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$100 oil means it's time for the Sputnik treatment

Energy woes set incentive to let science come to rescue

By YANNIS C. YORTSOS

Energy has emerged as a chief player in the grand economic and societal drama of our age. In silent movie style, energy is the onrushing train crashing through the $100 per barrel barrier, with the public as the hapless victim tied to the tracks, strapped by the forces of partisan politics.

I have a hero in mind: Let science and technology come to the rescue.

To the extent that politics is about the process by which a society allocates resources, energy is inevitably a political affair. Yet the least productive aspects of politics — grandstanding, wishful thinking and the reduction of sophisticated concepts to T-shirt slogans — have the most direct implications for whether we pursue policies that meet the needs of the society that we aspire to be. The stakes could not be higher on the issue of energy, not only for this country, but also for the world.

In a welcome sign, Congress recently handled energy in a refreshingly high-minded way when it took up a bill to create ARPA-E, the Advanced Research Projects Agency-Energy, in the Department of Energy, modeled after the highly successful DARPA of the Department of Defense. DARPA, established as a bold American response to the Sputnik launch 50 years ago this year, nurtured revolutionary advances in science and technology in the defense, and by extension, the civilian arenas.

We need this type of holistic approach. The scientific community, through the voice of the National Academies, has staunchly supported ARPA-E. While key members of Congress have listened thus far, we can only hope that the bill becomes a reality. Stewardship and cultivation of our energy resources, with the protection of the planet as a paramount objective, is a scientific challenge of the highest order.

Science can't solve all our energy-related problems, but without good science we have no hope at all. We urgently need an objective, holistic approach. Energy exists in a multiplicity of forms: as mechanical motion of wind and water, (kinetic energy), relative altitude (gravitational potential energy), and most important economically, through matter's thermal and chemical states (internal energy).

A key issue involving the capturing, converting and utilizing of energy is inefficiency.

We waste between 30 percent and 40 percent of the global energy flow. Worse, byproducts, ranging from CO_2 to nuclear waste, also have increasingly serious side effects. Gross inefficiencies of this type are typical of process not optimized.

When energy sources were cheap and population densities were low, we could slide. But we live in an increasingly energy-hungry world, of increased population density, looming environmental concerns, and with the threatening specter of a dramatic slowdown or even an arrest of economic global growth.

And we can do much better. We now have the tools to achieve the innovations needed. The breathtaking advances in information technology in the recent decade and the continuous unlocking of mysteries at the nano- and biomolecular scales promise unprecedented discoveries that will lead to a much needed "high-tech"-ization of the energy field. These tools can be in our hands in a few short years if we will just invest the effort and investment to create and apply them.

It is not just how, though, it is where. Solving the energy challenge cannot be decoupled from intensely addressing one specific energy landscape: that of megacities. Within the span of this generation, urban population is estimated to double. The air, water, energy, pollution and recent fire problems of Los Angeles, for example, are daily reminders of this growing paradigm. A holistic energy research agenda is a critical element in mitigating the problems of dense urban environments.

Obviously, my university could benefit from increased energy research funding, as would many other research institutions. But I deeply believe that investing in this research is the right thing to do: It is our best alternative; it is the right thing to do.

Fifty years after Sputnik, we have again the opportunity to create a social consensus that unties energy from the train tracks. That is the first step towards a happy ending of the energy conundrum.

Yortsos is professor of chemical engineering and the dean of the Viterbi School of Engineering at the University of Southern California.