

# e-Future Times



*e-Future Times* was an on-line version of *Future Times* published in electronic form only and as supplement to the printed version when there was extra material available.

[ed After a break of five years this is the next issue in the *e-Future Times* series which I hope readers will enjoy]

## Volume 17 December 2011

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### THE LESSON FROM HISTORY?

#### George Preddey

The article reproduced below was a contribution from the New Zealand Commission for the Future (CFF) to “Environmental Perspectives” (second edition) in 1981. As its contributing author, I would not change any of it three decades later except to:

[i] note the environmental effects of doubling atmospheric carbon dioxide are now definitively established; and

[ii] perhaps replace “man” by gender-neutral “humanity” throughout the text.

With Solid Energy Ltd supported by the National Government poised to exploit Southland lignite (New Zealand’s largest fossil energy resource), the questions posed in the article are arguably more apposite in 2011 than they were in 1981. They raise a further question (is “man” any wiser than he was 30 years ago?) and arguably confirm the adage that the lesson from history is that “man” never learns from history.

### WORLD RESOURCES

Time magazine, the bell-weather of Western affluence, ran the following paragraph on 22 December 1980:

“The price of oil is rising again. Like a waking nightmare that seems never to end, the energy crises of leaping prices, dwindling supplies, and multiplying miseries goes on and on ....

(nothing) has more profoundly shaken the established world order, or brought about more rapid and tumultuous economic change, than the end of the era of cheap oil .... The energy debacle has become a crisis of economics, of politics, of the very balance of power in world affairs. In short it is an all-embracing, mesmerizing Everything crisis.”

### **The Means and End of Economics?**

The basic aim of virtually all political systems is to promote a growth economy: for example see [1].

Economics has to do with means and ends. It has been defined as the study of the allocation of scarce resources among competing ends. Success is measured by a standard of living achieved by participants in the economy.

According to thermodynamics, a basic branch of physics, the ultimate useful stuff of the universe (for man's purposes) is low-entropy matter-energy, the ultimate means of economics [2].

This stuff has two forms: a terrestrial stock and a solar flow. The terrestrial stock comprises resources which are renewable on a human time scale, and resources renewable over geological time scales which for human purposes must be considered non-renewable.

The non-renewable stock is limited in amount available, and includes coal, oil (mentioned by Time magazine above), and the Earth's mineral deposits. Terrestrial renewables are also limited, but, if exploited on a sustained yield basis, the amount available over time is unlimited. The maximum sustainable yield is a limit only on the rate of use. Thus the world's oceans can provide a sustained yield of 70 million tonnes of fish per year [3], or 6 thousand billion billion tonnes (the weight of the Earth itself) over 90 thousand billion years, if we care to be this patient. Any attempt to increase the annual fish yield above 70 million tonnes will deplete the fish resource.

All human societies (and other living species for that matter) sustain themselves by extracting low-entropy ordered resources from their habitat and by discarding higher-entropy disordered wastes. The true efficiency of the extractive, productive, and consumptive processes is best measured by their success in minimizing the rate of entropy increase. Mysticisms of orthodox economics, such as „inflation“, may simply represent the fundamental concepts of thermodynamics ignored by orthodox economists [4].

### **A Cornucopia of Resources?**

Rapid growth is commonly observed in populations of organisms when nutrients are readily available. Two things can happen when the nutrients become scarce. The rate of growth declines to zero at which stage the population achieves an equilibrium with its habitat. Alternatively, the growth may continue until an inevitable collapse occurs, and the population is catastrophically reduced to a small fraction of its potential steady-state size. By their access to cheap, abundant, non-renewable resources, the developed countries have experienced rapid economic growth over the past 200 years. Today their institutions are superbly adapted to past conditions of large, unexploited fossil energy resources, rich mineral deposits, and fertile or sparsely-populated land.

The present era of rapid economic growth is a curious anomaly. During previous millennia of human occupation of the planet, the human economy was essentially a steady-state one. Man

lived on solar income. Only for the past 200 years has he achieved rapid economic growth by breaking the constraint of solar income. He has begun to live on geological capital, by processing low-entropy resources using low-entropy fossil energy into high-entropy wastes. The geological capital will in time run out. Already, cheap oil is gone. Faced with this unpalatable truth, many planners believe that nuclear energy alone can provide continuing freedom from the solar income budget, and is essential for continued economic growth in the post-fossil fuel era. They hold that nuclear energy will allow the extraction of materials from ever leaner ores. The trend thus is towards a more uniform distribution of matter-energy resources throughout the Earth's crust. The cornucopia of nuclear energy makes resource and waste product indistinguishable.

The view expressed above conforms uncomfortably with the laws of thermodynamics. It is non-uniformity, ordering, and differences in concentration or temperature that make for usefulness. A uniform distribution of matter-energy implies an absence of potential for any process, including life itself. Organisms do not survive by consuming their own wastes. The proponents of nuclear energy as the ultimate means for continued economic growth would have us do just that.

### **Growth within Gaia?**

The solar input has been a central constraint on the evolution of the biosphere. Some believe that man, the only species to break through this constraint, is in disequilibrium with the rest of the biosphere as a direct consequence. Natural cycles are becoming overloaded, and new materials (toxic chemicals) are being produced for which no natural cycles exist. Advocates of this view hold that not only is geological capital being depleted, but that the basic life support systems (the ocean, atmosphere, and soil) are being increasingly threatened by the growing throughput of resources by the human sector of the world ecology.

The response of the developed countries to the oil crisis provides an example. Faced with dwindling oil supplies, most developed countries are redoubling their efforts to increase supplies of non-renewable alternatives to oil, rather than rethinking their problem as one of energy and resource over-dependence. New Zealand is moving from a dependence on oil to a dependence on natural gas for instance.

In the longer term, the great hope is coal. The present rate of fossil fuel consumption will double the carbon dioxide content of the atmosphere within 300 years, perhaps a sufficient time for the development of sustainable alternatives to oil. A continuation of the present trend for increasing fossil fuel consumption indicates a doubling time of less than 40 years [5]. While the environmental effects of doubling the carbon dioxide content of the atmosphere have not been definitively established [TRUE in 1980, UNTRUE in 2011 – GP], these might include a partial melting of the icecaps, a rise in sea level, and an expansion of the world's desert regions.

The present terrestrial stock of fossil energy is in fact small compared with the solar flow, equivalent to a few weeks of sunlight falling on the Earth. The biosphere runs on solar energy, and man has lived until recently, on solar energy, which is non-polluting and non-depletable. Only in the past 200 years has he become dependent on much scarcer forms of energy such as oil. Technology is often presented as having saved man from his dependence on resources, by freeing him from the solar income constraint. The very opposite is true.

The Gaia hypothesis [6] holds that Earth, and life on Earth, are not two things but one. The atmosphere, oceans, land surface, and living things are all part of a system capable of controlling ambient temperature, composition of the air and sea, soil acidity etc so as to create optimal conditions for the survival of the biosphere.

In man, Gaia may have evolved the equivalent of a central nervous system, a potential for planetary consciousness, but also a threat to her continued survival. Man may choose to rejoin the world ecology by stabilizing (reducing?) his demands to match the solar input. Or he may choose to continue his present growth economy by recreating technological suns on Earth to reprocess his own waste products. The first option recognizes that man requires Gaia for his continued survival, but the second begs the question of whether Gaia can accommodate man for her continued survival.

### **Further Reading**

- [1] Ministry of National Development, “Growth Opportunities in New Zealand” (Government Printer, 1980).
- [2] Daly H E, “Steady State Economics” (Freeman and Co, San Francisco, 1977).
- [3] Commission for the Future, “Resources and Technology – Sustainability” (Government Printer, 1979).
- [4] Henderson H, “Creating Alternative Futures – the End of Economics” (Berkley Publishing Corporation, New York, 1978).
- [5] Commission for the Future, “Fast-Track Self Sufficiency: an Alternative Energy Plan” (Government Printer, 1980).
- [6] Lovelock J E, “Gaia: a New Look at Life on Earth” (Oxford University Press, 1979).

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George Preddey  
(retired physicist in 2011, CFF Secretariat in 1981)

### **Building a bridge between engineering and sustainability**

Two recent papers by Professor Krumdieck explore a novel way to link engineering and sustainability which she has called Transition Engineering.

Professor Krumdieck notes that in 1987 when the UN Commission on Environment and Development sought to outline the need for strong economic growth that is socially and environmentally sustainable, the appeal to action was aimed at citizens, organisations, educators and scientists. Although nearly all of the environmental threats identified were the result of engineered systems, the engineering profession was not mentioned.

She further contends that it is hard to set up requirements for engineering projects that involve the moral issues of our own needs weighed against needs of others who have no legal representation or economic participation. It is even harder for engineers to participate in socio-political decisions about collapse or complexity, let alone adopting new, non-standard economic accounting methods.

There is limited evidence that the philosophical, anthropological or economic arguments regarding sustainability have had a great impact on engineering education or the professional discipline. Commissioned reports and books on sustainability issues like peak oil [Hirsh, 2005] and global warming [Flannery, 2005] hardly give mention to engineering as either a

source of problems or solutions. Even in research, engineering academics with a focus on sustainability are extremely rare.

The abstracts from the papers and links for the full papers are below.

## **The Survival Spectrum, the key to Transition Engineering of Complex Systems**

Susan Krumdieck

### **Abstract**

*This paper puts forward a simple idea describing the time, space and relationship scales of survival. The proposed survival spectrum concept represents a new way to think about sustainability that has clear implications for influencing engineering projects in all fields. The argument for the survival spectrum is developed sequentially, building on theory, definition, examples and history. The key idea is that sustainability will be effectively addressed in engineering as a further development of the field of safety engineering with longer time scale, broader space scale, and more complex relationship scale. The implication is that the past 100-year development of safety engineering can be leveraged to fast track the inclusion of sustainability risk management throughout the entire engineering profession. The conclusion is that a new, all-disciplinary field, Transition Engineering, will emerge as the way our society will realise reduction in fossil fuel use and reduction in detrimental social and environmental impacts of industrialisation.*

Full paper – see ([Vol 17-1-Survival Spectrum.pdf](#))

## **The Visioning Project: Part of the Transition Engineering Process**

**Dr. Susan Krumdieck, and Dr. Andre Dantas**

### **Abstract**

*The availability of transport options and energy sources is a strong determinant in the development of land use patterns. The current transport infrastructure and vehicle technology in developed countries has emerged during conditions of low-cost and abundant fossil fuel. It is not possible to simply substitute renewable fuels from any combination of resources in a way that reduces fossil fuel consumption while requiring no changes in land use, infrastructure and vehicle technology. However, many research scenarios focus on fuel substitution rather than transitional change of urban form and adaptation of public expectations. The paper presents a conceptual framework for the coherent integration of development projects involved in the new field of Transition Engineering. The research results focus on one of these projects, the visioning project. The research objective for the visioning project was to gain an understanding of the nature and magnitude of the systemic infrastructure changes that would be required to provide a modern quality of life using only renewable energy resources. A method was developed to generate feasible-sustainability concepts. The method first quantified the renewable energy resources available for transport in a New Zealand town, including biofuel, human power, and renewable electricity. Then transport system design concepts were generated using basic energy flow balance modelling for each major transport activity, e.g. personal mobility, access to markets and services, goods movements. The feasible-sustainability concept involved adaptive changes to the pre-transition urban form and infrastructure. The resulting urban form was recognisable yet*

*radically different from the pre-transition neighbourhood. This feasible sustainability transport system concept, based on a realistic use of renewable energy could fill a gap in the shared cultural vision that people in developed countries have about the long-range future, and should inform strategic investments in the near term.*

YC (ed)

Full paper – ([see Vol 17-2-The Visioning Project.pdf](#))

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## **Futuring a “Wicked” problem?**

**Yvonne Curtis**

Long-term visioning, long-term planning, foresight, futures thinking, futuring, futures studies, looking forward are all terms used today to identify the human capacity of dreaming and imagining what life might be like in the future. I am going to use the term futuring to mean to look towards the future with intent, from a broad understanding of the past and present. We all have this capacity and use it constantly as we go about our daily life. Futuring is complex and I think fits neatly into the newly defined category of problems called “wicked” problems.

A “wicked” problem can be defined as a complex problem, not fully understood and there is no one complete answer but there can be several possible solutions that will help mitigate the problem depending on the outcome needed or wanted. The understanding of futuring has paralleled our understanding of physical and human issues so that it is only more recently that physics for example now talks of complexity and chaos as facts, and human health and well-being is being discussed holistically.

What does this mean for futuring? Wicked problems need a holistic approach that requires knowledgeable people from many fields of expertise to be able to understand each other and work together. But all too often there is an apparent chasm between futurists who are looking long-term and those whose jobs are to design policy for action to meet the community needs that will be the building blocks of the future that unfolds. This can often be just a case of miscommunication because words can have quite different meanings when used in different contexts.

“Scenario Analysis: Maybe a spoonful of theory helps the medicine go down!” ([see Vol 17-3-Scenario article for FT.pdf](#)) an article by John Moriarty is a personal account that illustrates this chasm.

In the paper he reflects on his experience as a futurist over the last 30 years in the public service and in particular how the communication gap still seems to be there in his present task as a member of the Future Maker Project team developing *Scenarios for the Future of Tourism in New Zealand*.

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Dr. John Moriarty, J&H Moriarty Ltd. Member of Future Maker Project: Scenarios for the Future of

Tourism in New Zealand. John@moriarty.biz

## **The UN and Sustainability** A summary of the UN's work on Sustainability

### **Gray Southon**

Concerns about the environment and the sustainability of global development have been evolving within the UN system for over 40 years, and were formally put on the agenda in 1972. In that year the United Nations Conference on the Human Environment in Stockholm brought the industrialized and developing nations together to delineate the 'rights' of the human family to a healthy and productive environment. A series of such meetings followed, for instance, on the rights of people to adequate food, to sound housing, to safe water and to access to means of family planning. The recognition of the need to revitalize humanity's connection with nature led to the creation of a number of global institutions within the UN system.

In 1980, the **International Union for the Conservation of Natural Resources** (IUCN) published the World Conservation Strategy (WCS) which provided a precursor to the concept of sustainable development. The Strategy asserted that conservation of nature cannot be achieved without development to alleviate poverty and misery of hundreds of millions of people and it stressed the interdependence of conservation and development in which development depends on caring for the Earth. Unless the fertility and productivity of the planet are safeguarded, the human future is at risk.

In 1982, at the 48th plenary of the General Assembly, the WCS initiative led to the approval of the World Charter for Nature. That Charter stated that *"mankind is a part of nature and life depends on the uninterrupted functioning of natural systems"*.

In 1983, the World Commission on Environment and Development (WCED) was created and, by 1984, it was constituted as an independent body by the United Nations General Assembly. WCED was asked to formulate 'A global agenda for change'. In 1987, in its report *"Our Common Future"*, the WCED advanced the understanding of global interdependence and the relationship between economics and the environment previously introduced by the WCS. The report wove together social, economic, cultural and environmental issues and developed global solutions. It reaffirmed that *"the environment does not exist as a sphere separate from human actions, ambitions and needs, and therefore it should not be considered in isolation from human concerns. The environment is where we all live; and development is what we all do in attempting to improve our lot within that abode. The two are inseparable."*

In 1987 also the **Montreal Protocol** that phased out the gasses that were depleting the Ozone layer, with developed countries providing funding for developing countries assisting them to make their changes.

In 1988 the **World Metrological Organisation** (WMO) and the **UN Environmental Program** (UNEP) formed the **Intergovernmental Panel on Climate Change** (IPCC). The task of the IPCC was to review and assess the most recent scientific, technical and socio-economic information relevant to the understanding of climate change.

In 1989 the General Assembly resolution **44/228** established the **Conference on the Environment and Development** (UNCED) which became the Rio Earth Summit in June 1992. This was a massive event, involving 172 countries, 108 heads of state and 2,400 NGO organisations, with a concurrent “Global Forum” with 17,000 attendees. Out of this summit came:

- **Agenda 21**, a programme of action for sustainable development for the 21st Century.
- The **Rio Declaration on Environment and Development** which defined principles of development, including sustainability.
- The **Convention on Biological Diversity** which entered into force in Dec 1993
- The **Forest Principles** agreement that addressed the engagement of developed countries in supporting the protection of forests in developing countries.
- The **Framework Convention on Climate Change** (UNFCCC) to address the political and technical responses to climate change, based on the scientific findings of the IPCC. This became the centre of the development of the climate change agenda with a continuing **series of meetings**.

UNCED for the first time mobilized the major groups and legitimized their participation in the sustainable development process. For the first time also, the lifestyle of the current civilization was addressed in Principle 8 of the Rio Declaration and the urgency of a deep change in consumption and production patterns was expressly and broadly acknowledged by State leaders. Agenda 21 further reaffirmed that sustainable development was delimited by the integration of the economic, social and environmental pillars.

The spirit of the conference was captured by the expression "Harmony with Nature", brought to the fore with the first principle of the Rio Declaration: "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature". A highlight of the conference was the appeal of 12 year old Severn Cullis-Suzuki for adults to honour their responsibilities to preserve the planet.

This conference laid the groundwork of a broad range of programs. Many of these came under the management of the **UN Department of Economic and Social Affairs** (DESA), which has a **Division for Sustainable Development** (DSD), managed by the **Commission for Sustainable Development** (CSD). Other sections of the UN are also involved as shown by the page on "*Sustainable Development, Human Settlements and Energy*". Also, the **Global Environment Facility** (GEF), which had been developed as part of the **World Bank** (WB), was restructured as an independent institution. The GEF serves as a financial mechanism for the Convention on Biological Diversity, the UN Framework Convention on Climate Change, the Stockholm Convention on Persistent Organic Pollutants, and the UN



Convention to Combat Desertification. The GEF also addresses sustainable forest management, international waters, and ozone layer depletion.

During the 1990s there were conferences **on a wide range of subjects** including Population Development, Social Development, Status of Women, Sustainable Development, Biological Diversity, Desertification, Forests, Ozone layer protection, Climate Change and Fisheries. One them was the 1997 UNFCCC **Kyoto Protocol** addressing the control of greenhouse gas emissions by developed countries.

These led to:

1. The 2000 **Millennium Declaration** from the General Assembly summit which led to the **Millennium Development Goals** (MDGs), aimed at reducing global poverty and setting a series of poverty reduction targets for 2015. While these goals were principally related to poverty, health, education and women's empowerment, responsibilities of the relevant countries, Goal 7 addressed sustainable development and Goal 8 specified a partnership whereby the developed countries supported the developing countries.
2. The World Summit on Sustainable Development in Johannesburg, South Africa in 2002 (Rio+10). The extensive **summit report** specified a wide range of targets, many reflecting the MDG program, and contained detailed programs of action. The summary outcomes outlined a variety of initiatives by countries and corporations. New Zealand was substantially involved, and realised significant **achievements**.
3. An International Conference on Financing for Development, Monterrey, Mexico, 18-22 March 2002 developed the **Monterrey Consensus** addressing the financial requirements for development. This also addressed institutional and governance issues.

The 2005 UN General Assembly **World Summit** addressed a range of critical security issues, one of which was sustainable development. A central theme was the "interdependent and mutually reinforcing pillars" of sustainable development as economic development, social development, and environmental protection, as outlined in the **outcomes** document and its **fact sheet**.

In the years after 2005 the issues of **climate change** became more important, as the **2007 fourth assessment report** of the IPCC indicated more clearly the hazards of the increase in green-house gasses. The UNFCCC activity became more critical, and the need for concerted global action came to a head during the Copenhagen conference in December 2009, where high ambitions to attain a binding agreement clashed with the reactive political realities that many countries were dealing with. The result of the "train wreck" was a much diluted **Copenhagen Accord**; much less than was thought necessary for effective progress, but nevertheless provided a basis for moving forward. A less ambitious and more pragmatic approach was taken in Cancun in December 2010, with the hope that more progress is made in Durban in 2011. Wikipedia provides a **summary** of UNFCCC meetings, while the UNFCCC outlines a much greater range of the meetings related to the **Rio Conventions Calendar**.

On the broader sustainability program, the UN General Assembly resolution **A/RES/64/236** in March 2010 established the Rio+20 meeting for June 2012 in Rio de Janeiro. This resolution outlines the historical and organisational context of this event and identifies many of the principles involved. The Rio+20 web site details the preparatory documents and the planning for the event. The principal themes to be addressed learning from what has and has not happened in proceeding years, as well as developing “The Green Economy” and “The Institutional Framework” required to carry action forward. In December 2010, the UN Secretary General presented his report “Objectives and themes of the United Nations Conference on Sustainable Development”.

The UNCSO, under the Secretary Generalship of the Chinese diplomat Sha Zukang, is currently coordinating a series of meetings in preparation for Rio+20, coordinated with the UNFCCC meetings. The New Zealand government is involved in this process and has launched an ‘all of government’ exercise in preparation.

### **Comment**

These activities of the UN system are driven by the largely consensus agreement of the worlds’ governments, guided and stimulated by a range of ancillary organisations, NGOs and corporates, both national and international. The agreements do much to combine the interests and perceptions of the communities involved, the development and environmental agencies, corporate sector and international NGOs. They are broad ranging, incorporating the many ecological, social, political, technical, resource and economic factors in enhancing the sustainability of the development programs, and often distil the critical issues. However, the outcomes of the UN deliberations are essentially agreements between governments, and it is principally the responsibility of governments to implement them. The principal role of the UN is in monitoring progress, sharing information between countries and regions and providing some support for specific critical activities. Some insight into the nature and achievements of these programs can be seen in the UNDP report to the 2010 General Assembly “*Accelerating Progress towards the millennium Development Goals – UNDPs Work on Environment and sustainable Development*”.

While most of the development initiatives focus on the needs of the developing countries, there is also attention given to the need for changes in patterns of consumption which are directed principally at developed countries, as the General Assembly Resolution **A/RES/64/236** states:

*“Reiterating that fundamental changes in the way societies produce and consume are indispensable for achieving global sustainable development and that all countries should promote sustainable consumption and production patterns, with the developed countries taking the lead.....”*

This issue was also identified in Agenda 21 in 1992, and in the almost 20 years since, developed countries have continued their unsustainable consumption patterns almost unheeded, supported by an economic model that relies on continued expansion in consumption. Further, key developing countries, particularly China and India, have

developed their own economies based on the same unsustainable patterns, while exploiting the consumptive demands of the developed countries, as well as their own people's. Thus unsustainable consumption has, in that time, become further entrenched in the global economy.

For forty years now there have been authoritative warnings of the global unsustainability of the lifestyles of developed countries, but the message was contrary to common expectations of progress and the powerful interests that were promoting it. The message was dismissed, distorted and denigrated. The experts trying to warn people of the threats were dismissed as doom-sayers, and the public preferred to listen to those who denied the risks. Few governments have been able to respond adequately, because the political risks have been so great. Now that the threat is starting to impact on our life, many nations are at a loss of what to do. In fact some of the more coherent constructive responses seem to be associated more with the developing countries, rather than the developed.

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Note: Basic text was drawn from the Rio+20 web site, but it is extensively supplemented.

<http://www.uncsd2012.org/rio20/index.php?menu=22>

[Editor's note: What response do concerned futurists make to this? Can the UNA provide a more effective leadership in the future? If not who else?]