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Via Federal Express Overnight

December 2, 2015

Mr. Mark Zuckerberg
Dr. Priscilla Chan Zuckerberg
1456 Edgewood Dr.
Palo Alto, CA 94301

Ref: Energy & the future of mankind

This letter is digitally stored on the enclosed USB RAM drive in MS Word & PDF with all active links to our 100% clean and virus free websites[1].

Dear Mr. Zuckerberg & Dr. Chan Zuckerberg:

Congratulations on the birth of your daughter, Max. May she bring you much happiness and joy and grow up in your image. And may she be a part of your future plans articulated in your open letter published by Facebook.

We[2] are contacting you to discuss an urgent issue and to seek your help. The most important issue confronting mankind today is energy. Yet few people talk about it seriously. Gasoline prices are down and the supply is plentiful. Electricity in America is still relatively cheap and abundant. Energy is an issue which drops off the pollsters charts in our current election cycle. Thus, politicians pay little more than sound bite lip service to it.

In your letter to Max you acknowledge that large amounts of "clean energy" are required in the future. Furthermore, in several instances you mention technology. However we must move beyond "technology" to the advancement of basic science in order to solve energy for a worldwide population approaching 9 billion people by mid-century.

Today's technologies of renewable energy sources are unable to provide for our future. Take solar as an example. In order to produce the current U.S. electrical generation capacity of roughly 440 GW on a 24 hour, 365 day per year basis using photo voltaics and the associated electronics and battery storage, 29.3 billion square meters of active solid-state photo voltaic cell surface area are required. Produced, installed, and connected at the rate of one square meter per second would require over 900 years to deploy. If we were to expand the generation capacity to electrify our ground transportation system, over 175 billion square meters of active surface area would be required and over 5,570 years to deploy. Solar cells have a life expectancy of 30 years and batteries around 10 years. Our detailed analysis based on the physics and sciences provide the details. To be clear the limiting factor is not the physics and efficiencies of the PV solar cells themselves but rather the "dilute" nature of the sun's radiated power over the surface of the Earth as the above analysis teaches.

Wind is no better and even more intermittent and remote. Storage issues are as problematic with wind as solar.

And very few "renewable energy technologists" are willing to subject their proposed solutions to the full scrutiny of an EREI (energy return on energy invested) analysis. It must be stressed that solar and wind generating schemes are unsustainable once fossil fuels and nuclear are no longer in the energy mix. Why? You can never generate enough power from these devices to build more of them as well as provide power to consumers. This is a simple argument to prove based on physics and math yet you will see little mention of it in today's energy discussions.

As can be seen we have a major problem looming ahead. The media savvy "technologists" are exacerbating the problem by not addressing the science thereby creating a false sense of security suggesting "renewable solutions" are at hand.

Moreover, the environmental community is confusing the issues by emphasizing "anthropogenic climate change" while at the same time not explaining how much energy is used on a per capita basis. There is a clamor to "solve energy" beyond fossil fuels but no discussion of what this means empirically. Fear mongering is generated out of concern for the environment but the BIG problem of how to provide energy for 9 billion people is all but overlooked in the media. We took the initiative and wrote a letter discussing this to Pope Francis after his recent call for further environmental stewardship and raising the poor out of poverty.

As a matter of basic science there are only four ways to produce what the utility industry refers to as "baseload power."

1. The combustion of hydrocarbon fuels to produce heat and drive electromagnetic generators for electricity or mechanical energy through heat engines for the transportation industry.

2. Nuclear fission to produce heat and drive electromagnetic generators for electricity.

3. Atomic fusion to produce heat as well as electrons in the future to produce electricity along with synthetic liquid and gaseous fuels for transportation.

4. Matter anti-matter annihilation reaction to convert matter to energy at virtually 100% efficiency.

We elaborate on these in our article "Energy Basics; where does energy on our planet come from?"

Today over 90% of all energy across all energy sectors is produced from fossil fuels. That cannot continue. No, climate change is not the reason. The reason is that fossil fuels are finite. Regardless of climate change, fossil fuel use will decline because the supply is finite and is being used up.

As your letter to Max correctly notes, the internet and instant worldwide communications raises the expectations of all people in the world to aspire to a living standard similar to that of Americans and people in other wealthy nations. To do that requires an 8 fold worldwide increase of energy production. That corresponds to a depletion of finite fossil fuels 8 times

faster than that currently projected. Two hundred years of economically viable reserves becomes 25 years. We lay this out in our article, "2060 and Lights Out."

Energy forecasters conveniently overlook the close to 1.5 billion people in the world that don't have electricity and the 2 billion who have never used motorized transportation and they overlook the huge differences in per capita energy availability in industrialized nations versus those in undeveloped nations.

Nuclear fission is a practical, viable solution to baseload energy today. Advances in reactor design and fuel cycles address most of the safety and even fissile fuel proliferation concerns. Fission is cost effective and its installed base could easily be increased by an order of magnitude worldwide which would be the breakeven point to replace fossil fuels used to produce electricity…but not transportation….and not with the 8 fold increase needed to equalize the per capita energy availability for all people in the world. The principal downside of fission is the long term actinide decay chain of radioactive waste products. This simply becomes unmanageable absent a solution to transmutate the long term radioactive waste into non-radioactive elements.

Peter Thiel has recently called for significant expansions in nuclear fission power in the U.S. in his New York Times Opinion Piece.

Bill Gates has also correctly pointed out that solar, wind, hydro and the like, are not viable baseload energy producers and has called for investment in modern safe nuclear fission (see June 26, 2015, see June 29, 2015, see November 2015 interview with The Atlantic) and his company TerraPower is poised to provide solutions.

The science of nuclear fission is well understood and as such this is an engineering and application issue. Technological innovation, regulatory, and public acceptance is all that is required.

However nuclear fission does not address transportation except to the extent additional electricity is used for the partial electrification of the transportation system. It offers no benefit to the aviation industry.

Item number 4 of the four ways to produce energy, matter anti-matter reactions, is purely theoretical. If man could achieve this on Earth, it would indeed be the "Holy Grail" of energy solutions providing the 10^{16} conversion of mass to energy resultant from the formula $E=MC^2$ in scientific units. But the science required to understand how to do this is hundreds of years away…if ever.

This brings us back to energy method number 3. Atomic fusion. Fusion is attractive because its fuel cycle is based on common light element isotopes available in the ocean and on land. By all measures we have sufficient fuel cycle components to serve man for millions of years. In its fully developed aneutronic form, it produces zero radioactive waste and zero pollutants. And in the future the heat to steam to electromagnetic turbine cycle will be replaced through the direct production of electrons comprising electricity. Indeed fusion is the only realistic solution as our article explains. Our fusion energy elevator pitch sums it up in one short paragraph.

As several of our articles and papers explain…most notably "Who Killed Fusion?"…fusion should have been developed in the United States and on line by 2005 as a mandate from the Magnetic Fusion Energy Engineering Act signed by President Carter in 1980. However the Act was never properly funded and by 1985 the American fusion energy development program was shut down by President Reagan at the request of the Soviet Union Secretary General Mikhail Gorbachev.

The myth that fusion science and development has been funded with billions and billions of American tax payer dollars is simply not accurate. It has been mismanaged and chronically underfunded by the government. That is why fusion is always 30 years away and always will be. Fusion energy is too important to fail and too big to hoard and our paper explains why this has gone so wrong. More importantly this same paper concludes with a plan to get fusion science and development corrected and properly funded without government intervention.

Today the United States government has virtually zeroed out all fusion project funding for projects in the civilian sector in America except those constituting "work in kind" for our 9% ITER contractual obligation.

It is imperative that we begin this endeavor now. We are a decade away from major scientific experimental studies and discoveries which will produce demonstrable results in terms of things like net positive energy gain and a "sustained plasma burn." This will be followed by at least another decade of applied engineering and materials development leading to a commercial reactor suited for day in and day out long term operation by utility companies and energy producers. Furthermore we must consider the regulatory analysis and approval cycle as well as further innovation to produce cost effective designs. This easily takes us to 2050 which is beyond the point that petroleum fuels will be in significant declining supply and costs will rise enormously as explained by Dr. Tom Murphy in his Energy Trap essay and by Dr. Robert Hirsch, past program manager of fusion projects for ERDA, the predecessor to the DOE and expert on declining oil supplies.

The problem is this. Much basic experimental science has to be done in order to fully understand the fusion and plasma phenomena at the fundamental scientific level. This is required before any fusion approach can be demonstrated let alone technology developed to make use of it.

The U.S. Department of Energy considers fusion to be an interesting area of theoretical science and a hypothetical source of energy in the future. However, because the DOE is essentially a regulatory body, it has no interest in funding fusion science and research. As noted above it has limited fusion science funding to ITER related projects at various U.S. national labs and universities.

There has been no interest in the energy industry to invest in the science necessary to master fusion. Whereas energy companies such as Gulf General Atomics (now General Atomics) and Phillips Petroleum had robust fusion science programs in the 1970s; those programs have been abandoned as the result of corporate takeovers and mergers with new emphasis placed on short term financial results, price earnings ratios, and cutting expenses to the minimum.

As we point out in our "Fusion Energy; Too Important to Fail – Too Big to Hoard" article, much media attention has recently been given to a few privately held "fusion companies," notably, Helion Energy, Tri Alpha Energy, in the U.S., General Fusion in Canada and a lesser known start-up in the U.K named Tokamak Energy. Three of these companies were highlighted in a December 2, 2015 Time Magazine cover story. However none of these companies are remotely near achieving fusion breakeven in the scientific sense let alone the lowest technological readiness level.

We have asked a well-known, highly regarded fusion researcher, [redacted] National Laboratory, to review the science and technical issues associated with each of these four company's approaches. An objective commercially unbiased review of published articles describing their work suggests that in all probability none of these companies will achieve their goals before running out of money and investor patience.

Should this occur fusion will effectively receive its "death sentence" in terms of academic, public, media, and funders interest and the "fusion never" syndrome will be perpetuated.

Freeman Dyson recently stated in a widely published interview that the U.S. "no longer does real science but rather focuses on real big engineering projects"…such as ITER. By most measures the U.S. gave up its lead in the hard sciences (excluding medical research) in the 1990s at the time the Superconductor Collider Center in Austin, Texas was de-funded a year after ground breaking and a billion dollars invested in construction and hardware. The Swiss took it over at CERN as the Hadron Collider Center described in a recent CBS "60 Minutes" story.

How We Will Get Fusion Science & Research Back on Track:

Your letter to Max correctly states the power people have when they have access to information and the power Facebook and social media have in influencing attitudes and motivations. Coupled with freedom, people will make prudent choices when they are educated with the facts. Although it was not stated in the letter to Max, freedom is the basic requirement for people to reach their highest level of human achievement once basic needs are provided for. Hence our principal website is called Fusion 4 Freedom.

Our plan is to bring this energy information and basic science to all Americans through a series of exciting, action packed video games. The games will quietly teach people science as the games are played. Over time the public will become aware of the energy trap and the fact that the solutions offered by politicians, and environmentalists will not power the world and provide the basic sustenance for the next generation. Imagine "games that matter."

We have laid this out on our EnergyCite® website at http://www.energycite.com We will not force people to understand and accept fusion energy early on. Rather the games will frame the energy problem and allow for a multitude of solutions. Knowledge is developed in the process of gaming which ultimately allows people to realize the situation and make correct choices. At the same time, this is revenue producing business entity from which we will invest most of its earnings into an energy consortium.

Our video game elevator pitch describing the mission, need, and plan is a straightforward statement of what we will do, why we will do it, and how. A simplified 6 bullet point plan describes the essence of how we will execute on this.

Our revenue model for the games is based on the Candy Crush Saga which has generated over $300 million in revenue quarterly and resulted in a $5.9 billion acquisition for the firm's maker.

Mover, Tom Tamarkin is the "inventor" of the electric utility smart meter and holds key patents which must be practiced by the utility industry. In order to avoid legal patent infringement, the utilities using the smart meters will be brought into the consortium which will generate additional recurring revenues for the life of the patents based on their coverage of the integration of the smart meters into the utility company's billing and cash collection systems.

Once this plan is fully operational we will generate significant annual revenues which will be invested into the consortium to fund fusion science and private companies engaged in fusion research with plans of commercialization over time. This is laid out in the concluding section of the "Fusion Energy; Too Important to Fail-Too Big to Hoard" article in the 14 numbered points.

Our mission is to turn the fusion energy quest through the consortium into the "Apollo moon shot program of the 21st Century." Through social media and our interactive websites we will bring this into virtually home in America and the world over.

We believe passionately in Dr. Steve Cowley's often stated quote that fusion energy is energy based on knowledge. As Dr. Cowley says: "we have to make it work."

The theme of energy based on knowledge will be leveraged into a worldwide peace movement. We understand that people the world over will respond positively to truth based on science. Nothing will have a bigger impact on creating peace in the Middle East. We have embodied this theme in our "Proclamation to the World From the American People" which we have published in English, Hebrew, Arabic, Russian, and Spanish. Farsi and Chinese are in progress.

What we need now and how you can help:

We plan to fund the PowerMasters™ video game development through an exceptionally well produced and managed Kickstarter program. There is an established record of funding exceptional games on Kickstarter and our goal is to exceed $5 million in funding. We will also reach out to high net worth individuals with philanthropic interests and concerns in energy and the environment to match the KS raise.

Today we are in need of $300,000 to properly build the Kickstarter campaign and launch it over the next 6 to 8 months. The early seed capital raise is structured as a securitized loan with full high yield repayment based on the private placement offering memorandum published on the EnergyCite® website.

Please note that we have brought this most important issue up to Tim Cook of Apple, Bill & Melinda Gates, Larry Page & Sergey Brin at Google, Elon Musk, Peter Thiel (investor in Helion Energy,) Harry Hamlin (early investor in Tri Alpha Energy,) Jeff Bezos (investor in General

Fusion,) and Paul Allen (investor in Tri Alpha Energy.) Relevant correspondence and presentations are on our website.

We ask that you consider advancing us the $300 K so that we can launch this project ASAP. We can conference anytime by telephone and Tom Tamarkin resides in Sacramento and can drive to Palo Alto to meet with you to discuss details privately and in confidence.

Please give this matter your utmost consideration and respond to our request soon.

Thank you.

Sincerely,

Tom Tamarkin

tt@usclcorp.com

Pat Boone

Boonesbiz@aol.com

[1.] A copy of this letter with active links is included herewith on the USB drive.

Please note the domains and websites for energycite.us, fusion4freedom.com, fuelRfuture.com and USCL are owned by us and we vouch for their safety and security. All links above are to sections of our site with the exception of the Facebook link to the open letter to Max, the Department of Energy Office of Fusion, and iter.org which is the public site for ITER in the EU.

[2.] Tom Tamarkin is the leading worldwide authority on the history of fusion energy development. For the last 10 years he has researched the fusion science and program history and written extensively about it. He has traveled around the world multiple times visiting all the known research facilities and interviewing scientists and managers in the fusion and plasma science community. He is the founder and manager of http://www.fusion4freedom.us which has become the world's preeminent fusion energy website with fusion & energy news updated daily, videos, expansive science sections, academic journal papers, and fusion commentary.

Pat Boone is a Hollywood icon in the music and entertainment field. Pat and Tom have been working together on fusion advocacy issues since April 2011 and have co-authored a series of 8 articles on fusion meant for the public at large. Pat and Tom are the initial founders of EnergyCite LTD along with early investor Don London.