

Sustainable Development

BSc Environmental
Conservation



Construction: Is it necessary for change?

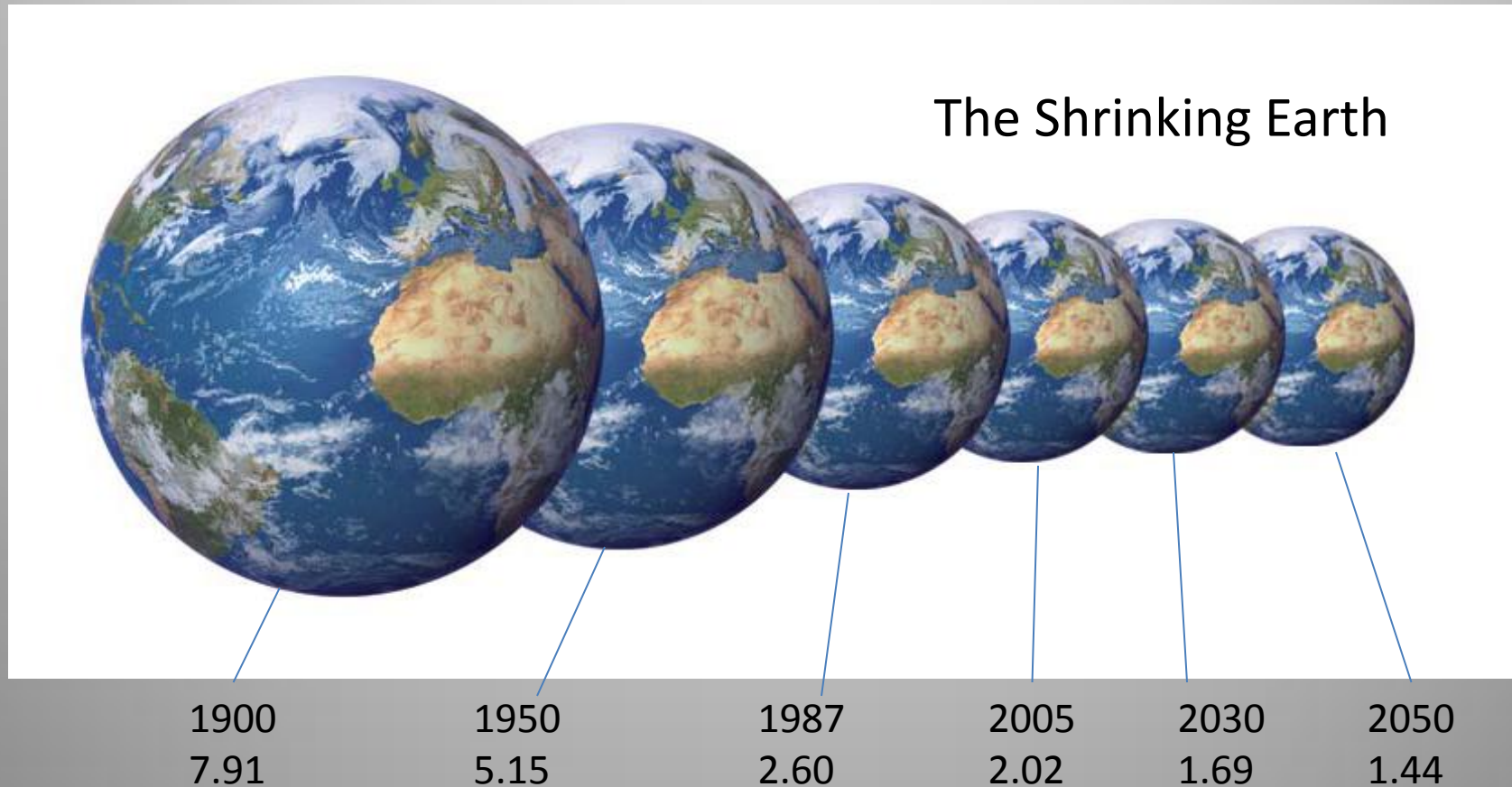
Sustainable Development

What might be the challenges?

- Form Vs Function
- Social Vs Public Infrastructure
- Architecture Vs Humanity



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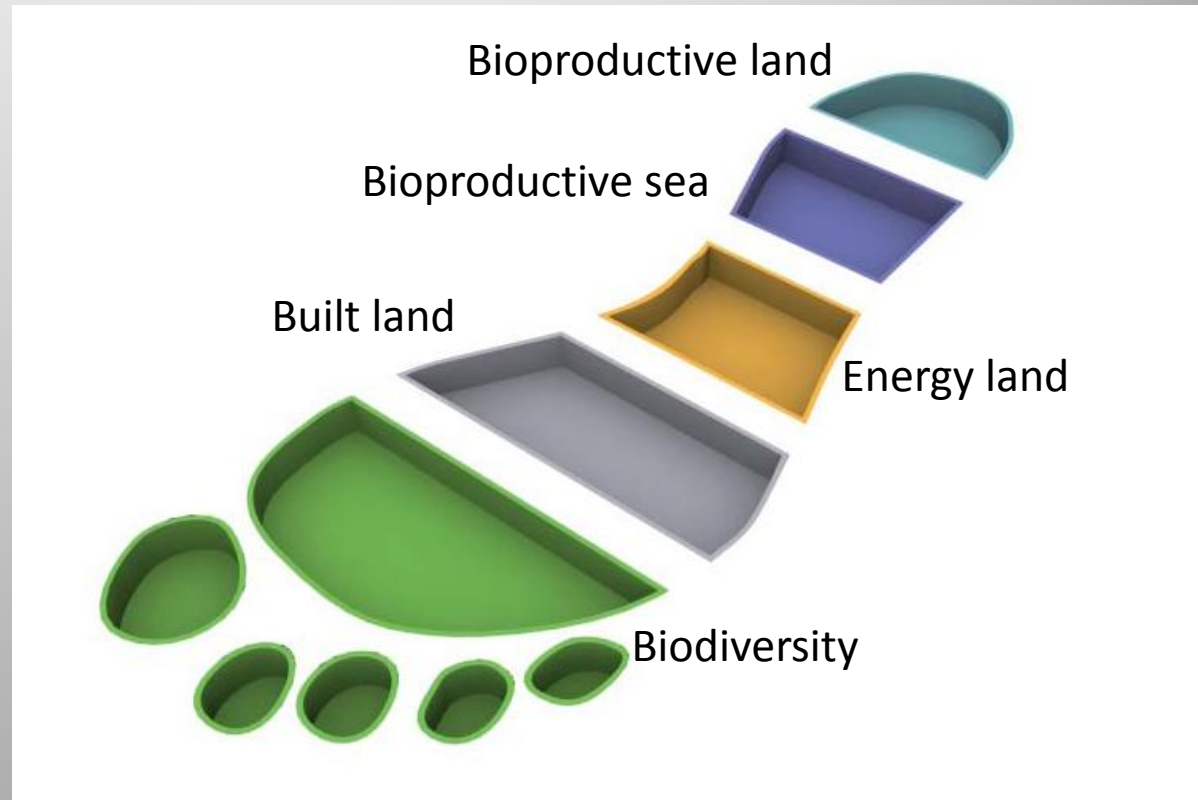
Year
Hectares of Land Per Capita

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Some key issues:

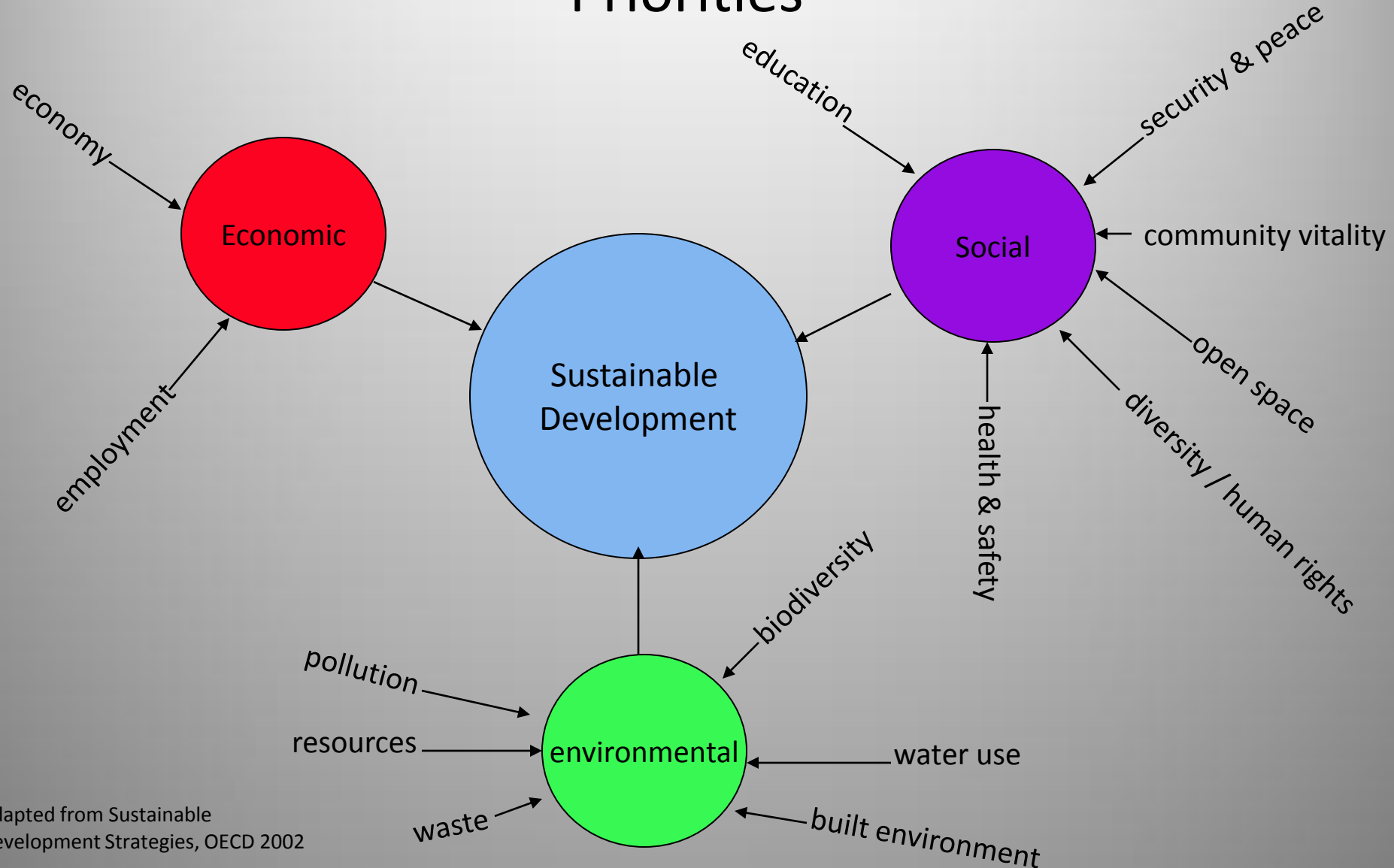
Can we achieve a sustainable way of living with a population expected to reach some 9 billion by 2050?

Are there challenges with current policies and investments?



How might construction help overcome any expected challenges?

Construction's Sustainable Development Priorities



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The current model is not working!

Economics

- Non-renewable resources
- Waste
- Pollution
- Eco-system
- Growth



Source: Guardian, Beijing's waste

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A way forward!

- Renewable resources
- Less waste
- Cleaner technologies
- Design with nature in mind
- Efficient use of resources



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The drive towards more ecological reasoning

- Ecological economics
- Building ecology
- Bioclimatic design
- Sustainable growth
- Natural capital
- Performance efficiency
- Eco-profiling of materials

Source: Healthy Home Project, Surfers Paradise, Queensland

Look at the work by David Pearce

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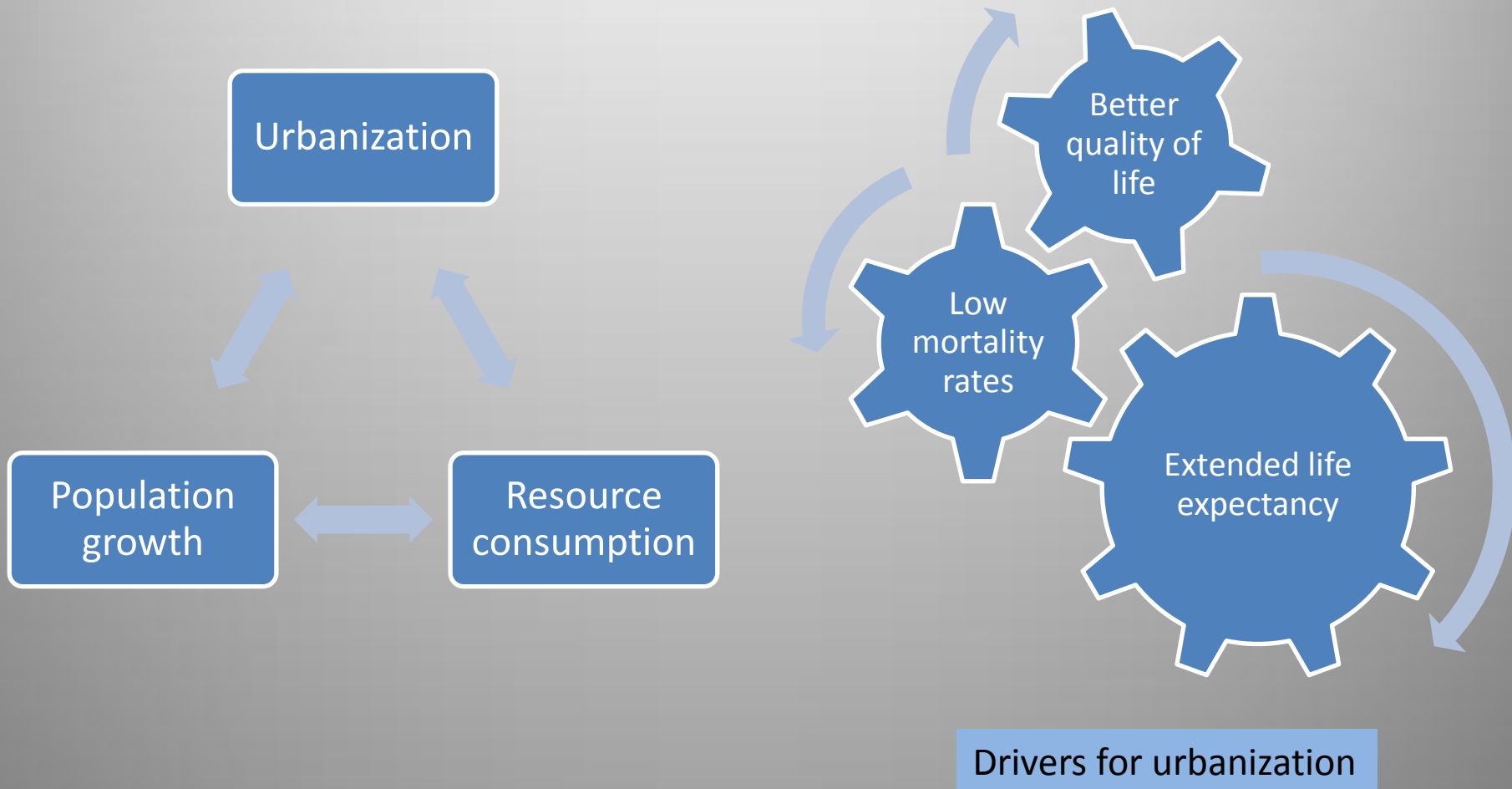
The electric Volt



Pedestrianised streets

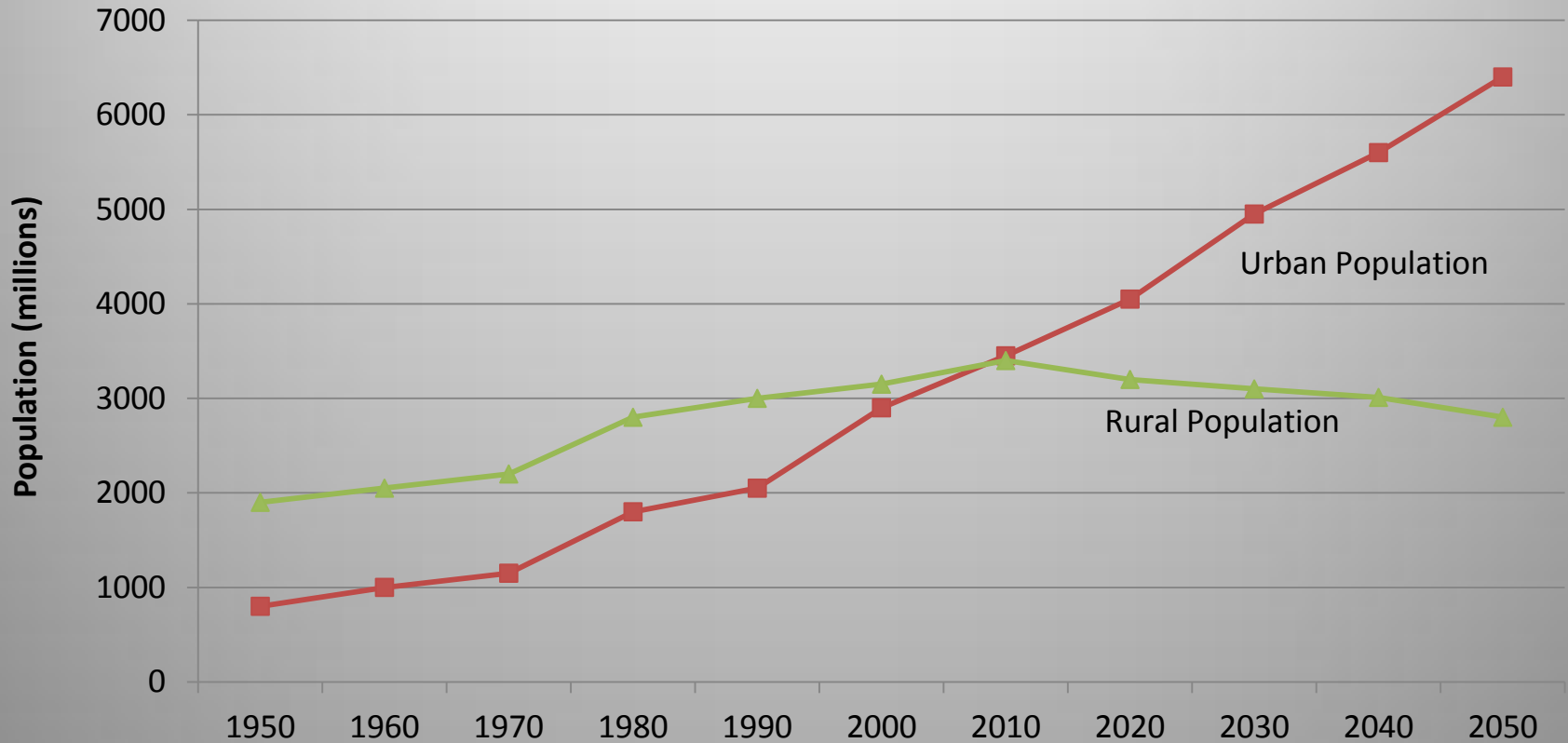
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Significant impacts



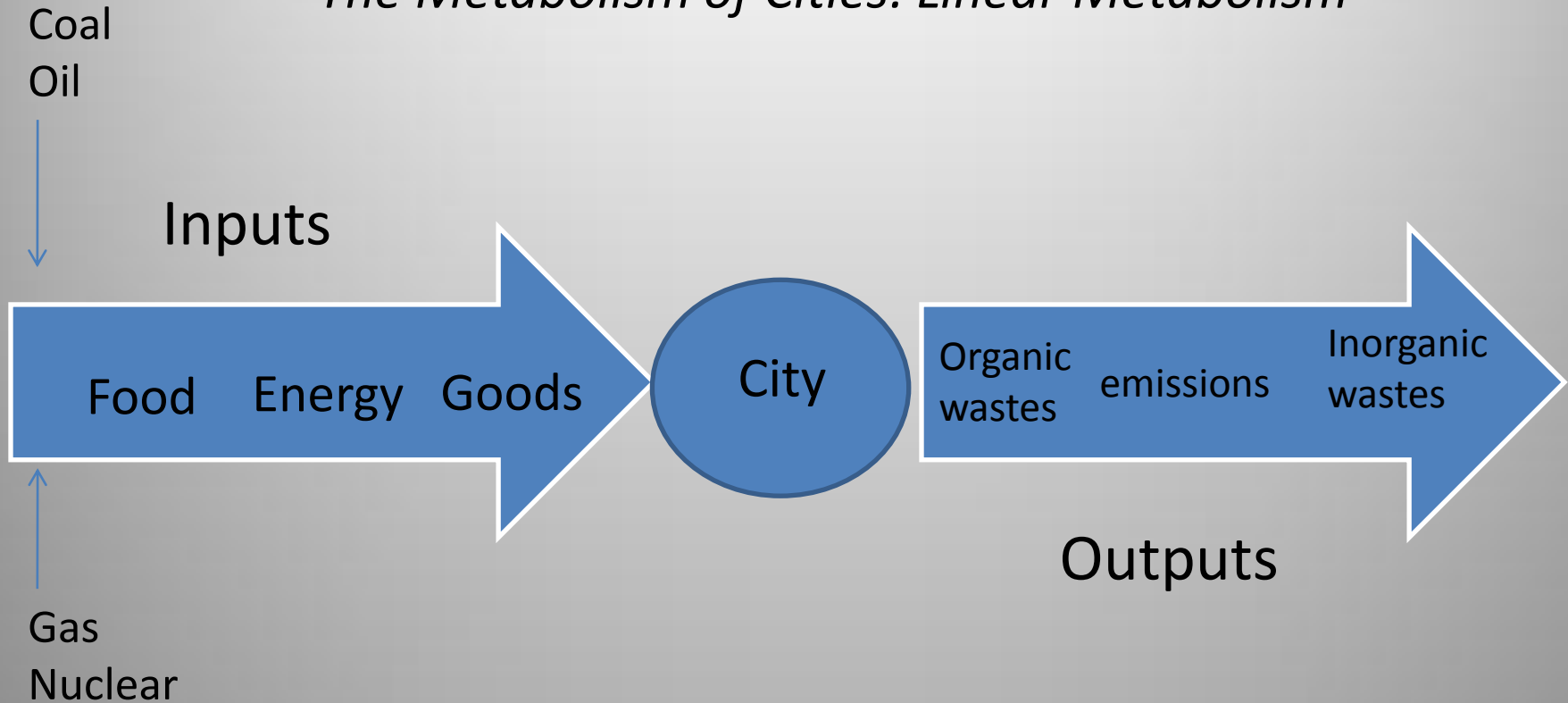
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Global Urban & Rural Populations 1950 - 2050

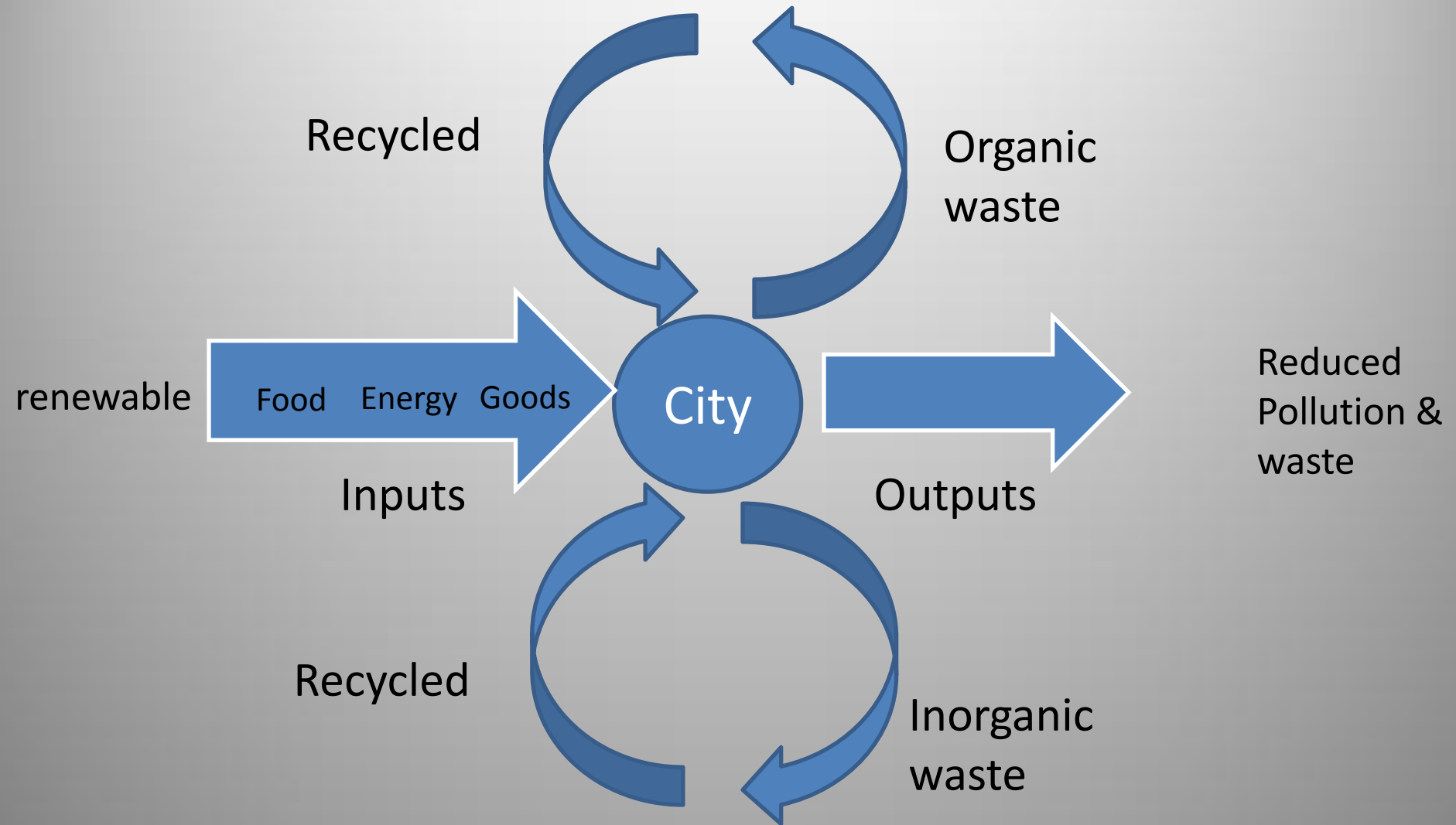


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The Metabolism of Cities: Linear Metabolism



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The Metabolism of Cities: Circular Metabolism

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City of Munster

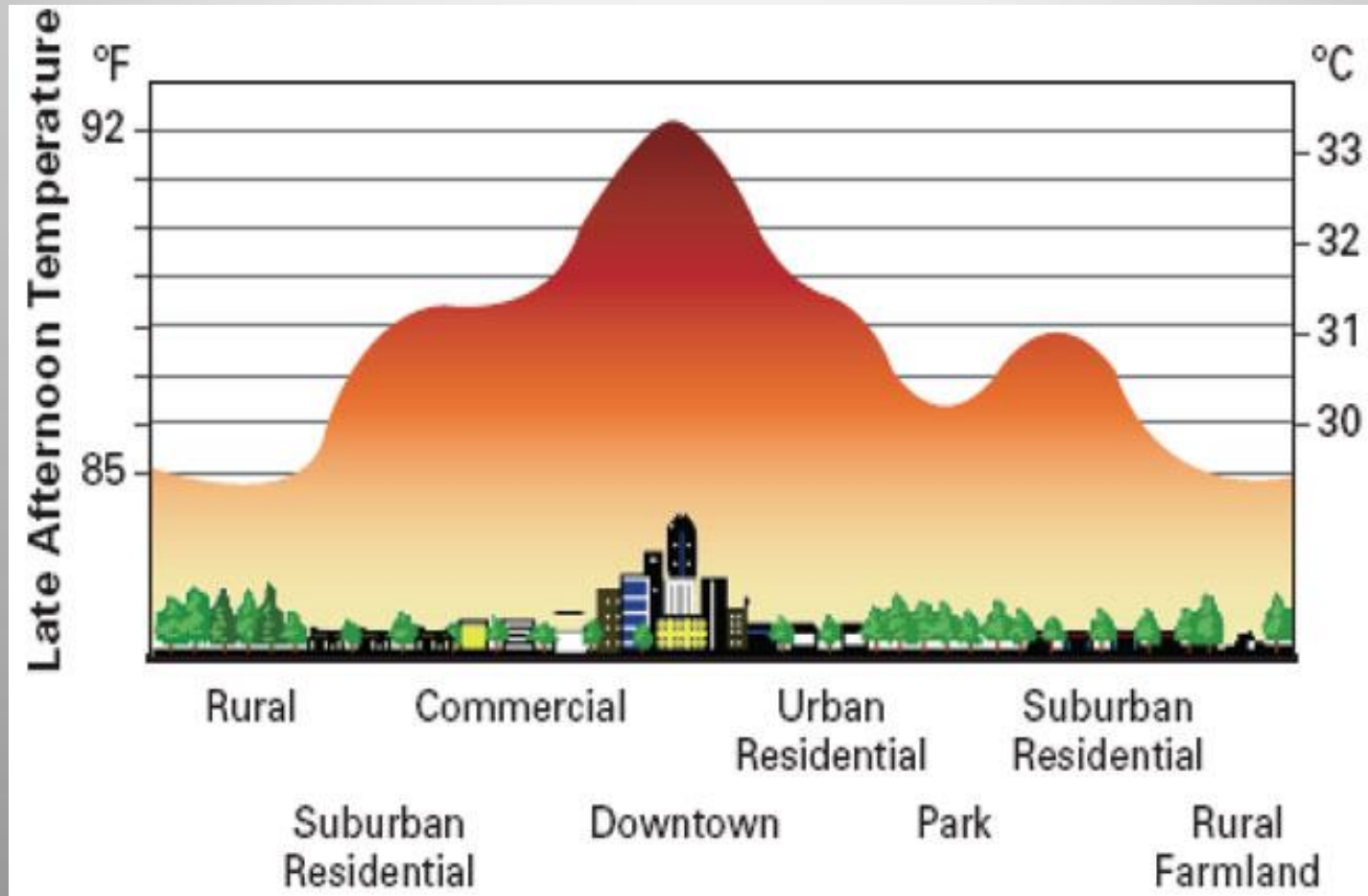


Daily Telegraph



FreeFoto.com

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Resource Efficiency: the challenges...

- Land
- Food
- Water
- Energy
- Raw materials



Productive land

Supply and demand

Water scarcity

Emissions

Consumption

Picture source: WRAP

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- Can construction apply ecological ways of building?



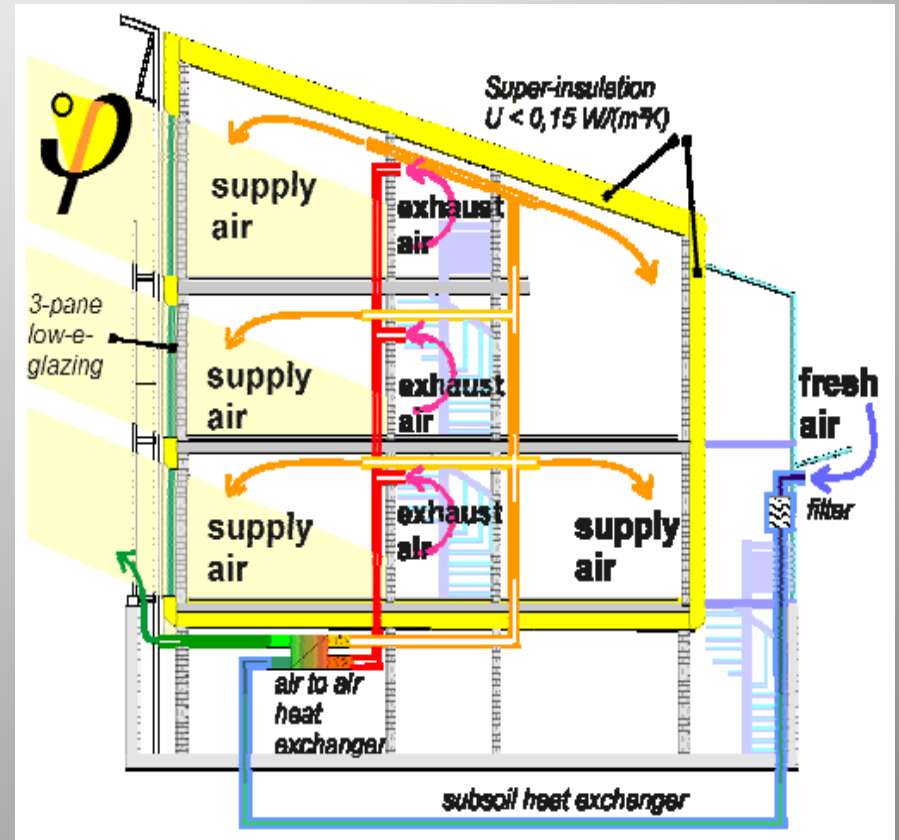
Denby Dale Passivhaus

- Key principles...
 - Consume resources no faster than nature can replenish them
 - Create systems that consume maximum energy-quality
 - Create only by-products that are nutrients or raw materials for resource production
 - Enhance biological and functional adaptability and diversity

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Ecological design?

- Passive design
- Native landscape
- Attention to power
- Water conservation
- Reduction of emissions
- Design for operation and maintenance
- Materials efficiency
- Design for recycling



Perhaps an intelligent approach!

Source: Passive House Institute

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PassivHaus standard typically includes:

- very good levels of insulation with minimal thermal bridges
- well thought out utilisation of solar and internal gains
- excellent level of air-tightness
- good indoor air quality, provided by a whole house mechanical ventilation system with highly efficient heat recovery



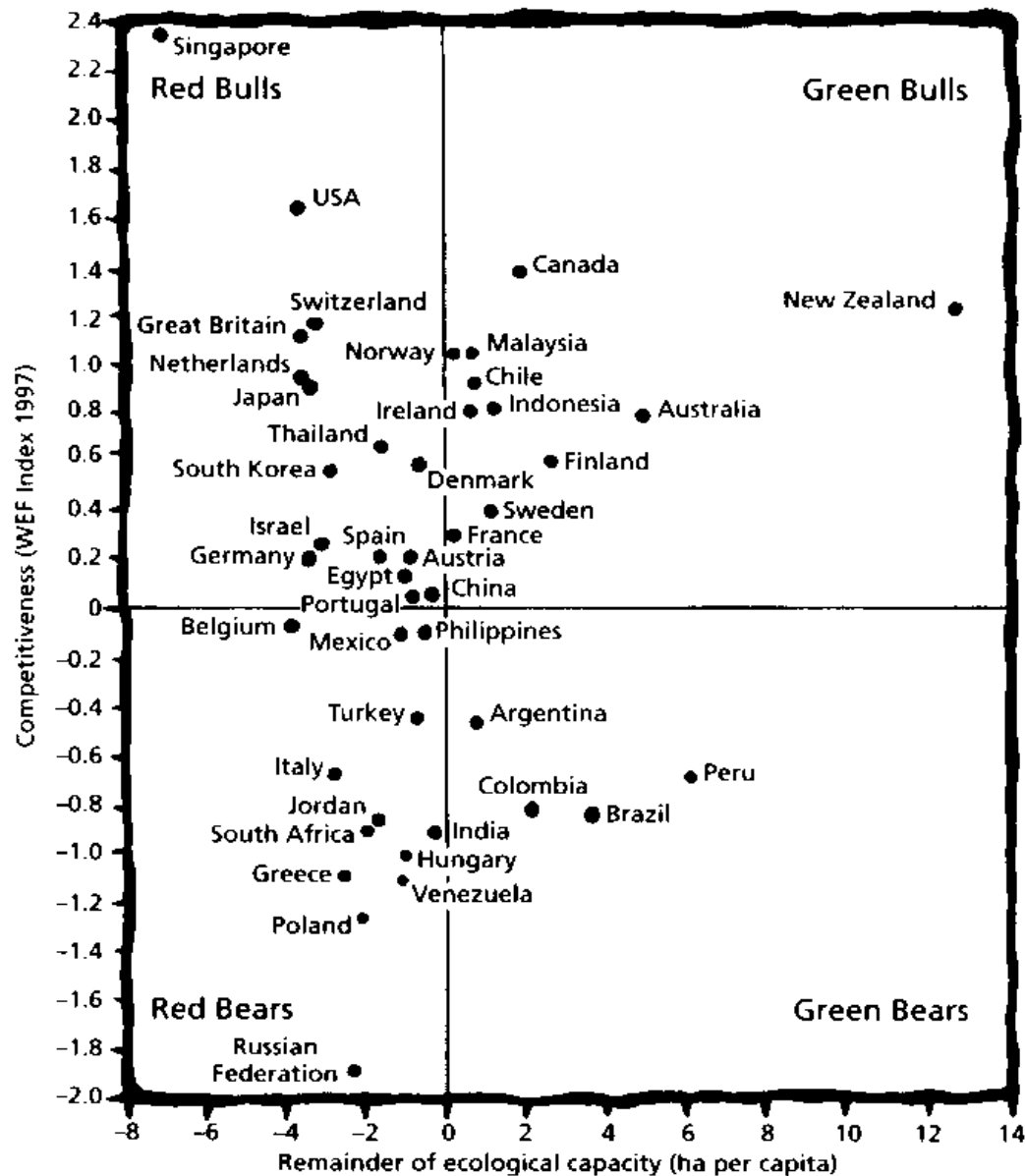
Student halls of residence, Carnegie village, Leeds
Source: passivhaus.org.uk



Office Development,
Kent, Van
Developments

Racecourse Estate, Houghton-le-
Spring, Gentoo / Devereux
Architects





Ecological capacity
and competitiveness

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Housing and sustainability

Well built, safe and environmentally friendly housing is fundamental to our individual and community well-being.

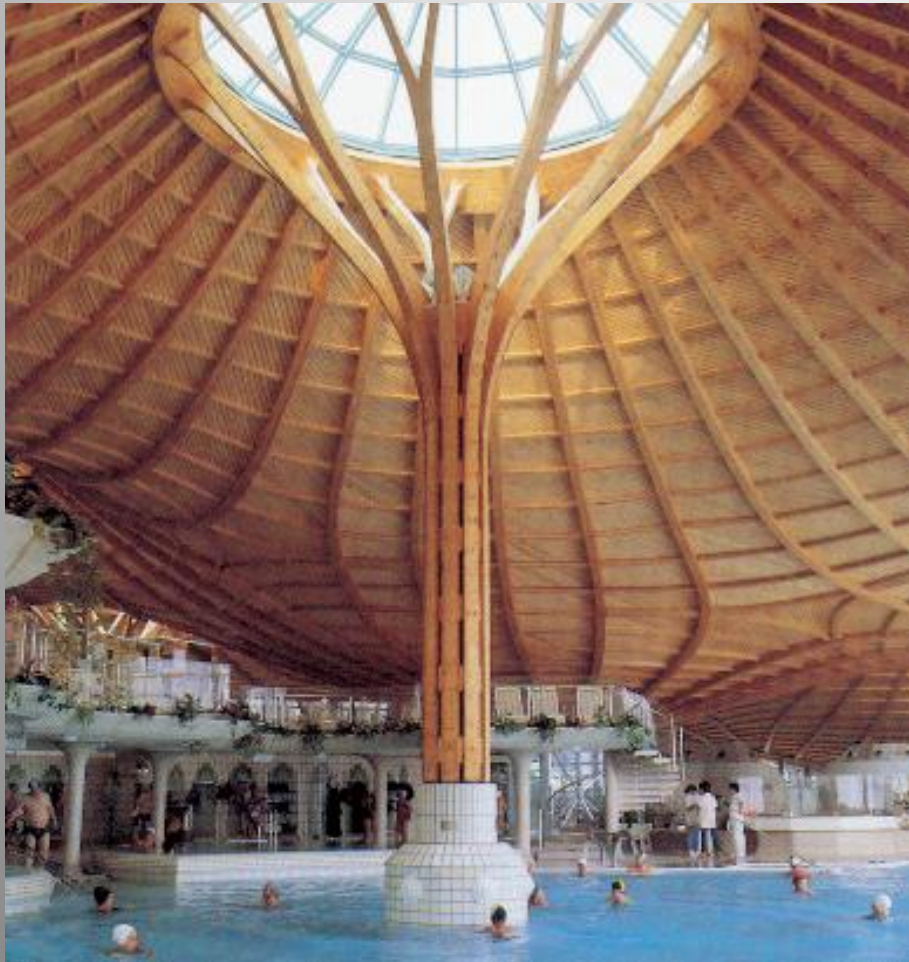
Code for sustainable homes?



Source: Cullis M J (2003)

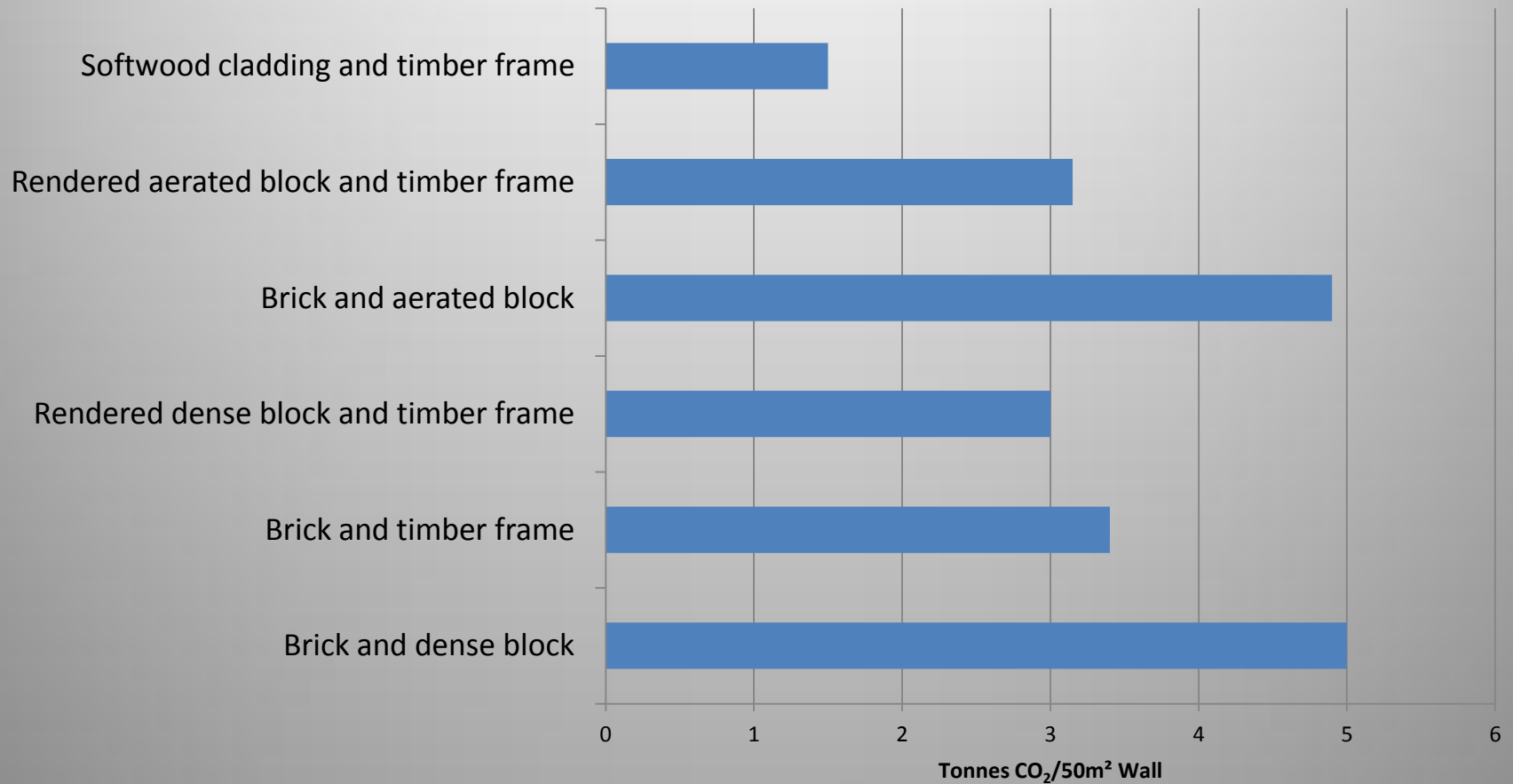
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Materials



- Timber... LCA
 - Production phase
 - Extraction
 - Production
 - transport
 - In-use phase
 - Energy use
 - Thermal properties
 - maintenance
 - End-of-life phase
 - Recycling
 - Recovery
 - Disposal

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Source: www.roadmap2010.eu/wisd/pdfs/42.pdf

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Much of sustainability relates to the concept of appropriate technology...



‘...the application of technological styles...that respect the natural ecosystems and local social and cultural patterns’.



5 litre

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The city as a metabolism

The sum total of the technical and socio-economic processes that occur in cities resulting in growth, production of energy and the elimination of waste

(Kennedy *et al* 2007)



Should we adapt?

Are we ready to adapt?



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- Adapting to climate change:
 - Urban centres concentrate large populations

Urban centres concentrate the businesses that generate most of the world's GDP



- Urban centres have large deficits in infrastructure



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- Adaption to human-induced, or anthropogenic climate change...
 - ... all actions to reduce the vulnerability of a system, population group or an individual or household to the adverse impacts of anticipated climate change.



Source: arecentstudy.com

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- Adaptive capacity...
...is the inherent capacity of a system, population, or individual/household to undertake actions that can help avoid loss and can speed recovery from any impact of climate change.

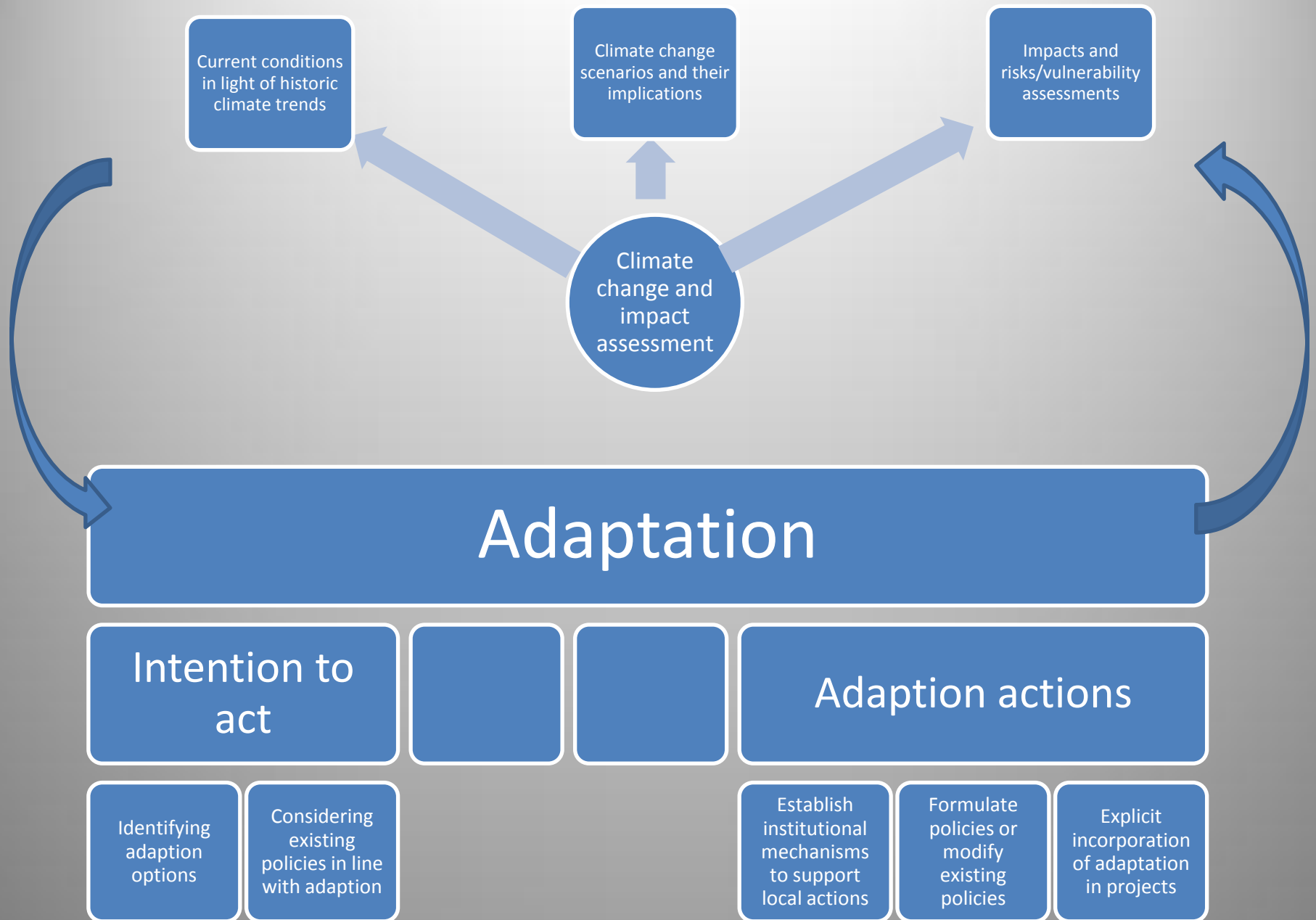


Source: BBC

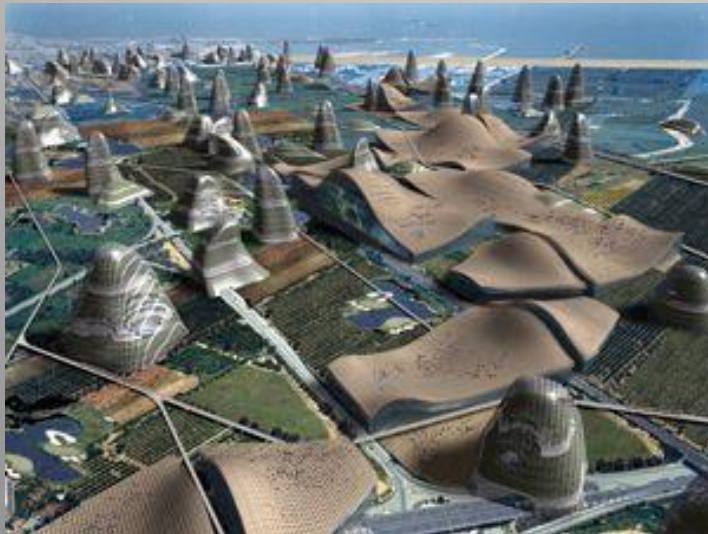
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- Adaption deficit...
...the deficit in infrastructure and service provision and in the institutional and governance system that is meant to be in place to ensure adaptation.





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- Retrofitting Cities
 - Communication services
 - The future
 - Pollution
 - Water
 - Buildings

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Making Workplaces Better Places to Work:

- Management
- Diversity
- Character, quality and continuity
- Adaptability
- Ease of movement and legibility
- Sustainability

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Sustainability is a multidimensional concept that relies on a number of interrelated factors such as; ecological, environmental, economic, ethical, social, cultural and political. The table below can help define, measure and monitor progress towards a sustainable future.

Aspects of Sustainability	Dimensions of Sustainability	Examples of Indicators
Ecological/Environmental	Natural resources & environment	Energy use Air quality
Economic		
Ethical		
Social/Cultural		
Political		

Complete this table incorporating areas of dimensions of sustainability and indicators; the first aspect has been part completed.