

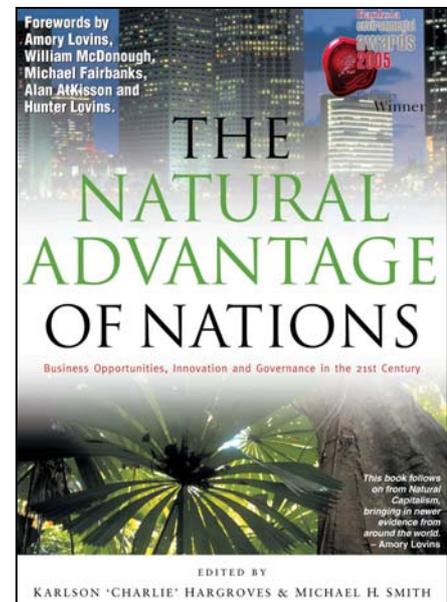


Engineering Sustainable Solutions Program

Course 1: The Role of Engineers in Sustainable Development (1 Day Short Course)

This course, targeted at entry level professionals and late tertiary students, explores the emerging field of sustainable development through an interactive format to enable participants to gain a strong understanding of, and ability to communicate, the base principles related to engineering practice. The course will focus on the context for incorporating sustainable development into the engineering profession, describing the terms, barriers, opportunities and existing tools that define and explain a whole systems approach to Sustainable Development.

The course and supporting book, *The Natural Advantage of Nations* (Earthscan 2005) were awarded the 2005 Banksia Award for Environmental Leadership, Training and Education and were one of three finalists in the Australian Museum Eureka Prize for Sustainability Education. The courses have been officially credited as part of the United Nations Decade for Education in Sustainable Development. [\(View online companion for program\)](#)



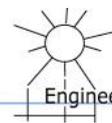
The Presenters



Charlie Hargroves (B.E. Civil) is a co-founder and Coordinator of The Natural Edge Project (TNEP); a non profit affiliate of Engineers Australia. Charlie is a co-author and the co-editor of the publication *The Natural Advantage of Nations*. Charlie recently returned from an engineering visiting scholar position at the University of Colorado, Boulder. He and his TNEP colleagues have contributed to a variety of private and government sustainability initiatives, and have presented a range of training courses and workshops in Australia and internationally.



Cheryl Paten (B.E. Env), *2005 Young Professional Engineer of the Year*, worked for 4 years with Arup after graduating and then joined TNEP as the Education Coordinator. In partnership with Griffith University, Cheryl is a lecturer in the School of Environmental Engineering. Cheryl is a co-author of the publication *The Natural Advantage of Nations* and she represents TNEP on the Engineers Australia National Sustainability Taskforce and the International Advisory Board for the International Journal of Sustainability in Higher Education.



Dear Reader

On behalf of Engineers Australia, the College of Environmental Engineers is pleased to announce the first of a number of educational modules on sustainability and engineering to be supported by the College over the coming years. The College is proud to have supported the development of this - the founding module - in the Engineering Sustainable Solutions Program being developed by young engineers and scientists from The Natural Edge Project (TNEP). TNEP was established in 2002 as a special project within Engineers Australia, as a form of in-kind support along with seed funding and mentoring. This has since grown into a partnership where the team has been mentored and guided by leaders within the engineering profession. The funding of this initiative demonstrates Engineers Australia's commitment to sustainable development. In particular it demonstrates the College's objective of ensuring that the sustainability imperative in engineering practice commences with education of all university engineering students.

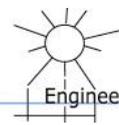
This introductory module will provide students with an understanding of the 'critical literacies' relating to sustainability. It is intended that it will be complimented by a second introductory module focused on providing a range of operational case studies to support the material presented here. The two introductory modules will then be used as the basis for other modules to be developed by TNEP through the Engineering Sustainable Solutions Program. These two introductory modules will prepare the reader for the six detailed modules comprising Level 1 and 2 under development in partnership with UNESCO. Support for this module also represents a further milestone in the development by the College of Environmental Engineers and the Environmental Engineering Society, of a series of documents with the intent of informing and directing engineering practice. They have included: The Environmental Principles for Engineers in 1992, The Policy on Sustainability in 1994 and Towards Sustainable Engineering Practice, Engineering Frameworks for Sustainability in 1997.

Continuing Professional Development is nowadays mandatory for all professionals, including engineers. The College will continue to assist members in maintaining their professional competency throughout their careers by the development of training modules across the sustainability agenda and in other related areas. The College is particularly anxious to ensure that all university engineering students are not only exposed to sustainability issues during their undergraduate learning, but that sustainability becomes an embedded feature in their practice as professional engineers. As National President of Engineers Australia, Doug Jones, stated earlier this year, "*It is up to engineers to consider sustainability in every project they design and construct, and every product that is made. Sustainability is now a fundamental responsibility that all engineers must carry every day.*" We are proud to provide the foundation stone to this program and look forward to the further publication of CPD modules in the coming years.

Yours sincerely
Tim Macoun FIEAust CPEng
Chair, College of Environmental Engineers
September 2004

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Engineers Australia is the common name of The Institution of Engineers Australia



Overview: The Role of Engineers in Sustainable Development

This short course, targeted at professionals in the field of engineering and the built environment, explores the emerging field of sustainable development through an interactive format to enable participants to gain a base understanding of, and ability to communicate, the main principles related to engineering practice. The course will focus on the context for incorporating sustainable development into the engineering profession, describing the terms, barriers, opportunities and existing tools that define and explain a whole systems approach to Sustainable Development.

On successful completion of this short course, participants will have a base understanding and will have gained experience in communicating the importance of the role of engineers in sustainable development and be able to articulate this role to peers.

In particular the course will look at the context for incorporating sustainable development into the engineering profession. Focusing on innovation and engineering creativity from the global context through drivers for unsustainable practices to implications of resource scarcity. The course will also cover the terms, principles, and existing mechanisms that contribute to delivering sustainable solutions.

Participants should have undertaken some self directed reading in the subject area however are not expected to have existing literacies. Participants should enter the course with an interest to explore further the role they will play in sustainable development as a Built Environment and Engineering Professional.

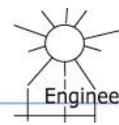
Text Book and Reading Material

Participants will be provided with copies of additional materials as required during the course. It is recommended that participants purchase a copy of the primary reference below and take some time to view the book's online companion database.

- Hargroves, K. and Smith, M Eds. (2005). *The Natural Advantage of Nations: Business Opportunities, Innovations and Governance in the 21st Century*. London, UK, Earthscan/James and James.

The Course will make reference to a number of key texts including;

- Benyus, J (1997) *Biomimicry: Innovations Inspired by Nature*, William Morrow, New York.
- Birkeland, J (2002) *Design for Sustainability: A Sourcebook of Integrated Eco-Logical Solutions*, Earthscan, London.
- Hawken, P., Lovins, A. and Lovins, H. (1999). *Natural Capitalism: Creating the Next Industrial Revolution*. New York, Little brown & Company.
- Von Weizsäcker, E, Lovins, A and Lovins, H (1997) *Factor Four: Doubling Wealth, Halving Resource Use*, Earthscan, London.

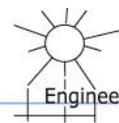


Course Overview

The Role of Engineers in Sustainable Development short course aims to explore the emerging field of sustainable development and enable participants to gain a base understanding and ability to communicate the main principles to apply to their area of professional activity.

Theme: Engineering Sustainable Solutions, aims to set the context for incorporating sustainable development into the engineering profession and will cover the following topic areas.

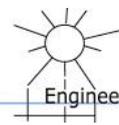
- The Global context from which the call for sustainable development has emerged, highlighting the history and role of engineering.
- The main reasons for the sudden urgency for sustainable development, such as ever increasing pressures on the planet's natural ecosystems and resources to provide for the increasing global population.
- The concept and evidence that sustainability will create opportunities and stimuli for innovation.
- Placing the engineering profession within the context of sustainability, highlighting how engineers can have a significant impact on progress toward sustainable development.
- Commonly used terms, aims to briefly introduce the terms 'eco-efficiency', 'ecological footprint', 'life cycle assessment', 'integrated bottom line', and 'whole systems thinking'.
- Economics, Business and the Market and the role of the environment as a vital element for sustaining business and the global economy.



Supporting material for classes

This course presents the material developed by The Natural Edge Project in the Engineering Sustainable Solutions Program, developed in partnership with and through a Grant by the Environmental College of the Institution of Engineers Australia. As a resource for students a number of handouts will be used during the program and will be structured in the following way.

	<p>Educational Aim:</p> <p>This provides a snapshot of the intent: the key message for this part of the Technical Unit, as an overall guiding aim for the trainer. The trainer may use this as an introduction to the class.</p>
	<p>Learning Points:</p> <p>This lists the key items to cover during this part of the Technical Unit. The text has been formatted so that it can be easily copied onto overhead slides.</p>
	<p>Brief Background Information:</p> <p>This provides the trainer with a context within which to interpret the key learning points. It also indicates the type of information contained in the recommended references and resources. This material often explains terminology in more depth, or provides background information to help further explain concepts in case students find the material difficult to understand. This additional information could also be used to prepare student handouts, or as additional reading for students. Note: Brief background information should not be considered the core source of in-depth information. The trainer should refer to additional references such as The Natural Advantage of Nations for detailed information to support lecture delivery.</p>
	<p>Key References:</p> <p>This list is essential as a summary of where key information has been sourced from, and where more information on related topics can be found.</p>
	<p>Key Words for Recommended Web Sites:</p> <p>Due to the frequency of address changes on the internet, key words have been provided as well as web site addresses. With the vast search capabilities of current search engines, a search on these key words will also list the most current material available on the topic of interest.</p>
	<p>Assessment Questions and Activities:</p> <p>A number of questions and activities have been provided for each Part of a Technical Unit to help check whether the students have understood the key terms and content. The questions are intended as 'memory joggers', to be used as a quick quiz at the end of the unit, or at the end of each part of the unit, depending on the preferred teaching style. The activities could be undertaken as a workshop session or could be carried out by the students as homework or a short take-home assignment.</p>



Companion Website

A companion website has been developed for the technical components of the course to facilitate access to material for further research, updated by The Natural Edge Project.

An example of the type of material presented on the web site is given below:

Profitable Greenhouse Solutions

Introduction to Cost Effective Greenhouse Solutions

Adjunct Professor Alan Pears writes. "(Greenhouse Gas) Emission reduction sounds like a daunting prospect, and many people imagine that we will have to freeze in the dark, shut down industry, and face misery. But remember, we don't have to slash greenhouse gas emissions in a couple of years - we are expected to phase in savings over decades. This allows us to take advantage of the fact that most energy producing or using equipment, from fridges and computers to cars and power stations has to be replaced every 5 to 30 years. So we can minimise costs by making sure that, when old equipment is replaced, low greenhouse-impact alternatives are installed. For example, by 2020, most of Australia's dirty coal-fired power stations will be more than 30 years old - and they will have to be re-built or replaced: renewable energy, cogeneration and high efficiency energy supply technologies (such as fuel cells) could replace them. Similarly, most household appliances are replaced every 15 years: in 2005, you will be able to choose a super-efficient fridge that generates a third as much greenhouse gas as today's 5 star fridge. "

[Read full article](#) | [View Further papers by Alan Pears](#)

Climate: Making Sense and Making Money

In fact approached wisely preventing climate change can be extremely profitable if governments work with their business sectors and civil society to ensure that when old equipment is replaced, it is replaced with low greenhouse-impact alternatives. But to do this, governments need to address as many as 80 regulatory, institutional and market failures that prevent these options from being adopted. One of the best overviews of how any nation can wisely address these barriers is Amory and Hunter Lovins' paper, Climate: Making Sense, Making Money. It clearly shows through inspiring case studies that businesses, governments and energy utilities around the world are addressing these key barriers for change with remarkably profitable results.

[View PDF](#)

This paper provided the basis of Chapter 12 of Natural Capitalism: The Next industrial Revolution. Download the entire chapter from either the RMI or Natural Capitalism Inc web **sites**.

[View PDF](#) | [View Website](#)

Cool Companies: Cutting Pollution and Saving Money with Clean, Efficient Energy Technology.

"A new industrial revolution is helping American companies save energy and reduce pollution using clean, efficient technologies, and even on-site production of energy. Nearly 100 case studies charted by the Centre for Energy & Climate Solutions for the Cool Companies project demonstrate how one business after another is earning the equivalent of 40 to 50 percent returns on energy-saving investments. Savings bring not only lower costs, but also measurable, documented productivity gains through improved product quality and employee morale."

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