The Egg... the Birds

Tom Ransom 2011

Which came first? Insofar as humankind is concerned, no question about it—the egg came first. Indeed, our 'yolk' was here long before we were, waiting reservoirs of oil of such abundance they were under pressure; Just tap in and out gassed petroleum, barrels full for the filling, so much fuel that it provided for the cityscaping of Earth and the globalization of commerce. Yet many now believe the petroleum age is fouling our planet, presenting humanity with a potential crisis that places our future in jeopardy. Really? Consuming our yolk is the evolutionary *end* of it all! Rather, consider how improbably the Earth resembles a veritable *incubator*—fertile lands awash in water, slowly rotating around a hydrogen fusion 'lamp', generating a magnetic shield sufficient to deflect the Sun's most damaging radiation. Why is it so improbable, then, that life on Earth—humankind, might just possibly be right on time?

So favorable fertile was our "biosphere" that over the course of hundreds of millions of solar orbits the Sun's energy was appropriated into a global cache of plant "carbohydrates". These carbon-hydrogen bonded sugars and fats fueled the subsequent coevolution of evermore plentiful life forms, and with each generation's passing, under the compounding pressure of all the biomass, and then geologic churning, life's layers were slowly processed into coal, oil, and methane gas. Such "fossil fuels" ignite because when heated to their combustion temperature they become so kinetic their hydro-carbon bonds break, and as oxygen rushes in to "oxidize" the free carbon, a flicker of leftover energy from the original photo-bond is released. That's the heat of the Sun we feel whenever something organic burns; Stored sunlight from millions of years ago if we're burning fossil fuels.

It now seems a gathering majority believes that critical consequences require us to restrict our consumption of these fossil fuel reserves. Clearly, it's not like letting sunlight out of a jar: When light and heat are released from combusting carbohydrates, carbon is discarded in the process, and carbon compounds get heavy and messy. Burning hydrocarbons pollute the atmosphere with particulates and gases altering its composition and density. Those who warn of an impending climate crisis recognize that the prevailing ecological equilibrium is a tentative adaptation tuned to the mean of its habitable range. Rapid range change can overwhelm its adaptive capacity and undermine the viability of the most highly evolved organisms. They know the fossil record provides substantial evidence that the evolutionary edifice of life on Earth has collapsed many times in the past due to catastrophic volcanic and meteoric events[1].

As global warming alarmists continue inputting field data into computer models portending environmental stress if fossil fuel consumption continues unabated, informed skeptics caution that the ecosystem may be too dynamically complex and convoluted to successfully compress into algorithms predicting long term outcomes. They know that the water vapor cycle, one of the most influential and perhaps most mitigating model components, is also the least understood(2). And they question the purported "anthropogenic" climate-change evidence. There are, after all, causations far greater than human activity influencing the global climate, such as stochastic variations in solar radiance and periodic perturbations in Earth's orbit and rotation. And unlike major geo-cataclysmic events, the burning of our hydrocarbon reserves would likely evidence the thermal effects of a slow extended impact trending on a centuries scale—not decades.

While such skepticism may be justified, a countervailing fact remains: Over a few hundred years humankind will have reintroduced hundreds of *millions* of years(3) of hydrocarbon-sequestered solar energy onto the surface of our planet. Because every fossil fueled activity ends up as heat, and compensatory radiative forcing is a retarded process(4), even without additive "greenhouse gas" effects, the certain consequence of consuming our petroleum yolk *will* be a warmer world. Take a look at an overview of our electrical resistance grid and consider that in the relative comparative space of an apple skin, this round-the-clock, multi-terawatt, 'electric heater' is visibly less than half the heat we're actually producing:

Though this anthropogenic heat may account for a relatively small percentage of Earth's daily thermal exchange, our terrestrial environment is a profoundly complex, feedback intensive system, small influences can have significant effects, and the thermal input of human civilization is both non-trivial and unprecedented. While we can't predict to what degree, perhaps in principle we can agree, that *all* heat released from the accelerated combustion of latent buried resources makes a positive thermal contribution to current global conditions. That said, to whatever degree, a predilection toward our presumptive demise doesn't necessarily follow. We might be right on time—Buckminster Fuller:

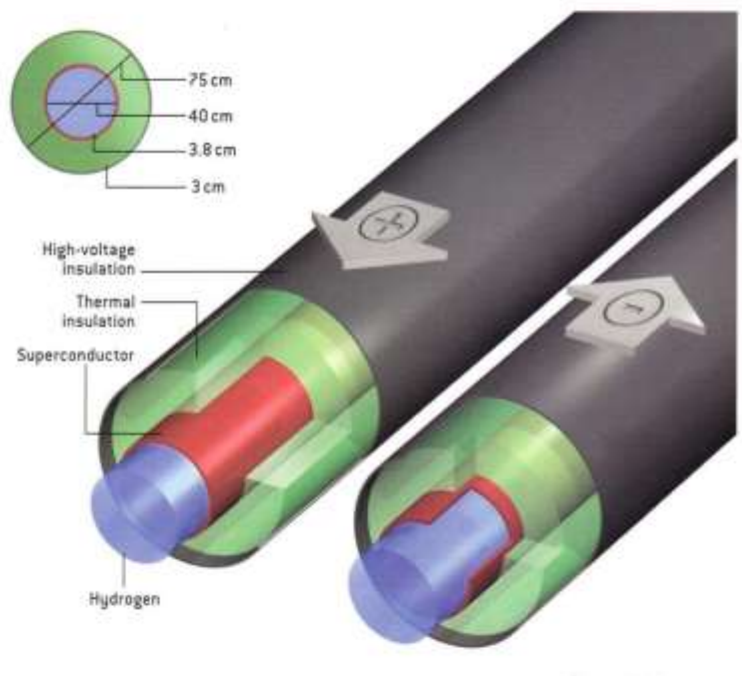
> "Humanity's survival and growth up to now was apparently provided just as a bird inside of the egg is provided with liquid nutriment to develop it to a certain point. But then by design the nutriment is exhausted at just the time when the chick is large enough to be able to locomote... stepping forth from its [shell] the young bird must now forage on its own legs and wings to discover the next phase of its active regenerative sustenance. My own picture of humanity today finds us just about to step out from the pieces of our broken eggshell... we are faced with an entirely new relationship to the universe. We are going to have to spread our wings of intellect and fly or perish." (7a)
>
> "The fossil fuel deposits of our Spaceship Earth correspond to an automobile's storage battery which must be conserved to turn over our main engine's self-starter. Thereafter, our 'main engine', the life regenerating processes, must operate exclusively on our vast daily energy income from the powers of wind, tide, water, and the direct Sun radiation energy." (7b) [1970]

The extent to which the ecosystem may be influenced by our energy production will be proportional to what we *introduce* into the environment—not by what we necessarily consume. There would be no pending "energy crises" were we to unburden ourselves of having to find, extract, refine, carry, burn and clean up, heavy, contaminating, hydrocarbon and radioactive mineral fuels. In fact, relief has always been here. A clean, weightless, inexhaustible, incoming daily solar and geothermal energy allowance is ours to use freely, and it's not just adequate—it's *plenty*. The direct annual solar potential is greater than that obtainable from the total of Earth's combined fossil fuel and uranium resources(8). Add to this the geothermal potential existing everywhere to some degree below ground and we have more energy available than will ever be required. Already the technologies to utilize it are readily advancing. At any rate, it's just a matter of time before the scarcity and externalities of fossil and fissionable fuel acquisition and consumption finally drive up their total cost (were "true costs"(9) included), to where alternative energy sources favorably compete, and humanity moves as a matter of course, from its petroleum yolk dependency on the past, to a real-time regenerative energy future.

We could expedite and exploit this eventuality by anticipating the energy end-game: hydrogen and electricity. These two 'fuels' aren't energy resources themselves because it takes energy to produce them, rather, they are readily transportable fluid carriers. Free electrons and atomic hydrogen are the ultimate energy currencies because not only is each immutably basic and universally abundant, they are complementary, each regenerating the other to become one electro-chemical utility. Hydrogen can be oxidized (leaving only water behind!) to drive the magnetic turbines that send an electric charge surging through a conductor. Hydrogen can produce electricity directly if processed in a fuel cell. And an electrical differential is an excellent way to separate a water molecule into its constituent gases: oxygen and hydrogen. Hydrogen can then be pumped into storage and called upon to produce electricity whenever solar, wind and water resources directly provide less than demand requires. And last, but not least, the carrying capacity of these energy carriers is complementary as well. At the temperature of liquid hydrogen electrical conductors are nearly "super-conducting" meaning that charge conveyance via hydrogen cooled cable is as efficient as it gets. All told, the integration of these two carrier coefficients is so enabling, that without the hydrogen factor, real-time renewable electrical resources may never satisfactorily solve the sustainable energy equation.*

Government and corporate leadership could promote the transition from the hydrocarbon to the hydrogen age by committing to the capitalization and construction of a "SuperGrid". Following the existing power-tower corridors, a "SuperCable"[10] infrastructure would pipe hydrogen and electricity ("hydricity") into every city center. A "smart"[11] decentralized Super-Grid would feature "network redundancy"[12] being locally energized along its way by whatever means and from any source that can produce pressurized hydrogen or a positive voltage potential. It would literally be a pipe dream—a 'build it and they will come' proposition. Anyone able to deliver grid-standard inputs at market price would have an income. Small scale energy producers would proliferate, innovation would be directly rewarded, efficiencies and synergies forthcoming. True-cost adjusted hydrocarbon and nuclear fuel contributions could compete as any other.** A strategic plan to design and develop a distributed-supply interstate SuperGrid would reaffirm our nation's technological leadership, stimulate capital investment, create new employment sectors, and trend the economy away from its dependency on fossil and fissile fuels *as* they become too costly to produce. At any rate, it's likely these non-renewable buried resources will be even more valuable to future generations for purposes other than terminal combustion.

SuperCables could transport energy in both electrical and chemical form. Electricity would travel nearly resistance-free through pipes (*red*) made of a superconducting material. Chilled hydrogen flowing as a liquid (*blue*) inside the conductors would keep their temperature near absolute zero. A SuperCable with two conduits, each about a meter in diameter, could simultaneously transmit five gigawatts of electricity and 10 gigawatts of thermal power (*table*).



	Voltage/Temperature	Flow rate	Power delivered
DC circuit	+50,000 volts and −50,000 volts	50,000 amperes	5,000 megawatts electric
Liquid hydrogen	20 kelvins	0.6 cubic meter/ second in each pipe	10,000 megawatts thermal

An advancing marketplace of products and technologies is primed and ready to begin moving us toward a sustainable, non-polluting, net thermal-neutral, hydrogen-solar economy. Geothermal and hydrogen conversion systems, hydrogen turbines, hydrolytic and hydrogen fuel cells, biofuels, photo-voltaics, solar-thermal arrays, hydro-electric, oceanic and wind driven turbines are all producing energy today. These geo-solar, electro-hydrogen sources, at whatever scale, will minimally stress the global ecology because they've always been integral components of the natural environment. It's time we begin investing our fossil fuel endowment in the development of a smart, secure, hydricity SuperGrid energized in real-time by the radiant heat of the Earth and its parent star: That life sustaining, exemplary fusion of hydrogen and electromagnetic transmission. It's time we gratefully turn away from our petroleum yolk, tap our way out of Fuller's metaphorical eggshell, tap into the solar wind and "spread our wings of intellect and fly". And yes—it's very possible we're right on time.

* And those who believe thermonuclear hydrogen fusion could be the ultimate sustainable energy solution should consider how numerous terrestrial 'mini-stars' might affect Earth's long-term thermal equilibrium.

** The recent abundance of recoverable natural gas is a most propitious finding, for not only is methane the most preferable of hydrocarbon fuels with the least burdensome externalities, it is currently the preferable source of hydrogen. Fractured shale technologies also provide access to geothermal potential.

References:

1) http://en.wikipedia.org/wiki/Extinction_event

2) http://www.geocraft.com/WVFossils/greenhouse_data.html
http://www.nasa.gov/topics/earth/features/vapor_warming.html

3) http://en.wikipedia.org/wiki/Evolution_of_plants

4) http://en.wikipedia.org/wiki/Radiative_forcing

5) http://apod.nasa.gov/apod/ap001127.html

6) http://en.wikipedia.org/wiki/Earth%27s_energy_budget

7) Fuller, R.Buckminster: *Operating Manual for Spaceship Earth* Southern Illinois Univ.Press, 1970; a:52 b:111

8) http://en.wikipedia.org/wiki/Solar_energy

9) http://en.wikipedia.org/wiki/Full_cost_accounting

10) Grant, Paul M.; Starr, Chauncey; Overbye, Thomas J.
A Power Grid for the Hydrogen Economy Scientific American, 7/06 p.77

http://www.w2agz.com/.../The%20**SuperCable**%20_Paper%203_.pdf
http://en.wikipedia.org/wiki/SuperGrid

11) http://www.oe.energy.gov/smartgrid.htm

12) http://en.wikipedia.org/wiki/Redundant_topologies