



CARL JOHNSON
A POTENTIALLY
PERFECT
ENERGY
SOURCE!







An Almost Unlimited (Clean) Power Source!



A POTENTIALLY PERFECT ENERGY SOURCE!
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CARL JOHNSON

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The huge multi-National oil companies employ tens of thousands of researchers whose sole function is to find new locations to drill oil wells. However, it is reasonably well established that, assuming that we find it all, we humans will manage to use it all up by around the year 2050, in just 50 years. (That petroleum took hundreds of millions of years to form.)

A natural side effect of the formation of that oil is that massive accumulations of natural gas (mostly methane) also exist underground, and we are using it all up at an amazing rate, too. It appears that we may not use it all up for a hundred years or so.

We use these irreplaceable natural resources in some pretty disappointing and wasteful ways. Enormous numbers of barrels of oil get used up to make the plastic



bags we bring everything home in (and then immediately throw away). Ditto for the packaging of almost every modern product. Our attitude seems to be "It's here, so why not use it all up. I won't be alive when it runs out!" But, hopefully, other people will be! There will be smart people around. THEY will figure out what to do!

Around 1990, I realized an interesting situation, **which seems to show promise of being a source of electricity and mechanical energy billions and possibly trillions of times the total available energy in all existing oil, gas and coal!** I am bemused that so many tens of thousands of researchers struggle to find oil supplies while exactly zero are even exploring this far more vast potential source of energy!

Now, consider that the Earth is rotating. When I was a small child, I was quite impressed at a giant pendulum in the Museum of Science and Industry in Chicago. While I would watch, the direction of the pendulum was obviously seen to very slowly change! The Museum even had the numbers of a clock face on the floor under it. When I later learned Physics, I realized that the pendulum was actually not rotating like that, as Newton's Laws clearly show that the pendulum should maintain its original motion. The



apparent change in that pendulum was ACTUALLY due to the Earth (and Museum floor) rotating beneath the pendulum!

Around 1990, it occurred to me that gyroscopes also maintain their orientation in space. I was "slow" on that since it was known for centuries! Certain applications of gyroscopes in navigation functions rely on this characteristic. So, it dawned on me then that, IF an (imaginary) million-ton, Ferris-wheel-type, gyroscope was built on the North Pole of the Earth, with the really, really good bearings that gyroscopes always have, an interesting possibility existed! Once a motor would be used to start the gyroscope spinning, it would then spin (forever, if the bearings were good enough and there was no air friction). Its spin axis would try to remain fixed in space, with the axis pointing to some specific star. But the Earth's rotation, and ground under the huge gyroscope, would constantly be turning, once a day. If the gyroscope axis was supported so it could stay pointed at a specific star, and the Earth able to slowly rotate beneath it, a TORQUE (or moment) would exist of the Earth trying to rotate the fixed axis of the gyroscope. A gear-train could then be driven by the differential motion of the Earth underneath to power a generator or other equipment. Essentially, the Earth's



rotation would externally drive the gear train, using the gyroscope as a fixed object to push against!

The Earth certainly has kinetic energy of rotation. An unimaginable amount! The Earth is known to have a rotational inertia of $8.070 * 10^{37}$ kg-m². It rotates once a day, so it turns at the rate of $6.2832/86164.09$ radians/sec. The Earth's kinetic energy of rotation is $1/2 * (I)$ the rotational inertia * the square of this rate, or $2.145619327 * 10^{29}$ kg-m²/s² (or newton-meters). A published value is $2.137 * 10^{29}$. That unit of energy is also called Joules. **I would point out here that this amount of "spinning energy" of the Earth is around 60 thousand million times that TOTAL ELECTRIC USAGE of all Americans for an entire year!** And at least a billion times ALL the electricity that has EVER been created and used by humans!

Now say that, **over a period of 1,000 years**, the Earth's rotation somehow SLOWED by 0.0007 SECOND per day. Instead of a day being the current 86164.09 seconds, it would then be 86164.0907 seconds long, an absolutely unnoticeable effect. (Especially if it only occurred so slowly that it took a thousand years!) The kinetic energy calculation above would be the same except we would now

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use 86164.0907 and the Earth's kinetic energy would be $2.145619292 * 10^{29}$ kg-m² / s².

A basic law of Physics is that energy must be conserved. By gradually slowing down by just that fraction of a second, an unnoticeable effect, and one with no consequences whatever, the Earth would have had to have given up the difference in those two energy totals, or $3.6 * 10^{21}$ kg-m²/s², or $3.6 * 10^{21}$ Joules. A Joule is a watt-second. To convert this into kWh, just divide by 3600 seconds/hour and 1000 watts/kW or 3.6 million, and get **$1.0 * 10^{15}$ kWh**.

This is identical to the total electric use of all Americans for one thousand years! So, if we could just figure out how to insignificantly slow the Earth's rotation, to make the length of the day longer by a tiny fraction of a single second, we could have essentially limitless electricity for more a thousand years! Interesting?

This amount of energy is the same as if a large 50-megawatt electric power generating plant operated constantly for $2 * 10^8$ hours, or around 23,000 years! Or the total of the hundreds of such giant electric generating plants which operate continuously now (always



using up conventional power sources such as oil, gas, coal, nuclear or hydroelectric).

See my reason for fascination? If someone could figure out how to SIMPLY tap into this enormous energy of rotation of the Earth, to somehow convert a tiny part of it into electricity, we could totally supply all the electricity needed for all American homes for a thousand years while only making the day 0.0007 second longer. No burning of any coal, oil or natural gas to deplete those supplies or pollute the atmosphere with their waste products and their global warming. There would also be no reason to use nuclear power generation to create electricity, and so there would not be all the environmental hazards there. Countries wouldn't even have political reasons to wage war over sources of petroleum or other energy supply natural resources! All the known supplies of oil, coal and natural gas together will probably be used up in only around 100 years. And then what? IF somebody can figure out how to convert that rotational energy of the Earth, WOW! Even a conservative view makes clear that there are billions of times as much energy present as we could ever hope to discover in all the coal and gas and oil we will ever find.



This concept of simply converting a small portion of the Earth's rotational energy into mechanical energy, seems to have very little possible inefficiency or wastage. It IS true that then converting it into electricity would have some conversion losses, but they are still a lot better than 13% or 21% energy usage!

There is actually another aspect of this that seems even more attractive to me, for several reasons. Here is an example of the current "silly thinking". California has so many people that it is in urgent and even desperate need for electricity. As I understand it, they are funding research in North Dakota, around 1500 miles away, regarding generating electricity with giant windmills. That technology would have some environmental implications of its own, if really extensive use was made (wind patterns and weather patterns would be altered for everywhere east of the wind farms, for example), but that is not the silly part. If you ask ANY knowledgeable Electrical Engineer, he can explain that the "power grid" that we rely on has a problem. Even when those high-tension power lines are operated at around 500,000 volts, they are designed so that roughly 10% of the electric power put in at one end of a 60 mile long stretch, gets lost as resistive heating (by the wires into the surrounding air). So, 60 miles away from ANY



central electric generation station, only about 90% of that electricity is still available. (This is why virtually all such generating stations are pretty close to large cities where the electricity is needed.) So, go another 60 miles, and we lose 10% of that remaining electric power (or 9% of the original, so we have 81% still going. After 180 miles, there is only 72.9% left available.

If you continue with these "transmission line losses", which ALL Electrical Engineers can easily calculate, for a 1500 mile stretch to California, it is easy to see that only around 7% of the electricity created in North Dakota would actually get to California! And worse, the other 93% of it would go to heat up the air, contributing to global warming. A good idea? Who is doing this thinking?

I guess it sounds impressive to politicians and executives of giant corporations! They figure they are seen as "green" by spending money on researching such things! I do not argue that a MODERATE usage of wind power is a good idea, as long as the electricity created was to be used fairly locally. Maybe there should be a "Ministry of Common Sense" to oversee such things?



I admit that California seems to have an impossible situation. They keep needing to use more and more electricity, and they have started building electric power plants that will not be operational for ten years. California also relies very heavily on electricity generated by hydroelectric power plants at Hoover Dam and other dams, and drought has lowered the reservoirs more than a hundred feet below normal. They have spectacular problems. But spending money to research making wind electricity in North Dakota??? Wow!

Back to the issue here! Instead of a million-ton gyroscope at some central electrical generation plant, and then all the transmission losses and atmospheric heating, **the idea seems extremely appealing that SMALL systems might be able to be installed for each house or building.** Talk about "off the power grid!" This would be its own separate electric generation system. The idea of personal independence is a nice side benefit, should this concept be practical!

Now, the example mentioned here, of a million-ton spinning gyroscope at the North Pole, would actually work as indicated. However, the expense of building and maintaining such a ridiculously huge device, and then the



transmission power losses in order to get the power to anywhere where there are people, make it an impractical approach. It would have bearings that were NOT perfect, so there would be frictional losses. The constant 80 mph outer surface speed of the gyroscope would cause air resistance and turbulence and drag. **I now know that a more sophisticated (and more complex) device can be made which is far more effective in making this transformation of energy.** I have known about this for around fifteen years and have investigated dozens of concepts. I have gotten some to work, on a very small scale.

Now, I realize that you do NOT believe any of this! It sounds completely crazy and impossible! However, please realize that I was educated (very well) in Nuclear Physics at the University of Chicago, and I actually know what I am talking about! Let us consider some more-practical-sized devices and do some calculations:

I happen to have a flywheel from an antique air conditioning refrigerator. It's radius is around 0.20 meter (8") and it weighs around 19 kilograms (42 pounds). Let's consider getting it to spin about as fast as a normal appliance motor, 1800 rpm. If we assume that all the mass is at the outer edge, the Rotational Inertia (I) is $m * r^2$ or

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0.80 kg-m². The Angular Momentum is $I * \omega$ or 150 newton-meter-sec.

If the supporting shaft size is 4 cm (about 3/4") in diameter, then the shaft bearing velocity is 1.9 m/s. If standard ball bearings are used, which have a dynamic coefficient of friction of around 0.0015, the standard friction loss calculations show that the power loss due to friction in the bearings is 0.57 watt.

These are pretty good bearings. If the flywheel is spun up to 1800 rpm, it would coast for quite a while before stopping. Another way of looking at it is that IF a really tiny motor was placed on the gyroscope shaft, that provided just 0.57 watt of power, the frictional loss of the bearings would be overcome and the gyroscope would keep running at a constant speed of 1800 rpm. Notice that at this point, we need 0.57 watt of outside power!

Getting back to the gyroscope resisting having its axis changed, we now need that Angular Momentum times the rate of rotation of the Earth. Since the Earth rotates completely in 86,400 seconds (one day), it rotates one radian in around 14,000 seconds. So we just have 150 nt-

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$m \cdot s^2 \cdot 1/14000 \text{ /sec}$, which is around 0.01 nt-m of torque (moment) available. This torque is applied at a very slow rate (1 radian/14000 sec), so we would only have less than one one-millionth watt of power generated. In this case, it is a really tiny amount of power and not nearly enough to overcome the frictional loss in the bearings. Yes, this was an example of what would NOT be useful, to show the general concepts involved!

Gyroscopes work better as their radius is increased. Let's consider a gyroscope of the same weight (19 kg) but ONE HUNDRED TIMES the diameter. This would be a really skinny rod curved into a giant circle with a 20 meter radius (over 120 feet in diameter, but extremely skinny. In fact, it would be much less than 1/4" in diameter if it was a steel rod. Also, let's slow down the rotation of the shaft, to 1/100 of before, so the actual speed of the outer parts is still around 80 mph, so we will use 18 rpm instead of 1800.

$I = 7600 \text{ kg} \cdot m^2$. With the (slow) 18 rpm rotation, the Angular Momentum is 14,600 nt-m-s. When multiplied by the rotation rate of the Earth, we get more than 1 newton-meter of torque (moment) available. This would give about 1/14000 watt (0.00007) (one hundred times the output, with the same weight of material, but just a lot bigger).



Even better, the bearing velocity is only 1/100 as fast because the spin speed is that much slower. The result is that the bearing frictional loss is now only 1/100 of before, or 0.0057 watt.

Now, we're getting closer! If this giant Ferris Wheel type ring is made out of standard 2" diameter steel rod (ten times the previous diameter), (with a thicker supporting shaft and bigger bearings), the ring mass would be about 100 times as great 1900 kg (4200 pounds). These calculations show that it would then produce a continuous 0.007 watts of output power, with now about a watt wasted by bearing losses.

These calculations show that some power can be created but that it is difficult to overcome bearing friction. There are also two more complications that need to be considered. First, there would also be air resistance friction, and so the entire gyroscope would need to be enclosed inside a sealed chamber and the air removed so there was a good vacuum inside. Second, one must remember that the Earth rotates and causes the apparent axis of the gyroscope to change. So it would not remain standing up like a Ferris



Wheel, but would need to (very slowly) rotate (the entire gyroscope) opposite the direction of the Earth's rotation. Astronomers say that it must revolve (precess) around a "polar axis" where the gyroscope would appear to completely tumble over once each day. So the room surrounding it would have to be REALLY big!

These comments and calculations above are to show that this concept certainly works, and that we have available an unbelievably huge source of power, which has NO pollution or global warming or any of the other bad side effects of current energy production approaches.

Absolutely no one seems to even be aware of this theoretical resource! A much more complex practical (mechanical) mechanism can be made. I believe that an enhanced version of my experimental "toys" can be made such that the entire device would fit into a normal room, and without the vacuum needs! It is not inordinately complex.

In my opinion, the idea of a truly huge spinning gyroscope to try to produce a few watts worth of power is impractical. But I believe that a "more sophisticated" mechanism of

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maybe eight or ten foot diameter, maybe in a basement, might be able to constantly produce 10 kW of electricity for that house.

This subject continues to fascinate me!



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