

OutPost Contents & Abstracts

No. 1, 16 June 1998

Opening Act: Is It the Final Curtain Already?

The introductory issue. A reflection on John Horgan's thesis, "The End of Science," and whether this implies we already know all we need to about energy science. Not so, thus we take our "marching orders" from Vanevar Bush's famous essay, "Science: The Endless Frontier," as our imprimatur for *OutPost on the Endless Frontier*, a "future watch sentinel" for you whose lives and businesses are vitally tied to the evolving Energy Enterprise of the coming millennium.

No. 2, 2 July 1998

Faster, F a r t h e r...Smaller: Toward "Street Smart" Electricity

A discussion of the implications of post-gigahertz computing capability for energy, especially in control and operation of the grid in a competitive electricity energy business where dollars and watts are traded in real time.

No. 3, 9 July 1998

Unidentified Superconducting Objects

An example of the questionable scientific reports that appear from time to time in the press, this one which your correspondent investigated in considerable detail. Occurrence of USOs – Unidentified Superconducting Objects -- have been endemic to the science of superconductivity since its discovery in 1911. In 1986, one of them "proved out" and led to the revolution we now call High Temperature Superconductivity. However, this latest spotting in lithium beryllium hydrides on the banks of the Rhone is most likely another "ET" that hasn't yet landed.

No. 4, 17 July 1998

Journey Down the Path of Least Resistance

In the early summer of 1998, Prof. Deborah Chung of SUNY-Buffalo reported an observation of static negative resistance in a four-probe measurement made on a bundle of carbon fiber composites. If true, such a result would require a serious, to say the least, reconsideration of the Second Law of Thermodynamics. However, are there artifacts in the performance of four-probe measurements on highly anisotropic conductors that could lead to spurious "negative resistance" Prof. Chung's data? The answer is "yes," so we're off the hook on having to modify the Second Law.

No. 5, 3 September 1998

Sun, Sea and Sand: Solar Energy Stored in Hydrogen Controlled by Silicon Semiconductors

Electricity is a form of energy that is hard to store...you have to use it almost as it's made. This is particularly true with temporally cyclical renewable sources such as wind and solar powered generation. A project at Cal State University-Humboldt neatly skirts this difficulty by using a portion of daylight-derived solar power to electrolyze water and storing hydrogen for subsequent electricity generation in a fuel cell when the Big Light goes out at night. A paradigm for future standalone renewable power plants?

No. 6, 25 September 1998

Squeeze Play

Workers at IBM's Zurich Research Laboratory reported in a summer issue of *Nature* the apparent doubling of the superconducting transition temperature of an "under-doped" thin film sample of $(\text{Sr}, \text{La})_2\text{CuO}_4$ held under a compressive biaxial stress of 50,000 atmospheres. They then speculate such a doubling may occur under similar conditions for all high temperature superconductors, including those of practical importance for power applications. The T_C 's of these latter compounds now sit at around 110 K...achieving twice this number would have profound consequences. However, there are strong reasons to believe the reported result on a single under-doped sample may be anomalous and peculiar to its particular chemistry.

No. 7, 3 November 1998

Return to Death Valley Days

In a November, 1997, issue of *Science*, researchers at UC Irvine and the University of Florida suggest revisiting the "light fission reaction," $p + {}^{11}\text{B} \rightarrow 3\alpha$ (8.7 MeV) as an alternative fuel for fusion derived electric power. Colliding these particles spin-polarized at their cross-sectional resonance energy in field-reversed plasma confinement is proposed as a method for improving the traditionally low energy gain of this reaction. The history of both nuclear fission and D-T fusion approaches to electricity production is reviewed as background. At first appearance, it seems that the separate energies of the colliding proton/boron beams would equilibrate within the plasma at such a high rate that the hoped-for "resonance amplification" would not practically materialize.

No. 8, 5 March 1999

Why Diamonds are a Girl's Best Friend

Wide bandgap semiconductors, such as SiC, the III-V nitrides, and the diamond form of carbon, by virtue of greater breakdown voltage and higher operating temperature, could potentially replace silicon as the material platform of choice for active bipolar power electronic components in such applications as inversion/rectification of high voltage dc transmission. However, there are many serious materials obstacles to overcome before the level of structural/defect/doping perfection experienced in silicon is approached. Even then, some basic materials physics issues will remain, e.g., inevitable large on-state voltage drops due to the large bandgaps involved, which may preclude eventual deployment. Warning: this is a long, long OutPost.

No. 9, 2 July 1999

Dolly and Deep Blue

The final achievement of a computer chess program victorious over the best player in the world in that most human of board games, and the continuing penetration of physics into our understanding of genetics leading to a successful mammalian clone, hold great portent not only for the future of energy, but all human endeavor as well. It is speculated that techniques learned in the creation of Deep Blue may find application in testing various climate change scenarios, and that progress in genetic engineering which will follow in Dolly's hoofsteps could lead to "improved" life forms that could better adapt to and even take advantage of particular climate conditions. However, in considering all this, it would be prudent to give Huxley's *Brave New World* another read before getting too carried away.

No. 10, 25 August 1999

Too Good to Be True

From time-to-time we all hear about panaceas reported claiming the final solution to the problems of mankind, ranging from endless sources of energy to universal cures for the medical afflictions of our race. Somewhere deep in the center of our rational consciousness, a voice mutters, "this sounds too good to be true." All too often our instincts prove correct, a tribute, perhaps, to the soundness of our American basic science education curricula, notwithstanding the criticisms leveled in that direction over several past decades. This issue of OutPost commences a series reinforcing this innate skepticism of ours, providing guidelines whereby one can apply critical judgement on those occasions when we are confronted with assertions that appear, indeed, "too good to be true."

No. 11, 2 September 1999

Mr. Watson, Come Here, I Want You!

You've heard of "infinite energy," right? Well, how about "infinite bandwidth?" OK, maybe not infinite, but let's say 2.5 gigahertz, way above coaxial cable bandwidth capacity. There's more. We've had this unexploited resource for about 110 years...it's called the regional/national distribution-transmission grid. In Dallas, TX, a company called Media Fusion reports it has developed a technology which circumvents what many believe to be fundamental physical limitations on long- distance transmission of high frequency electromagnetic signals over unshielded copper/aluminum wire, and transparent to iron-core distribution transformers. Just remember, extraordinary claims require extraordinary proof, which, in the case of Media Fusion, remain to be provided.

No. 12, 24 October 1999

Retro Chautauqua

"Do you want free electricity?" shouts Dennis Lee. "Yes!" rejoins his audience of true believers, an assembly that sort of reminds you of the worst of the turn of the century pseudo-science, semi-revivalist traveling roadshows. In the fall of 1999, the New Tesla Electric Company put on a 20-odd city tour demonstrating the coming era of free energy for all. Let OutPost take you live to witness Dennis Lee at the Marin County Civic Center, a performance which is reported in part through the eyes of your correspondent's artist daughter.

No. 13, 31 December 1999

Nearer, My God, to Thee

Builders of modern day particle colliders have sometimes been compared to the master masons of medieval cathedrals. Both, within the scope of their particular craft, attempt to bring the rest of us "nearer to God," as sung in that old Unitarian hymn famous in Titanic lore. As construction of medieval cathedrals wrought important improvements in overall architectural engineering, so do the hadron colliders of our time bring about the development of infrastructure technologies of broader impact. Improved superconducting magnets and materials come readily to mind. For one future design, the Master Builders of Fermilab are examining guided microtunneling techniques to house the particle ring 150 m underground in a two meters in diameter and several hundred kilometers long. Think of the possible spin-offs for power delivery and telecommunications, and perhaps even small parcel transport. Talk about the ultimate out-of-site, out-of-mind. Almost as heart-throbbing as Leonardo DiCaprio slowly slipping into the depths of the North Atlantic, right?