ICE/IStructE/ACED Annual Conference 2007

Meeting the Challenges - Sustainability in Design Teaching Experience at Queen's University

Professor Roger Venables

Managing Director, Crane Environmental,
Royal Academy of Engineering Visiting Professor in Engineering Design for Sustainable Development at Queen's University Belfast
and Chief Executive CEEQUAL Ltd

Sustainability in Design Teaching

- Coverage:
  - The RAEng VP Scheme
  - Objectives and achievements so far at Queen's
  - What is still planned to be completed
  - Challenges
  - Hoped-for outcomes

Sustainability in Design Teaching

- The RAE Visiting Professorship Scheme
  - Supports VPs at UK universities for 5 year stints
  - VPs in Engineering Design for Sustainable Development followed earlier scheme on Engineering Design – now VPs in Integrated Systems Design
  - Across all engineering disciplines, and seeking to involve non-engineers
  - 26 appointed – RKV one of 6 in 2002 (5 in 2003, 0 in 2001, 5 each in 2000, 1999 and 1998)
  - Initial 3 years, almost all extended to 5
  - Primary task = preparation of case-study-based teaching materials to embed SD in engineering curriculum
  - Results meant to be available to all UK Universities

Sustainability in Design Teaching

- RKV's overall role as VP at Queen's
  - Faculty-wide but so far mostly in SPACE
  - Working towards SD thinking being embedded in teaching of all engineering, especially in design
  - Assisting with staff development on SD
  - RKV teaching as pre-cursor to the staff developing their own teaching of engineering design for SD
  - Exit strategy - Working oneself out of the job!
  - Supporting the wider application of SD principles at the University

RKV Academic Sponsor, Professor Adrian Long

Sustainability in Design Teaching

- RKV's specifics at Queen's
  - Development and use of case studies (for teaching of 'Engineering Design for Sustainable Development')
  - Curriculum Development – embedding SD thinking
  - Assisting teaching staff up the sustainability learning curve
  - RKV Teaching – introductory *and* SD in design, plus modifications to major projects, and Design at all levels
  - Supporting preparations for re-accreditation by JBM and new SD Guidelines
  - Identifying colleagues to 'carry the torch' forward
  - Links with other relevant groups
  - Supporting development of SD-driven research

Sustainability in Design Teaching

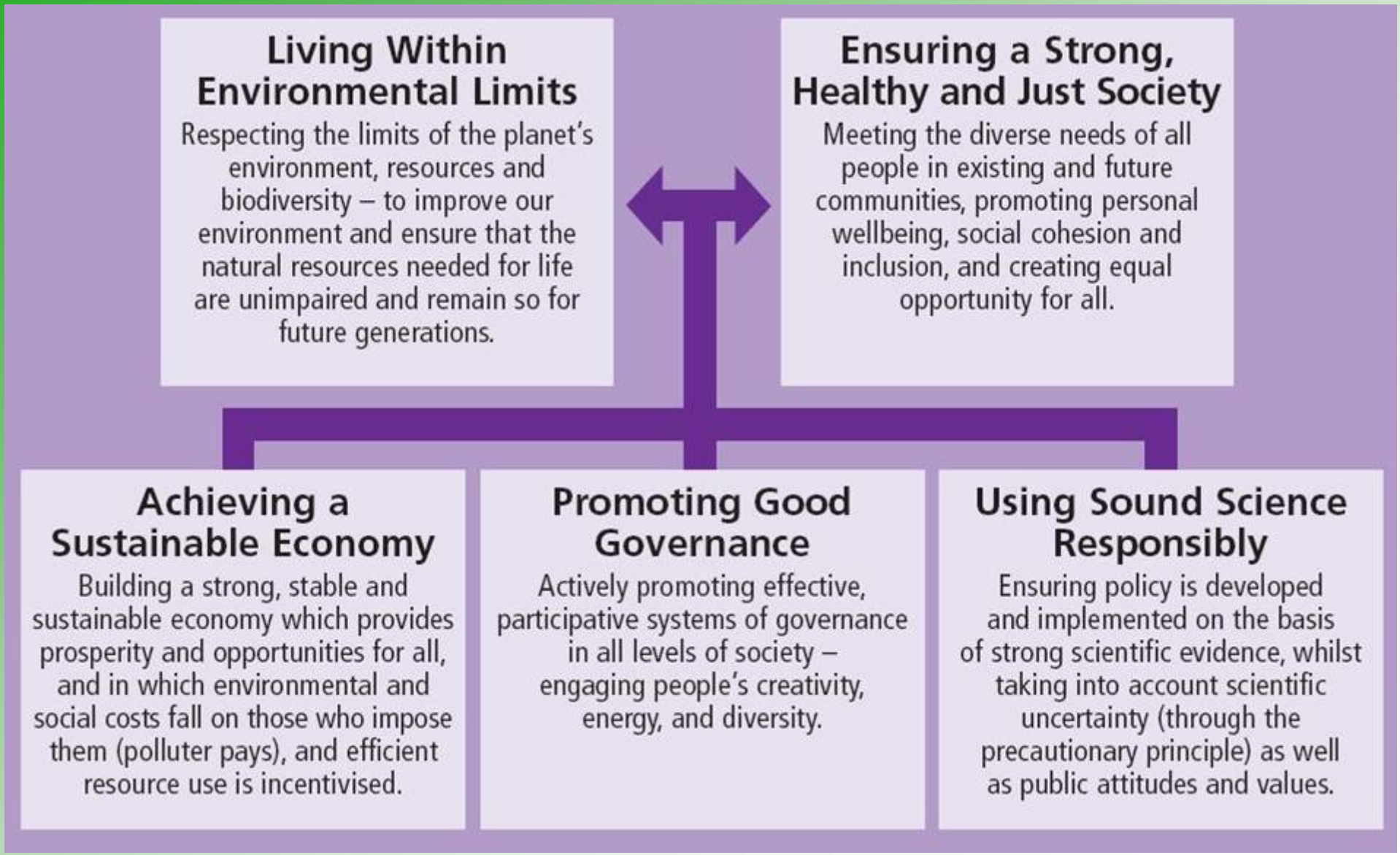
- **Example changes**

We need to think in terms of 'one-planet-living', not three

Think globally – act locally

Engineer locally, while thinking globally

New UK Government Sustainable Development Strategy



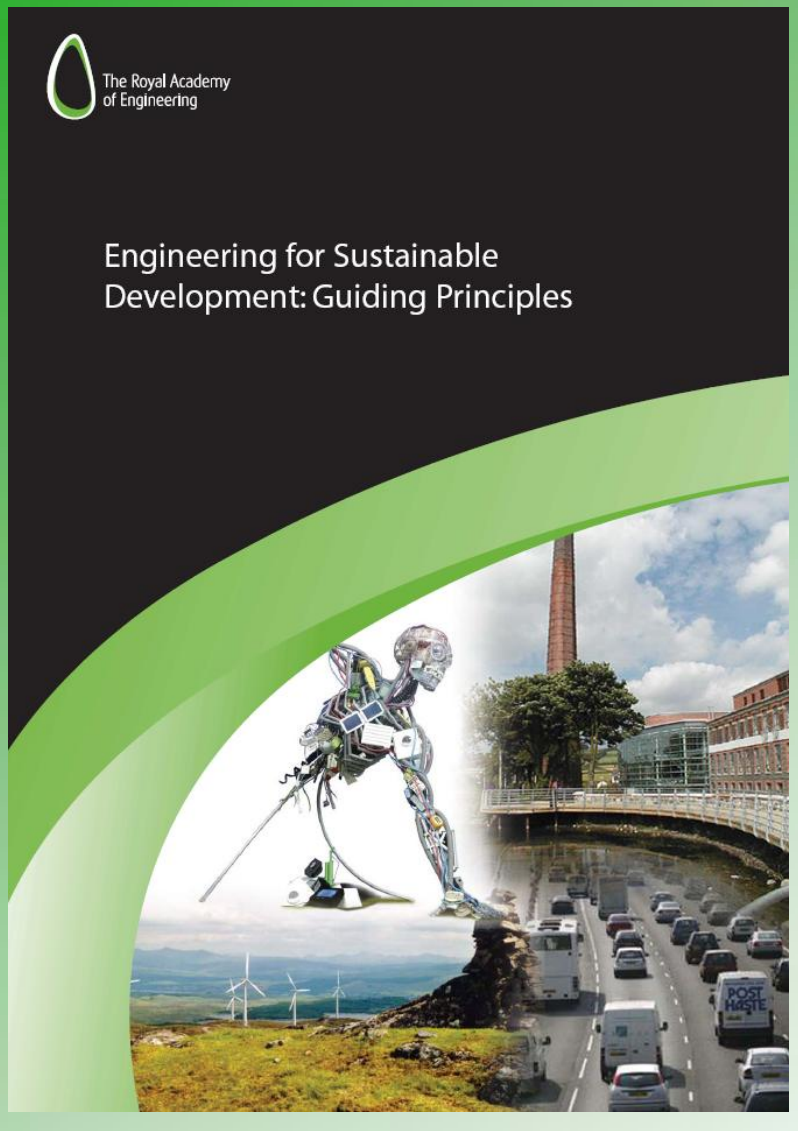
Sustainability in Design Teaching

- Example changes
  - All civils students have SD addressed by RKV every year
  - Mock Public Inquiry project re-focussed into an SD context
  - Social aspects of Hazards & Disasters project enhanced
  - Level 1 Communications focus on SD with marked essays
  - Level 2 Design – sustainability applied to design of elements
  - Level 4 Design – Sustainability appraisal now a marked element of design projects
  - Timber bridge design module – added focus on sourcing, waste minimisation, design for minimum waste
- But … NOT diluting $wl^2/8$

CEEQUAL – The Civil Engineering Environmental QUALity Assessment & Awards Scheme

www.ceequal.com

RAEng Guide to Engineering for Sustainable Development



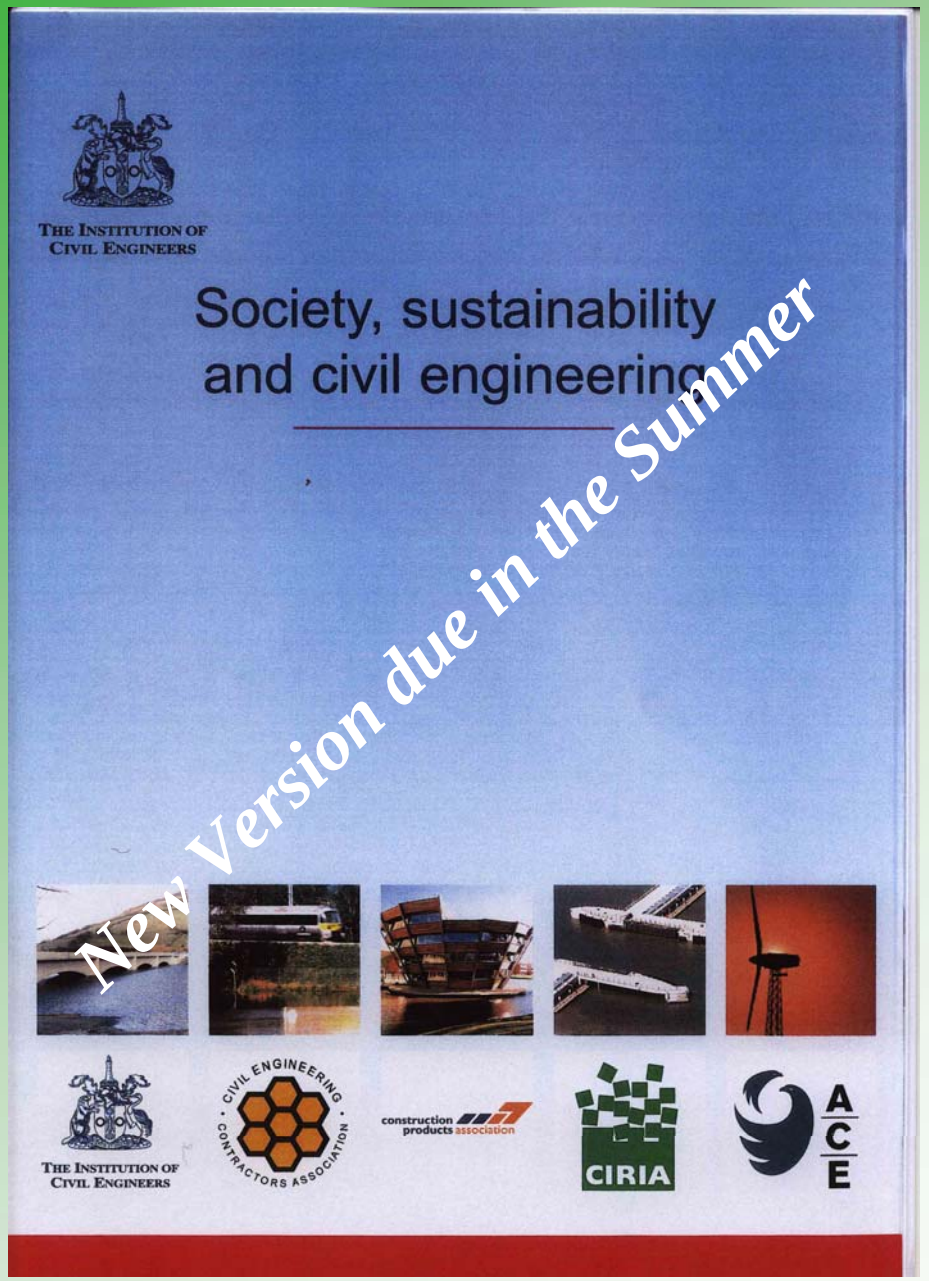
- Contents
  - Introduction
  - Examples of Sustainability Issues in Engineering
  - 12 Guiding Principles
  - The Principles explained
  - The Principles related to the Examples
  - Application of the Principles in Practice
  - Use of the Guide in Academia, Practice and Personal Development

1. Look beyond your own locality and the immediate future
2. Innovate and be creative
3. Seek a balanced solution
4. Seek engagement from all stakeholders
5. Make sure you know the needs and wants
6. Plan and manage effectively

7. Give sustainability the benefit of any doubt
8. If polluters must pollute… then they must pay as well
9. Adopt a holistic, ‘cradle-to-grave’ approach
10. Do things right, having decided on the right thing to do
11. Beware cost reductions that masquerade as value engineering
12. Practice what you preach.

1. Look beyond your own locality and the immediate future

12. Practice what you preach – do not expect more of others than you expect of yourself.



- Next Steps at Queen's
  - Teaching Fellow - full time June 07 to September 08, plus RKV role extended
  - Preparation of materials to enable an intro module, and intro lectures to be delivered by staff
  - Module reviews to link them to SD agenda and intro modules and lectures
  - Embedding SD thinking in delivery as a result
  - More seminars for staff
  - Continued RKV Teaching but in collaboration with staff
  - Identifying more colleagues to 'carry the torch' forward
  - Roll out to other schools
  - Continued support for ISW

Sustainability in Design Teaching

- The challenges?
  - Staff development and engagement
  - Reaching consensus about what needs to be done to the courses and modules
  - Developing good materials that others will *want* to use
  - Creating markable assignments
  - Finding room in modules
  - Finding room in the timetable
  - Long-term commitment

- The challenges continued
  - Embedding …
  - Keeping it all current and up to date with developing thinking

Sustainability in Design Teaching

- And the outcomes for students?
- An understanding and appreciation of
  - sustainability and SD
  - the contribution of engineering generally to their delivery
  - the constraints they place on engineering practice
  - the principles of engineering design for SD
  - the role of their chosen specialism in SD delivery
  - the importance of multi-disciplinary working to delivery of modern infrastructure and buildings

- Student outcomes continued
  - Project-based experience of applying the principles
  - Delivery of their own commitment?

Sustainability in Design Teaching

- Summary?
  - Come a very long way
  - A warm welcome for the initiative – staff and students
  - Wide range of enthusiasm and uptake – staff and students
  - SD and one-planet-living ethos introduced, and specific changes made already
  - Re-accreditation in line with JBM guidelines achieved
  - Much more still to do – agenda agreed & full time help secured!
  - Torch carriers needed!

Sustainability in Design Teaching

CRANE
environmental

Queen's University
Belfast

roger@crane-enmvironmental.co.uk

www.crane-environmental.co.uk*, *then go to News and Current Projects