mathematical Physics," Mathematische Annalen, Vol. 57, 1903, pp. 333-355.

(b) See also E. T. Whittaker, "On an Expression of the Electromagnetic Field Due to

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Electrons by Means of Two Scalar Potential Functions,” Proc. Lond. Math. Soc., Series 2, Vol. 1, 1904, pp. 367-372.

66. The difference in potential established across the circuit, when acting on the charged electrons in that circuit, *together with those interacting charged electrons* constitutes an EM force acting on those interacting charged particles. When the electrons are again free to move as current, this force pumps the interacting electrons around through the losses and loads to the ground side (the forward emf path)—and also pumps the spent electrons from the ground side back through the back emf path of the source, destroying the source dipolarity as it powers the loads and losses. Thus work can be engendered by “static” potentialization, if dynamic depotentialization (dissipation in losses and loads) occurs. The reason is that the circuitry transforms the “static precursor potential difference”, *when it is interacting with charged masses*, to force by interacting the precursor with charges  $q$ . And when—with the original source disconnected and the external circuit recompleted as a separate and “already-potentialized” circuit—the electrons are unpinned and flow as current, these forces move and produce work  $W$  by the equation  $W = \int \mathbf{F} \cdot d\mathbf{s}$ . So by potentializing statically from a static voltage source, separating the source, re completing the circuit and then allowing it to dynamically dissipate its energy by self-pumping current through the losses and loads, we do “free” useful work in the loads, paying only for a very tiny bit of switching and timing work.

With efficient switching,  $COP > 1.0$  is easily achieved.

67. H. A. Lorentz, "La Théorie électromagnétique de Maxwell et son application aux corps mouvants," [The Electromagnetic Theory of Maxwell and its application to moving bodies], Arch. Néerl. Sci., Vol. 25, 1892, pp. 363-552. Also in H. A. Lorentz, Collected Papers, The Hague: Martinus Nijhoff, vol. 2, pp. 168-238, esp. p. 168. This is the work that Lorentz cites later (in 1895) for his proof of the symmetrical regauging theorems (the two equations of symmetrical regauging).

68. H. A. Lorentz, Vorlesungen über Theoretische Physik an der Universität Leiden, Vol. V, Die Maxwellsche Theorie (1900-1902), Akademische Verlagsgesellschaft M.B.H., Leipzig, 1931, "Die Energie im elektromagnetischen Feld," pp. 179-186.

Figure 25 on p. 185 shows the Lorentz concept of integrating the Poynting vector around a closed cylindrical surface surrounding a volumetric element. This is the procedure which arbitrarily selects only a small component of the energy flow associated with a circuit—specifically, the small Poynting component being diverged into the circuit to power it—and then treats that tiny component as the "entire" energy flow. Thereby Lorentz arbitrarily discarded all the extra Heaviside curled energy transport component which is usually not diverged into the circuit conductors at all, does not interact with anything locally, and is just wasted.

However, most of today’s scientists and engineers no longer are aware of the giant Heaviside curled energy flow component accompanying every feeble Poynting energy flow component in every circuit.

69. (a) See Editorial, “The Transfer of Energy,” The Electrician, Vol. 27, July 10, 1891, pp. 270-272. Two men independently and simultaneously discovered EM energy flow through space; before their discovery the concept does not occur in physics. The two men were Oliver Heaviside—a self-taught genius who never attended university, but

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purchased books and learned from them—and John Poynting, a scientist and an academician.

(b) Poynting published prestigiously as J. H. Poynting, “On the transfer of energy in the electromagnetic field,” Phil. Trans. Royal Soc. London, Vol. 175, Part II, 1885, pp. 343-361. Thus the major credit for discovering the flow of energy through space outside the conductor was given to Poynting because of his academic credentials.

However, Poynting only considered that very tiny component of the energy flow through space along the wire, which interacts with the charges’ fields and gets diverged into the wire, so-to-speak, to power up the electrons. He never even considered a curled flow that would not be diverged (in any special relativity situation). He also got the direction of flow wrong by  $90^\circ$ .

Heaviside discovered the small diverged component that enters the circuit, but also discovered a mind-boggling additional curled EM energy flow that does not get diverged (in any special relativity situation, where the divergence of the curl is zero) but is trillions of times greater in magnitude than the diverged Poynting component that “powers the circuit”. He also corrected Poynting’s mistake in the direction of energy flow.

(c) In Morgan’s ruthless suppression of Tesla’s “energy from the active medium” systems by Lorentz symmetrical regauging in 1892, the Heaviside equations had been modified to eliminate all remaining asymmetric Maxwellian systems—the ones which could indeed extract excess energy from the “active medium”. When a vexed Morgan then heard of Heaviside’s discovery—that from the terminals of every generator there pours trillions of times as much energy as we mechanically crank into the shaft—he again had Lorentz “fix the problem” so that future students would not be taught that fact.

So in 1900 Lorentz simply integrated the entire energy flow vector (containing both the curled and uncurled energy flow components) around a closed surface surrounding any volume element of interest. That neatly retains the very feeble Poynting diverged energy flow component, while arbitrarily discarding Heaviside’s giant curled energy flow component. The reference where Lorentz introduced this concept to all the electrodynamicists—and rid all the emerging EE books of any mention of the giant Heaviside energy flow component—is given in the previous endnote, number {66}.

70. Oliver Heaviside, "On the Forces, Stresses, and Fluxes of Energy in the Electromagnetic Field," Phil. Trans. Roy. Soc. London, 183A, 1893, pp. 423-480. Heaviside discusses the Faraday-Maxwell ether medium, outlines his vector algebra for analysis of vectors without quaternions, discusses magnetism, gives the EM equations in a moving medium, and gives the EM flux of energy in a stationary medium. On p. 443, he credits Poynting with being first to discover the formula for energy flow, with Heaviside himself independently discovering and interpreting this flow a little later by himself in an *extended form*.

71. Quoting Jackson:

*"...the Poynting vector is arbitrary to the extent that the curl of any vector field can be added to it. Such an added term can, however, have no physical consequences. Hence it is customary to make the specific choice ..."* [J. D. Jackson, Classical Electrodynamics, Second Edition, Wiley, 1975, p. 237]. Note that Jackson’s statement of “no physical consequences” is correct for special relativistic situations. It is false for general relativistic situations without the Killing symmetry arbitrarily applied.

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72. E.g., quoting Sir Roger Penrose:

*"We seem to have lost those most crucial conservation laws of physics, the laws of conservation of energy and momentum!"* [Penrose then adds the Killing symmetry arbitrarily, to get conservation again, when the Killing vector applies and gravity is separated.]. *"These conservation laws hold only in a spacetime for which there is the appropriate symmetry, given by the Killing vector  $\kappa$ .... [These considerations] do not really help us in understanding what the fate of the conservation laws will be when gravity itself becomes an active player. We still have not regained our missing conservation laws of energy and momentum, when gravity enters the picture. ... This awkward-seeming fact has, since the early days of general relativity, evoked some of the strongest objections to that theory, and reasons for unease with it, as expressed by numerous physicists over the years. ... in fact Einstein's theory takes account of energy-momentum conservation in a rather sophisticated way—at least in those circumstances where such a conservation law is most needed. ... Whatever energy there is in the gravitational field itself is to be excluded from having any representation..."* [Roger Penrose, The Road to Reality, Alfred A. Knopf, New York, 2005, pp. 457-458.]

Our comment is that this "solution" accepted by many general relativists is to just arbitrarily toss out the gravity and gravitational energy density of spacetime in a given troublesome case, and the problem of nonconservation of energy and momentum then vanishes. In short, separate the spacetime itself from the fields, and there is no problem! However, simply avoiding the problem itself is not solving the problem! Considering the neglected and unaccounted giant Heaviside energy flow always accompanying every Poynting EM energy flow, the gravity effect is always at least of importance, and this "solution" itself is in general nearly always untenable.

73. Quoting the great Hilbert, shortly after Einstein published his theory of general relativity:

*"I assert... that for the general theory of relativity, i.e., in the case of general invariance of the Hamiltonian function, energy equations... corresponding to the energy equations in orthogonally invariant theories do not exist at all. I could even take this circumstance as the characteristic feature of the general theory of relativity."* [D. Hilbert, Gottingen Nachrichten, Vol. 4, 1917, p. 21.].

74. Quoting Logunov and Loskutov:

*"In formulating the equivalence principle, Einstein actually abandoned the idea of the gravitational field as a Faraday-Maxwell field, and this is reflected in the pseudotensorial characterization of the gravitational field that he introduced. Hilbert was the first to draw attention to the consequences of this. ... Unfortunately, ... Hilbert was evidently not understood by his contemporaries, since neither Einstein himself nor other physicists recognized the fact that in general relativity conservation laws for energy, momentum, and angular momentum are in principle impossible."* [A. A. Logunov and Yu. M. Loskutov, "Nonuniqueness of the predictions of the general theory of relativity," Sov. J. Part. Nucl., 18(3), May-June 1987, p. 179].

75. Bedini's present patents are:

(a) John C. Bedini, "Device and Method for Pulse Charging a Battery and for Driving other Devices with a Pulse," U. S. Patent No. 6,677,730 issued January 13, 2004.

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(b) John C. Bedini, "Device and Method of a Back EMF Permanent Electromagnetic Motor Generator," U.S. Patent No. 6,392,370, May 21, 2002.

(c) John C. Bedini, "Device and Method for Using a Monopole Motor to Create Back EMF to Charge Batteries," U. S. Patent No. 6,545,444, Apr. 8, 2003.

(d) A fourth patent application has been made and is pending completion by the patent office, and several other patent applications are in preparation.

76. For a thorough explanation of how the MEG works, see T. E. Bearden, "Engineering the Active Vacuum: On the Asymmetrical Aharonov-Bohm Effect and Magnetic Vector Potential A vs. Magnetic Field B" available at link

<http://www.cheniere.org/techpapers/On%20the%20Aharonov-Bohm%20Effect1.doc>.

That's a definitive write-up (with drawings) which clearly reveals the way the MEG operates, and what the free evocation of the Aharonov-Bohm effect actually does vis a vis (a) exciting the local vacuum, and (b) triggering that excited vacuum outside the MEG core to produce E-field energy pulses directed back toward the MEG core.

77. E.g., see M. V. Berry and S. Klein, "Geometric phases from stacks of crystal plates," *J. Mod. Opt.* Vol. 43, 1996, pp. 165-180.

78. See Michael Berry's very important website at [http://www.phy.bris.ac.uk/people/berry\\_mv/index.html](http://www.phy.bris.ac.uk/people/berry_mv/index.html). Many of his important publications are available from the website. A list of his publications is also available.

79. Y. Aharonov and J. Anandan, "Phase Change during a Cyclic Quantum Evolution," *Phys. Rev. Lett.*, Vol. 58, 1987, pp. 1593-1596.

80. Modern physics—not the more than a century old and terribly obsolete CEM/EE—already tells us that we can take energy from a charge forever and never run down, because we are already dealing with infinite charge and infinite energy. E.g., quoting Nobelist Weinberg:

*"[The total energy of the atom] depends on the bare mass and bare charge of the electron, the mass and charge that appear in the equations of the theory before we start worrying about photon emissions and reabsorptions. But free electrons as well as electrons in atoms are always emitting and reabsorbing photons that affect the electron's mass and electric charge, and so the bare mass and charge are not the same as the measured electron mass and charge that are listed in tables of elementary particles. In fact, in order to account for the observed values (which of course are finite) of the mass and charge of the electron, the bare mass and charge must themselves be infinite. The total energy of the atom is thus the sum of two terms, both infinite: the bare energy that is infinite because it depends on the infinite bare mass and charge, and the energy shift ... that is infinite because it receives contributions from virtual photons of unlimited energy."* [Steven Weinberg, *Dreams of a Final Theory*, Vintage Books, Random House, 1993, pp. 109-110.].

81. Note that this is not a flow of electron current, but a flow of pure photon current. Since this flow involves no flow of mass, there is force and thus no "translation of force" involved. Hence there is no "work" or "rate of work flow" (power) involved, so there is no self-destruction of the source dipole (the charge and its polarized vacuum).

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82. D. J. Evans and Lamberto Rondoni, "Comments on the Entropy of Nonequilibrium Steady States," J. Stat. Phys., 109(3-4), Nov. 2002, pp. 895-920. This paper rigorously proves that in theory real physical systems can produce continuous negative entropy, in total violation to the flawed old second law of equilibrium thermodynamics. We have nominated the source charge and the source dipole as universal examples demonstrating that capability since the beginning of the universe.

83. (a) See T. E. Bearden, "Leyton's Hierarchies of Symmetry: Solution to the Major Asymmetry Problem of Thermodynamics," available at [http://www.cheniere.org/techpapers/Fact\\_Sheets/Fact%20Sheet%20-%20Leyton%20Hierarchies%20of%20Symmetry%20-%20trial2%20-%20corrected.doc](http://www.cheniere.org/techpapers/Fact_Sheets/Fact%20Sheet%20-%20Leyton%20Hierarchies%20of%20Symmetry%20-%20trial2%20-%20corrected.doc) . This paper presents a formal correction to the old second law of equilibrium thermodynamics, and also discusses the necessary change from the very old 1872 Klein geometry to the much more modern Leyton geometry, which is necessary for explanation of the source charge's continuous emission of real observable EM energy without any observable energy input.

(b) See also Michael Leyton, A Generative Theory of Shape, Springer-Verlag, Berlin, 2001. The significant aspect of Leyton's epochal work is the development of an object-oriented theory of geometry that overcomes most of the limitations of the old Klein geometry. Negative entropy is in fact "wired in" to the Leyton geometry.

84. See "A New Transistor Design." (1994) Superconductivity News, 6(43), 1994, pp. 12, 8-9. This is a somewhat tongue-in-cheek article on Bill Fogal's new charge-blocking semiconductor, which if real will—in the editor's opinion—mean that "normal" superconductivity is doomed, and will mean the end of energy-based economies and infrastructures.

85. See Megan Potter, "Study Claims Pollution Causes 40% of Deaths," The Cornell Daily Sun, August 30, 2007. A new Cornell University study conducted by Prof. David Pimentel, Ecology and Evolutionary Biology, shows that about 40% of present human deaths yearly are caused by pollution and polluting products in the water, air, and soil.

86. T. E. Bearden, Oblivion: America at the Brink, Cheniere Press, 2005.