Sustainable Development: The Engineering Contribution Guidance Documents for Young Engineers

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Sustainable development has become a cornerstone of political and social policy and the decisions to be made have implications for engineers responsible for the construction and maintenance of the national infrastructure. The Royal Academy of Engineering (RAEng) that "brings together the most eminent engineers from all disciplines to promote excellence in the science, art and practice of engineering" has responded to this challenge to make engineers, and especially young engineers, more aware of sustainable development, and the contributions they can make, by appointing 26 Visiting Professors in Engineering Design for Sustainable Development at UK universities and by the publication of teaching materials for undergraduates.

Previous publications by the Royal Academy of Engineering for the use of engineering designers have included: *The Universe of Engineering - A UK Perspective* (2000), *The Social Aspects of Risk* (2003), and *Educating Engineers in Design* (2005). The RAEng's most recent publication is entitled *Engineering for Sustainable Development*: *Guiding Principles*, edited by two of the Visiting Professors, Richard Dodds and Roger Venables[1]. It was launched before a large audience on 6th September 2005 at a seminar entitled "*What do Engineers really need to learn about Sustainable Development?*" These Visiting Professors present case studies compiled from their own practical experience, that are based on general principles underlying the practical application of the theme of sustainability. A strong, healthy and just society can be realised by achieving a sustainable economy, by promoting good governance and by using sound science responsibly and living within our environmental limits. This publication is set in the context of the government's report on its strategy for sustainable development entitled Securing the Future (2005) that sets out the principles to be used to achieve this objective.

The concept of sustainable development originated in the 1987 Brundtland report of the UN World Commission on Environment and Development that has become a political slogan with a number of different meanings. The essential point made by Dodds and Venables is the need to ensure that we are all able to continue to live on this planet indefinitely. Engineers have made the world habitable and they are responsible for developing the earth's natural resources to provide us with the infrastructure services we have come to rely on. There are no more unexplored lands and undiscovered continents that we can expand into, we must make the best use of what we have.

Although the report does not discuss population growth, it is relevant to note that our numbers are increasing almost exponentially. In the last 75 years the world population has increased from just over 2 billion to just over 6 billion and planners are now considering the supply of the basic needs of shelter, water, fuel and food to 10 billion people in the foreseeable future. The earth's natural resources are not increasing, they are part of our capital, and we need to ensure that we look after this inheritance carefully.

Dodds and Venables refer to the five forms of capital: Human, Environmental, Social, Financial and Manufactured and they consider that we should strive to live off the interest rather than consume the capital. These factors should be combined in order to achieve economic success, social benefit and high environmental standards. They have selected seven examples to demonstrate how these objectives have been or are being achieved and to encourage others to introduce the concept of sustainable development into their own projects.

The Jubilee River is a new flood diversion channel on the River Thames which carries flood water to by-pass the towns of Maidenhead, Windsor and Eton.

Laundry cleaning products are an example of articles of mass production and consumption where the environmental impact of each stage of the process has to be considered.

The experiment of embedding sustainable development into an organisation has been introduced at Glasgow University.

Mobile phones are an iconic electronic symbol of the 21st century and the manufacturers are encouraged to examine the impact of their whole life cycle.

Regeneration of buildings: the Borough Council of Newtonabbey in Northern Ireland decided to renovate a disused mill for use as their new civic headquarters rather than construct a new building.

Catalytic converters: the use of catalytic converters is an example of balancing their practical benefits against the environmental impact of their manufacture.

The energy challenge: the problem is to meet the ever-increasing global demand for energy from sources generating minimal atmospheric pollution.

[1]Engineering for Sustainable Development: Guiding Principles.
Edited by Professor Richard Dodds and Professor Roger Venables. The Royal Academy of Engineering, 2005 ISBN 1-903496-21-7