Sustainable Development: Setting the Scene

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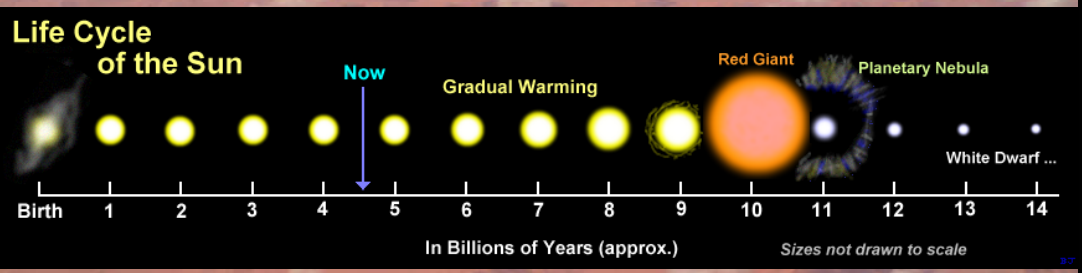
our future through science

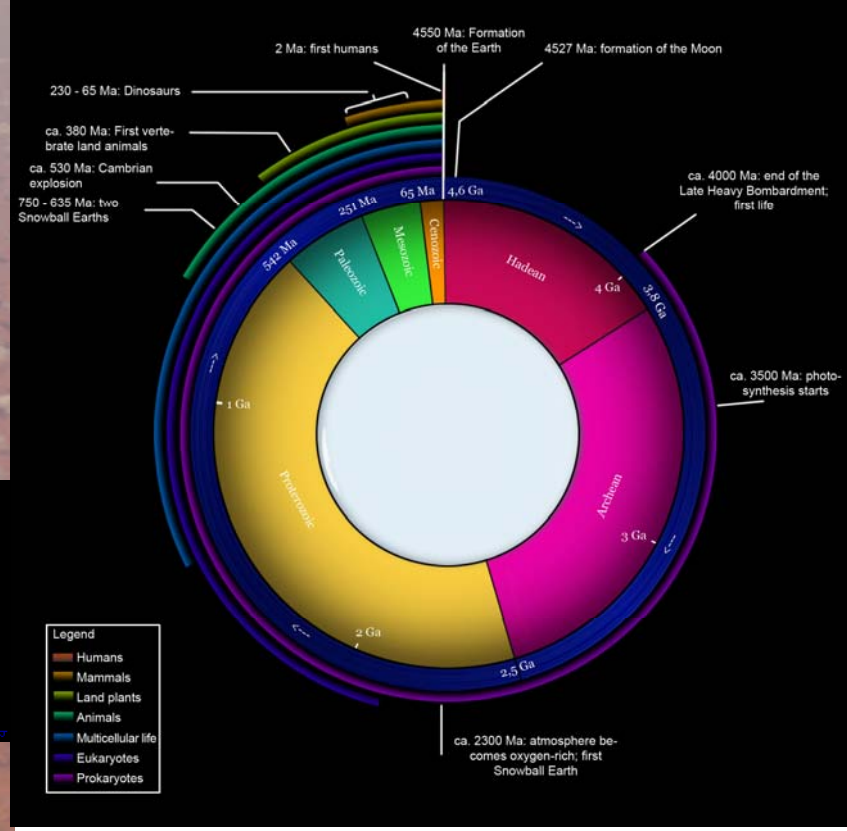

Can you tell me which
way I ought to go from here?

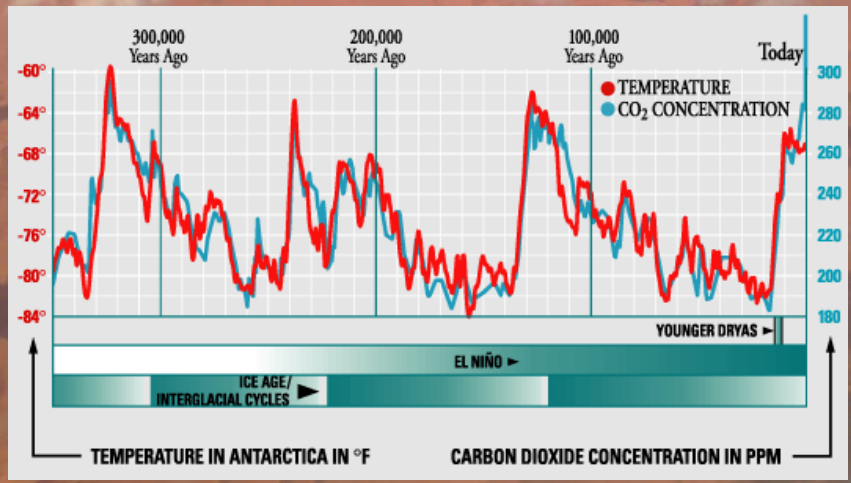
Definitions

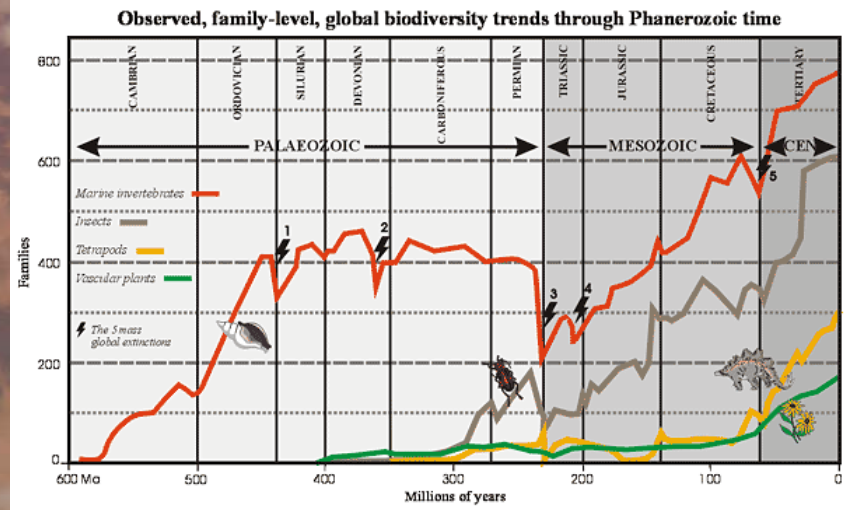
- Infrastructure – “the basic physical assets of a country, community, organisation”
- Built Environment – “comprising urban design, land use and the transportation system, and the patterns of human activity within this physical environment”

Sustainability Discourse









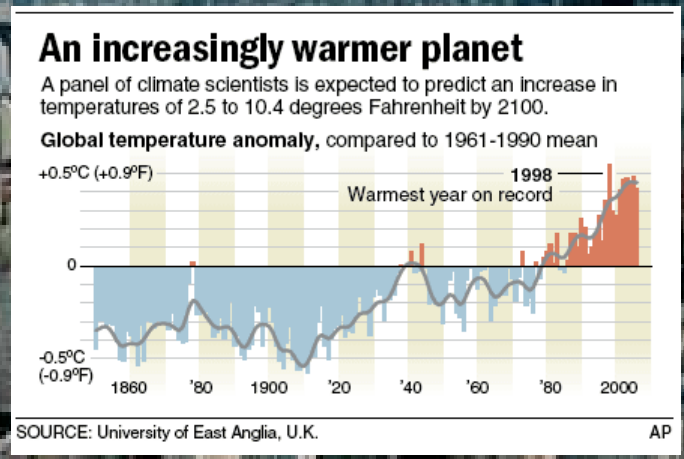
Historical Precedence

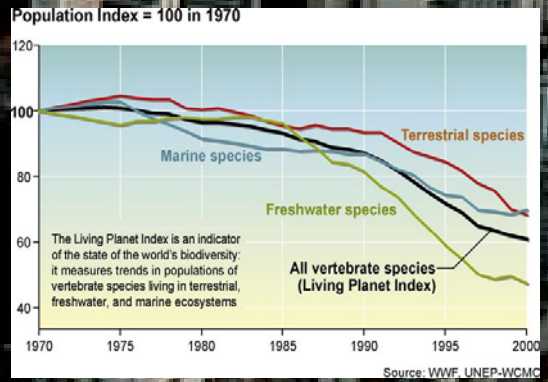
“Man has lost the capacity to foresee and to forestall. He will end by destroying the Earth”.
Albert Schweitzer

Neanderthal 600,000-30,000 years ago

People/Planet Interface

- 6,3 billion people
- 73 million per year
- Equivalent to a new Johannesburg/Pretoria every 6 weeks
- Growing inequalities between rich and poor
- Lack of social cohesion
- Infrastructure collapse
- Ecological collapse
- Social collapse
- Challenge is about adaptation and mitigation





Cities

CHALLENGES FOR HUMANITY

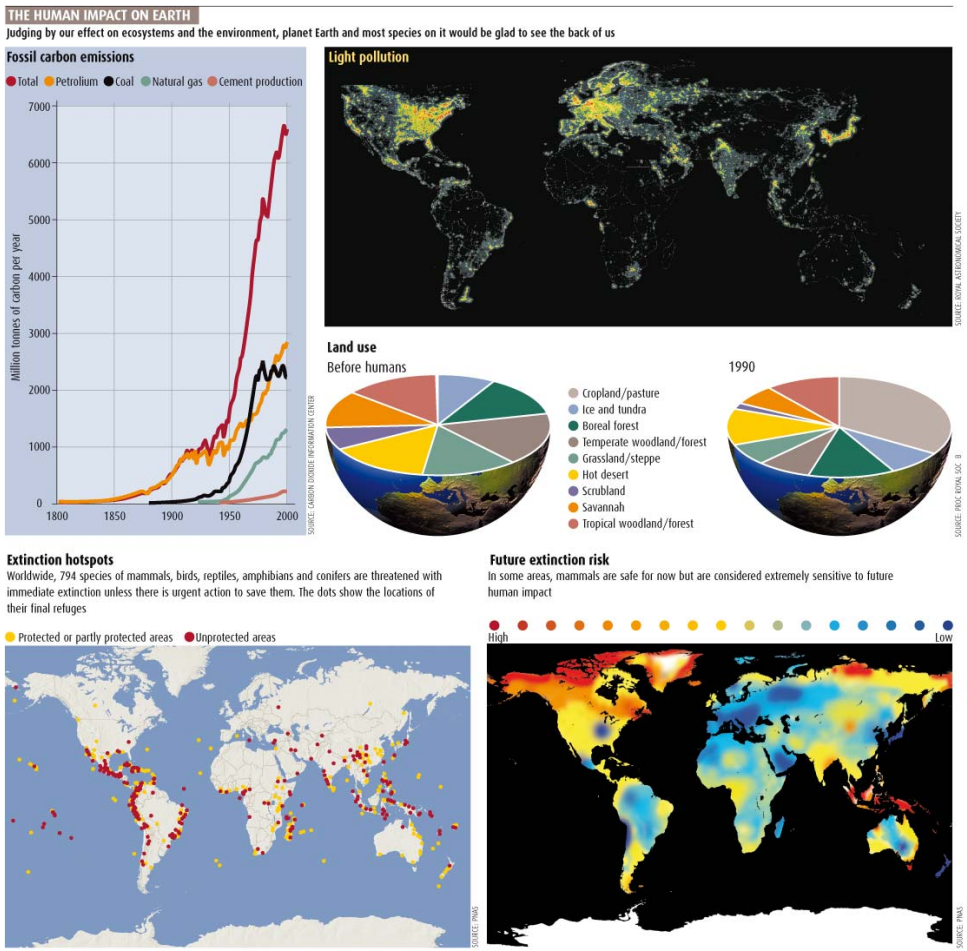
Two critical discourses of the 1960s: Ecology

- "Silent Spring" by Rachel Carson, 1963
  - *"Fundamentally, therefore, Miss Carson makes a well reasoned and persuasive case for human beings to learn to appreciate the fact that they are part of the entire living world inhabiting this planet, and that they must understand its conditions of existence and so behave that these conditions are not violated"* (Carson 1963:xiii) Introduction by Lord Shackleton.
- Anthropecene Epoch

Two critical discourses of the 1960s: Sociology

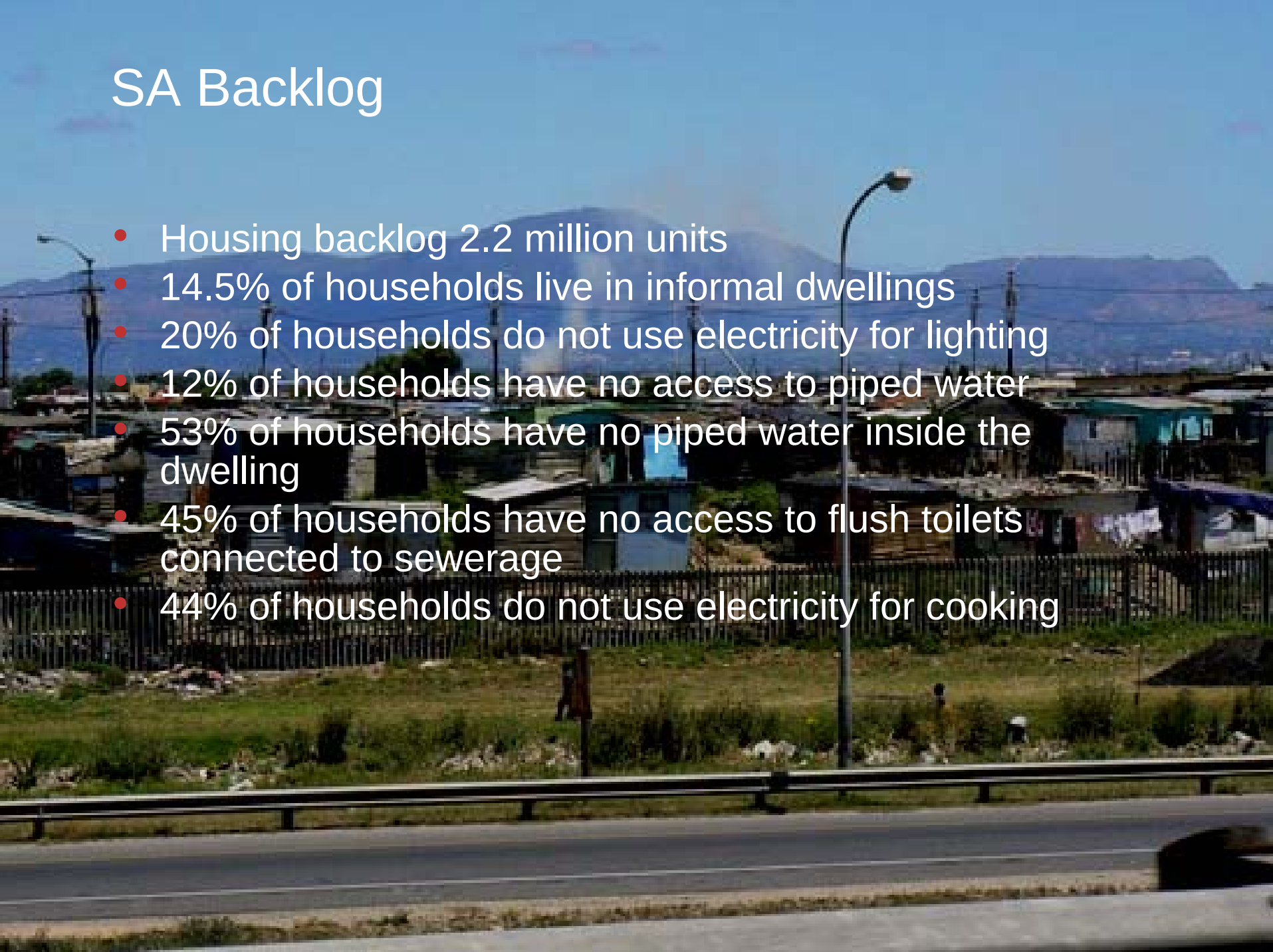
- Human Society by Kingsley Davis (1966)
  - Can the anonymity, mobility, impersonality, specialization, and sophistication of the city become the attributes of a stable society, or will the society fall apart?
  - How can devotion to a common system of values and a common set of mores be maintained in a highly literate, scientifically trained, individualistically inclined, and sceptically oriented population?
  - “The answer is not clear”

Current Global Ecological Paradigm



- "Measuring sustainable development – Nation by nation", Ecological Economics, In Press, 2007
  - Only 1 out of 93 met two specified minimum consumption requirements without exceeding biosphere capacity
  - Between 1975 and 2003 only 33 countries decreased foot prints: HIC increase ratio from 1.9 to 3.7

SA Backlog

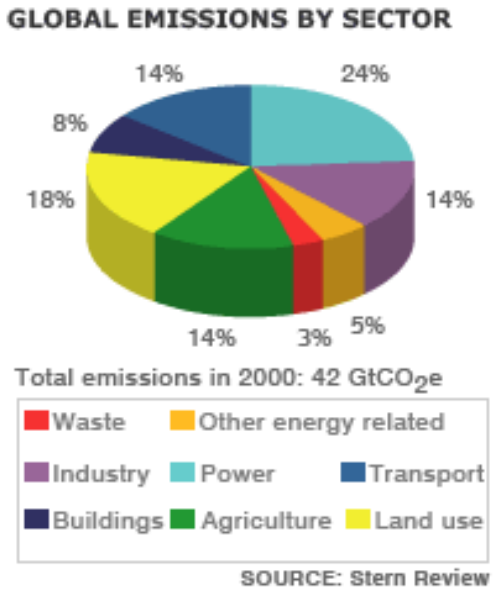


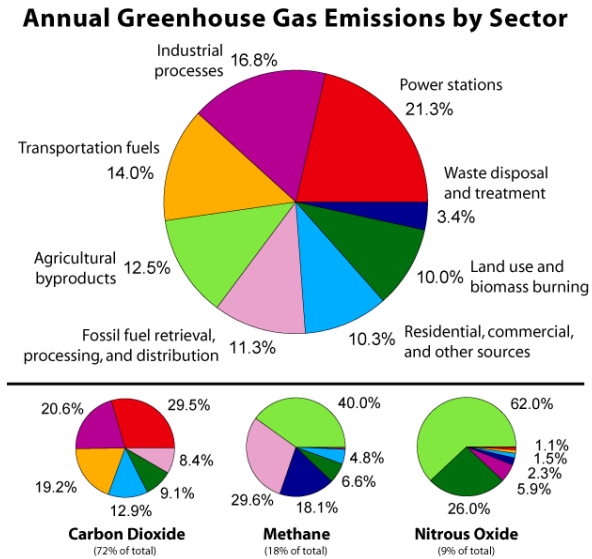
- Housing backlog 2.2 million units
- 14.5% of households live in informal dwellings
- 20% of households do not use electricity for lighting
- 12% of households have no access to piped water
- 53% of households have no piped water inside the dwelling
- 45% of households have no access to flush toilets connected to sewerage
- 44% of households do not use electricity for cooking

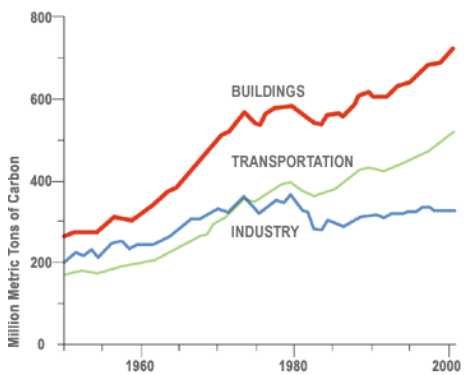
Construction Performance: Materials

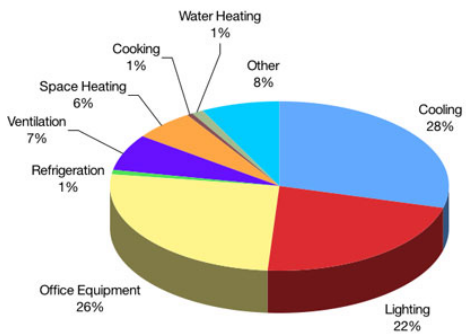
- $4,2 trillion plus industry
- Employs over 100 million
- 10% global GDP
- Resource consumption
  - 50% all resources globally
  - 45% of energy generated + 5% during construction
  - 40% of water used globally
  - 60% of prime agricultural land lost to farming
  - 70% of global timber products
- Over-budget, over-time
- Little added-value
- Little process or technological innovation

Emissions by Sector



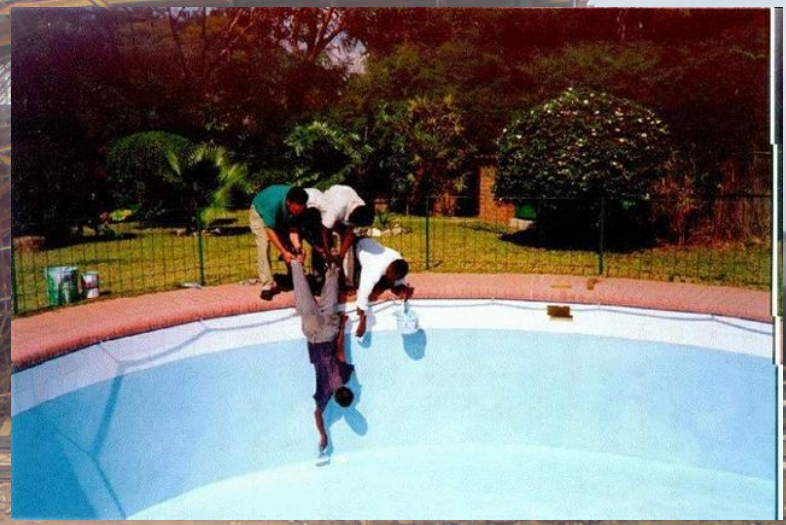






Construction Performance: Governance

Poor OHS record
High rates of corruption



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‘Our Common Future’

- Gro Harlem Brundtland Report 1987
- “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

‘Earthrise’, Apollo 8, Dec 24, 1968

5 Key Concepts

- Needs:
  - Essential needs of the world's poor. Could also include Maslow's needs
- Limitations
  - Imposed by the state of technology and social organisation on the environment's ability
- Responsibility
  - The environment is held as a proxy for social equity between generations
- Transformation
  - Sustainability is pro-development providing that it "involves a progressive transformation of economy and society
- Ecological Capital
  - Impact of development on the quality of natural elements must be accounted for

Throughout history engineering has driven the advance of civilisation

Applying the rules of reason, the findings of science, the aesthetics of art, and the spark of creative imagination, engineers will continue the tradition of forging a better future

CSIR

our future through science

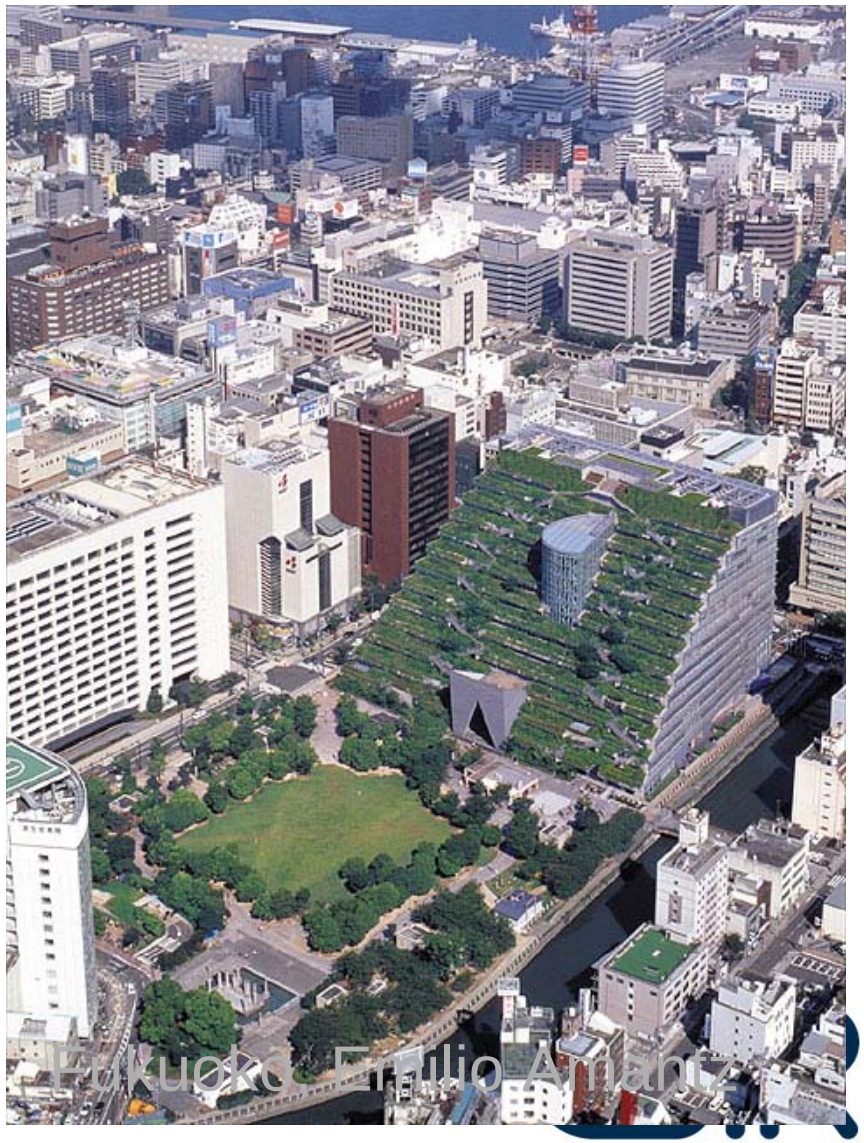
Required delivery paradigm

- Smart
- Efficient
- Effective
- High-performance
- Sustainable
- Knowledge-based & technology-driven
- Skilled

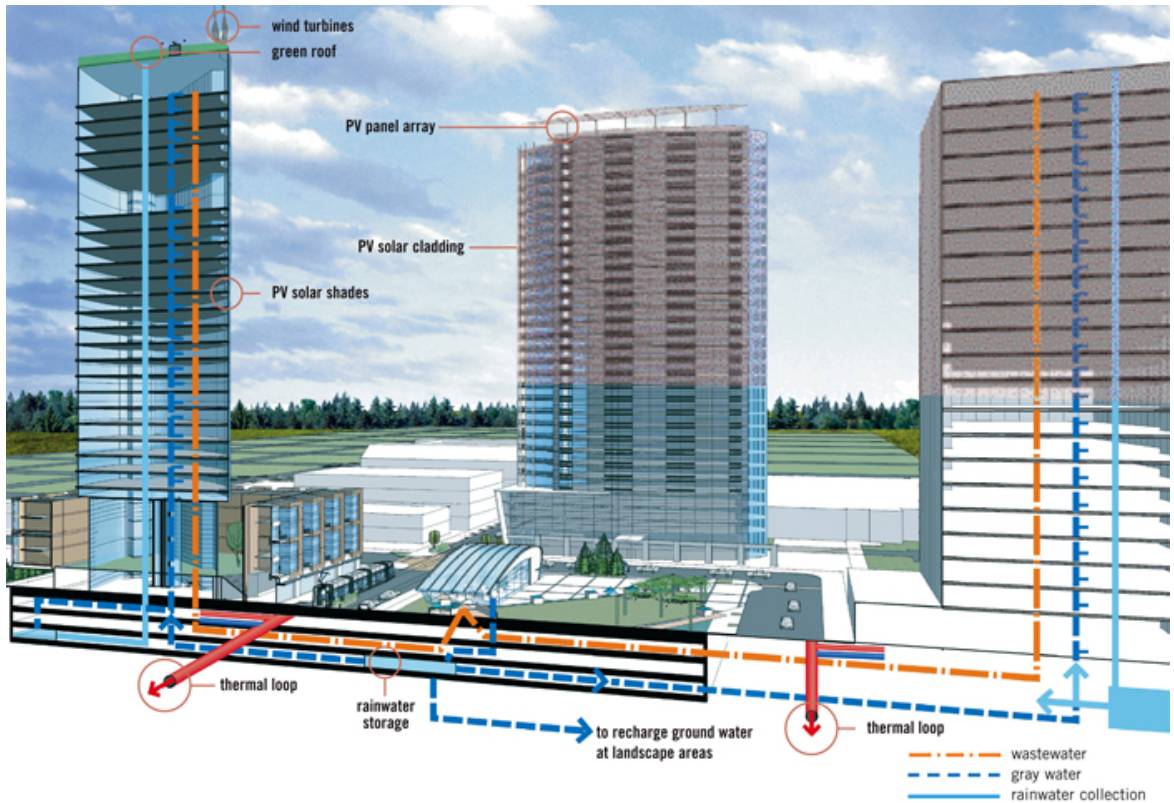
Introduction and Background

- "*First, our approach to infrastructure must focus not just on economic growth or human growth, it must also focus on smart growth. That is growth that is economically sound, environmentally friendly, socially acceptable, locally desirable and most important, growth that makes a real difference in the lives of poor people*" Wolfowitz, World Bank 2006.

Ecological Design: Replace what's Displaced

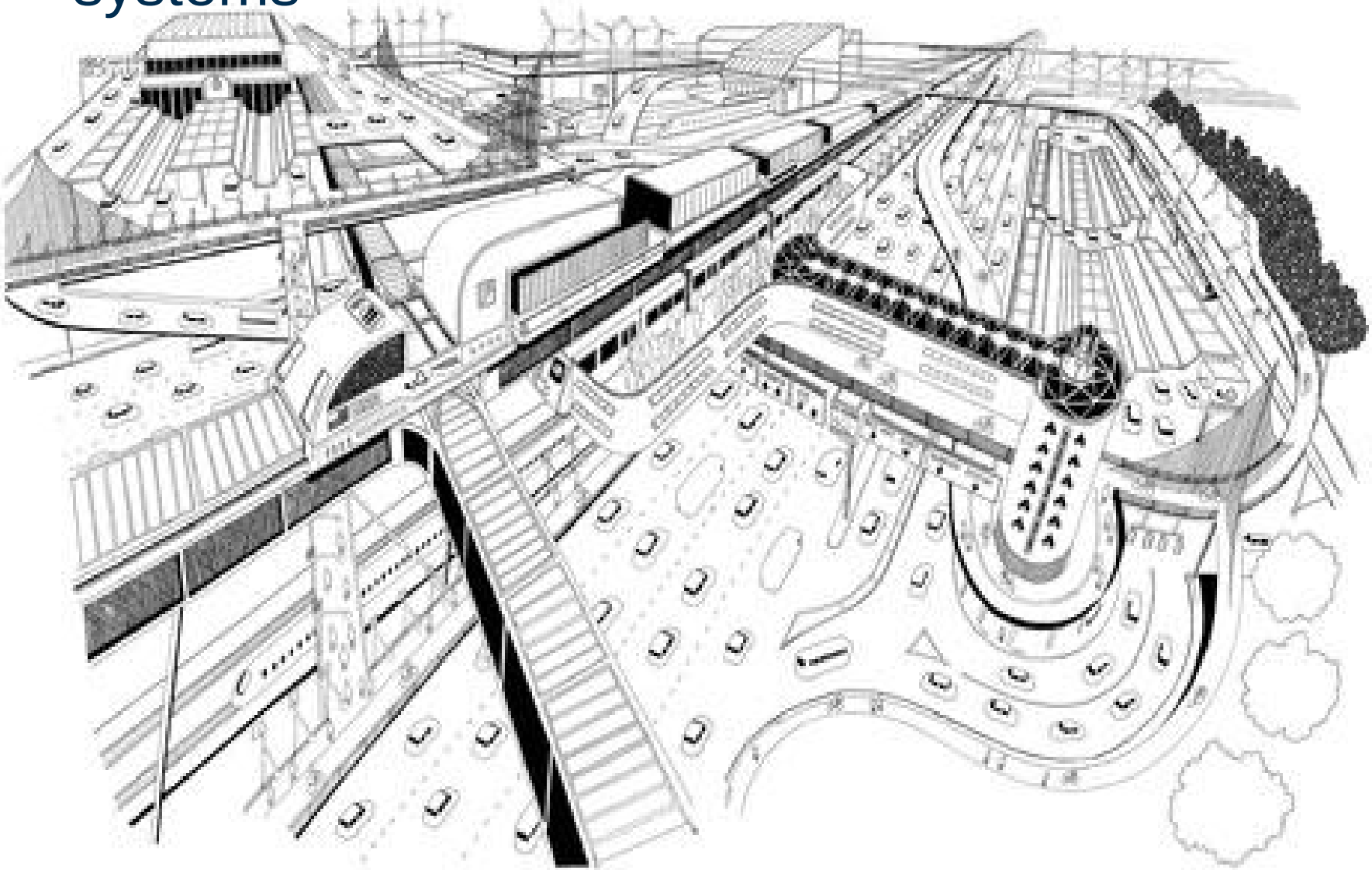


The building as tree, and city as forest



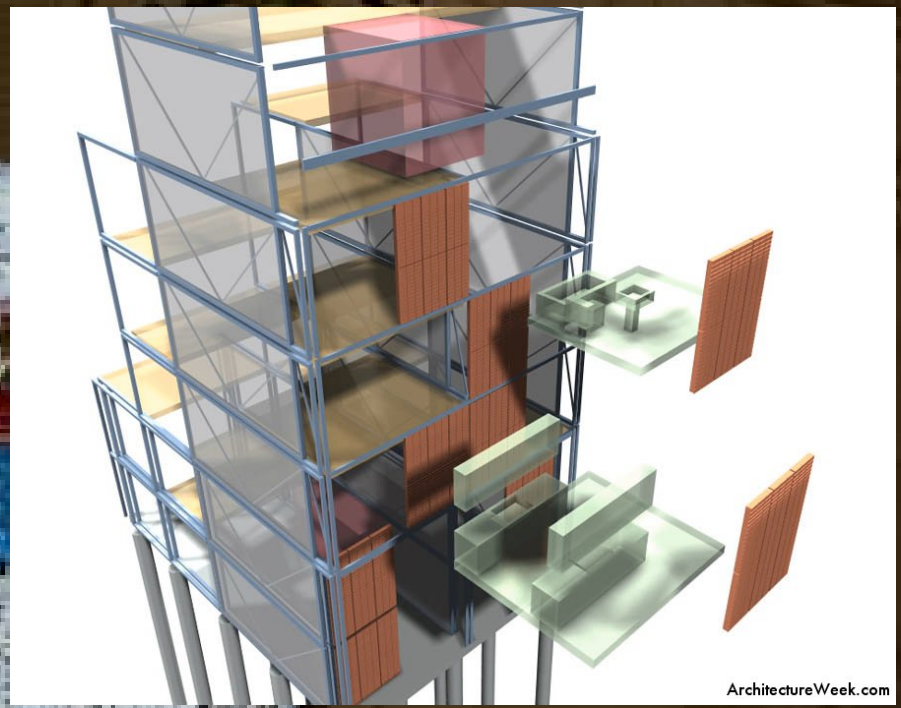
3D Rendering of Catalyst Project

Engineering integrated transportation systems



Yona Friedman
‘Open Infra-structural Approach’

- Fix service positions
- Industrialised manufactured modular components



Sustainable Infrastructure: Definition

- A process of change in which the:
  - Exploitation of resources;
  - Direction of investments;
  - Orientation of technological development; and
  - Institutional change

  are all in harmony and enhance both current and future potential to meet human needs and aspirations

Summarise

- Design serves its constituents: good design extends to respecting what is notable and honourable about the past, present and future, in a manner that is restorative and transformative
- Infrastructure is back on the developmental agenda: to be sustainable it must contribute to:
  - Poverty alleviation
  - Community upliftment
  - Social cohesion
  - Quality job creation
  - Healthy, safe and uplifting working environments
  - Distributing the costs and benefits equitably
  - Skills development and transfer
- Ed Mazria “We are the problem, and we are the solution” West Coast Green, San Francisco, Sept 28, 2007

Masdar: Norman Foster (2008)

Conclusion

- 21st C, post-Modern epoch, is a turning point for humanity.
  - Old environmental management theories and practices have no ongoing value
- Sustainability seeks balance between people/planet
- Development must improve quality of life
  - ‘Do least harm’ not good enough


“That depends a great deal on where you want to get to”
“I come to give you life, and that you may it more abundantly” John 10:10
Siamak Hariri: Baha’I temple, Santiago
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Thank You