CALL FOR INNOVATORS TO JOIN AN ENERGY SOLUTION REVOLUTION

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Brian O'Leary, Ph.D. is a scientist-philosopher with fifty years of experience in academic research, teaching and government service in frontier science and energy policy. He was a NASA scientist-astronaut during the Apollo program, the first to be selected for a planned Mars mission, and he participated in unmanned planetary missions as an Ivy League professor. Over the past four decades, Brian has been an international author, speaker, peace activist, founder of non-profits, and advisor to progressive U.S. Congress members and presidential candidates. His latest book, The Energy Solution Revolution, describes the enormous potential of breakthrough clean energy technologies, their suppression and their logical necessity for our survival. In 2004, Brian and his wife, the artist Meredith Miller, moved to the Andes in Ecuador, where they co-created Montesueños - an eco-retreat and educational center dedicated to creativity and the rights of nature.

"The resistance to a new idea increases as the square of its importance." - Bertrand Russell
"Any sufficiently advanced technology is indistinguishable from magic." - Sir Arthur C. Clarke

The world is at an energy crossroads. The alarming new information coming out of the climate science community confirms the unprecedented danger faced by all of humanity and nature by mankind's routine burning of hydrocarbons - oil, coal and natural gas. The resulting emissions of carbon dioxide and carcinogens into the Earth's atmosphere spell almost certain doom not only for the environment, but for human systems of government and commerce as we know them. Human survivability itself is in question, especially against the backdrop of vast deforestation, marine habitat destruction, accelerating species extinctions, and the threat from weapons of mass destruction on Earth, and, perhaps soon, in space.

Nature is fighting back with heat waves, super storms, rising oceans, desertification, species and disease vector migrations, acidification of the oceans and weakening of the Gulf Stream, in response to warming caused by injection of record amounts of carbon dioxide, methane and other greenhouse gases into the atmosphere. Despite this, and in the face of dwindling supplies of hydrocarbons, humans still consume as if there were no tomorrow. Even modest international agreements such as the Kyoto Protocols are ignored by the most polluting nations, especially the United States government, which seems to be more interested in going to war for oil than transforming its energy infrastructure to cleaner sources.

This multi-trillion dollar hydrocarbon juggernaut, including going to war for oil, is the largest economic engine ever made in human history. We see record profits for the petroleum and war industries while peaceful and sustainable innovation is stifled and largely ignored by established scientists, leadership and media. Yet innovation in our energy systems may be the single most important factor for our survival.

Significant solutions using conventional technology have proven to be elusive, prompting some scientists and environmentalists such as James Lovelock, Stewart Brand, John Holdren, Nathan Lewis, Richard Heinberg and myself to conclude that even the traditional renewables such as solar, wind, biofuels and hydrogen are not adequate to replace hydrocarbon combustion. Solar, wind, waves, tides, ocean-thermal, geothermal, hydropower and satellite solar power can suffer from intermittency, site unsuitability, diffuseness, limited availability and materials-, capital- and land-intensity. Biofuels such as ethanol and biodiesel compete with agriculture for land and still inject significant carbon dioxide into the atmosphere. Hydrogen is expensive to produce. It most often requires more energy to extract hydrogen than you get out of it, making this fuel an energy carrier but not an energy source. Typical methods of production (reformation of methane and electrolysis of water) still consume fossil fuels, emit carbon dioxide and can deplete atmospheric oxygen.

These fundamental physical limitations have led James Lovelock, Stewart Brand and others to reluctantly conclude that we should construct centralized nuclear power stations throughout the globe to produce electricity through aging and unsightly grids in an electric economy. But because of limited supplies of uranium, high costs, hazardous fuel cycles and nuclear proliferation concerns, many

of us in the scientific community (e.g., Union of Concerned Scientists, Bulletin of the Atomic Scientists, Federation of American Scientists) believe this is a very poor choice for our future. First, the questionable safety of nuclear power plants, especially in the age of terrorism, presents grave dangers to us all. The Chernobyl accident of 1987 should provide us ample warning. Moreover, no safe long-term method has yet been found for disposing of high-level, long-lived radioactive waste - an inevitable byproduct of the nuclear fuel cycle. Finally, the proliferation of the technology throughout the world, would inevitably lead to acquisition of doomsday nuclear weapons by numerous irresponsible parties.

The prospects for "hot" nuclear fusion are equally dim. In spite of tens of billions of dollars over decades being spent on trying to achieve energy "breakeven" using gigantic Tokomak reactors, the results have thus far been negative. Moreover, nuclear fusion plants would constitute oversized, vulnerable facilities necessitating the continued use of ugly, antiquated centralized grid systems.

When full life-cycle environmental costs are considered, none of the above technologies appear to meet the criteria of sustainability - absent a breakthrough. By choosing any or some of them, we could only hope for incremental changes in our energy supply in the face of accelerating global demand. More importantly, these alternatives do not address the urgency for clean energy needed to mitigate global pollution and climate change.

On the other hand, many new energy technologies have already been proven in hundreds of demonstrations in laboratories scattered throughout the world. Any one or some of these approaches, if properly developed, could end our dangerous dependence on hydrocarbons and uranium. Clearly the traditional technologies keep us mired in the nineteenth and twentieth centuries rather than launching us forward into the twenty-first century. Nevertheless, this conventional thinking continues to dominate the news these days. Despite the great need, suppression of new energy has been historically documented in great detail by those who have taken the time to investigate. Inventors have suffered funding cuts, threats, sabotage and even assassination ever since the time of Nicola Tesla more than one century ago.

We define "new energy" to generally mean innovative technologies with the potential of providing a quantum leap in our ability to tap cheap, clean, safe and decentralized energy for producing fuels and electricity. These may or may not be recognized by mainstream science. The technologies include:

Advanced hydrogen and water technologies

1) catalytic water molecule manipulation and dissociation through cheap electrolysis; and
2) manipulation of hydrogen plasmas with catalysts to induce fractional quantum electronic states that yield large energy outputs;

Cold fusion or non-radioactive low-temperature nuclear reactions by electrochemical means, induced in water and heavy water solutions catalyzed by:

1) palladium cathodes;
2) sonocavitation; and
3) other processes that can produce large amounts of thermal, radiation-free nuclear energy;

Vacuum energy or zero-point energy, tapping the enormous quantum potential of every point in space-time, through the use of:

1) super-motors with super-magnets (cf., the experiments of Michael Faraday in the 1830s);
2) solid state devices;
3) Tesla coils;
4) charge clusters;

Thermal energy from the environment.

Any one of the above approaches to new energy promises a quantum leap, i.e., orders of magnitude increase, in our ability to tap and have abundant clean, cheap, decentralized energy for all of humanity. In addition, there are many important transitional technologies which can mitigate emissions in the very near future, as follows:

Recyling and sequestration of co2 and other pollutants at the source through innovative chemistry; and

Remediation of radioactive nuclear waste with innovative technologies, based on the principles of low temperature non-radioactive nuclear transmutations.

All of the above concepts have already been demonstrated in laboratories throughout the world (I have seen many such demonstrations) and have been published in the peer-reviewed literature. But implementing them has proven difficult because there is no significant support. This lack of support for outside-the-box thinking is familiar to those of us who know the history of innovation. That is to say,

there is generally a bias against the credibility of a new technology until it is accepted by the mainstream culture. The most strident objectors are often scientists themselves because some of their treasured "laws" appear to be broken by breakthrough experiments that often lead to profound technological change. And, as Russell stated in the quote at the beginning of this essay, the bigger the change the bigger still is the resistance, by a large margin. In spite of these severe limitations, I propose here that the transformation of our energy culture to one based on new energy is necessary for our survival, and that we should embark on a research and development program as soon as possible.

History is replete with examples of disbelief of new technologies when they first emerge. One example is aviation during its early days, when Scientific American published an editorial asserting that the Wright brothers were a fraud because their flights "weren't reported," even though thousands of people witnessed their first flights. During those times, we had been embroiled in a vicious cycle of media and scientific blackouts of reality.

Unfortunately, the leading innovative nation, the United States, is living in fear since this century opened, with the suppression of innovation that might be perceived to threaten vested interests - particularly in energy innovation The nation appears to be too distracted by wars, repression, and the dominance by large corporations who don't embrace technological change outside of their own interests. The public awareness of the gravity of the global environmental crisis and the innovative spirit of America has gone underground, awaiting the opportunity to be sanctioned by the larger culture.

There is much discussion now about how the warnings we hear from leading atmospheric scientists continue to be ignored and scoffed at by those in power. In a refreshing counterpoint to politics-as-usual, former U.S. vice president Al Gore said that our children "deserve better than the spectacle of censorship of the best scientific evidence about the truth of our situation and harassment of honest scientists who are trying to warn us about the looming catastrophe." Yet there exists a second group of scientists involved in new energy research that has been suppressed even more. These truly unsung heroes of innovation will eventually take their place in our quest for solutions. New energy would shift the paradigm overnight. We will therefore need public policies in place to:

1) Do the necessary R&D Apollo-style in secured laboratories, gathering teams of the best and brightest scientists and engineers in the field. But first we should support a wide variety of inventors and technologies throughout the world. Surprisingly, this seed effort would only be on the order of $1 billion for the first few years, equivalent to a few days to weeks of fighting in Iraq or profits for ExxonMobil. Funds could come from public and/or private sources. At the moment, the new energy researchers receive no public support and only scattered private support. This is because of the fear element and that we are still on the toe of the profit curve and therefore in great need of public and/or angel funding. The seed money can come in the form of small business grants and loans to the 100-200 most promising researchers until they can attract capital or open source their technologies. As the technologies mature, we can expect the actual amount of investment and return to end up being significantly greater, depending on a number of factors other than the true R&D costs. The goal is to produce prototypes for the marketplace as soon as possible. Whatever management model emerges, we must leave no stone unturned in this quest because of the urgency of the global crisis. Fortunately, the range of technologies is already broad and far-reaching. The research effort should be international in scope and be immune to the political vicissitudes and corruptions of leadership and corporate dominance in the United States and elsewhere. Therefore, the research may need to be done discreetly at first under responsible and publicly accountable auspices. A governing body such as the United Nations should oversee the research, as no important resource like energy or water or food production or forest protection should be privatized.
2) Provide public forums to debate and discuss how to implement the most viable new energy options to reverse climate change and pollution; and provide education and demonstrations for the world community. We need to plan conversion scenarios that can help industries and governments make the necessary transition to a new energy economy, free of corruption and monopoly. We need to assess the full life-cycle environmental impact of each alternative and its safety on a level playing field. We don't want to repeat the mistakes of touting its benefits without properly assessing its dangers and hidden costs (as in the case of nuclear power).

While being politically incorrect at the moment, the consideration of new energy needs to be at the forefront of future energy policy discussions. It is too late to deny this, and we certainly don't want the control of these technologies to fall into the wrong hands by default. In former U.S. president Dwight Eisenhower's words, "Only an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals so that security and liberty may prosper together." New energy needs to be controlled by the citizens of the world under regulation and not be weaponized or over-used. In my opinion, a strong grassroots movement will become vitally important.

I cannot stress too strongly that an aggressive program to develop new energy is what humanity requires to survive this perilous situation. It may be painful for us to address these issues and may seem a bit far-fetched at first, but I can assure the interested reader that these technologies are very real and can be developed as public policy. Clearly, the scientific evidence plus the precautionary principle command us to leave no stone unturned in our quest for clean energy. The goal of zero carbon emissions stated in 2010 by entrepreneur Bill Gates would seem to have only one solution: the adoption of widespread new "over-unity" energy. That these concepts would seem to violate the "laws" of thermodynamics, is no matter, because we know now that the science we're dealing with is much broader than that for systems in thermal equilibrium.

We shouldn't rely exclusively on those mainstream scientists, journalists and pundits who deny the reality of new energy. Some of these skeptics do not seem to understand that we are in the research phase of an R&D cycle, and we cannot expect yet to have the kind of commercial prototype demonstration they desire in order to be convinced. They are just as ignorant as those scientists who denied the practicality of aviation even after the Wright brothers were flying. But to expect the Wrights to immediately deliver a finished product would have been unrealistic - or insane.

But, for the sake of argument, let us grant for a moment the remote possibility that the skeptics are right and that no new energy source were to prove to be practical for one reason or another. Would doing the research have proven to be a waste of time and money? Of course not. The path of discovery always comes up with unexpected surprises, and I would opt for such a modest effort, compared to the costs of war and polluting energy, when our survival is at stake. It is time to put altruism and creativity ahead of near-term profit.

Meanwhile, because of the urgency of the problem, I would encourage innovators throughout the world to move ahead to organize themselves to team up, obtain the necessary resources and perform research and development of new energy - in spite of cultural pressures to act otherwise. All of us should become educated about the possibilities and collectively support these pioneers of innovation, because we need all the help we can get to convert civilization from a catastrophic energy age to a new energy age.