The Mathematics Of Electrical Engineering Has Already Spelled Out *The Theory Of Free Energy.*

As Consumers of Energy, All We Have To Do Is Understand And Demand It!

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Let's define a few terms before we get started...

Real power possesses an ingredient of electrical potential energy contributing to the overall energy of apparent power (real power plus reactive power) and this ingredient is known as simple resistance when it is affecting real power or it is known as resistive impedance when it is affecting reactive power.

Reactive power is a potential energy composed of: capacitive reactance, inductive reactance and frequency. Electrical reactance results in reactive impedance which can be either positive reactive impedance or negative reactive impedance. Like simple resistance, a.k.a. resistive impedance, positive reactive impedance slows current down – but at specific frequencies – while negative reactive impedance does the opposite – it accelerates current at specific frequencies.

The potential energies of reactive power are best utilized by not inputting the total quantity of voltage calculated to satisfy a load. For, this will suppress the utilization of the potential energies of reactive power by regulating them out of manifestation and keeping them in potential form.

It's best to begin the design of a free energy circuit operating with an input voltage of one microvolt – which is equivalent to the background voltage at ground level emitted and received by plants and animals. From experience I can say that this is the best input voltage to start with before playing around with higher or lower quantities. It appears to me that a maximum of 10V and something around a minimum of one femto volt is the window of opportunity – more or less.

We all know that energy can be converted from one form into another and the potential energies listed above are no exception to this rule. In other words, capacitance can result in an alteration of kinetic energy regardless of how much quantity of kinetic energy enters into capacitance. Likewise is this true for the other factors of electrical potential energy which are pertinent to this discussion (listed above). Thus, when we claim conservation of energy must not be violated, we often forget to include all of the potential energies of electrodynamics. This results in a misdiagnosis of what constitutes free energy.

Free energy is the release of potential energy resulting in a gain or a loss of kinetic energy. It is the actualization of kinetic energy which is stored as potential energy in an electric circuit.

This release of free energy can result in a gain of kinetic energy, or its loss, depending upon how much energy shifts to – or from – the

kinetic world of real power versus the potential world of reactive power.

The “consumption” of power is normally ascribed to real power since real power can be seen, heard and felt. Real power can be measured. Once real power is converted into something else, it can't be measured anymore as real electrical power. So, it's considered to have been “consumed”, ie. converted, and lost to our sensitivities. It has, all – but, disappeared if it were not for the fact that we can get it back, again, by its reconversion into real power. But it won't be the same anymore. It won't measure the same. It will be more or less than it was before it slipped into that other reality which is not measurable or electrical.

Reactive power is this other electrical realm – which is invisible to our senses and to which real power can be converted into if real power is not converted into something else in the real world which *can* be measured, but not as electricity, such as: heat, light, etc. This other electrical realm of reactive power is predicated upon imaginary numbers combined with real numbers making them complex numbers...numbers which can't measure anything in our real world.

So, what makes reactive power associated with the “production” of power to compliment its opposing companion of real power which can be consumed?

It is the “lossless condition of reactive power” which makes it appear to us as the “production of power” since it can't be lost, ie. converted, into something else. All it can do is accumulate its amplitude heaped on top of whatever amplitude of reactive power has already appeared during prior cycles of its oscillation.

If it weren't for these distinctions between the consumption of real power and the production of reactive power, we'd easily get them mixed up with each other since at first glance, they appear to be mirrored opposites with no clear distinction as to which should be used as our reference point and which should be the complimentary inverse since both are inversions of each other.

What follows is a table of trigonometric functions as they relate to real power and to reactive power. Their default conditions are assumed to be: “consumption” associated with “real power” quantified with “real numbers” versus “production” associated with “reactive power” quantified with “complex numbers”. The negation of power factor is what inverts the state of “consumption” into its opposite condition of “production”. Negation of power factor also inverts the state of “production” into its opposite condition of “consumption”.

Trigonometric Table of Real Power versus Reactive Power Demonstrates their Mathematical and Energetic Consequences		
Four Identities of Phase Relation in a Context of Time	**Eight Power Factors**	
	Four Identities of Real Power in a Context of Real Numbers whose Default Condition is the *Consumption of Real Power*	**Four Identities of Reactive Power in a Context of Complex Numbers whose Default Condition is the *Production of Reactive Power***
Four Quadrants of Phase Shift within One Cycle of Oscillation	**Real Power results from the application of the Trigonometric Cosine Function (made upon the Angle of Phase Shift between Current and Voltage) yields a Power Factor of...**	**Reactive Power results from the application of the Trigonometric Sine Function (made upon the Angle of Phase Shift between Current and Voltage) yields a Power Factor of...**
Synchronicity of Current and Voltage Waveforms yields a Phase Shift of Zero Degrees	**Cos(0°) = Consumption of Real Power at a Power Factor of +1**	**Sin(0°) = No Production of Reactive Power at a Power Factor of 0**
A Leading Power Factor yields a Phase Shift of +90° between Current and Voltage Waveforms	**Cos(90°) = No Consumption of Real Power at a Power Factor of 0**	**Sin(90°) = Production of Reactive Power at a Power Factor of +1 due to Capacitive Reactance**
Complete Separation of Current and Voltage Waveforms by a Phase Shift of 180° between them	**Cos(180°) = The Negation of the Consumption of Real Power (due to a Power Factor of –1) makes this Functionally Equivalent to the Production of Real Power at a Power Factor of +1**	**Sin(180°) = No Production of Reactive Power at a Power Factor of 0**
A Lagging Power Factor yields a –90° = 270° Phase Shift between Current and Voltage Waveforms	**Cos(270°) = No Consumption of Real Power at a Power Factor of 0**	**Sin(270°) = The Negation of the Production of Reactive Power (due to a Power Factor of –1) makes this Functionally Equivalent to the Consumption of Reactive Power at a Power Factor of +1 due to Inductive Reactance**
Since the Negation of the Consumption of Power (Real or Reactive) yields its Production and vice versa, and... The difference between +90° and –90° is the same as adding +90° and +90° or multiplying 2 times +90° which are both equal to 180° Then, the Simultaneous Union of Capacitive Reactance with Inductive Reactance yields the Production of Real Power.		

Reactive Power Recycles Itself Since It Is Lossless
Which Is Equivalent To Being Immediately Impractical

This lossless condition of reactive power is due to its quantification by the use of complex numbers. These types of numbers are based on the square root of negative one. $\sqrt{-1}$ And reactive power can recycle itself, indefinitely, creating the illusion that energy came from out of nowhere due to its lossless character.

Reactive power cannot be spent. It cannot be wasted. It simply piles itself on top of whatever is inherited from previous cycles of oscillation amassing an increase of reactive power with each cycle.

Frequency regulates its rate of accumulation. And frequency, along with capacitance and inductance, contribute as potential forms of energy. This is what reactance is all about: a potential form of energy waiting to become converted into real power so that we can benefit from its buildup.

The mechanics of its bidirectional conversion and amplification – acting as a potential form of freely available power – is easily organized into a table of trigonometric functions comparing reactive power to real power, as per the chart which is displayed on the previous page.

The consequence is that an application of real power made upon a reactive component, such as: a capacitor or an inductor, yields a reactive consequence enumerated by its power factor of plus or minus one under the third column on the far right at sin(90°) and sin(270°). This consequence is the conversion of real power into reactive power. And the union of two reactive power factors of opposite angular polarity (plus versus minus) yields a second conversion which returns (and converts) reactive power back into its equivalency of real power. This occurs at cos(180°) resulting from taking the difference between cos(–90°) and cos(+90°) to find the angular distance between them.

Add to this the fact that reactive power is lossless – which means: that it cannot violate energy conservation since it cannot be spent as real power, because its real power factor is zero. Nor can it move in transmission to another location for the same reason. Yet, it can wiggle in one place as a standing wave similar to a fish flopping, but not going anywhere, when out of the water and lying on dry ground.

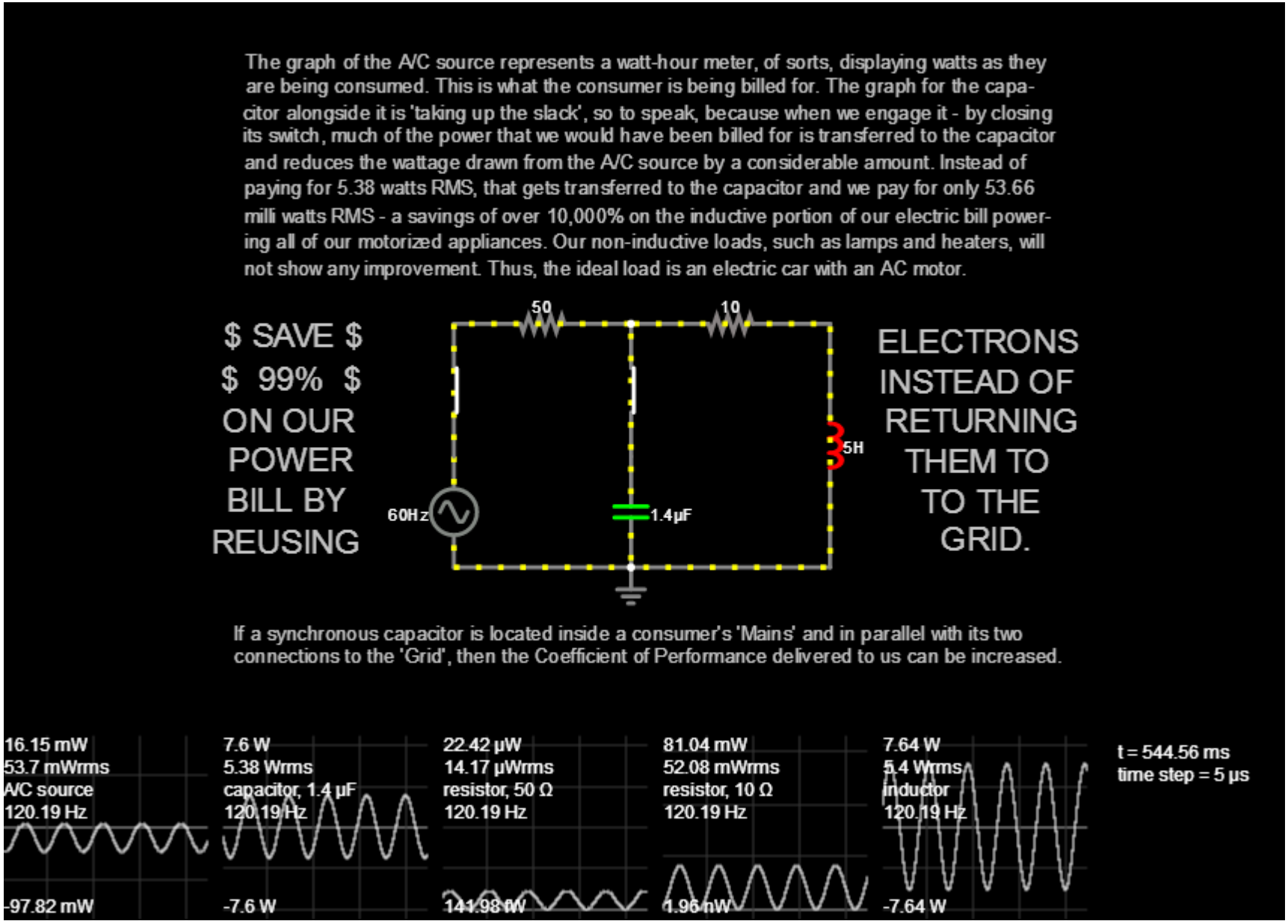
This style of movement is brought about by the union of oppositional reactive power factors – a standing wave of lossless energy. This lossless condition forces this type of energy to restrict itself to mere accumulation of amplitude over the course of time (multiple cycles of oscillation) resulting from each cycle's amplitude adding (accumulating) onto the amplitude of the prior cycles of oscillation.

This is how the colloquialism of “free energy” has become an over-simplification of this slightly complicated phenomenon of the conversion of real power into reactive power, followed by its recycling and summation (accumulation) into a self-amplification of amplitude before its reconversion back into real power when passed through a resistive load – such as: a lamp, or a resistive heater element, etc, or passed through a full rectification of a four diode bridge, or else passed through a bifilar counter-wound coil in which the magnetic field of one coil-winding matches up with the electric field of the other counter-wound-coil (and vice versa) to create a power factor of positive one.

Now, let’s look at a simplified model which demonstrates the practical use of this principle of converting real power into reactive power at an inductive load – a coil of wire on the right-side of the following diagram (on the next page) – exhibiting the characteristic behavior of the trigonometric function of cos(270°) which shifts current backwards in time (relative to voltage) by one-quarter cycle of oscillation. This is called: a lagging power factor since the current lags the voltage. This loss of reactive power is recovered and recycled (reflected) back to the inductor by the reactance of the capacitor in the center of this diagram – exhibiting the characteristic behavior of the trigonometric function of sin(90°) which shifts current *forward of voltage* by an equal amount of an angular difference of one-quarter cycle of oscillation. This effectively converts the reactance of the inductor back into the real power of the source of voltage coming from the power grid on the left-side before redelivering (recycling) it back to this same inductor. This reduces, by a factor of 100, how much power is drawn (in watts) from the A/C voltage source on the left-side. Meanwhile, the inductor continues to spend the same quantity of wattage as before the capacitor became involved by closing its switch.

This saves industrial customers 99% on their reactive use of real power – which is a waste of a mere 1% which they must send back to the power grid (each time they consume power coming from the grid) by comparison to a waste of 99% which they previously had to return (to the power grid) after a mere single use of the power company's energy. This significantly reduces the monetary cost of industrial customers since they are billed for *all* of their apparent power (real plus reactive) which they receive from the power company…

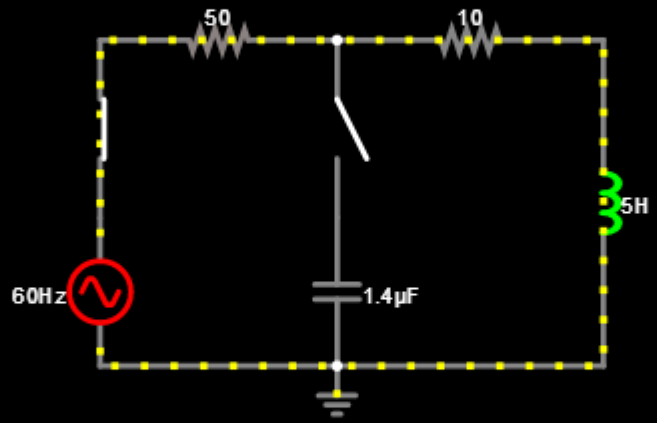
http://vinyasi.info/ne



Compare this, above, to what would happen if capacitance were not used to recycle the reactive power of an inductive load…

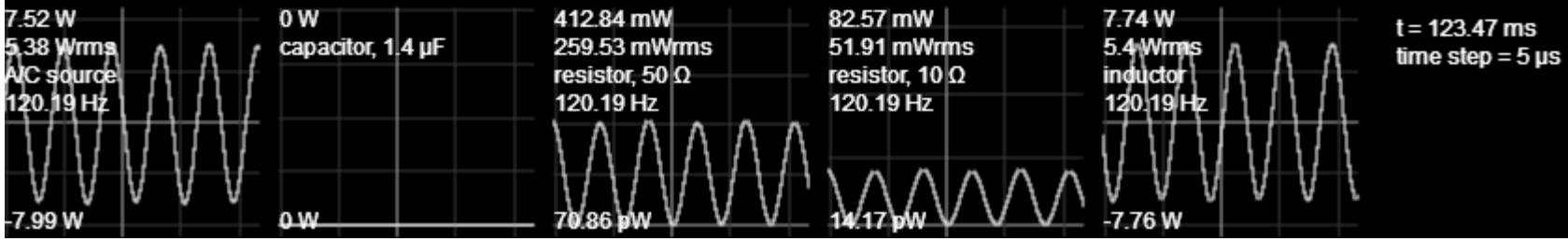
The graph of the A/C source represents a watt-hour meter, of sorts, displaying watts as they are being consumed. This is what the consumer is being billed for. The graph for the capacitor alongside it is 'taking up the slack', so to speak, because when we engage it - by closing its switch, much of the power that we would have been billed for is transferred to the capacitor and reduces the wattage drawn from the A/C source by a considerable amount. Instead of paying for 5.38 watts RMS, that gets transferred to the capacitor and we pay for only 53.66 milli watts RMS - a savings of over 10,000% on the inductive portion of our electric bill powering all of our motorized appliances. Our non-inductive loads, such as lamps and heaters, will not show any improvement. Thus, the ideal load is an electric car with an AC motor.

$ SAVE $
$ 99% $
ON OUR
POWER
BILL BY
REUSING



ELECTRONS
INSTEAD OF
RETURNING
THEM TO
TO THE
GRID.

If a synchronous capacitor is located inside a consumer's 'Mains' and in parallel with its two connections to the 'Grid', then the Coefficient of Performance delivered to us can be increased.



Residential customers never have to worry about this wasteful expenditure of reactive power since they are never billed for its use. But if we possess an electric car, then *we should be demanding* that greater measures be taken to conserve our use of battery power since this will increase the range of our vehicle and make it cheaper… very cheap… to replace our battery pack! *That's because we'd have only one battery powering our car – the same battery which is powering our headlights and radio, etc.*

Let's crunch some numbers and find out how much real power we could save if we recycled a greater percentage of its reactive outcome…

A greater than 99% recovery of electrical power is possible under more stringent – and complicated – conditions of electrical reactance in which the phases of current and voltage are out-of-sync by one-half cycle of oscillations at cos(180°). In fact, there is no theoretical limit to how close it is possible to approach a 100% recovery of reactive power. And by all appearances, raising a recovery rate to nearly 100% of renewability is little different than claiming "free energy" since the two are remarkably similar in appearance.

In other words, if a recovery rate of 99.9999% is achieved, then this is equivalent to possessing an output which is one million times greater than its input since 100% minus 99.9999% equals a difference of 0.0001% which is one million times smaller than 100%. This implies that the cost for providing an output of 99.9999% efficiency-of-recovery has been reduced to one part per million of its output. Or put another way, the beneficial gain has been increased by a million times greater than its input. Thus, it is possible to incorrectly conclude that this is an instance of the violation of Energy Conservation (only physicists and the U.S. Patent Office worry about this) when, in fact, all that has occurred has been a reduction of the cost of energy at the input making it look like "energy appeared out of nowhere" at the output. This misdiagnosis only occurs if we ignore the renewable mid-step which recycled the input – many times over – producing an excessive gain at the output. Consequently, there is no "free lunch" of "free energy". Yet, there *is an improvement of efficiency* by keeping the cost down through the process of the renewability of reactive power and the ease with which we can convert from real power to reactive power – prior to performing its renewal, and then reconvert reactive power back into real power.

The data for the trigonometric table was gleaned from... https://www.electronics-tutorials.ws/accircuits/power-in-ac-circuits.html

Here's a very interesting reference, for further reading, on how reactive power relates to the management of the power grid…

https://web.archive.org/web/20070816173441/http://www.ornl.gov/sci/decc/RP%20Definitions/Reactive%20Power%20Overview_jpeg.pdf

A similar set of questions were asked at StackExchange in the electrical engineering section…

The following electrical energy questions concerning the trigonometric functions of real and reactive power were inspired from the following tutorial? — https://electronics.stackexchange.com/q/607760/151041

The following directories store various simulation files which demonstrates this principle of the simultaneous union of capacitive and inductive reactance for the recycling of reactive power yielding a beneficial gain of real power at a motor load…

http://vinyasi.info/graham/

Hogwash! That's how conventional wisdom describes free energy...

http://vinyasi.info/hogwash/

Index of /energy...

http://vinyasi.info/energy/?C=M;O=D

Download any of these files and use them as you wish. GNU copyleft...

http://vinyasi.info/circuitjs1/

Index of /graham...

http://vinyasi.info/graham/

Index of /patent/pri-vate...

http://vinyasi.info/patent/pri-vate/

Mho's Law Justifies Free Energy, by Vinyasi - Monday, 26 July 2021...

http://vinyasi.info/mhoslaw/

Here is a criticism of my post by an electrical engineer on Quora...

https://electricalscience.quora.com/The-Mathematics-Of-Electrical-Engineering-Has-Already-Spelled-Out-The-Theory-Of-Free-Energy

https://www.quora.com/profile/Bob-Myers-5

> Unfortunately, this is completely incorrect and is based on a rather basic misunderstanding of just what is meant by “reactive power.” Suffice it to say that there is absolutely no “free energy” to be had here.

Here is my response...

> I won’t expect you to be a little more precise since I don’t wanna take up your time with a task that may be unnecessary if you can point me in the right direction…? In other words, an Internet resource that corrects my mistakes would be vastly appreciated; thank you very much.
>
> BTW, there is no “free energy” to be had anywhere. That’s a colloquialism made popular by a pervasive ignorance on the subject of the natural tendency for the lossless characteristic feature of reactive power to recycle itself adding its amplitude – for any given cycle of oscillation – onto the amplitudes of all prior cycles of oscillation. After a sufficient duration, this amasses a considerable quantity of reactive power which, by itself, is useless. Hence, its moniker of being lossless.
>
> Yet, it is well known in the electrical engineering field that, at the very least, there is one simple method available for utilizing (ie, converting) lossless reactive power into spendable real power by passing this accumulated energy through a resistive load and boiling water with it to rotate a steam-driven turbine hooked up to an electrical generator and do away with all of our power plants spending

coal, petroleum, nuclear, or any other “fuel”. I list two other methods of converting reactive power into real power in this post.

Effectively speaking, this makes reactive power a freely available resource (since it doesn’t take much real power to “fuel” reactive power’s ability to endlessly recycle itself) which has hitherto been untapped and which the lay person is ignorant of.

As I point out in my post, the gain is never greater than one. It is always less than 100% if we divide the input by the output and subtract this ratio from 100%.

If anything solves the riddle of, “what is free energy”, then this qualifies.

What was missing was a wholistic view using the two trigonometric functions of cosine and sine applied to the four quadrant positions of cyclic phase relations between current and voltage for real and reactive power yielding eight power factors: four for real power and four for reactive power. All eight are mandatory or else we’ll end up with a partial view of the dynamics of energy conversion occurring here.

For, no energy is created nor is it destroyed. Yet, it is converted, recycled and reconverted besides whatever gets wasted due to the inefficiencies of these three steps. And each of these three steps occur at the same time per cycle of oscillation.

Great criticism of my post!

Here is a comment posted by a dear friend of mine...

https://www.quora.com/profile/Franco-Bruno-Corteletti

It seems that if the right quadrants (which ones? the 2 reactive?) could be combined, energy can be continued endlessly in a region of space (either filled by dielectric matter or vacuum).

Here is my response...

Yes, the two quadrants of plus and minus 90°. In fact, that’s probably how they already exist. It is mankind who seeks to combine them to harness free energy.

I suspect that plants and animals use them as the source for their life force. And it is their combination which creates the aging

process, and ultimately the death of the organism, whenever real power is the result unless reactive power is continually utilized to regenerate their physiology.

And here is his reaction to my response...

Very clever. If we think in terms of attributes of each time frame (quadrant), it is kinda like a key combination which nature can do “automagically”. It's obvious that we can do the same way using wires and sources of potential.

Here is another criticism by a well-meaning Edward Barrett...

https://www.quora.com/profile/Edward-Barrett-57

Load of Bollox. You can’t get something for nothing. There are many aspects of engineering that cover this, one alone is “Conservation of Energy”. Look on YouTube and find all the “free Energy Generators” and look for the hidden wires.

My response...

They make their mistake by calling these “...generators...” by a commonly nonsensical phrase involving the word “...energy...” to which I also subscribe to its use since the public doesn’t know any better to use the correct term of “freely available reactance” or “freely available reactive power”.

Answer me this...

Does capacitive reactance always equal inductive reactance?

...and...

Can Energy, namely: the kinetic energy of Real Power, readily yield a reactive result whenever subjected to reactive components, such as: capacitors and coils of wire?

...and...

Can Reactive Power, namely: a potential form of energy resulting from the three reactive ingredients of potential energy, namely:

frequency, capacitance and inductance, can reactive power readily convert into the kinetic energy of Real Power whenever passed through a resistive load, such as: an incandescent light bulb, as just one example?

So, in other words, “you can’t get something for nothing” is true (from a scientific standpoint), yet (from another scientific standpoint) leverage – in the form of reactance – can be utilized to recycle its lossless character and, thus, accumulate an absurd quantity of *imbalanced* reactive power until a quantity of imbalance is reached sufficient enough to blow up speakers used in a public address system at a rock concert (despite the fact that the meter on the gas-fired generator supplying power for that PA system is rock steady indicating no change in power being supplied to that system), or be insufficient to provide voltage demands made upon the power grid leading to blackouts and brownouts...

https://web.archive.org/web/20070816173441/http://www.ornl.gov/sci/decc/RP%20Definitions/Reactive%20Power%20Overview_jpeg.pdf

In the words of that immortal objection...

Yeah, the sky is blue. We all agree that it is true that it is blue. But, is it relevant to the discussion at hand? Or, is Energy Conservation a simplistic distraction to prevent a more serious discussion on what *really* matters to the electrical engineers who are responsible for “balancing the resistive loads against the reactive loads” and for balancing inductively reactive loads against the capacitively reactive loads, which are imposed upon the power grid?...

https://www.youtube.com/watch?t=3h45m15s&v=cCJcU7INwnU&feature=youtu.be = https://is.gd/spacetimeconjunction

This is my supposition which I propose to you...

What happens whenever we take the cosine function of the union of two power factors, namely: the sine of positive 90 degrees and the sine of negative 90 degrees? We’d get a zero power factor indicating – not the cancellation of reactive power which would be a violation of Energy Conservation, but – a conversion of reactive power into real power, yes? Is their union mathematically equivalent to taking the cosine function of their difference (representing the angular distance) between negative 90 degrees (equivalent to +270 degrees) and positive 90 degrees? Do we get a negative one power factor from taking the cosine function of this

difference of 180 degrees?

And since reactive power is lossless, does this engender the tendency for us to describe reactive power to be a condition in which it is “generated” by a power factor of +1 (due to capacitive reactance resulting from a capacitor)? And, also, a condition in which reactive power is “consumed” whenever its power factor is negative one (due to inductive reactance resulting from a coil of wire)?

And if we don’t consume reactive power with a sufficient quantity of a capacitive load, wouldn’t we have an explosive condition without an adequate capacitive load to compensate an overly abundant inductive load (as so aptly described by Eric Dollard in the YouTube video, above)?

Eric was describing the inductive impedance of a very long transmission line stretching for hundreds of miles spanning from Las Vegas, Nevada, to Los Angeles, California. And without sufficient capacitance interjected in series with the transmission line’s inductive impedance, it becomes “imbalanced” between the two forces of inductive and capacitive impedances? And this imbalance can result in the generators in Los Angeles “exploding” whenever they should fall behind the generators in Las Vegas?

Why? Because there’s too much reactive power contained within the entire utility grid to risk damage to any of its equipment should the grid also become too imbalanced between the inductive and capacitive impedances of its entire system.

In other words, we (as uneducated consumers) overlook the fact that reactive power injected into the power grid by the inductive reactance of the lengthy stretches of copper wire (spanning great distances between power stations) may not equal (in all instances) the reactive power of the transmission line’s capacitive reactance. And its huge overall quantity of reactive power, in general, may lead to an excessively imbalanced buildup of a reactive power factor of negative one (excessive to the design tolerances of all of the grid’s equipment) leading to devastating damage or downtime (due to brownouts or blackouts) or both.

Thus, the potential energies of: frequency, inductance, capacitance and resistance may all contribute to the total *apparent* power (equaling reactive power plus real power) in addition to whatever limited quantity of real power is fed into any electrical system. These potential contributions can result in an excessive condition of apparent power (let alone its imbalance) despite the misapplication of the Conservation of Kinetic Energy does not apply to the non-conservability of Reactive Power. Reactive Power

serves as a Potential form of freely available Energy and it's high time we recognize it as such.

It is this excessive manifestation of a reactive power factor of negative one, plus its simultaneous union with an excessive manifestation of a reactive power factor of positive one, is precisely what I aim for whenever I simulate a "free energy" circuit.

I try to create both conditions *at the same time* in order to get a situation which is potentially capable of manifesting an excessive real power factor of negative one, also known as: the generation of negative watts – which is the standard definition for the generation of power according to passive sign convention.

And I continue to use the erroneous expression of "free energy" despite my knowing better not to use it (due to the Conservation of Energy of physics) until the populace raises its consciousness on this subject by coming to know what is already known among electrical engineers (who are not afraid to admit it).

I know how tough it is to hold a job as an electrical engineer if he/she were to admit to all of the above. It's ludicrous to think otherwise. Peer pressure is a substantial incentive to deny critical judgment and independent thought.

That's what I do since I am not an engineer of any sort. I'm an informed consumer. That is all the incentive I need to speak out against the "policy" of silence and the misrepresentations occurring on both sides of this argument – both pro and con.