THE SOCIETAL IMPLICATIONS OF ENERGY ABUNDANCE

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ABSTRACT

Major technological change affects the way we live and the way we interact in society. Few inhabitants of this planet in 1890, who traveled to town by horse and buggy, could have imagined that in 60 years time, people would travel the World in jet planes in the span of a few hours. Likewise, in that same time period, the World developed a dense grid of instantaneous telecommunications, first over wires, and then even without the wires to provide greater mobility. In this same timeframe, mankind has sent machines into outer space, studied far away galaxies, gained an entirely new understanding of the Universe, and cured many diseases thought incurable. Today, we live in a time when we need to consider that many things previously thought impossible might indeed be possible, and that these changes profoundly affect what we can do technologically, and how we live as individuals and in society. This panel will investigate the implications of these possibilities.

Panel Description

The prospect of abundant or unlimited energy is a real and growing possibility. Unlimited energy was nearly achieved through a nuclear production scheme during the 20th century but the high costs and risks tempered the effort.

During the mid-20th Century, research and development into nuclear energy offered society its first plausible opportunity of abundant energy. A sufficient set of reactor designs combined with radioactive raw materials offered to the world for the first time the plausibility of unlimited or abundant energy that could be produced at special facilities and then shipped to consumers nationwide through a complex distribution grid. Yet, there were serious practical limitations that tempered and ultimately curtailed these nuclear energy plans. True enough, nuclear power approaches appeared poised and capable of providing virtually unlimited amounts of energy to fuel all facets of society, but the approach carried risks and costs that were ultimately deemed too high. In short, the potentially devastating side effects included two serious problems: the generation of copious amounts of highly dangerous radioactive waste that would require storage and/or "disposal" and the increasing and ever-present threat that these dangerous radioactive waste materials could or would be weaponized. Ultimately, the appeal and practicality of a 20th Century nuclear energy panacea was greatly reduced with improved appreciation of the extraordinary drawbacks. Unfortunately, recent events around the world continue to remind us of the terrible costs and risks to society posed by nuclear energy, especially when combined with the powerful and unforeseen forces of nature in a world experiencing global climate and atmospheric changes.

The Computing and Information Age of the 21st Century made possible by advancements in microelectronics represents another example of energy abundance when viewed from an alternate perspective. A review of computing machinery of the mid to late 20th Century and the subsequent portrayal of this technology in popular literature provided a certain impression to the society of that era. Based on projections of technological trends, computer scientists believed that computers would continue to grow physically into monstrous contraptions with dramatically increasing computational capability. It was believed that the evolution of room-sized computers would lead to super-computers of ever-growing size to accommodate new capabilities that were envisioned over time. Expectations developed that supercomputers of the future would occupy massive buildings or even special cities. These expectations also included the need for huge energy supplies to operate the machines upon which society would increasingly depend. Movies and books especially during the 1960s and 1970s often captured these visions of supercomputers. The power demands of such devices would have been enormous and added an additional burden to the energy production needs required by the rest of society. Interestingly, however, supercomputing technology developed along a path far different from what was envisioned earlier as the result of miniaturization. This previously unanticipated miniaturization, enabled through integrated circuit manufacturing methods, quickly reversed the trend of physical supercomputer growth while providing staggering improvements in power consumption and computational performance. In contrast to the early trends and portrayals in literature of that era, today's supercomputers occupy only a small corner of our working space and consume ever decreasing amounts of power. Needless to say, many of the computing devices upon which we increasing rely are now portable, handheld devices that we store within our pockets or purses as we go about our day. Our computing technology has nearly reached the point at which we can operate any of these devices for a full day by the charge we store on a modest sized battery embedded within the device. Our computing devices are interconnected with one another through wired and wireless schemes to access a cloud computing infrastructure with the potential to provide each consumer with a virtually unlimited amount of computing capability. So, from the computing perspective and the benefits derived from miniaturization and interconnection, technology has already achieved a form of energy abundance with sweeping global societal implications. This perspective needs to be tempered by the fact that even though advancements in miniaturization and battery technology continue at a quickening pace, the proliferation of computing devices places a substantial demand for power from the power distribution grid, but this demand is far less than had previously been considered.

Finally, let's look to the future and make some bold and speculative but not entirely unreasonable projections. A scientific revolution leading to a new physical understanding of our universe and a radical new cosmology may occur, and there are indications that such a revolution may be imminent. A radical new cosmology might involve the unification of the fundamental forces, the unification of quantum physics with relativity, and insights into the precise nature of the relationship between individual observers and their external universe. This new view of physics might therefore provide humanity with its deepest glimpse and understanding yet into the innermost workings of the universe, as well as the natures of void and the seemingly inexhaustible quantum fluctuation energy. Such a revolution may lead to the knowledge and means by which to tap into the universe's vast potential energy reserves to produce a new, cheap, and inexhaustible power production paradigm that may be benign and free from costly and dangerous side effects.

A variety of new power paradigms have emerged over the past century and new ones are expected to emerge over a timeframe that may be difficult to predict. How will new power paradigms alter human society and the path of human civilization? Which facets of society are more likely to be affected and over what timeframe?

Panel members will share their particular views on how prospects for abundant energy will alter various facets of society. Various aspects of society and segments of the economy will be considered and addressed during the session, which might cover city and space planning; personal and public transportation and mass transit solutions (sea, land, air); manufacturing and factory design; consumer products and communication; food production and clean water generation; building design and construction (residential and commercial); medicine, healthcare, and public health; government and politics (municipal, state, federal, and world); and impacts to power production schemes and distribution to consumers.

Questions with which the panel might grapple include:

- What changes to the physical appearance of society might result?
- What changes might we make to the design of basic infrastructure?
- What changes might we expect in the field of transportation?
- Will there be a shift in balance between personal and mass transit modes of transportation?
- Might new forms of personal and mass transportation emerge?
- What might be the impact to city design and the migration among urban, suburban, and rural living?
- What might be the impact upon highway design, as well as the role of rail and air modes of transportation?
- Will there be an impact upon social appearance and organization?
- How might the role of government be impacted?
- Will the role of national, regional, and local boundaries be affected?
- Will the architecture of power production become more centralized or more decentralized? In other words, might power production occur increasingly at or near the consumer?
- How will the significance and/or need for a national distribution grid be affected?
- What might be the impact upon reliable access to power?
- What will be the impact upon the nature of man?
- What might be the impact upon international relationships, conflicts, and war?
- How might free or cheap, abundant energy affect the employment based economy and what might the impact be the traditional work week?

- Will the prospect of energy abundance lead us toward or away from utopian society?
- How might a new, benign, abundant power paradigm impact upon public health issues and the future efforts of the life sciences industry?
- What might be the hidden dark side and harmful side effects of abundant energy, even if it's considered to be of a benign nature?

The panel session will begin with an opening statement from the moderator followed by statements from each panel member speaking from within their respective fields. During the panel session, the moderator will pose questions to panel members and solicit questions from the audience. The panel will conclude with closing remarks from each panel member.

Moderator and Panel Member Biographies

Scott M. Tyson has devoted much of his 31-year career to developing new technological approaches at IBM's VLSI Laboratory, Johns Hopkins University's Applied Physics Laboratory, and Sandia National Laboratories. Long-recognized as a pioneering problem-solver and "big picture" futurist, he served as an advisor to the Office of the Secretary of Defense on space computing technology development and planning. Tyson's landmark innovations have accelerated the advancement of space electronic solutions while distinguishing him as a change agent in his field. He has fifteen patents in space technology and multiple awards—including a 2011 "Who's Who in Technology" award recognizing him as a key leader of scientific innovations in New Mexico's technology sphere. His work continues to have a profound impact on the way scientists and laymen alike view themselves and the world around them.

Col. Steven C. Suddarth is the Chief Research Officer of the Configurable Space Microsystems Innovation and Applications Center (COSMIAC) at the University of New Mexico and a private consultant through Transparent Sky, LLC. A retired Air Force Colonel, Dr. Suddarth has overseen several substantial computer engineering/embedded systems projects. These include the development of a first-ever three-dimensional mixed analog/digital image processor which advanced the State-of-the-Art by three orders of magnitude, several airborne optical sensing systems, unmanned aerial robotics, and software systems for large military space programs, as well as the development of miniature spacecraft systems and components.

Russell Brito is the Manager of the Urban Design and Development Division of the City of Albuquerque Planning Department. Over his eighteen-year tenure with the City, he has worked with development review of current projects, metropolitan redevelopment in distressed areas of the city, and long range planning for specific sectors, areas, and the larger metropolitan area. This type of Planning involves the coordination of land use, transportation, and infrastructure across multiple jurisdictions, in concert with elected and appointed officials, business owners, neighborhood associations, and other interested parties. Consensus is not always the result, but collaboration has resulted in successful projects and partnerships that benefit individual communities and the city as a whole, such as the redevelopment of Old Albuquerque High School, the Downtown 2010 Sector Development Plan, and the Nob Hill/Highland Sector Development Plan.

Lt. Gen. Tom Goslin (ret.) is Director for Business Development of Strategic Systems for Raytheon Company. Gen. Goslin served as the Deputy Commander of U.S. Strategic Command where he was a key command link for the U.S. nuclear resources involving both power plants and weapons. He brings great experience in terms of the sociological and strategic challenges imposed by systems that involve large amounts of energy applied to a variety of applications.

Michael D. Shaw is executive vice president and director of marketing for Interscan Corporation, a Los Angeles-based manufacturer of toxic gas detection instrumentation and related software. Michael has developed an international reputation as a straight-talking, scientifically-grounded commentator, and writes a weekly column for Health News Digest, a leading supplier of content to the life sciences industry. Michael performed undergraduate biochemical research at UCLA under Professor Roberts A. Smith and Nobel Laureate Willard Libby and performed graduate studies at MIT. Michael is keenly interested in all aspects of wellness, health care, and life sciences, including rational approaches to so-called environmental hazards, as well as complementary medicine (combining the best of alternative, allopathic, and natural hygiene).