

## Running on Empty While the Tank is Really Full

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March 26, 2006

Next month we mark the 20<sup>th</sup> anniversary of the Chernobyl nuclear power plant disaster. The price of a gallon of gas in the Richmond area is currently at about \$2.50 minimum, and we have seen them more than double from twenty years ago.<sup>1</sup> Carbon dioxide levels are rising faster than previously estimated, about double what it had been for the past 400,000 years.<sup>2</sup> More than 70% of poll respondents worldwide are acknowledging the direct causal link to this very threatening problem from human sources.<sup>3</sup> With the ice caps melting at increasing and unprecedented rates,<sup>4</sup> we are seeing already the consequences in the increase of intensity and frequency of hurricane-force storms. And further, Iran is voicing commitment to a nuclear power program including fuel enrichment. Even if the Iranian government were to suddenly and consistently refrain from any military nuclear weapons development – something that most of the world including Russia and China believe to be inconsistent with Tehran's actions – the threat for additional Chernobyls and the risk of global nuclear fallout are more probable in fact than during the Cold War's peak.

Back then in the late 50's and especially in 1962, fingers were nervously tapping near the red buttons but decisions of global life-or-death were in the hands and minds of sane-enough and very powerful people who did not want to see their two nations annihilated. There was no perceptible shortage of oil or gas, at least none recognized or discussed openly in the popular press and in everyday conversations. There was no evident or clear rising of the seas nor any probable stoppage to the Gulf Stream. Not many people were thinking about threats of climatic changes with apocalyptic consequences. Also with significance, no one was proclaiming the holiness and spiritual rewards of killing millions of Americans and annihilating Israel from the map, even at the cost of sacrificing their country and people. We have seen such calls for jihad only increase since the 1990s and there is a direct relationship between energy, the environment, and terror.

Even without the hand of religion-fueled terrorism, the consequences of global warming, CO<sub>2</sub> increase, loss of polar and glacial ice masses, and a cascade of related effects will bring about more hurricanes and tornadoes. Considering only that fact, as an isolated but very tangible consequence that everyone can appreciate easily, we have a problem on our hands that is going to cost more in lives, property, economy and peace of mind than most people can imagine. Yes, it will inflame terrorism and social chaos of the sort we witnessed in New Orleans at the Superdome. But it is avoidable and reversible if we act now and stop putting our hands over our eyes and ears. The water is rising, its coming into the house, and it is past the time for just talking about doing something drastic.

All of these threaded events are tightly woven and knotted together. Inseparably. As conventional sources such as fossil fuels become more scarce and more expensive, the competition and the threats of misuse and abuse are increasing. Witness the problems faced and risked by the European Union countries in the recent gas transport crisis involving Russia and Ukraine. As consumption increases due to population growth and demands, centralized production and distribution systems by definition pose problems because of the need for more infrastructure, more vulnerability to both natural and intentional disruption. The divide between

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haves and have-nots increases, the strife and tension increases, and we come no closer to attaining stability among nations.

Today, in 2006, no one can deny or ignore that the situation demands a concerted answer, an effort unprecedented in the history of our nation and the world. The Problem of Energy demands the level of patriotism and sacrifice made by people in defense of liberty against the holocaust-inferno of Hitler's and Tojo's totalitarianism. The Problem of Energy is the fundamental threat against political and spiritual freedom, individual civil rights, and homeland security. And this Problem of Energy has a very real solution, sitting in our lap almost, if we had but the eyes to see it and the free hands to pick it up and open the wrapper.

We are running on empty as a nation and as a planet. Oil and gas and coal are the transition elements, the bridge fuel, necessary for the beginning of an industrial revolution and an age of mechanization and automation, but if we keep on burning the equivalent of scrap papers and birch bark and don't go out, metaphorically speaking, to cut some solid white oak and ash, we are going to be freezing in the dark very soon.

The Problem of Energy is not just about BTUs and kilowatts. It is the source and the solution for reducing the ignorance and lack of control that is simultaneously pushing the population far past the six billion mark and cutting back the global oxygen-generating factory of our tropical forests. This problem is also one of the dominant fires at the heart of terrorism as conflict over resources and dependence on foreign oil both fuel the sharia invectives and polemics of those who want a purging jihad against the West.

Furthermore, as environmental shifts raise the seas, dry the plains, and create both tropical and winter upheavals, there are changes both predictable and unforeseeable in the types of biological threats we face, from insect swarms to bacteria and viruses. When we change the planet the way we have been doing with consumption and pollution, we cannot predict the details of what will prevail in micro-organisms and ecosystems, but we do know that we as humans live on a comparatively very thin edge of survivability, in spite of our grand cities and technologies.

It does not take much to upset the whole apple cart, and we have New Orleans 2006 and the Maya world of the 15<sup>th</sup> century as two examples for reflection.

Amazingly, as we run on empty perilously close to the edge, we do in fact have a very full and refillable "tank" and it is closer to our reach than many can imagine. We have just been not seeing what are the steps we need to take and how achievable it is in a way that, despite some sacrifices and shifts of thinking, is actually very profitable and in a concrete economical sense as well.

"Ecosymbiotics" is a term that describes succinctly the blending of economics and ecosystems in a manner such that corporate profit is not sacrificed but in fact increased in the process of building a supportive and sustaining energy system. We can begin this in our nation and within the world community, but we have to start among our own leaders and representatives, not simply waiting but actually doing. We have the technology and the know-how to do something bigger and faster and more lasting than what was heralded by the first industrial revolution and the age of coal, oil and gas.

The time to start is yesterday, but today will do. Tomorrow is too late.

What is in this "full tank" we apparently have but do not recognize?

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Biomass and biofuels. Achievable in quantities to make a lasting difference in America and the rest of the world – today. This is not something that changes our lifestyle radically. This is not about driving only 100 miles at top speeds of 40mph. This is about having normal and usual means of transportation and simply having a variety of clean fuels to use.

Solar power, but cheaper and easier than ever before. Imagine plastic sheets that are used as part of or on top of the roofs of nearly every home and commercial building. Power generation at a rate lower than that achievable today from fossil or fission fuels. This is attainable and economical Today, and we are looking at solutions that can be widespread within less than five years, available to ordinary homeowners and apartment dwellers – profitable solutions for producers, retailers and customers. We just need to have advocacy and leadership from those who are at the helm of our ships of state, especially here in the United States, and sadly this has been lacking through the present.

Nuclear fusion – distant and questionable to some, but worth every dollar and euro spent on the research, the total cost being a fraction of the budgets for any typical weapon system. We are closer than ever before to having this technology and the challenge is not about safety or environmental cleanliness but about engineering and economy.

Safe nuclear fission – not a permanent solution either, since it is non-renewable, but safer than it has ever been, for new systems and designs. Yes, many of the existing plants need to be disassembled and decontaminated. But this is a reasonable pontoon bridge to use, too, and one in which America leads with respect to clean, safe engineering.

Hydroelectric generation – this is clean, safe, and today can be expanded economically in manners that do not require massive dams and massive disruption to environments and communities by creating vast lakes and reservoirs. However, we do not to address the fact that while some sacrifices of landscape and geography may be objectionable, the continued dependence upon fossil fuels especially is far more objectionable and downright dangerous. We have three major sources of new, clean, renewable hydro power at our disposal, and we need to plan intelligently about these. First there are additional natural locations which does mean some environmental sacrifice. Even more available are locations where mini-plants and micro-generators can take advantage of natural or modified water flow without disruption to the ecosystem including wildlife and human life. These are more economical now than before but have not been properly examined as alternatives to building large facilities. Third, we have opportunities and needs to develop more reservoir resources that will require more earthworks, more engineering, and are in areas that have flood threats and do not disturb pristine natural and wild environments. I am speaking of regions that are often hit by major rains and flooding, within the USA and abroad. The engineering tasks are not insignificant because they require moving a lot of earth, but we can use the new lakes and this will be of value for drinking water, irrigation, fish farming, and even recreation.

Wind power, tidal power, geo-thermal power – all these achievable today on the large scale, all capable of producing enough power to make a Difference. Wind power is now in many localities providing a cheaper source of electricity than fossil fuel or nuclear generation. Wind generation technology has improved by orders of magnitude since the earliest commercial systems were being introduced in the 1970's and 80's. The Midwestern states could be exporting electricity from wind in reliable quantities for the regular demands of most of the continental USA even with a growth in consumption from electric automobiles. Geothermal power has in the past been comparatively scarce and small, but here also a convergence of technological improvements –

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subsurface sensing, drilling, and materials especially – provides the potential that sources like those explored by the Iceland Deep Drilling Project could generate in time not 5MW but 50MW.

Space-based systems also merit attention, and this can serve also as a practical focus for future space activities. We have an International Space Station, we have the means to build bases in stationary orbits and on the Moon. It is time to get as active about building large-scale solar farms on the moon for power transmission back to earth as we have been about sending manned missions to Mars, or deploying our fleets and armies everywhere on the planet. Budgets for even such “exotic” energy generation schemes are very modest in comparison to military budgets, and to shift gear from cruise missiles to solar panels in space is going to have only one bottom-line effect for the Lockheed-Martins and Northrop-Grummans of the world – bigger and more stable ROI. Shareholders of every major defense and energy corporation should jump onboard this platform of Sensible Economic Symbiotics with the fervor of a Super Bowl fan – this is what will help the stock price to grow in value and not run into a brick wall or off a cliff when one aspect or another of our ignorance of the Energy Solution hits us hard.

Thus far our focus has been upon power generation in the conventional manner – plants and networks that produce megawatts and distribute it to users far and wide through transmission networks. There is a something else we now have, are not yet employing at anything but a microscopic scale, and which can really make a big difference. This is the capacity to generate power and to save power at the level of individuals, strictly as individuals and as members of open-ended networks. The emergence of practical technologies including polymer film based methods of producing electric power, in conjunction with some of the methods described earlier, make small-scale plants and ultra-small-scale sources sensible and economical. Some of the means is practical only at the individual level of homes, automobiles, and even individual persons in the form of ecologically conservative and even energy-producing clothing.

There is new energy, renewable fuel, and saving grace in what we wear, drive and the very roof over our heads.

The concept of clothing apparel as a source of energy, or the individual automobile for that matter, seems to fly in the face of everything we have ever heard or learned but it is realistic given what can be used in fabrics for clothing and materials for inclusion in automobile roofs or the roofs, walls and windows of homes. Polymer conductive films for generation of electric current from both visible and infrared light sources is now feasible and beginning to be economical – it is no longer an expensive oddity from the laboratory. Furthermore, the use of alternative biomaterials and fabric strength enhancements such as carbon nanofibers is a path to reducing the amount of more expensive and ecologically demanding natural or synthetic fibers.

Individual homes can be equipped with multi-source generators, employing wind, sun, biomass, and even recycling energy from household sources. Lost heat is now a potential source of new electric current. Individual automobiles can recapture some of the energy that is lost as heat or that is absorbed and usually creates a new for air conditioning. Clothing can be thinner and warmer and using fewer materials.

Each household is different, depending upon the geography, the architecture, and the inhabitants. Each household can now begin to be optimized in its energy consumption and equipped with technologies that are economical but also tunable to the specifics of the household. This is not dreamy science fiction but the reality of 2006. What is a fantasy is the thought that we are not in

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the most serious global crisis of all time. What is imaginary is the notion that we can ignore the problems of major planetary climate upheavals even for one more day.

What is very real and at hand is the situation we have today. We can let ourselves be exterminated or brought very near to that point, with all of civilization crashing down around us, and also, if we choose to do so, we can pull ourselves out of this terrible nosedive and come out much better for it, nationally and as a planetary society.

The choice is ours. The choice is yours.

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<sup>1</sup> Average US prices @ \$1.25/gal. in 1980, @ 60 cts. in 1976

<sup>2</sup> Analysis of CO<sub>2</sub> levels in ice cores have shown scientists that for the 400,000 years before the industrial revolution began in the 1800s, atmospheric CO<sub>2</sub> concentrations remained between 200 and 280 parts per million. Today CO<sub>2</sub> levels are reaching 380 parts per million in the atmosphere. "If the ocean had not removed 118 billion metric tons of anthropogenic carbon between 1800 and 1994, the CO<sub>2</sub> level in the atmosphere would be about 55 parts per million greater than currently observed" [Christopher Sabine] (excerpt from National /Science Foundation Press Release 04-092, July 15, 2004.

<sup>3</sup> Several recent sources, March 2006 (BBC, CNN, Fox)

<sup>4</sup> Most recent reports (e.g., Time Magazine, March 27, 2006 and an upcoming Special Issue on Global Warming) show that approx. 53 cubic miles of the Greenland ice sheet melted into the sea last year (2005) compared to 23 cubic miles in 1996 (itself an increase over levels from 50+ years ago).