

# *Creating Our Common Future*

## *Reflections on the Four Es: Environment, Education, Energy, and Economics*

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### **Clear, Present and Future Danger**

*“If the ways of God are inscrutable the path of man has become incomprehensible. Modern man, despite the wonderful body of knowledge and information that he has accumulated and the means to apply it appears to be muddling ahead as if he were blind or drugged staggering from one crisis to another.”* So wrote the Club of Rome’s Aurelio Peccei and Alexander King in 1977 when addressing goals for humankind.

In this light, reflection on recent global and domestic events during the course of my year-long *2021 AD ComForum* experience has led me to believe that the clear, present and future danger faced by the world in general, and the United States in particular, has to do with two polarities. The first is the ecological polarity between human activities and the life-sustaining capacity of the Earth. The second is between the haves and have-nots . . . the so-called North-South economic polarity addressed in the late 1970s by Willy Brant and his independent commission on international development issues.

These polarities are strongly interrelated as they both involve the closely coupled *Four Es: Environment, Education, Energy, and Economics*. In combination, these ecological and economic polarities threaten the security of the world at large. More importantly, they represent two important dimensions of the real challenge we have before us . . . the challenge to create a secure and sustainable future for all of us. This means meeting the needs of those alive today without compromising the ability of future generations to meet their needs

As we approach the new millennium, there is a growing awareness that our world has changed dramatically. Through science, technology, engineering, and our expanding numbers, we humans have created a new reality. Central to this new reality is the fact that we are fast approaching the carrying capacity for meaningful life on this fragile planet Earth.

A salient response to this new reality came in 1983 when the United Nations General Assembly established the World Commission on Environment and Development. Chaired by Gro Harlem Brundtland, the commission was charged with proposing long-term strategies for integrating environmental protection and development. Their final report, *Our Common Future*, was published in 1987. It stated that the keys to sustainable development include equitable growth in impoverished countries and adoption of lifestyles that are “*within the planets’ ecological means,*” particularly in the industrial world.

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#### **NOTES Re: Appendix, Genesis and Distribution**

1. The author’s related letter to the editor of *THE BENT of Tau Beta Pi* is appended. Headlined “Sustainable Development,” It was published in *THE BENT*’s Spring 1993 issue.

2. This paper was based on a presentation at the 1991 National Communications Forum’s University-Industry Colloquium, *2021 AD: Visions and Directions*, on September 29, 1991. It was first published as a monograph by the National Engineering Consortium in April, 1992, and, as an adapted paper, in the Fall 1992 issue of *THE BENT of Tau Beta Pi*.

Copies of the monograph were distributed by Frank Popoff, the CEO and chairman of the board of the Dow Chemical Company, at an April 21, 1992, White House meeting with President George H.W. Bush and other American business executives. The monograph provided the themes for the keynote addresses as well as the Ameritech *SuperSchool* and the Nortel environmental initiatives at *SUPERCOMM/ICC’92* where some 8,000 copies were distributed. It was included in the Proceedings of the April 3, 1992, Graduate Business Conference, Indiana University and served as the background document for the author’s June 30, 1993, invited address to the World Future Society “Conference on Creating the 21<sup>st</sup> Century” in Washington, DC.

The monograph served as the basis for the author’s addresses as follows: in January, 1992, at Northwestern University; in March, 1992, at the University of Illinois at Chicago and the Western Society of Engineers; in May, 1992, as a keynote at the 20<sup>th</sup> Annual Computer Science Conference and at Northeastern Illinois University; in September, 1992, at Clemson University; and in June, 1993, at the Society of Women Engineers National Convention in Chicago. The monograph was also used as one of the background documents for the 1994 NSF Workshop on Engineering Education and the 1998 Engineering Foundation Conference on Realizing the New Paradigm for Engineering Education.

Indeed, all of this presents a formidable challenge, involving no less than the building of a comprehensive framework for our common future, a future beyond mere survival . . . a future that will ensure the continued evolution of the human species. Albert Einstein foresaw this challenge in 1946 when, with great insight, he declared:

*The unleashed power of the atom has changed everything, save our modes of thinking, and we thus drift toward unparalleled catastrophe.* “This could be one of the most critical times in our history, as well as that of humankind. We cannot afford to drift; positive change demands new ways of thinking and doing . . . a new way of being. As Senator Albert Gore put it in his recent book: *“the earth is in the balance.”*

## ***The Opportunity Today***

Notwithstanding the seemingly overwhelming problems of the day, the opportunity still exists to create our common future. However, to move beyond today’s problems, and to ensure evolution toward a secure and sustainable future for all humanity, requires the individual and collective realization that we are living in a time of transition, sometimes characterized by great chaos and crisis . . . *a time of correspondingly great opportunity . . . which could be the opportunity of Earth’s lifetime.* Successful seizure of the opportunity requires recognition that we are both part of the ecological and economic polarization problems and a major part of a workable systemic solution. By we, I mean us... all of us.

We can ill afford to be distracted from the main event issue... ensuring the survival and continued evolution of the human species. There exists persuasive evidence that our Planet Earth is fast approaching the limits of its ability to support meaningful life. Explosive population growth, environmental degradation, and financial disequilibrium are the prime culprits with each feeding upon the other to multiply the overall negative impact. Continued reliance upon our old ways will assure accelerated slippage of the earth community toward virtual extinction while mesmerized by the twin illusions of prosperity and progress.

To me, this threat stresses the need for the unifying global paradigm: *“we are one.”* Not only does the survival of the earth community depend upon our ability to change, to form new values, new ways of thinking, and a corresponding set of life-saving organizing principles, it also depends upon our ability to reorder our priorities and address a whole host of interrelated, main-event issues affecting our common future.

## ***Clearing the Way***

First and foremost, there is the urgent need to eliminate the threat of ecological collapse. Our modern throwaway society, in combination with staggering population growth and the concept of planned obsolescence, as well as with an addiction to “low cost” fossil-fuel-based energy, not only contributes to atmospheric problems, but to water pollution as well. Additionally, toxic waste and rubbish are generated to the extent that we are being overwhelmed with our waste products. The Gulf War, with its oil fires, spills, and usage has brought our assault on the Earth’s biosphere into dramatically sharp focus . . . for those who choose to see. Interrelated atmospheric issues, involving air pollution, heat trapping, and ozone-layer depletion, pose a critical threat to one of the global commons and set the stage for severe disruptions in life, as we now know it.

Understanding and implementing an appropriate global policy regarding the *Four Es* will be critical to our survival and fundamental to the creation of a sustainable future. Here at home, our nation’s increasing oil vulnerability demands a lasting strategy that balances energy needs with the imperatives of the environment, education, and overall economics. Taken together, these represent a daunting set of problems of almost paralyzing complexity. These problems are all the more difficult to address since they are characterized by very slow erosion-like developments... developments so gradual that they are almost imperceptible, certainly beyond our day-to-day awareness. In many cases, the threats are also beyond our senses. They cannot be seen, heard, tasted, smelled, or felt . . . and so, can easily be put out of mind. We have only to look at ozone-layer depletion for an example of these insidious threats. The challenge to affect an appropriate level of positive change to create a sustainable future is certainly of breathtaking proportions.

## ***Effects of Population Growth***

By no means is concern with the negative effects of population growth a recent phenomenon. In 1798, Thomas Malthus predicted the difficult problem of expanding food output to keep up with exponential growth in population. With reference to Figure 1, today’s world population of 5.3 billion reflects a doubling since 1950 with anticipated continued exponential growth. World population is expected to reach 8.5 billion by 2021. Related economic activity and natural resource usage will create overbearing pressure on the Earth’s life-support system. Projections from the

United Nations, the World Bank, and the University of Chicago provide estimates for the limits of the Earth's carrying capacity that range from 8 to 12-billion people. The upper limit will be surpassed by 2050 if present growth rates continue, thus increasing the likelihood of an ecological collapse.

## **Paradigm Shift**

As indicated previously, we are living in a time of transition. This can be seen with reference to Figure 2. As we move through this transition time, we can continue with our old ways of thinking and acting, or we can adapt and change. It is my personal view that old ways will assure continued preoccupation with enemies, perpetuation of military-industrial complexes, arms trade, and world-wide conflicts despite their huge human and financial costs. The alternative path is to work cooperatively to reduce or eliminate, as appropriate, all significant threats to the security and survival of the earth community. What is required is no less than an era of unprecedented global cooperation and commitment. Consequently, there needs to be a drive for a paradigm shift from pre-transition Epoch A's "*me and mine, and survival of the fittest*" to post-transition Epoch B's "*we and ours, and survival of us altogether.*" This shift can be brought about via the unifying global transition paradigm "*we are one.*"

## **No Guarantees**

Based upon the magnitude of the problems and the high stakes involved, it would seem obvious that it is in our vital interest to work together in addressing these issues and so create a sustainable common future. We can no longer afford the luxury of muddling . . . of engaging in resource draining activities that divert our attention from main-event issues. Likewise, we cannot be deterred by naysayers who would either discount the threat as Malthusian doomsdaying or else would call the approach naive, and so label the effort futile . . . wishful thinking, beyond the capacity of mere humans to even contemplate.

It is my view that to succumb to this negativism and do nothing would ensure the eventual devastation of the Earth community — possibly within the lifetime of some of my own children, but certainly my grandchildren. There appears to be no option but to respond with resolute intensity, resources, and vigor akin to that used to prosecute the Gulf War. Will it happen? Unfortunately, not immediately; perhaps it may never happen at all.

The *Global 2000 Report to the President*, issued in the early 1980s, indicated the potential for global problems of alarming proportions by the year 2000. Despite this clear warning and the salient efforts of the United Nations, Club of Rome, Worldwatch Institute, World Resources Institute, Natural Resources Defense Council, and many others, we continue to drift. We are seemingly unable to breakthrough the wall of apathy to launch an effort commensurate with the task of ensuring the continued evolution of the human species.

Surely, the 1990s will be a critical decade. Continued delay will allow the problems to magnify to the extent that they will explode beyond our capacity to exercise control. We must do much better than we have thus far with "Earth Days" and the like. There is no guarantee that we will respond in time, just as there is no guarantee that we will survive and continue to evolve as a species.

## **The Real Beginning**

As Jonas and Jonathan Salk stated in their book, *World Population and Human Values —A New Reality*: "Individually and collectively, we share the responsibility for the future course of events on the planet, whether it be positive or negative." Unlike war-related initiatives, attendant nerve-tingling excitement, passionate flag-waving, and 24-hour media coverage are not to be expected in this type of effort. Commitment, resourcefulness, persistence, hard work, and never-ending patience will be the battle order of the day. A major challenge will be to overcome the apathy of the general public, the characteristic inertia and short-term thinking of governmental administrations, and the nagging fear that we may already be too late with requisite action.

A real beginning demands a shared vision supported by a coordinated and sustained grass-roots thrust with power of the magnitude that brought down the Berlin Wall and launched the wave of democracy in Eastern Europe and the former Soviet Union. Absent this level of thrust, a catastrophic event such as a severe drought, or other dramatic climatic change, will be required to shock us out of our illusions, denials, and addictive behaviors.

In 1820, some 22 years after Malthus's dire predictions relative to exponential population growth, Thomas Jefferson said, "I know of no safe repository of the ultimate power of society but the people. And ~f we think them not enlightened enough, the remedy is not to take the power from them, but to inform them by education." It is my view that widespread knowledge and understanding will be the key to the real beginning. *Education will be the vehicle . . .* first to public awareness, followed by public demand, and finally governmental action. A step in the right direction is our America 2000 national education strategy announced this past April by President Bush. A positive force will be the continued expansion of world trade and telecommunications. Both will enhance global integration by promoting interdependence and cooperation among nation-states, thus bringing life to the unifying "we are one" transition paradigm.

Most likely, non-governmental organizations, populated by concerned citizens and working in conjunction with a revitalized United Nations, will be the real leaders in creating our common future. The Carter Center, for example, is doing seminal work in this area. Religious groups and our business enterprises will all have significant roles based upon the enormous potential influence of the religious groups and the proven ability of business enterprises to get things done; both need rise to the challenge.

## **What Can We Do?**

I firmly believe that we, in the business and academic sectors of the information industry, are in a high-leverage, trim-tab-like position. I also believe that we will have one of the more vital roles to play in addressing this formidable challenge. We should be leading the charge in at least two areas. The first is in tele-commuting to help reduce the significant environmental and energy costs associated with the transportation sector... 10 of the 17-million barrels per day of U.S. oil-based energy consumption. The second is in tele-education to further enhance the free movement of ideas and the dissemination of appropriate learning materials within the context of the "Bringing America On-Line" component of our America 2000 initiative. This involves the development of new and more appropriate learning tools as well as expanded distant learning vehicles to address widespread educational inequities . . . all based upon modern computer and telecommunications technology.

Additionally, we in the business community can provide proactive programs to help educate as well as encourage our employees to become involved in both educational and environmental affairs... and we are beginning to make some real progress! For example, Motorola, IBM, and Apple have become corporate pacesetters in the K-12 education area. I am pleased to see my own company become a leader in the environmental area, particularly with respect to the elimination of ozone-depleting CFCs. It is encouraging to see an increase in the number of corporations committing to balance environmental and educational imperatives with energy needs and economic vitality. Most of all, I am proud of the growing number of my colleagues in the information industry who are working to create our common future.

Educational institutions at all levels can play a crucial role by refurbishing and expanding their learning-tool kits, as well as by placing strong emphasis on global education, individual responsibility, and the value of conservation... using only what is needed, and then reusing and recycling after that. All students should be made aware of the dynamic interrelationships and the balance required among the environment, our energy needs, and our economy. Educators can also collaborate with both parents and the business community to improve the teaching and learning processes.

***We need to become a learning people . . . learning together what we need to learn and then learning it. As a matter of fact, we need to become a learning global community.***

On a personal basis, each of us might look deep within to learn what we can contribute to this critical effort to ensure meaningful survival for the human species. All of us can contribute to a new and real beginning, to the creation of our common future, by setting an example as leaders in balancing the *Four Es* within our business and educational organizations, and by making our voices heard—loudly and clearly within our families and communities. The choice is ours.... I hope that our children and those of generations yet to come will not have found us lacking.

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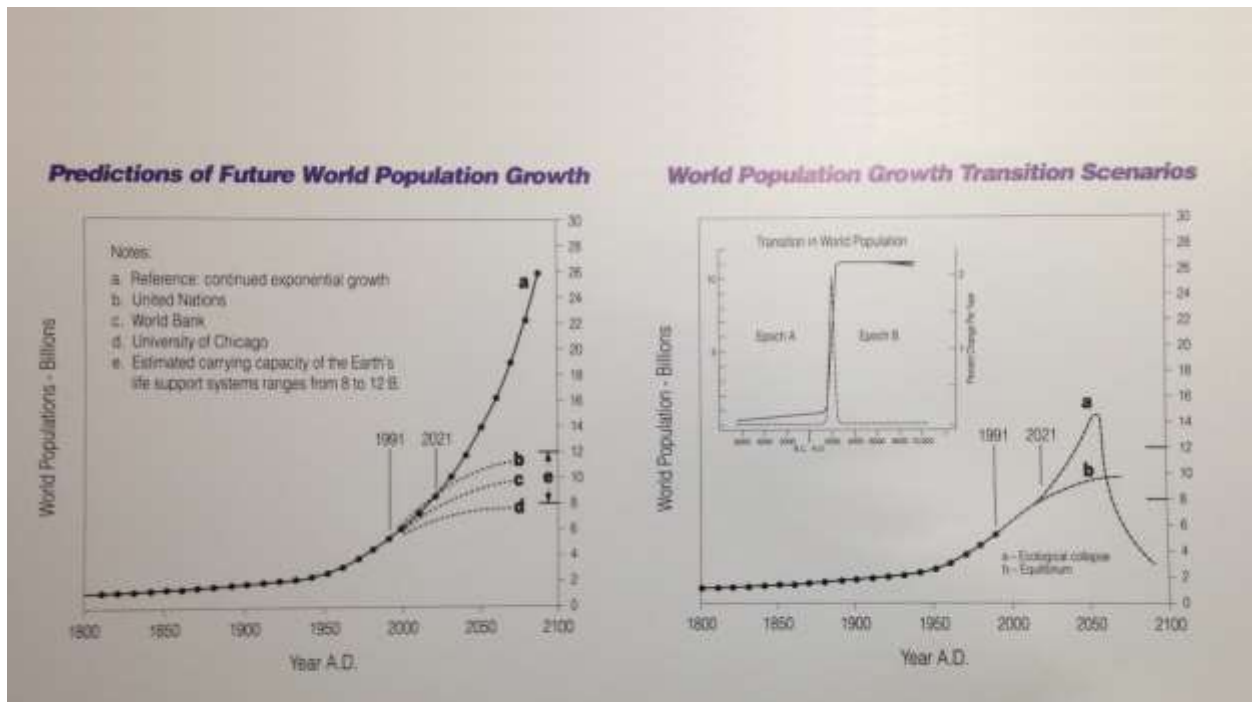


Figure 1

Figure 2

# **SUSTAINABLE DEVELOPMENT**

My article, “*Creating Our Common Future: Reflections on the 4Es: Environment, Education, Energy and Economics,*” [Fall 1992] triggered several interesting responses [Winter 1992]. These comments are addressed to readers who would argue that human intervention to save our planet from the threats of global-warming, environmental degradation, over-consumption, and population growth is but mere folly, as well as to those who would argue that we are not doing enough soon enough. I ask both groups to consider the following:

Last November 18, the Union of Concerned Scientists issued a document entitled *World Scientists’ Warning to Humanity*. It catalogs the damage to the atmosphere, oceans, soil and living species and states categorically that continuation of destructive human activities, such as unrestricted population growth, “*may so alter the living world that it will be unable to sustain life in the manner we know.*” The report was signed by 1,575 scientists from 69 countries including 99 of the 196 living scientists who are Nobel laureates.

As stated in *Time* magazine’s special fall issue on the future: “*The state of the environment in the latter part of the next century will be determined largely by one factor: human population, lthe species doubles its numbers by 2050, to nearly 11 billion, humanity may complete the devastation that accelerated so steeply in this century.*”

Vice President Albert Gore addressed population growth in his book *Earth in the Balance* where he says: “*Just as no problem better illustrates the dramatic change in humankind’s impact on the global environment, none better illustrates the necessity of adopting a truly global solution and designing it in a strategic fashion... What’s required, then, is foresight, maturity of commitment and philosophical cohesion...*”

To me, these are but representative examples of many thoughtful reflections and recommendations to precipitate action on population growth and other human-made problems that threaten the evolution of humankind. Also, according to the World Engineering Partnership for Sustainable Development, meeting the needs of the present without compromising the ability of future generations to meet their needs will be the dominant economic, environmental, and social issue of the 21st century.

Perhaps, more of us in the engineering community, acting as responsible Earth citizens, will join the effort to create our common future. We have much to contribute in the way of time, talent, and leadership abilities to help overcome extant confusion, disappointment, and frustration, as well as to address the arguments of entrenched special-interest groups. The stakes are high; there is much to be gained. And, **WHAT** do we have to lose?

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