<u>HOW AN EM CIRCUIT POWERS ITS LOAD --</u>
<u>AND SOLVING THE WORLD ENERGY CRISIS</u>

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To: Correspondent

Thanks for all the hard work you and everyone in your organization (and your colleagues outside the organization) are doing on resolving this increasing world energy crisis. It is sorely needed, as the strike of Hurricane Ike quite vividly illustrates in its effects (thank God, not too severe!) on our oil facilities and refineries and pipelines in Texas etc.

You also need to be aware of the presently unrecognized _actual cause_ of the present world energy crisis, since it's almost entirely unknown. The world was deliberately placed on this "eventual giant energy crisis" course just before the birth of electrical engineering, when in 1892 Lorentz was specifically elicited by J. P. Morgan's science advisors to "fix" (deliberately symmetrize) the Heaviside equations that were going to be used for the "new technology" to be called "electrical engineering" and to be taught in all our universities.

In the late 1880s Nikola Tesla -- who gave us AC power, the rotating magnetic field that made modern generators possible, radio, and many other things -- had discovered what the group symmetry specialists would call "asymmetric EM circuits". In other words, he could shuttle energy around in some of his circuits as he wished, and dissipate it where he wished. In this way, he could make a circuit that, once the source dipole and its BROKEN SYMMETRY was produced, would continually and freely radiate EM energy extracted (taken) directly from the "active medium" (Tesla's term for the "active vacuum" since special relativity, general relativity, quantum mechanics, quantum electrodynamics, gauge field theory, and quantum field theory were still unborn. Indeed, the electron had not yet even been discovered, and particle physics as we know it was unborn).
   [For the proof of this "shuttling" ability by actual Tesla circuits, see T. W. Barrett, "Tesla's Nonlinear Oscillator-Shuttle-Circuit (OSC) Theory," <u>Annales de la Fondation Louis de Broglie</u>, 16(1), 1991, p. 23-41. Barrett 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. The paper is carried on the cheniere.org website at internet link http://www.cheniere.org/references/TeslaOSC.pdf .]

One should realize that we have had group theory in our leading universities since 1870. So in 1890 Morgan had no difficulty having his science advisors (he had the best that money would buy, including Fleming in England) examine the Heaviside equations and tell him whether or not these equations still contained any of those confounded Tesla "energy from the active medium" systems -- i.e., whether they still contained asymmetric EM systems, since _Maxwell's equations_ definitely contain both symmetrical and asymmetrical EM systems).

Their group theory analysis showed that Heaviside's original equations (already a tremendous curtailment of Maxwell's theory) were still _asymmetric_.

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And so Morgan -- who had already conceived and was implementing a plan to utterly crush Tesla and his backer George Westinghouse -- simply directed his advisors to "Fix it!"

Lorentz was a very great scientist, but he was noted for something odd: He loved to appropriate other scientists' work and take credit for it. So "one could deal with Lorentz", in Morgan's terms. [To view a bit of this characteristic of Lorentz, see J. D. Jackson and L. B. Okun, "Historical roots of gauge invariance," Reviews of Modern Physics, Vol. 73, July 2001, p. 663-680. Jackson and Okun discuss roots and history of gauge invariance, verify 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 credit for it.]

And so they did. Lorentz simply "borrowed" (and took credit himself) Lorenz's (without the 't') previous symmetrization of those equations, and applied them. In short, he deliberately and knowingly further restricted even the original truncated Heaviside equations by symmetrizing them so that the _now-symmetrized_ Heaviside-Lorentz equations no longer contained any asymmetric systems at all. This was just before electrical engineering was born.

And those Heaviside-Lorentz equations were then the ones used in the new technology called "electrical engineering" that was set up and gradually spread through the world's universities. _All electrical engineers are still taught that horribly crippled and mangled tiny derivative of Maxwell's theory_, deliberately so they will not and cannot think, conceive, develop, build and deploy ASYMMETRIC Maxwellian EM power systems (the kind of system that can deliberately accept and use excess EM energy from its local vacuum, so it can produce COP>1.0 and even self-powering where all input energy comes entirely from the vacuum interaction, and freely).
    [In the hard physics literature, rigorous proof that eliminating the arbitrary Lorentz condition provides EM systems having free additional energy currents from the vacuum is given by M. W. Evans, P. K. Anastasovski, T. E. Bearden et al., "Classical Electrodynamics without the Lorentz Condition: Extracting Energy from the Vacuum," Physica Scripta, Vol. 61, 2000, p. 513-517.]

That way, Morgan insured that Tesla's dreams of taking all our necessary EM energy directly from the "active medium", for free, would not ever be realized. Morgan was an empire builder and a dastard, but he was a very thorough one!

Here are some direct quotes from Tesla to show what we are speaking of:

"Ere many generations pass, our machinery will be driven by a power obtainable at any point in the universe. This idea is not novel... We find it in the delightful myth of Antheus, who derives power from the earth; we find it among the subtle speculations of one of your splendid mathematicians...Throughout space there is energy. Is this energy static or kinetic? If static our hopes are in vain; if kinetic – and this we know it is, for certain – then it is a mere question of time when men will succeed in attaching their machinery to the very wheelwork of nature." [Nikola Tesla, in a speech in New York to the American Institute of Electrical Engineers, 1891. Quoted from back cover of his biography, Margaret Cheney, Tesla: Man Out of Time].

"Electric power is everywhere present in unlimited quantities and can drive the world's machinery without the need of coal, oil, gas, or any other of the common fuels." [Nikola Tesla].

"We have to evolve means for obtaining energy from stores which are forever inexhaustible, to perfect methods which do not imply consumption and waste of any material whatever. I now feel sure that the realization of that idea is not far off. ...the possibilities of the development I refer to, namely, that of the operation of engines on any point of the earth by the energy of the medium..." [Nikola Tesla, during an address in 1897 commemorating his epochal installation of AC generators at Niagara Falls.].

"Whatever our resources of primary energy may be in the future, we must, to be rational, obtain it without consumption of any material." [Nikola Tesla, 1900].

As you are aware, Morgan's plan did devastate George Westinghouse, Tesla's backer, who went broke and lost his company not long thereafter. It thus forced Tesla to come to him, J. P. Morgan, for the financing for his further projects. Morgan forced Tesla to sign over control (51%) of his patents, and then advanced only half the money Tesla needed -- and would not advance him any more funds thereafter. Tesla then went broke, with no control of his own patents etc., and was reduced to living in a small hotel room in New York for the rest of his life.

To see how this despaired Nikola Tesla, we quote him writing to J. P. Morgan in 1904:

"....Since a year, Mr. Morgan, there has been hardly a night when my pillow is not bathed in tears, but you must not think me a weak man for that. I am perfectly sure to finish my task, come what may. I am only sorry that after.... acquiring a special knowledge and ability which I now alone possess, and which, if applied effectively would advance the world a century, I must see my work delayed." [Nikola Tesla, in a letter to J. P. Morgan, Oct. 13, 1904].

But before the turn of the century, Morgan had also received another shock. Two men -- simultaneously and independently -- had discovered EM energy flow through space. They were Poynting and Heaviside. Poynting never considered anything except that EM energy flow component in space outside and along the external conductors that _gets diverged into the conductors_ to power up the electrons. But as Heaviside discovered, that is an incredibly small fraction of the overall gigantic energy flow that is actually pouring from the terminals of the generator (or any other dipolar source's broken symmetry). _The remaining huge unused flow is in curled form, and so -- in any special relativistic form -- we now know it will not diverge to be used at all_.

So several trillions times as much EM energy actually pours forth from the terminals of every generator and out through space outside the external conductors, as the amount of energy we crank into the generator shaft. And almost all that energy flow -- the giant Heaviside energy flow -- is just wasted and usually does not interact with anything.

When this new discovery was made known to Morgan, again he was set to fuming. He _did not_ wish those future young electrical engineers to ever know that cranking the shaft of the generator has nothing at all to do with directly furnishing the energy to power the external circuit's loads and losses! Or to know that _the generator actually pours out trillions of times more EM energy flow than the mechanical shaft rotation energy flow we_

input to the generator. He reasoned that, if that were made known to all the sharp young future electrical engineers, then some of them would inevitably find out how to tap some of that giant curled EM energy flow anyway, and this -- together with clamped positive energy feedback -- would lead immediately to self-powering electrical power generating systems, taking all their input energy directly from the seething vacuum (Tesla's "active medium").

And that would eliminate the tremendous and growing need for consuming fuel in order to "get our electrical power". He had watched Tesla destroy the huge financial empire he and Edison were preparing to set up with DC power, and he had no intention of letting Tesla destroy his (Morgan's) future fuel empire intentions. Morgan simply considered control of things -- people, nations, science and technology, whatever. And since the future rising need of humanity would be electrical power and such, then that need would be manipulated and controlled by the need of those systems to consume fuel. And then he who controlled the fuel would financially control the electrical power, and thus humanity itself.

So again he directed his science advisors to "Fix it!" And again Lorentz was elicited to do the dirty work.

Lorentz easily originated the clever little integration trick where one simply integrates the energy flow vector (containing both the small Poynting diverged EM flow component and the gigantic non-diverged Heaviside curled EM flow component) around a closed surface arbitrarily assumed around any volume element of interest. That neatly disposes of the giant nondivergent Heaviside energy flow component, while retaining the diverged Poynting energy flow component. This will in fact match our measured "energy collected and used in the circuit" since that energy is a priori the diverged component. Lorentz "justified" this procedure by deliberately stating that this foolish giant Heaviside energy flow component "had no physical significance".

So in 1900 Lorentz taught all our classical electrodynamicists and electrical engineers to just "integrate that pesky and bothersome huge Heaviside curled energy flow component away" and discard it quite arbitrarily. Today hardly a single EE hears of such a giant energy flow from the terminals of every generator and battery, and most certainly none of them really believe it even if they have heard its history.

And so Lorentz "fixed" the problem, and so they still do in all EE departments in every university. And they have done so for more than a century.

[*But reflect a moment:* In a *general relativity* situation, the divergence of the curl need not be completely zero after all, so in the proper GR situation one can indeed diverge (and use) a tiny bit of that giant curled Heaviside EM energy flow that accompanies every Poynting diverged flow but is unaccounted.
    In optical physics since 1967 (as released by the Soviet Union) there is indeed already such a process used to tap a wee bit of that giant curled Heaviside component by indeed deliberately adding a *general relativity* situation -- the self-oscillation of the charged particles in the receiving section of the system, at the frequency of the input energy flow. The self-oscillating particles obviously rotate their frames to and fro a bit, thus violating special relativity a bit.
    But those particular physicists are never allowed to say "excess EM energy emission", but only "negative resonance absorption of the medium" (NRAM). They are

never allowed to discuss their repeated COP = 18 process when a laser input (of either IR or UV is properly used), but instead they must say only that self-oscillation "increases the reaction cross section". Any deviation from those terms and conditions will immediately result in the offending physicist losing stature, his inability to get his reports published, and will destroy his career.]

[For proof of the NRAM process, see Craig F. Bohren, "How can a particle absorb more than the light incident on it?" American Journal of Physics, 51(4), Apr. 1983, p. 323-327. Under nonlinear conditions, a particle can absorb more energy than is in the light incident on it. (Actually it can absorb more energy than is in the *Poynting component* incident on it). Metallic particles at ultraviolet frequencies are one class of such particles and insulating particles at infrared frequencies are another. 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.]

But electrodynamicists still use Lorentz's sly statement that the giant curled Heaviside energy flow component has no physical significance. Quoting the eminent classical electrodynamicist 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 repeats the "logical justification" used by Lorentz. Jackson is correct in any *special relativity* situation (the usual case). *He can be quite wrong in a proper general relativity case* deliberately introduced to be able to diverge and use some of that curled EM energy flow component after all. And it that case, the diverged component of the giant Heaviside energy flow component definitely has real physical consequences.

With these two "fixes" by Lorentz, electrical engineering -- from its very birth -- has been and is deliberately restricted to only *symmetrical* EM systems, the ones that guarantee COP<1.0 electromagnetically and self-enforce it! They do that by building only systems (symmetrized) by having their forward and back emf/mmf equal and opposite to their forward and back emf/mmf. Such an EM system thus destroys its own internal source dipole (and the BROKEN SYMMETRY of that dipole) faster than it powers its load.

All EM energy in every electrical circuit is extracted directly from the vacuum via the proven asymmetry of its internal source dipolarity, once formed. Any charge, considered with its polarized vacuum of opposite sign, is also part of such a "dipolar ensemble" with concomitant broken symmetry.

Broken symmetry's giant occurrence in nature was predicted by Lee and Yang, and -- because of its revolutionary implications if true -- the experimentalists immediately leaped on it to prove it or disprove it. In Feb. 1957, Wu and her colleagues published very decisive experimental proof. Again, so great a revolution was this in physics, that with unprecedented speed the Nobel Committee awarded the Nobel Prize to Lee and Yang in the same year, in Dec. 1957.

So what is so important about the broken symmetry of a dipole?

As Lee pointed out, whenever we have a broken symmetry, then *something previously virtual has become observable*.

Take a source dipole -- which is a proven asymmetry. Once the charges are separated to form that dipole, its broken symmetry continually absorbs virtual photon energy from the seething virtual vacuum interaction with its charges, coherently integrates that virtual energy to quantal size, and then re-emits the absorbed vacuum energy as real observable EM photons steadily pouring out from the dipole. And contrary to EE texts, this outpouring includes the necessary energy for both the *accounted* Poynting (divergent) energy flow component and the *unaccounted* nondivergent giant Heaviside energy flow component.

Every joule of observable energy in the universe comes from the source charge (and its vacuum polarization) or a source dipole. In every EM system. It always has, and it always will. We live in the midst of an incredible number of "free EM energy emitters", called "charges and dipoles", that continually extract and outpour EM energy directly from the seething vacuum.

So every EE already builds circuits that already freely extract EM energy from the vacuum -- real, observable, quanta that continuously pour out, so that the charge or dipolarity and its emitted EM energy flow form a nonequilibrium steady state (NESS) thermodynamic system. Quoting Van Flandern on the question of a static field actually being made of finer parts in continuous motion:

"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." [Tom Van Flandern, "The speed of gravity – What the experiments say," Physics Letters A, Vol. 250, Dec. 21, 1998, p. 8-9].

Further, in modern physics a single classical charge -- e.g. an electron -- is actually composed of two infinite and opposite charges, each with infinite energy! The difference between the two infinite charges is finite, as is the energy difference between the two infinite energies. And so our instruments, peering through the external screening infinite charge and infinite energy at the bare infinite charge and infinite energy inside, see only that finite difference -- which gives the value of the "classical electron" listed in all the classical textbooks.

To see what the electron really is and really involves, however, we quote 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, <u>Dreams of a Final Theory</u>, Vintage Books, Random House, 1993, p. 109-110.].

I hope you are beginning to see just how archaic and erroneous the present day electrical engineering model and practice -- and power systems -- are. We are still applying a hoary old physics of the 1880s, that has not been modernized by anything that has happened in the entire rise of modern physics from the discovery of the electron forward.

And this is REALLY the problem generating the world's energy crisis -- the arbitrarily symmetrized EM model and systems. To show how easy it is to evoke a continuous and steady flow of EM energy that will last forever, simply lay an electret across a permanent magnet so that the E-field of the electret is at right angles to the H-field of the magnet. Then by every EM textbook in every EE department in every university, that silly two dollar gadget will sit there and freely pour out a real Poynting energy flow S, given by the simple equation S = EXH (constants of proportionality neglected).

Now of course that accounts the DIVERGED component of the flow, but it does not account the also-present giant Heaviside curled EM energy flow, which is several trillion times greater in magnitude as S. And we ourselves do not have to consume any fuel or furnish any further energy to that silly gadget, once it is simply _assembled_.

So there is no problem at all in evoking a "free and unending EM energy wind" anywhere in the universe, quickly and easily and for peanuts, that will also flow freely until the end of time.

Thus the only "energy" problem is how to build a proper "EM energy windmill" to sit there independently in that flowing wind, divert and collect a bit of that free energy wind and collect the energy, and then dissipate that collected EM energy SEPARATELY in the loads to power them.

You see, that type of EM system is a priori an ASYMMETRIC Maxwellian system.

And our EEs can only think, produce, and deploy a SELF-SYMMETRIZING system that uses half the "collected" energy to do nothing but destroy the source of the wind itself -- the internal source dipole inside the generator.

Again, shaft energy cranked into the generator has nothing to do with furnishing EM energy to the external loads to power them, but only with _restoring the internal source dipole_ that the stupid circuit keeps destroying faster than it powers its loads.

Let's follow the input crankshaft mechanical energy to see that this is true.

When we crank the shaft, we start to rotate the rotor. Its rotation energy -- courtesy of Nikola Tesla -- then is transformed into internal rotating magnetic field, completely inside the generator. The rigorous definition of "work" is transformation of the form of some energy. So we have done work, but we still have the energy left, since it has remained (in its new form) inside the generator as the rotating magnetic field energy, instead of escaping from the generator system.

Then all this rotating magnetic field energy is dissipated on the internal charges inside the generator, forcing positive charges in one direction and negative in the other, and thus producing the "internal source dipole" by that separation of opposite charges. The energy also is dissipated from the generator in the process, so it escapes the system and is lost.

So *that is all that the input shaft mechanical energy does*. It forms the internal source dipole, and nothing else before it escapes the system.

Once formed, however, the source dipole is a proven broken symmetry (known rigorously since 1957) and as such it continually transforms virtual state energy from its vacuum interaction into real observable photon energy that pours from the terminals of the generator out along through space outside the external circuit conductors. In any special relativity situation, only the small Poynting (diverged) component enters the wires to power up the electrons.

But the electrical engineer has deliberately built a *symmetrical* circuit, by hooking the external current circuit (the forward emf circuit) in a closed circuit loop with the internal source dipole itself (the back emf circuit).

So half the collected EM energy is used to power the external circuit's loads and losses in the "forward emf" region of the current flow. That means that less than half is used to power the loads, since all real circuits have some losses.

The other half of the collected EM energy is expended to forcibly pump the spent electrons (in the current) back through the source dipole against its back emf, thus scattering its charges and destroying that dipole -- *and thus cutting off the free extraction and flow of real EM energy from the vacuum*.

So to continue furnishing its energy flow from the vacuum and out of its terminals, the system has to continually have its internal source dipole restored because the symmetrized circuit is continually and forcibly destroying that source dipole. And so we have to continually crank the shaft to continually put in some more mechanical energy to continually transduce into some more rotating magnetic field energy to be continually expended in restoring the source dipole and thus sustaining the free EM energy flow from the vacuum and pouring out the generator terminals.

Even in a 100% efficient dipole-restoring input process, we would have to input as much energy as was used to destroy and scatter the dipole. That means we have to input at least half as much energy as was collected in the external circuit. And we get less than half the collected energy in the external circuit to power our loads.

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It is easily seen that we thus always have to input more mechanical shaft energy than the useful energy we get out there in our loads to power them. This inane symmetrized EM circuit therefore self-enforces COP<1.0.

And that is the only kind of circuit an EE can build or even think about, and it has been so since 1892.

The only reason we have to consume fuel is to crank the shaft of that generator to restore its source dipole -- it is NOT to directly power our loads for our usage! The energy that actually powers the loads freely comes from the local vacuum, via the broken symmetry of the source dipole inside the generator once it is built (and then continually restored).

So the world energy crisis is due to the world fuel crisis. And the only reason we need to consume all that fuel is because of our horribly mutilated electrical engineering model and technology, which only can think and build SYMMETRICAL electrical power systems.

Thus we force all our EM systems to continually require fuel consumption from the nuclear power plant, the coal power plant, the natural gas power plant, etc. We can take a little bit of this required "source dipole restoring energy input" from the wind or from water currents or from solar radiation, but it is a mere pittance of what we need. For the brunt of what we need, the arbitrarily symmetrized EE circuit forces us to continually consume fuel.

So oddly _the real reason for the world energy crisis and its coming giant economic collapse is our own inane symmetrized electrical engineering model, used in all our electrical power systems_.

But all is not lost. Once we know this and realize it, we can very quickly solve the world energy crisis -- quickly, cheaply, cleanly, and permanently -- if we will but recognize that it is a _physics_ problem, and _not_ a standard electrical engineering problem. _Electrical engineering is the problem_, and it can thus never offer the "solution" in its present form.

For your information, we attach a Decision and Situation Briefing and a Briefing on a Manhattan Project to quickly and permanently solve the world energy crisis -- and sharply reduce global warming, carbon wastes, etc. world wide and thus very sharply start cleaning up our fragile and long-polluted biosphere.

I hope you give very serious attention to the attached two Briefings and to this little write-up for your information.

Best wishes,
Tom Bearden

P.S. the Decision Brief and the Manhattan Project Brief are also posted on my website www.cheniere.org, along with lots of other material on the subject.