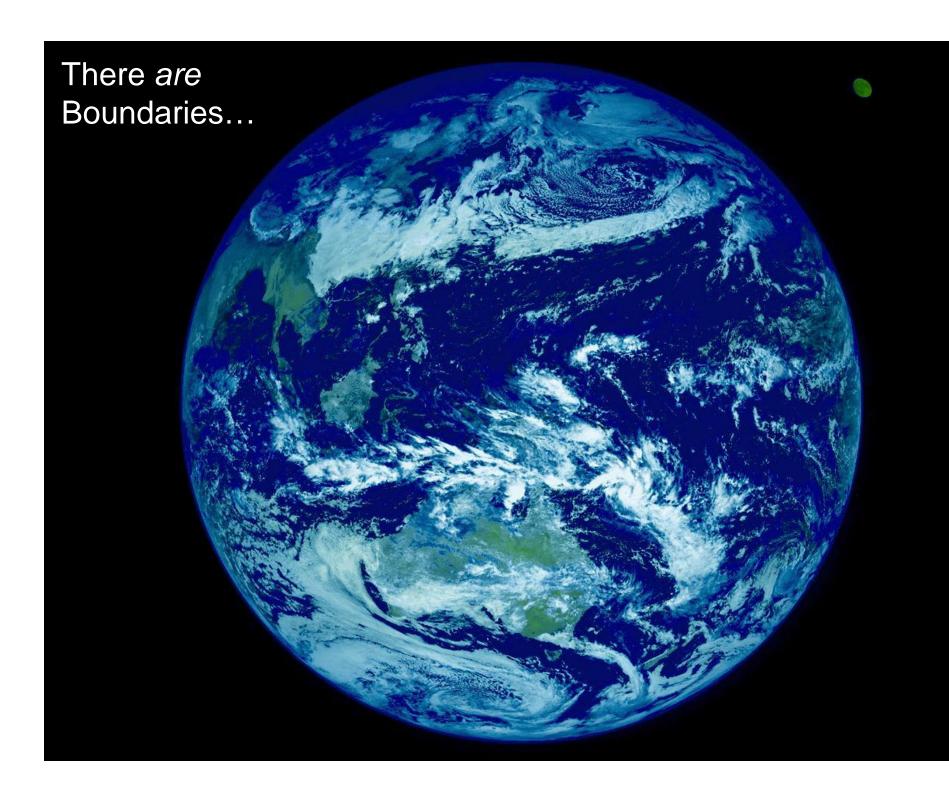
Fourth Sustainability Revolution and Sustainable Peace

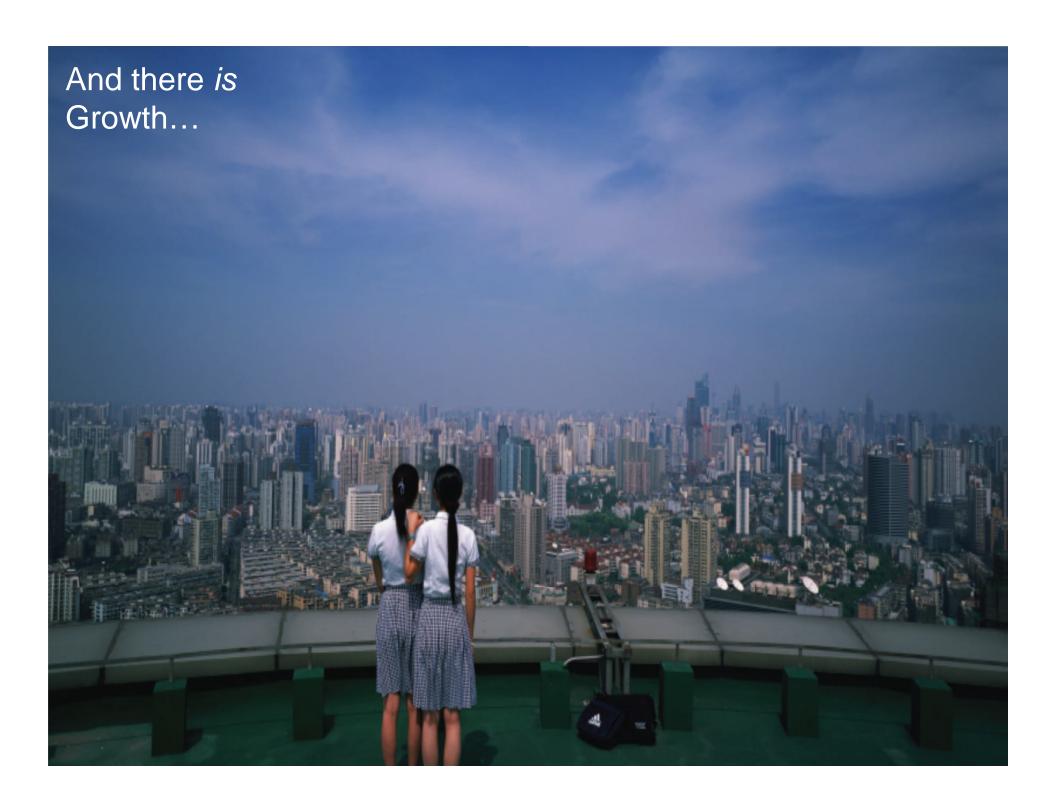
Visions and Strategies for Long Term Transformative Change to Sustainable Development in the 21st Century

Karlson 'Charlie' Hargroves

Curtin University Sustainability Policy Institute

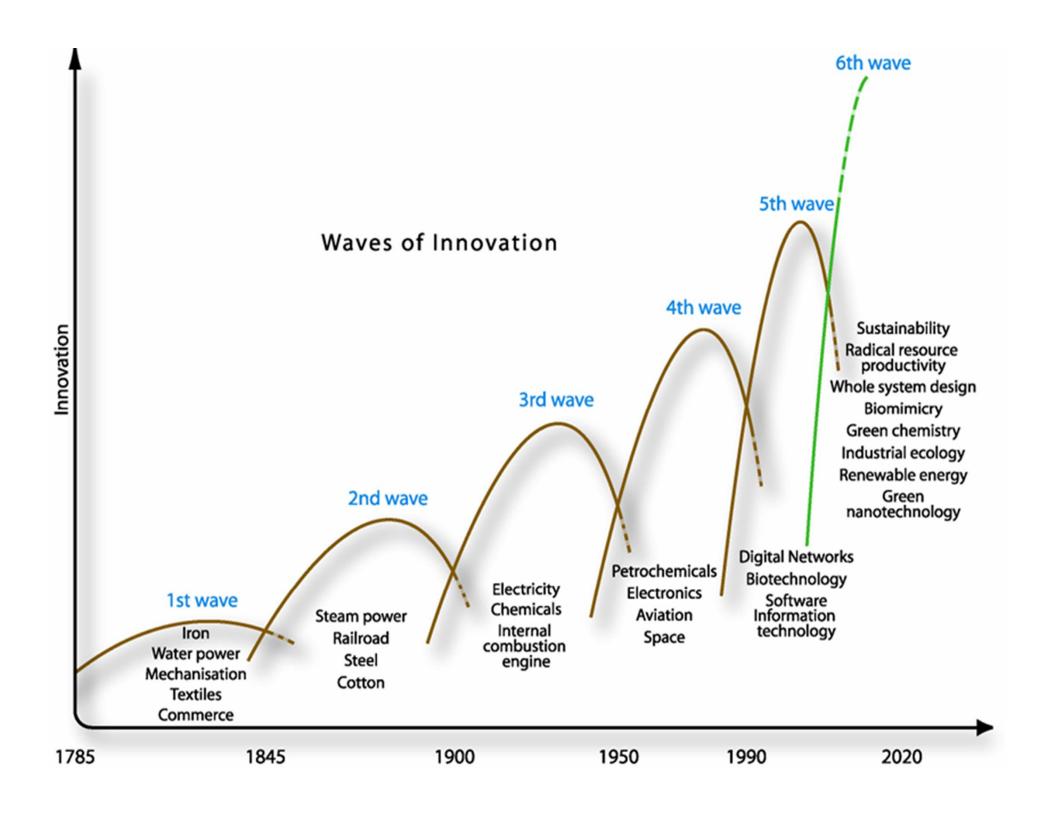
Morelos, Mexico, 10 – 13 September 2012 A Joint Workshop of UNAM-CRIM and AFES-PRESS

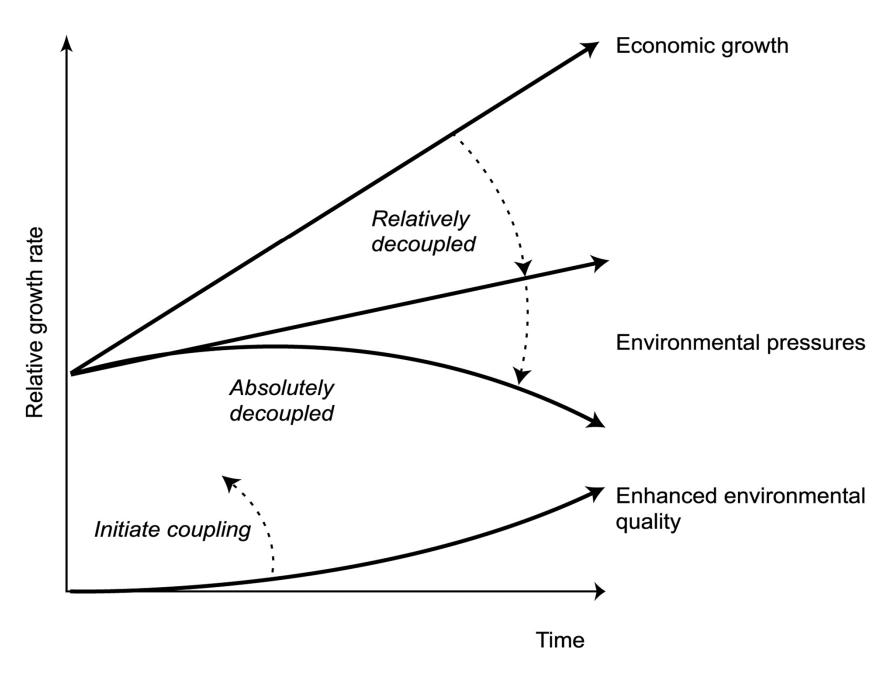




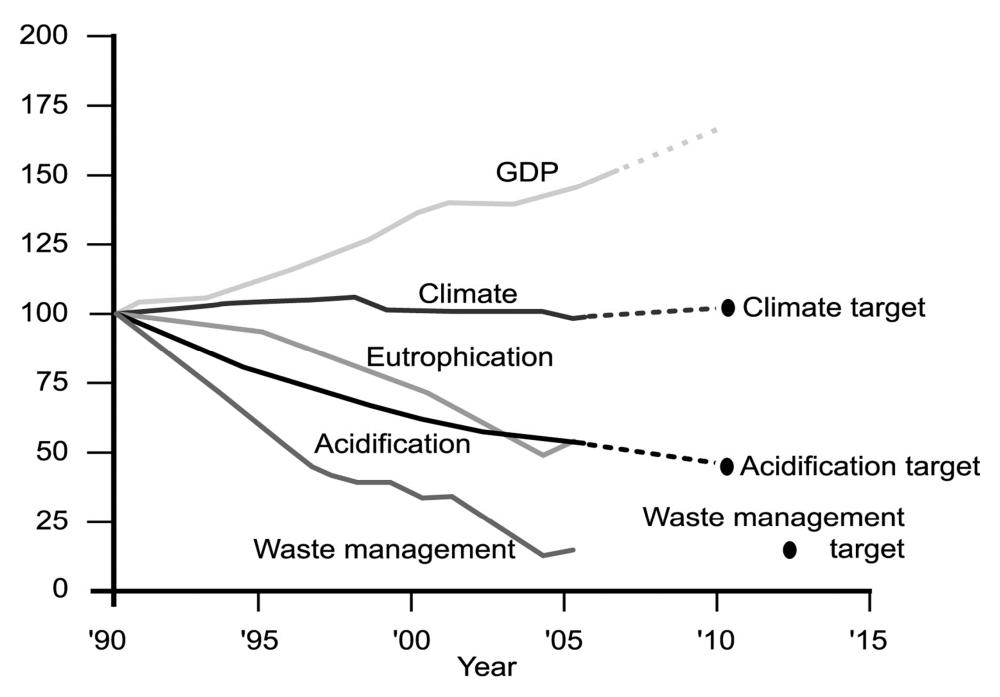






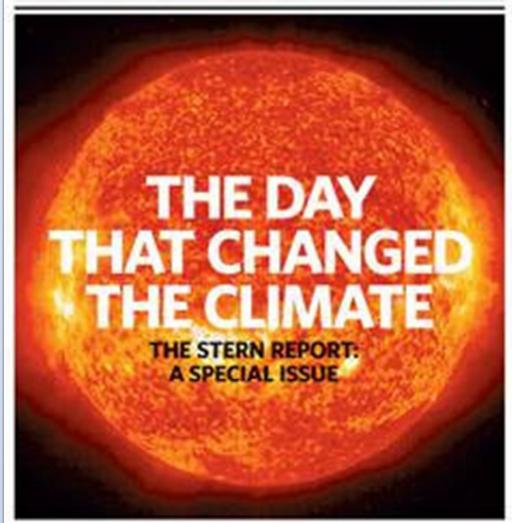


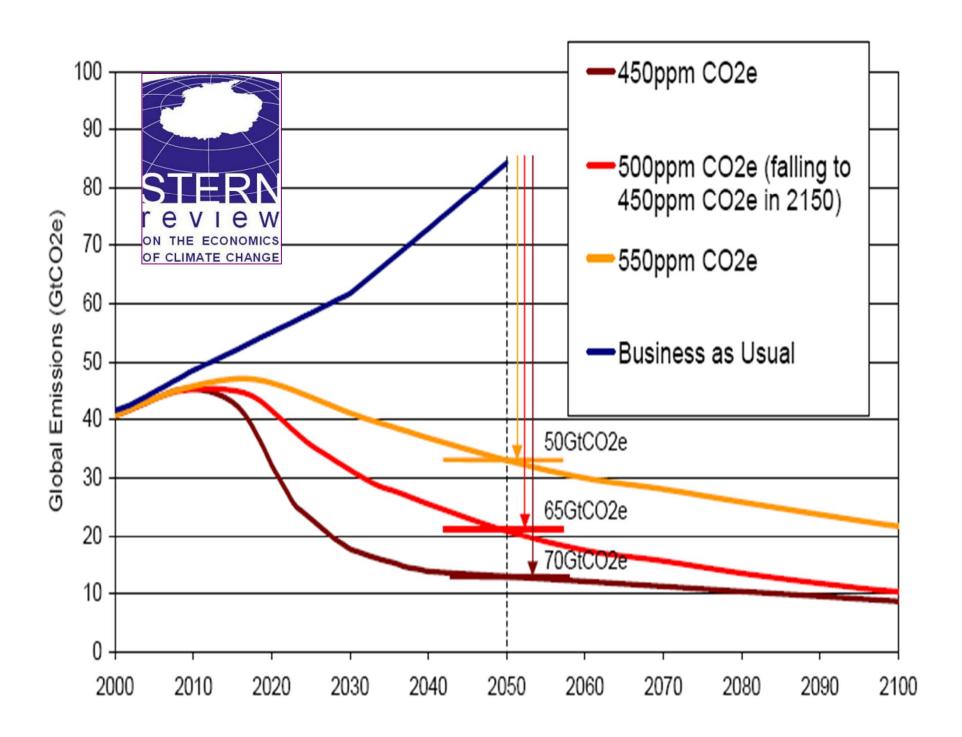
Source: Smith, M., Hargroves, C. and Desha, C. (2010) Cents and Sustainability, Earthscan, London.

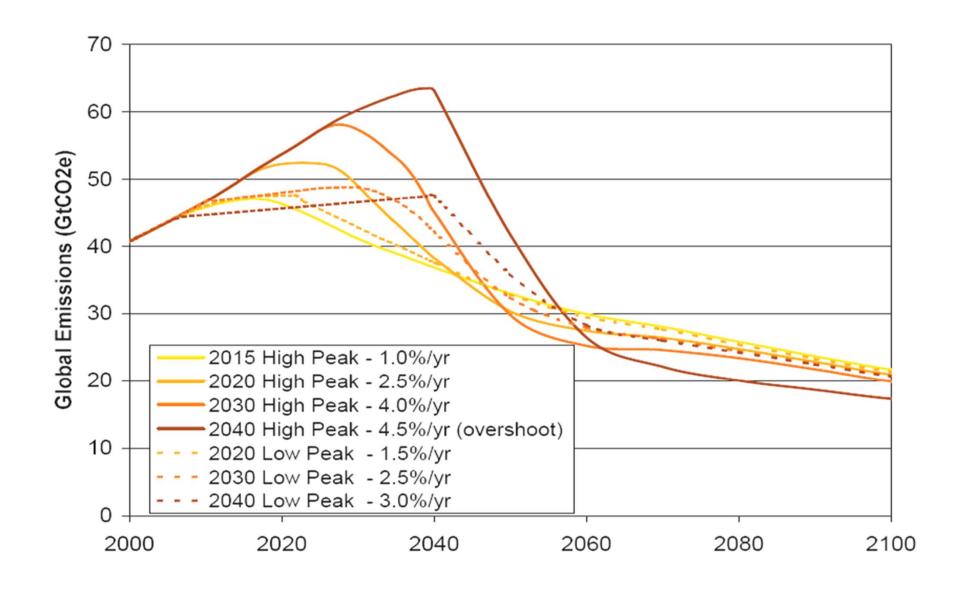


Source: Netherlands Environmental Assessment Agency (2007) Environmental Balance 2007, Netherlands Environmental Assessment Agency (MNP), Bilthoven, The Netherlands.



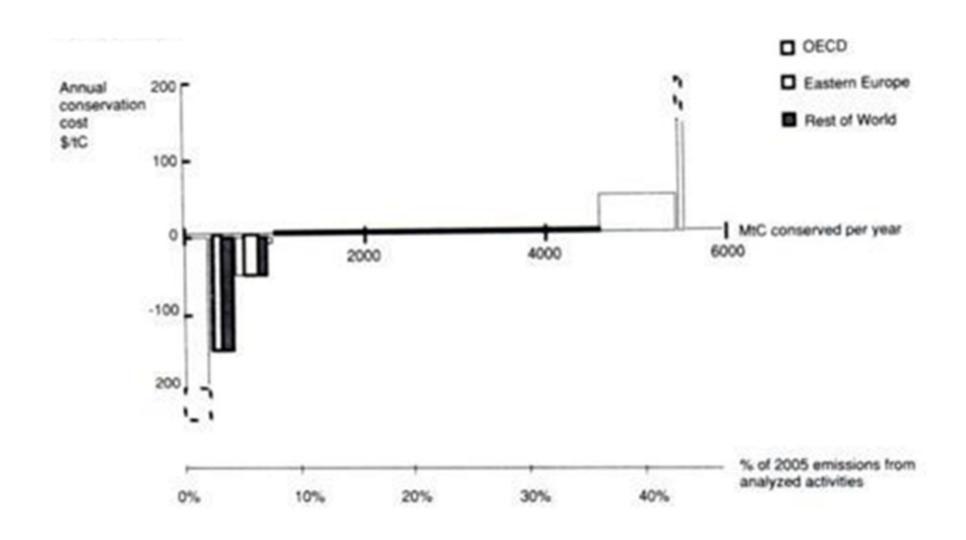






Illustrative emissions paths to stabilise at 550ppm CO₂e.

Source: Stern, N. (2006)



McKinsey Carbon Abatement Cost Curve, 1991.

Source: Cited in MacNeill, J. (1991) Beyond Interdependence, Oxford University Press, New York.

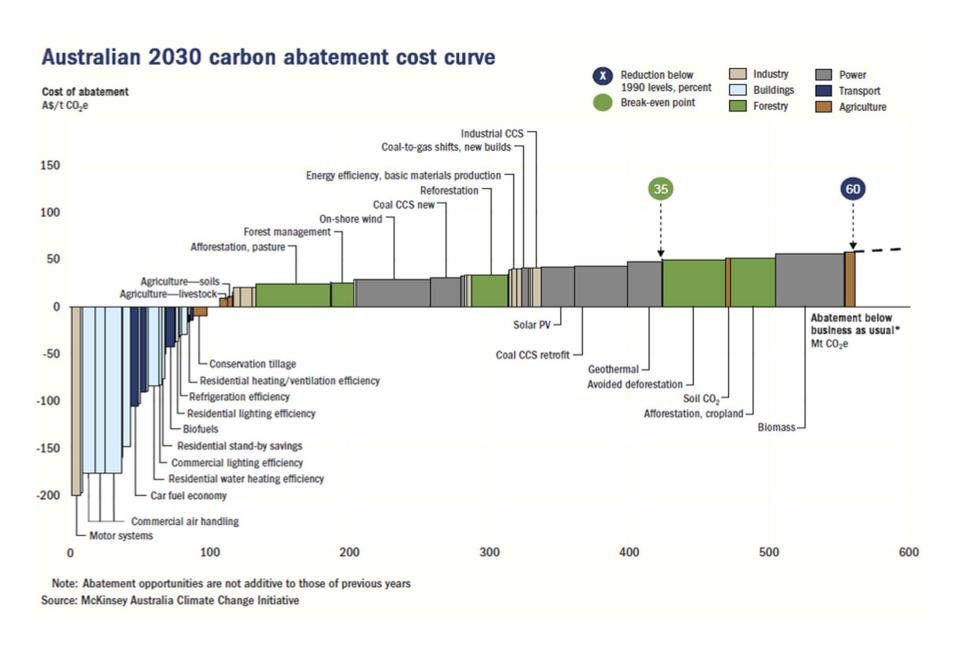
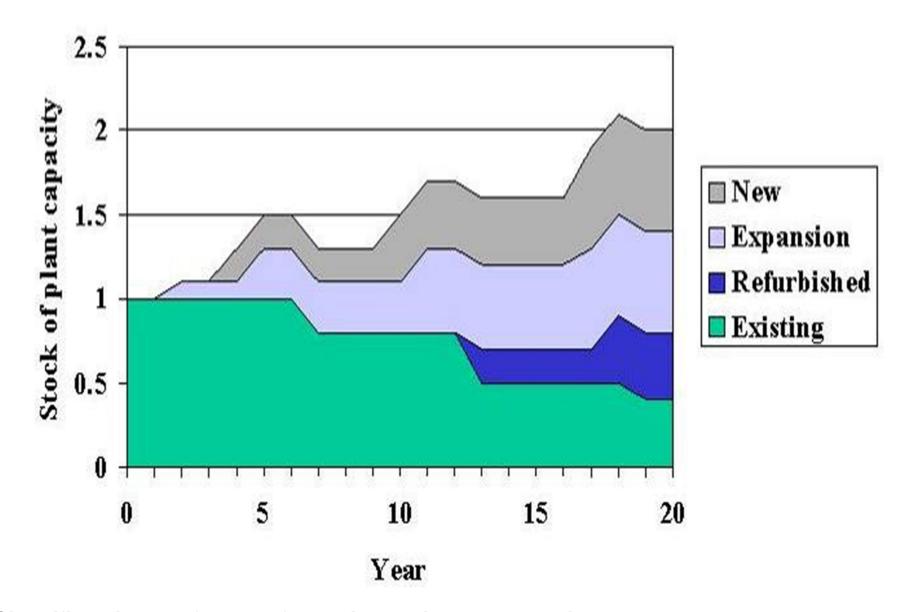
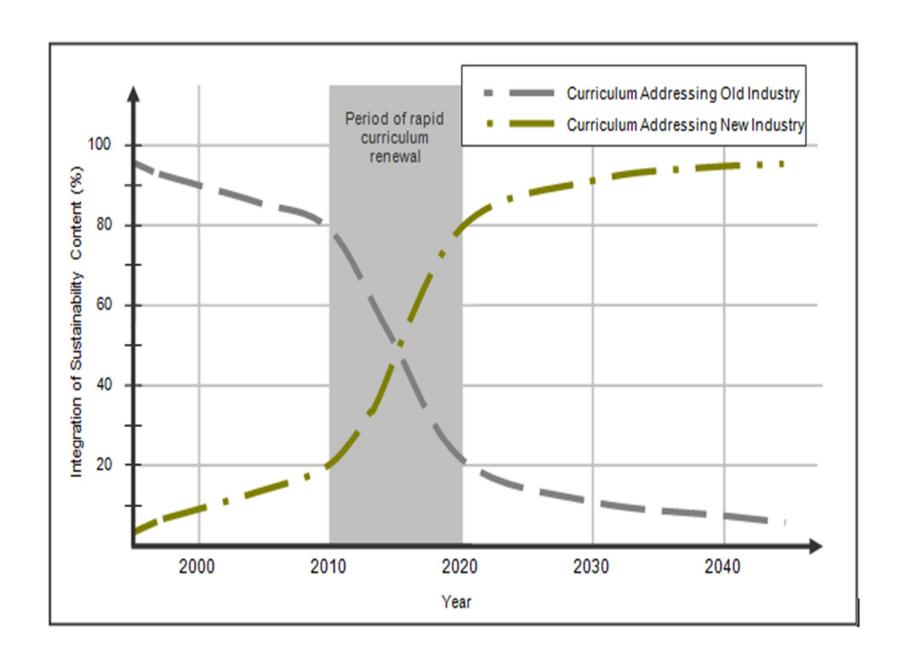


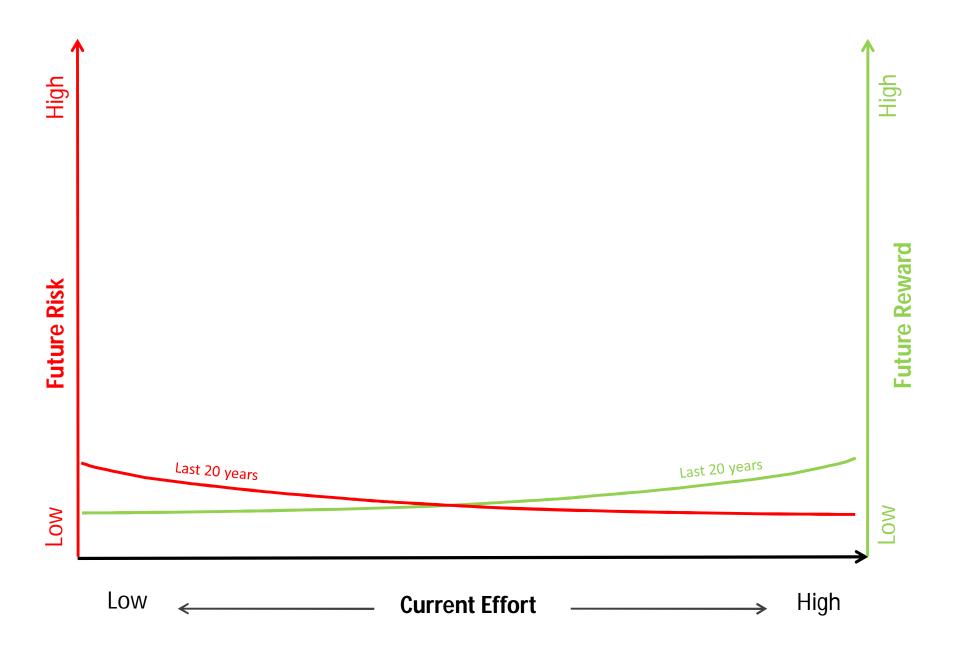
Figure 7.5: McKinsey Australian Carbon Abatement Cost Curve, 2007 Source: McKinsey Consulting (2007) An Australian Cost Curve for Greenhouse Gas Reduction, McKinsey Consulting.

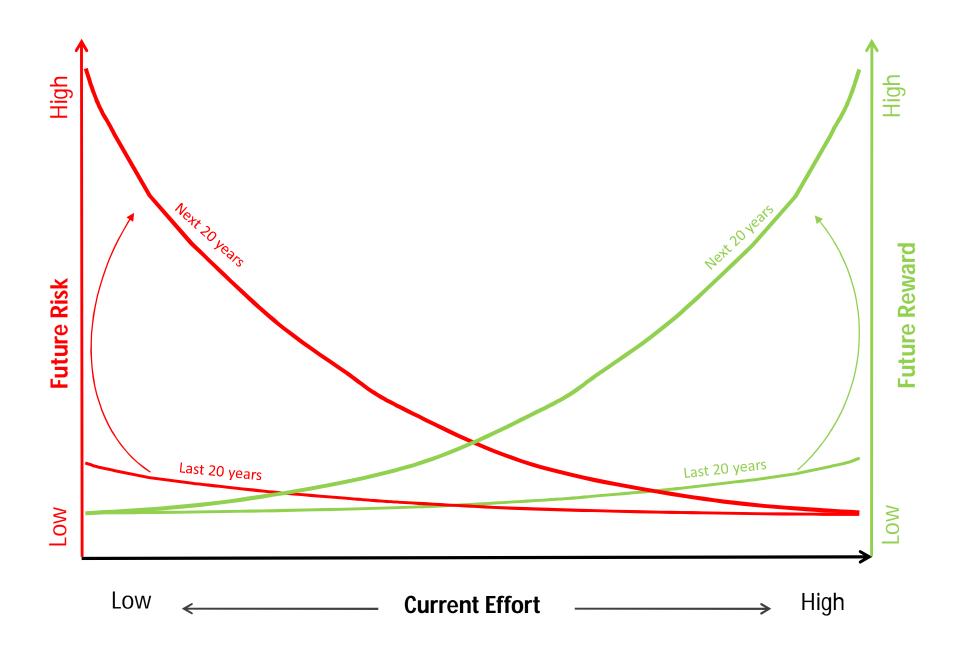


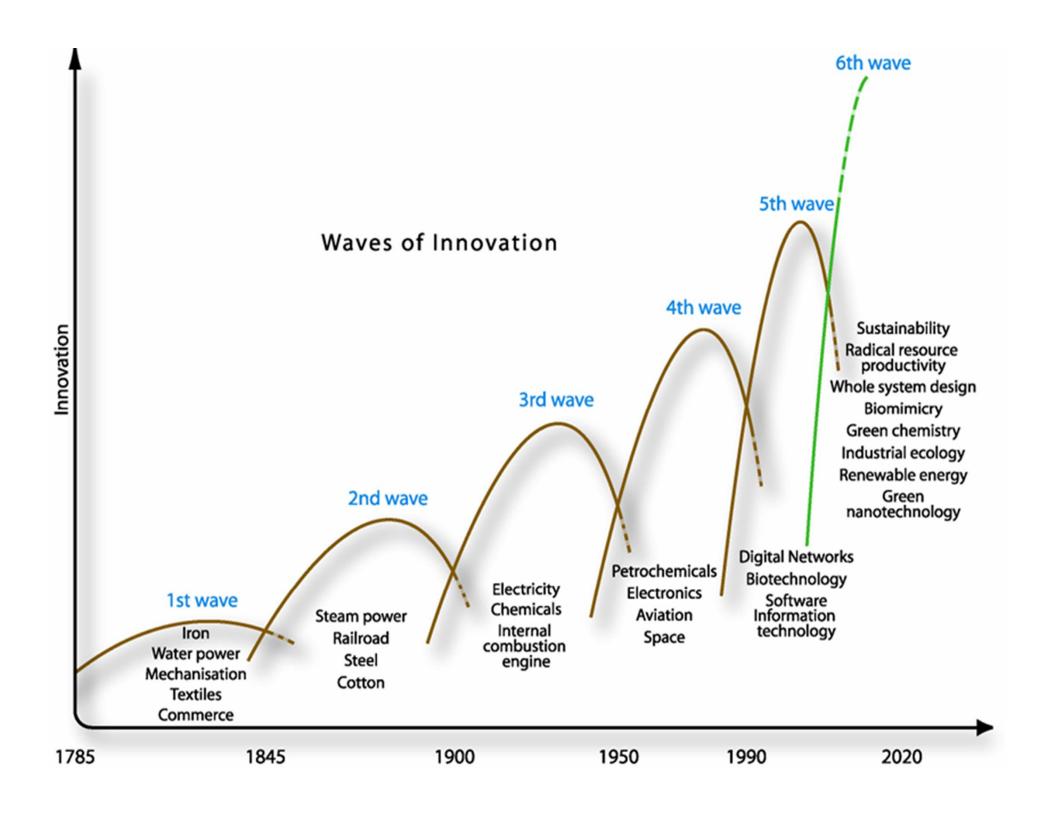
Simplified picture of stock of large industrial plant over time.

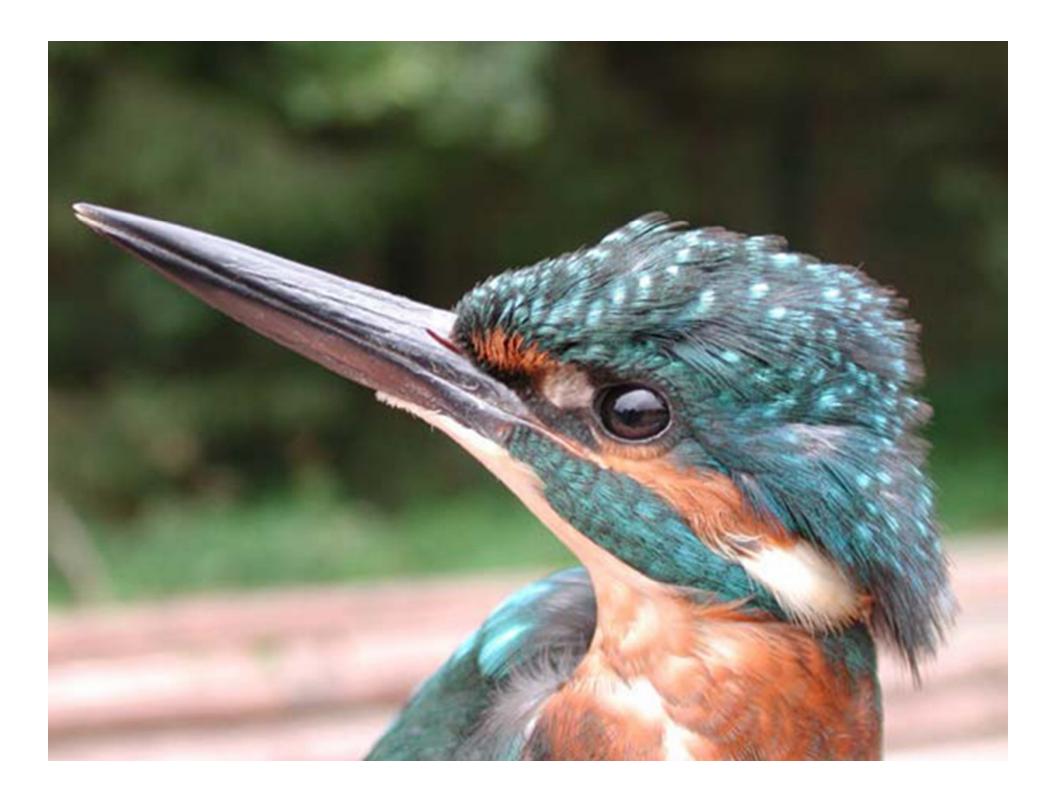
Pears, A. (2004) Misconceptions About Energy Efficiency – Its Real Potential: Some Perspectives and Experiences, Background paper for International Energy Agency Energy Efficiency Workshop, Paris April 2004.







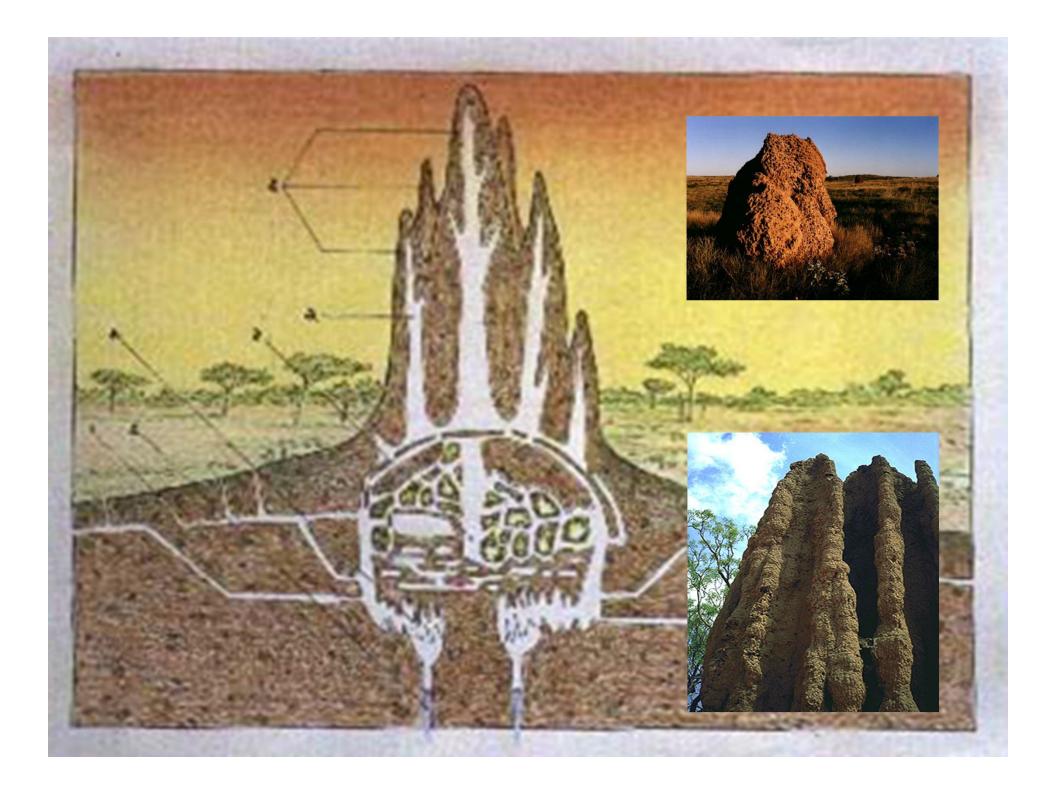


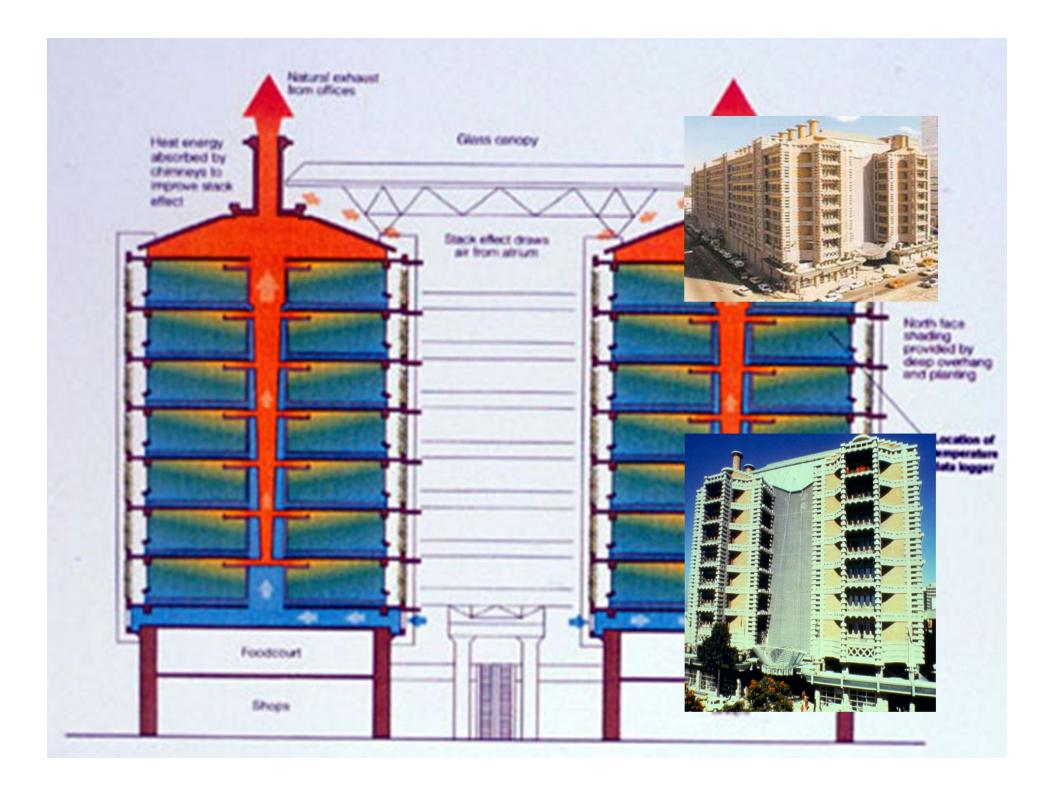


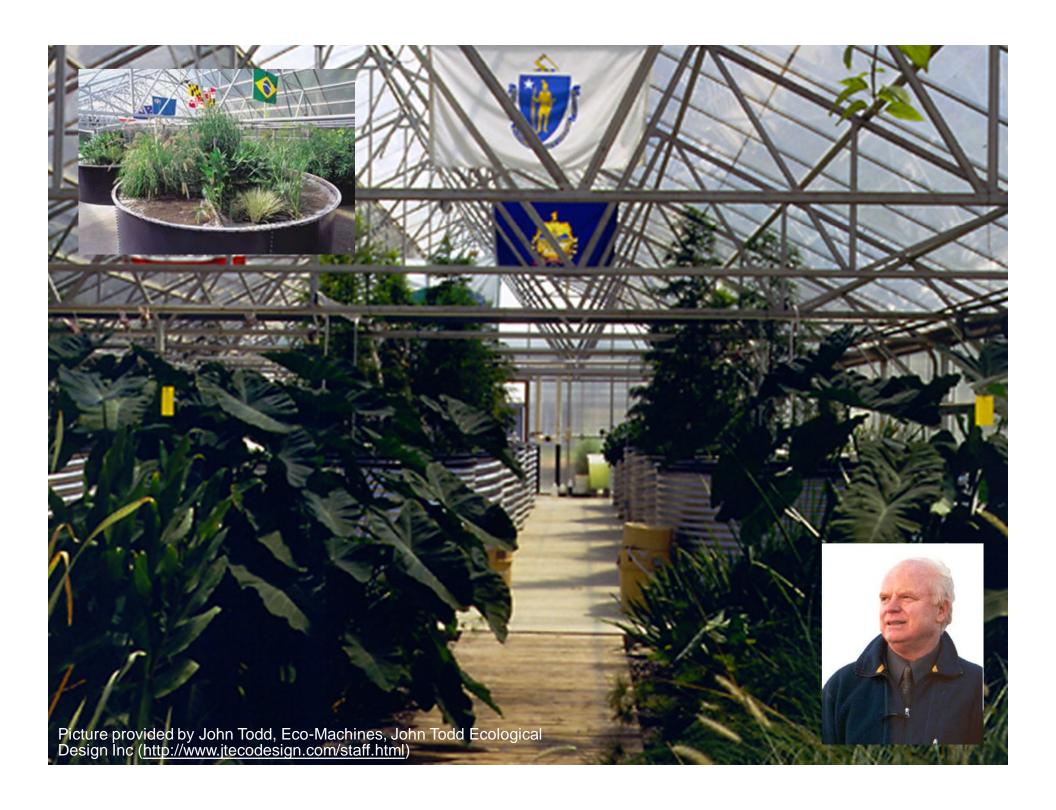














"The exciting thing about Factor Five is the combination of boldness and realism."

Lester R. Brown

"This exciting synthesis combines a powerful efficiency toolkit with farsighted policy insights."

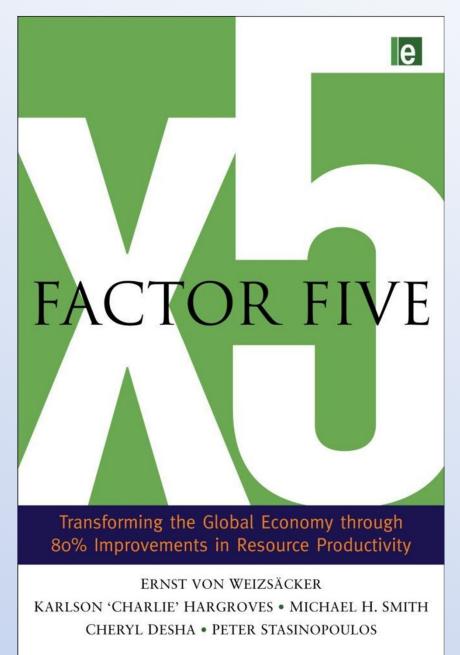
Amory B. Lovins

"Factor Five provides numerous win-win strategies."

R K Pachauri

"Factor Five shows the potential for major resource intensive sectors to significantly reduce greenhouse gas emissions in a costeffective manner."

Richard L. Sandor



"The arrival of Factor Five couldn't be more timely - or more significant."

Jonathon Porritt

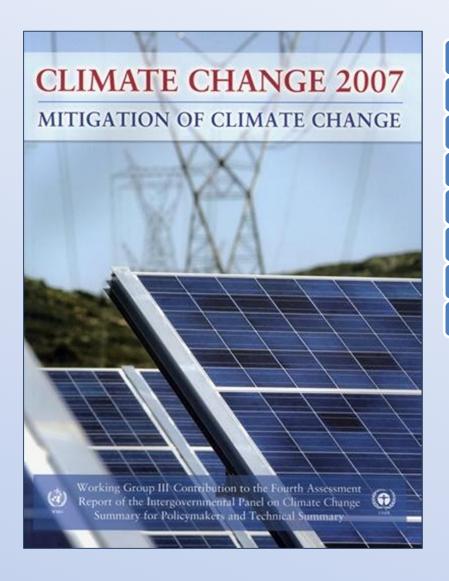
"This publication makes a significant contribution in responding to the global change imperative and should be required reading." Andrew Johnson (CSIRO)

"We need this book ...urgently."

Brice Lalonde

"We should embrace the strengthened message of Factor Five." **Bedrich Moldan**

Using a Systems Based Approach



- 1. Energy Efficiency
- 2. Fuel Switching
- 3. Heat & Power Recovery
- 4. Renewable Energy
- 5. Feedstock Change
- 6. Product Change
- 7. Materials Efficiency
- 8. Reducing Non-CO₂ Greenhouse Gases

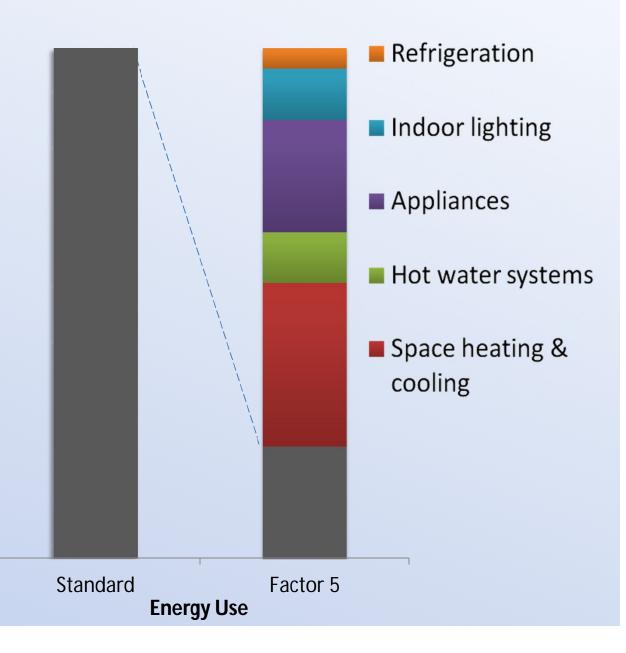
"Industrial Mitigation Matrix"

IPCC 4th Assessment Working Group III Report

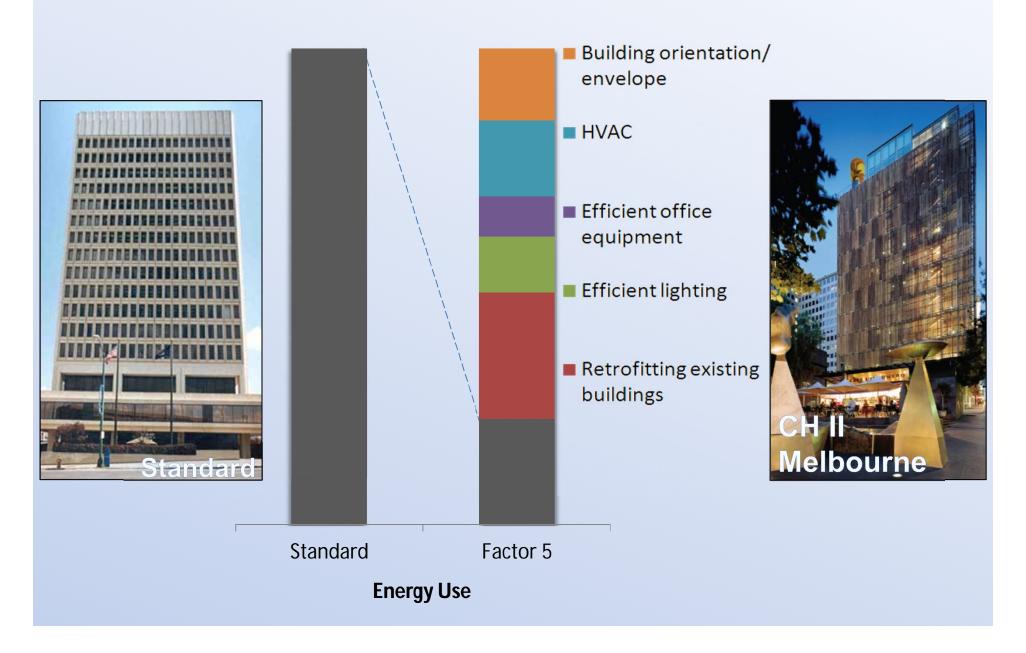
Residential Buildings



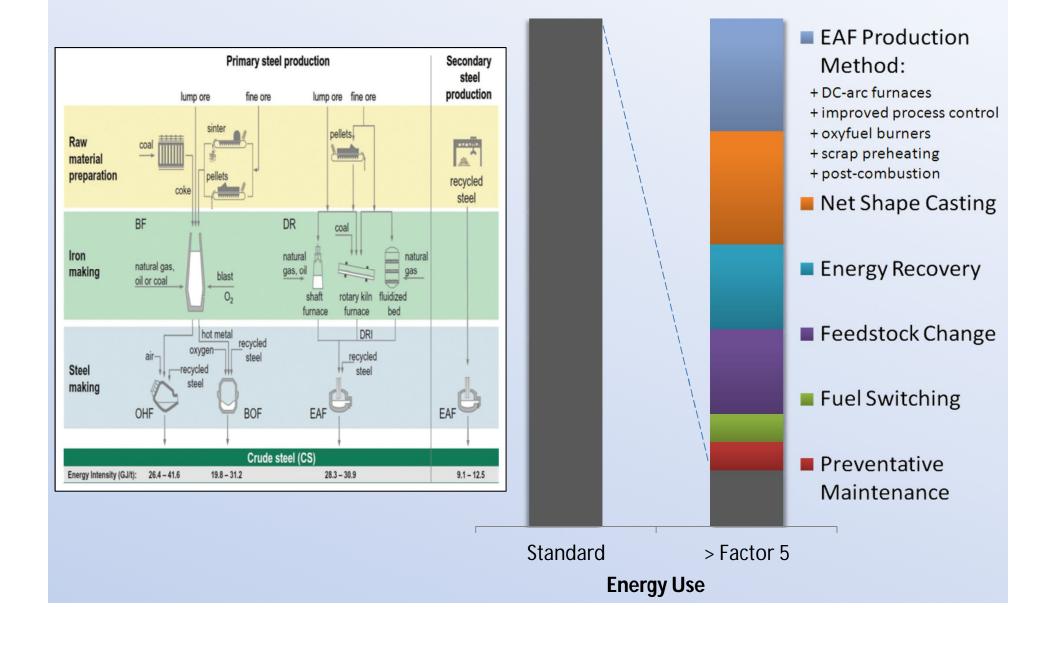




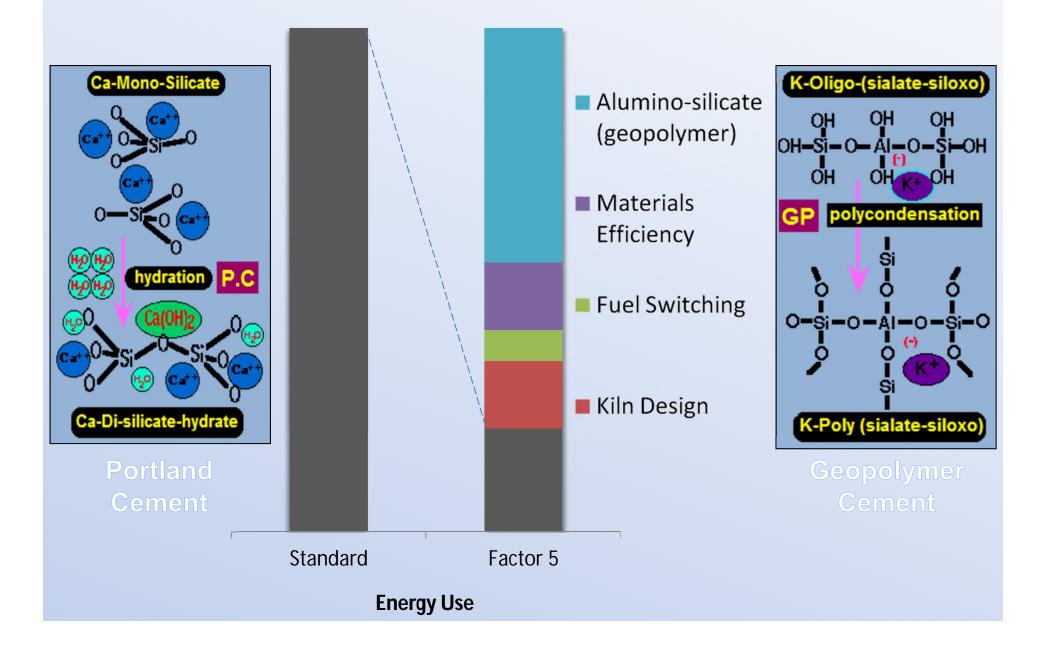
Commercial Buildings



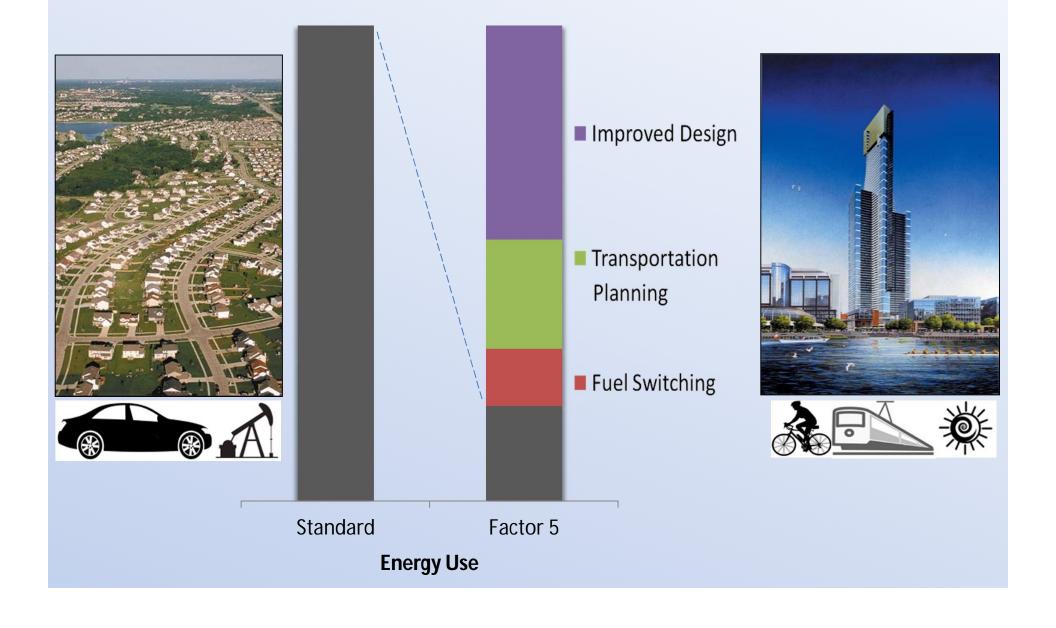
Heavy Industry (Steel Production)



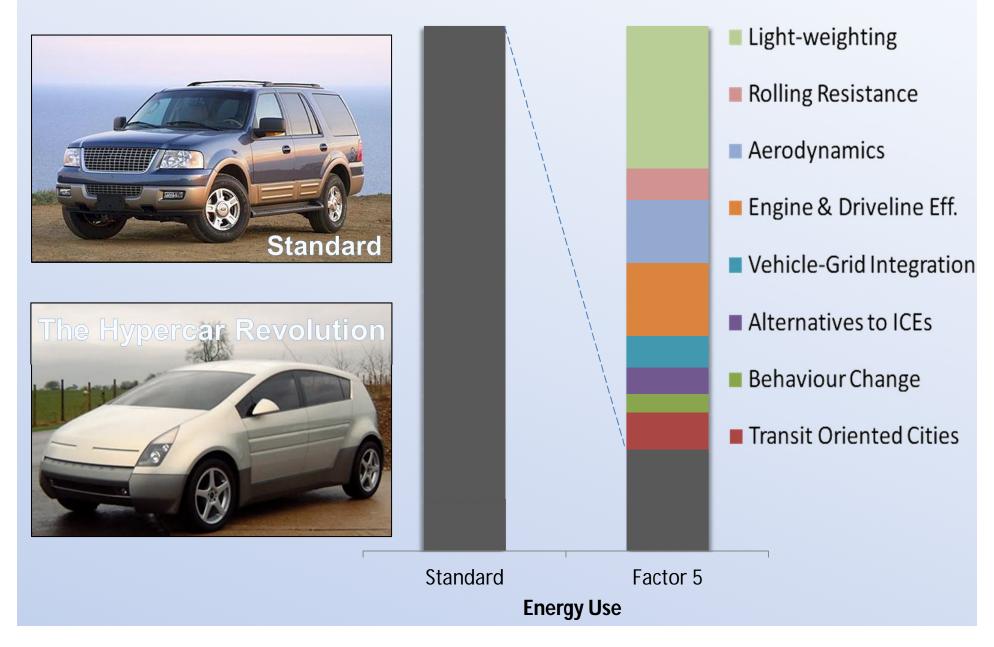
Heavy Industry (Cement Production)



Transport (General)



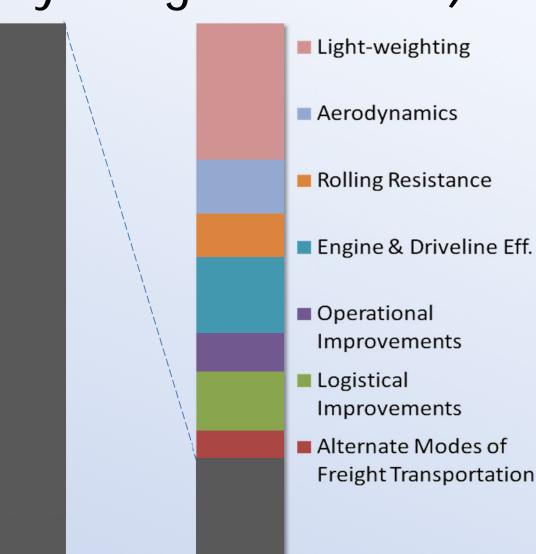
Transport (Cars & Light Vehicles)



Transport (Heavy Freight Vehicles)







Standard

Factor 5

Energy Use

Transport (Rail)



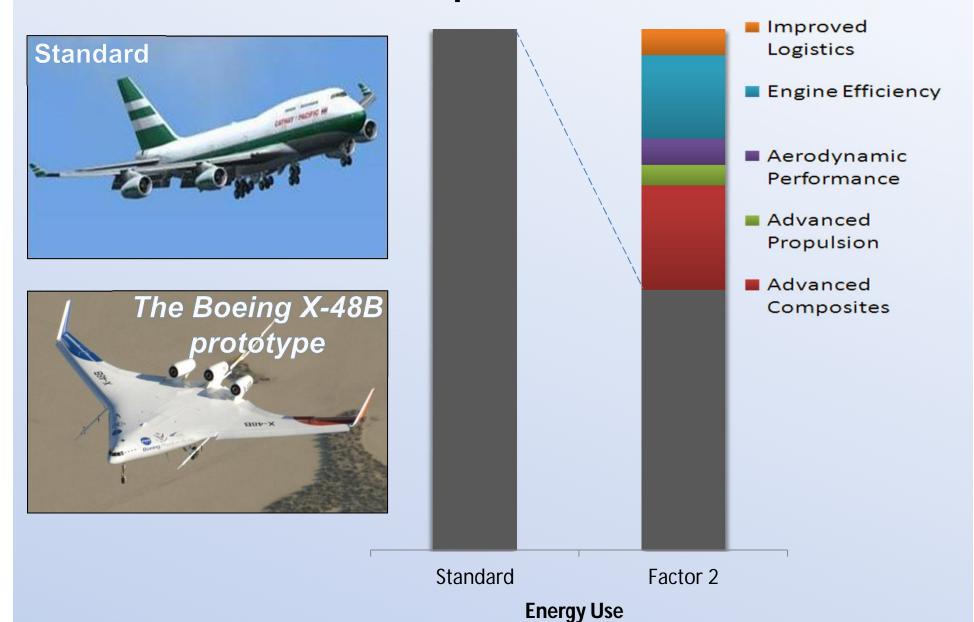




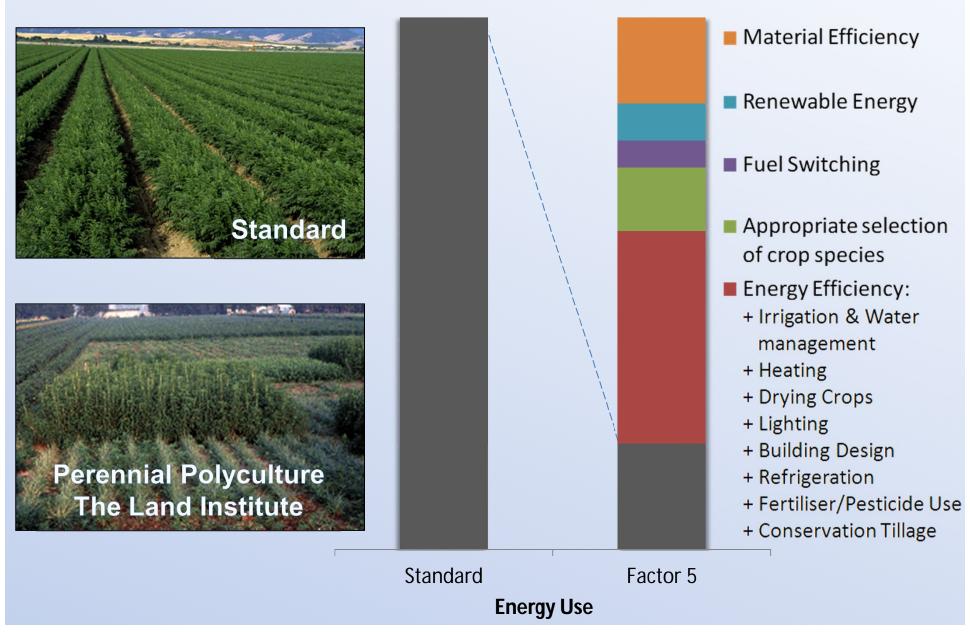
■ Energy Efficient Lighting

■ Speed Optimisation

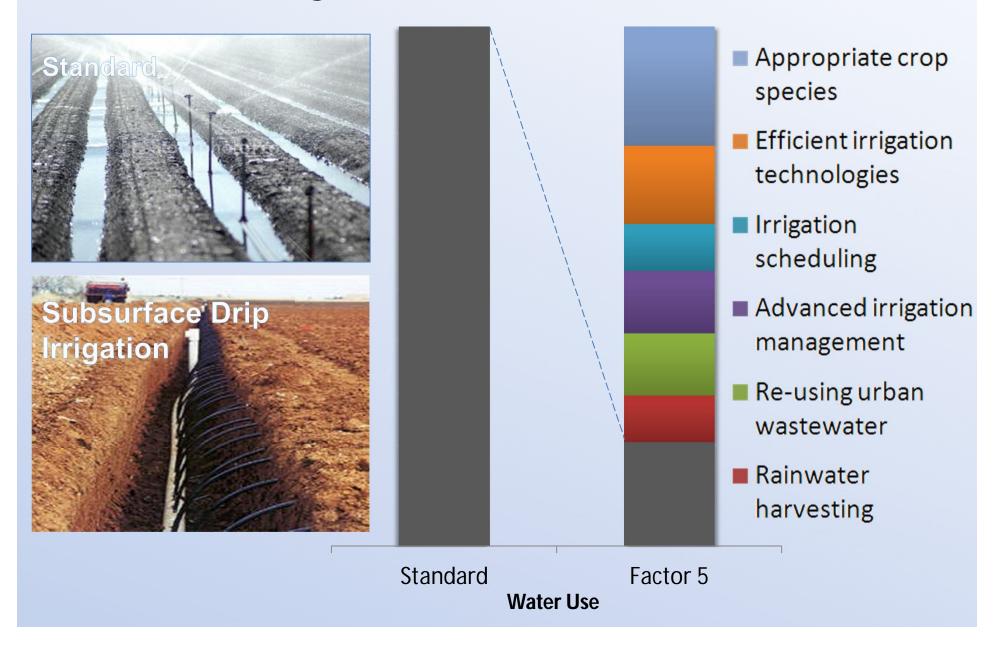
Transport (Air)

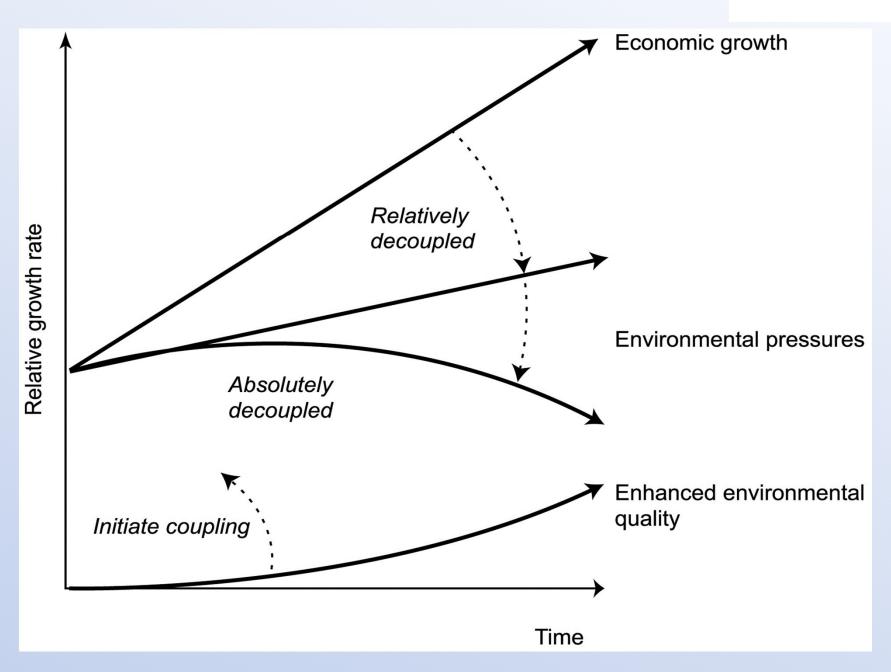


Agriculture



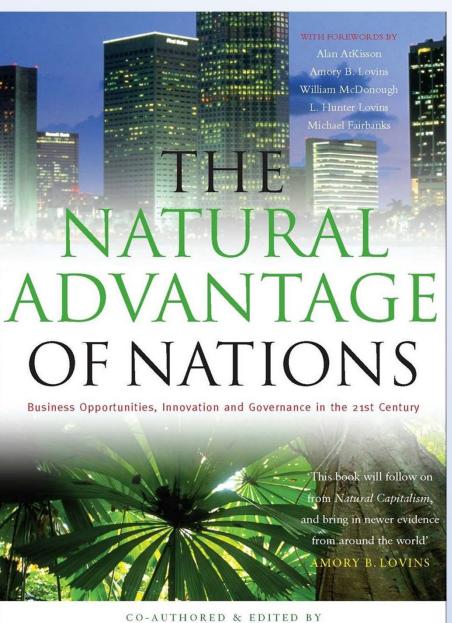
Agriculture - Water





Source: Smith, M., Hargroves, C. and Desha, C. (2010) Cents and Sustainability, Earthscan, London.

"We have learned a lot of lessons since Natural Capitalism came out in 1999, that I think will make the next explications of this subject even more powerful and effective, so working with our Natural Project Edge collaborators I think shows great promise, these are very diligent and well informed people that I think are doing valuable work and we are looking forward to cooperating with them in ways that will help us all to learn faster and get more done better." **Amory Lovins**



KARLSON 'CHARLIE' HARGROVES & MICHAEL H. SMITH

"The authors of this book [have] the energy, insight and commitment to begin the discussion of what I call 'the ultimate integration'; that is, integration of the concepts of competitiveness and Natural Capitalism."

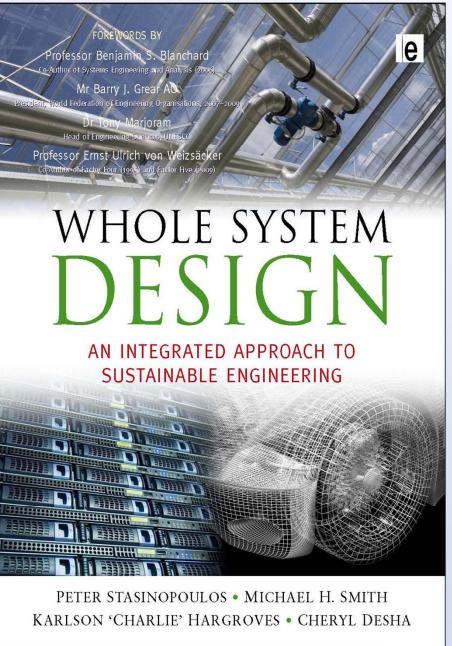
Michael Fairbanks

"Within these pages you will see that there is reason for robust hope, and as you read, we hope you will be inspired to contribute to this magnificent reevolution of human enterprise"

William McDonough

"The authors, in producing this introductory, technical, teaching material and these important examples, have provided a publication which can, and must, be widely used in our university and technical training institutions."

Barry J. Grear AO



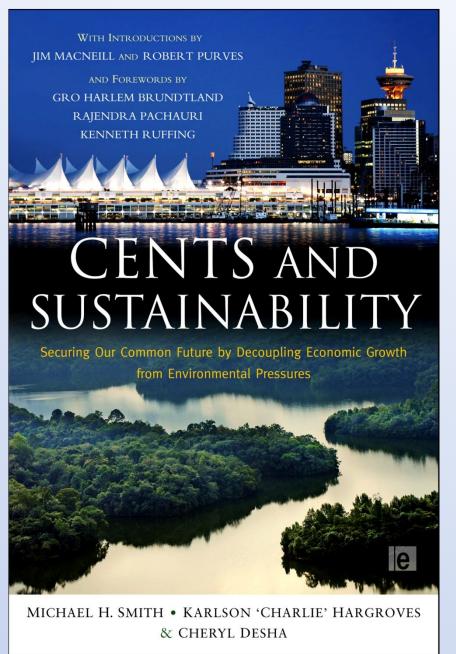
"I was thrilled and impressed reading this manual that features the integrated approach towards resource productivity and, ultimately, sustainability both at small and large scale."

Ernst Ulrich von

Weizsäcker

"I commend the team from The Natural Edge Project and their partners for undertaking to develop a response to 'Our Common Future' to mark its 20th anniversary."

Gro Harlem Brundtland



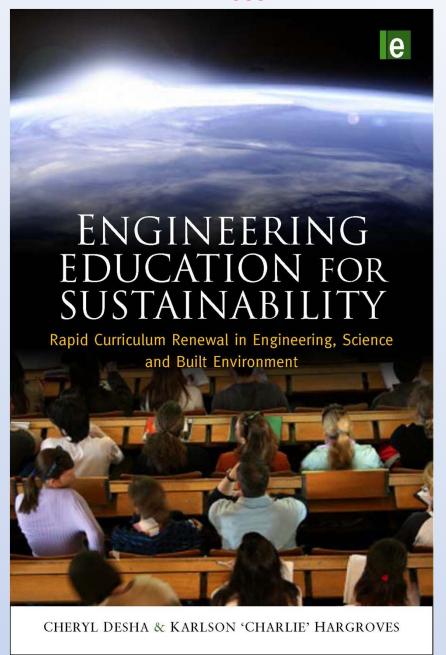
"The Natural Edge Project is to be commended for tackling this vitally important issue and highlighting where in the world already communities, regions and nations are creating solutions to this great challenge of our time."

R.K. Pachauri

In Press

"... a well argued appraisal of the rationale for rapid curriculum renewal to education for sustainable development. Higher education institutions around the world clearly have significant incentives and a variety of tools to embrace this challenge over the next decade."

Wynn Calder, Director, University Leaders for a Sustainable Future.



"I look forward to sharing this publication with my African and international colleagues, as we move forward in mainstreaming sustainable development in the higher education sector" Goolam Mohamedbhai, Secretary-General, **Association of African**

Universities, Past

Association of

President, International

Universities (2004-8)