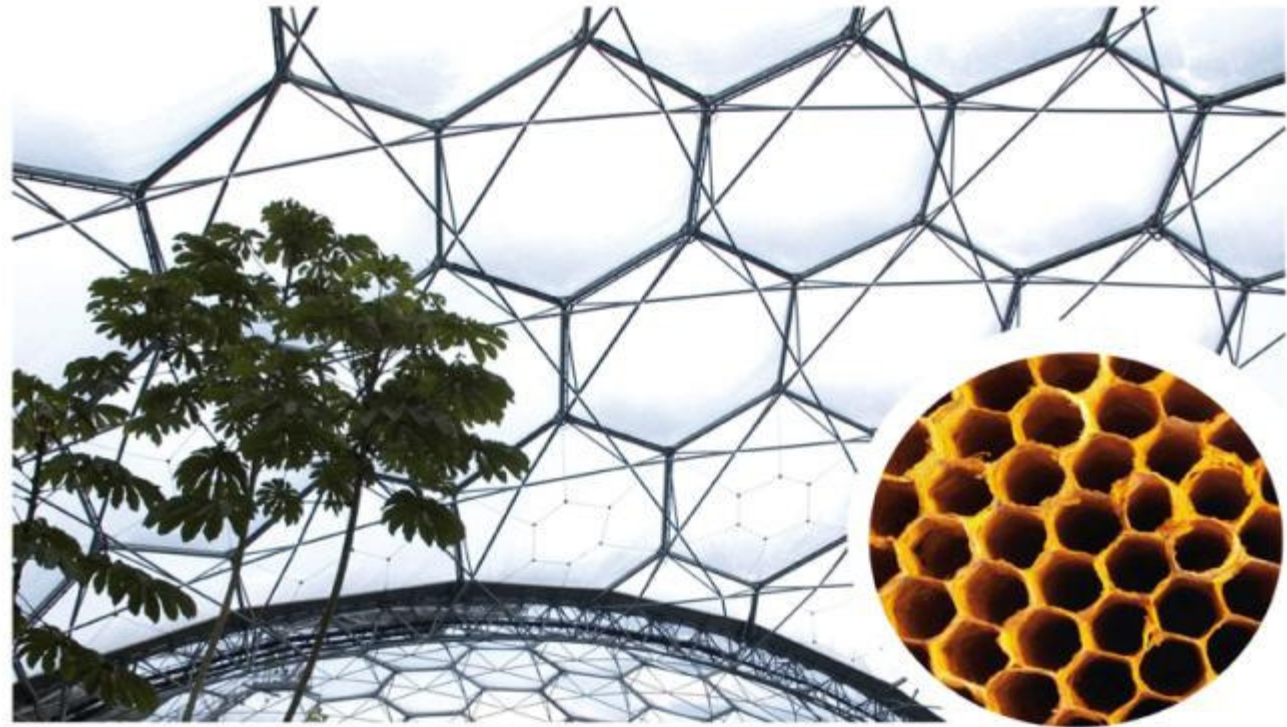


# It's not just about zero: Achieving economic and social sustainability



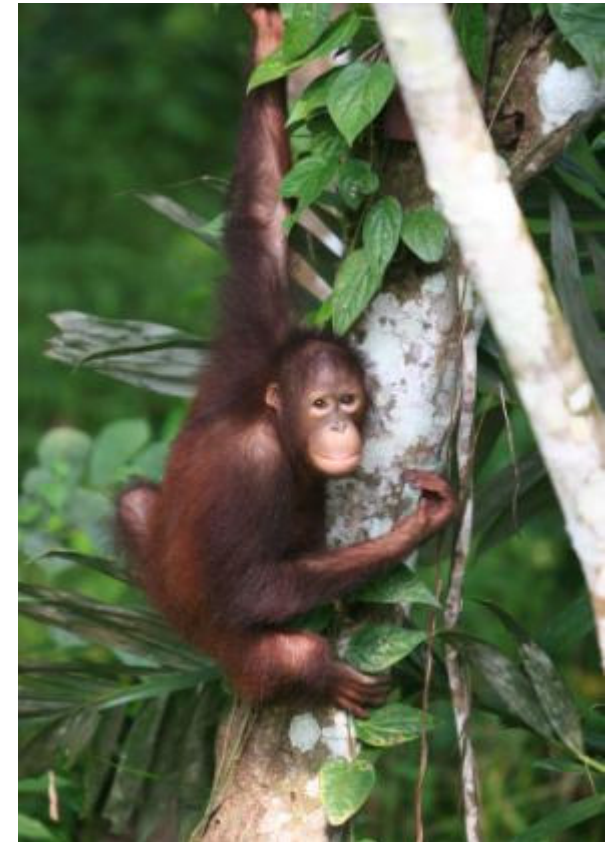
Prof. David Strong  
Chief Executive, Inbuilt Ltd  
Ecobuild, Earls Court  
26<sup>th</sup> February 2008



**Gaia Hypothesis:** The earth is a self-regulating environment. All the living organisms and the inorganic material of the planet are part of a dynamic system that regulates the conditions to support life.



If the Gaia Hypothesis tells us anything, it is that we should consider the **whole system**, not just the parts – everything is interconnected, and focusing on one element or issue can have dire and unforeseen consequences...





# Whole System Thinking

- Nature is not built-up from isolated blocks, but from a complex web of inter-dependent relationships
  - Human communities are also complex inter-related and inter-dependent living systems
- The danger of the “zero carbon” agenda is that it ignores social and economic sustainability and worse still, it can result in highly perverse outcomes
  - vital that a **whole system** approach is adopted so as to deliver **genuine sustainability**



Are we looking at the problem through the wrong end of a telescope?





# Firstly, what do we mean by net-zero Carbon and is it an illusion anyway?

Terminology and definition are currently very confusing. Over the past year, different government departments/agencies have used at least three different definitions:-

**Zero Carbon:** no carbon-emitting fuels are burnt on site and no electricity is imported from the grid.

**Net Zero Carbon:** carbon emitting fuels are burnt on site, but locally generated renewable energy is exported to the grid to make up for this.

**Carbon Neutral:** offsite generated renewable energy is imported from the grid via private wires.



# What is a renewable technology or energy source?

- There is no standard definition of what constitutes a “renewable” technology or energy source, different government departments, agencies and programmes recognise various systems, technologies and energy sources as “renewables”.
- “Active” renewable options include:-
  - Biomass/biofuels/biogas
  - Photovoltaics
  - Solar Thermal
  - Heat Pumps
  - Wind Turbine
  - Micro-chp
  - Hydro (including wave/tidal)
  - Energy from waste



Some technologies don't even feature in any government list of renewable technology but are (arguably) the most effective!



**Advanced wind powered solar assisted renewable low carbon drying system**

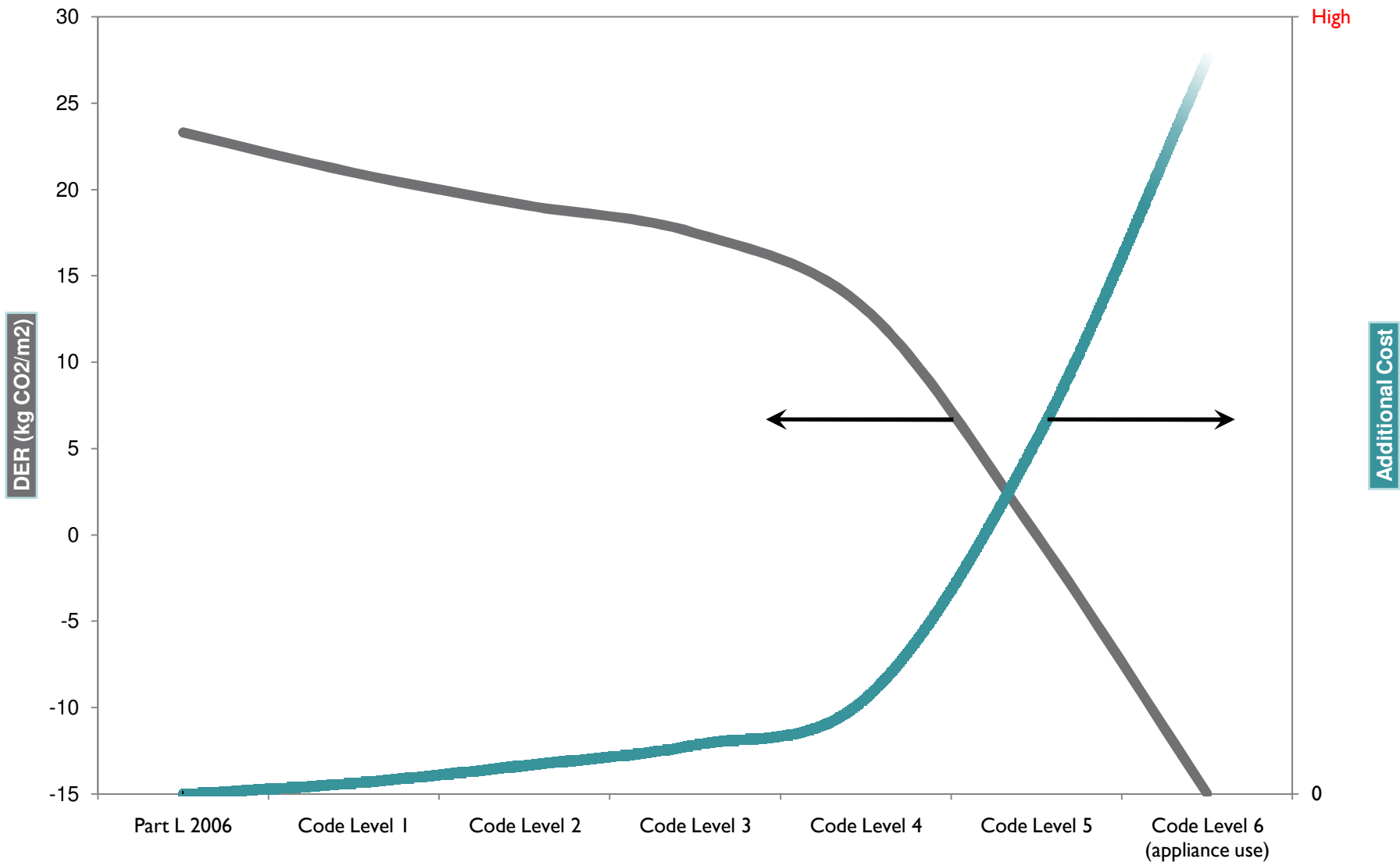


# Is zero Carbon offering the consumer a false promise?

The home is only zero-carbon in the sense that it complies with a **theoretical** carbon requirement

- Heating, lighting, hot-water energy requirements are derived from SAP
- Appliance related carbon comes from an HMRC formula which links CO<sub>2</sub> to the m<sup>2</sup> of the house
  - The formula does not have any basis in fact/science!
- The home could only be genuinely zero carbon if lifestyles are prescribed and energy rationed so as to balance onsite generation!
  - Politically unacceptable!

# Carbon emissions vs. Code Level –the law of diminishing returns!



- Based on an 80m2 semi-detached house



# Stewart Milne –Sigma House, BRE

- “CSH Level 5, near zero carbon”
- Will it deliver in practice?
  - One of the wind turbines has already blown off
  - Given the location and ground turbulence effects, it’s very unlikely that the micro-wind turbines will produce anything like the manufacturer’s rated output
  - recent research has revealed that many building mounted micro-wind systems in the urban environment are actually **net-consumers** of energy
- A “reality check” is needed urgently
  - Is the “**best**” in danger of becoming the enemy of the good?



# Avoiding perverse outcomes



- Beware the law of unintended consequences

- Summertime overheating
- Flood resilience
- Security
- Acoustic performance
- IAQ/Health problems



- Do not have a blind faith that all new technologies will work

- Micro gas-fired chp?
- Micro-wind?

- Beware the snake oil salesman

- If it sounds too good to be true, it probably is!
- Bizarrely, there are those already claiming to be able to deliver a CSH Level 7 house!





# Is the zero-carbon agenda acting as a huge distraction from the vital challenges associated with:

- Reducing carbon emissions from the **existing building stock**
  - An **urgent** inter-departmental government review and strategic plan was promised in November 2003 –it's never materialised!
    - c.f. Germany
- Securing investment/planning for large scale renewables
- In terms of £ invested per Tonne carbon saved, both of these options will provide a much greater/faster return than making new homes “zero” carbon!



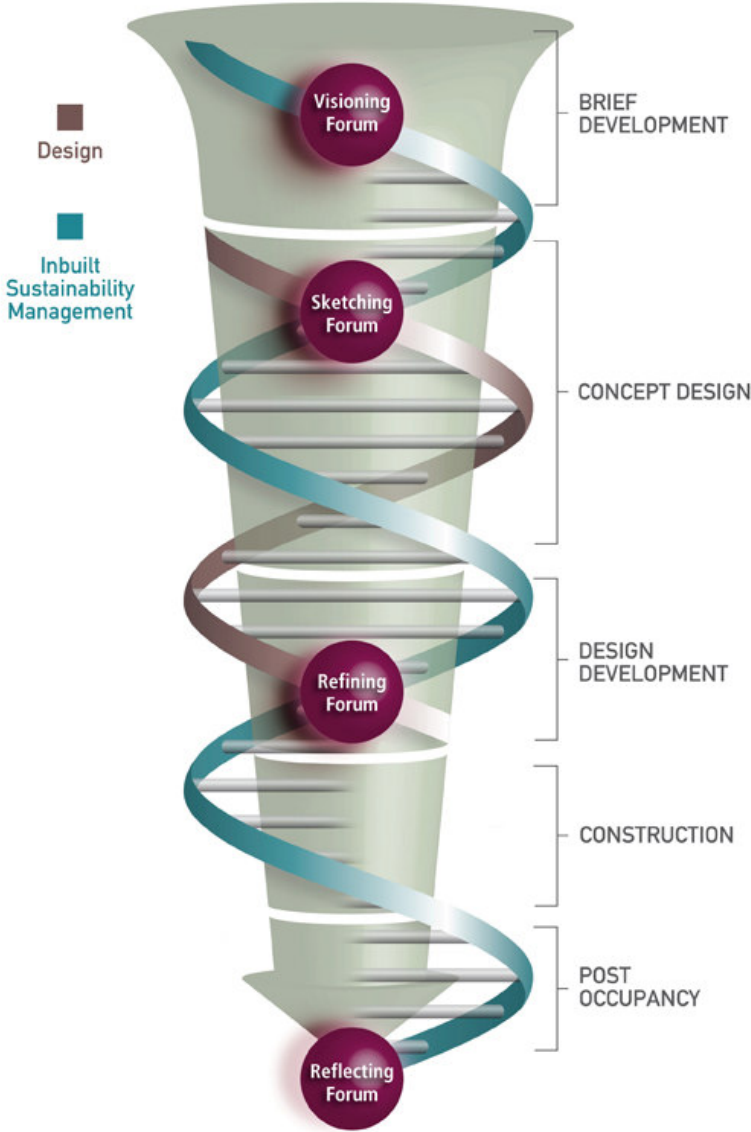


# Addressing the challenge of climate change requires a holistic approach to deliver genuine sustainability.

- Whole system thinking is essential:-
  - Vital to optimise the entire system, not just parts
  - Collaborative, multi-disciplinary, integrated team working
  - Working to find natural solutions to reduce our dependence on energy-intensive systems



# Whole system thinking



THE INBUILT APPROACH



# Managing Risk and Adding Value

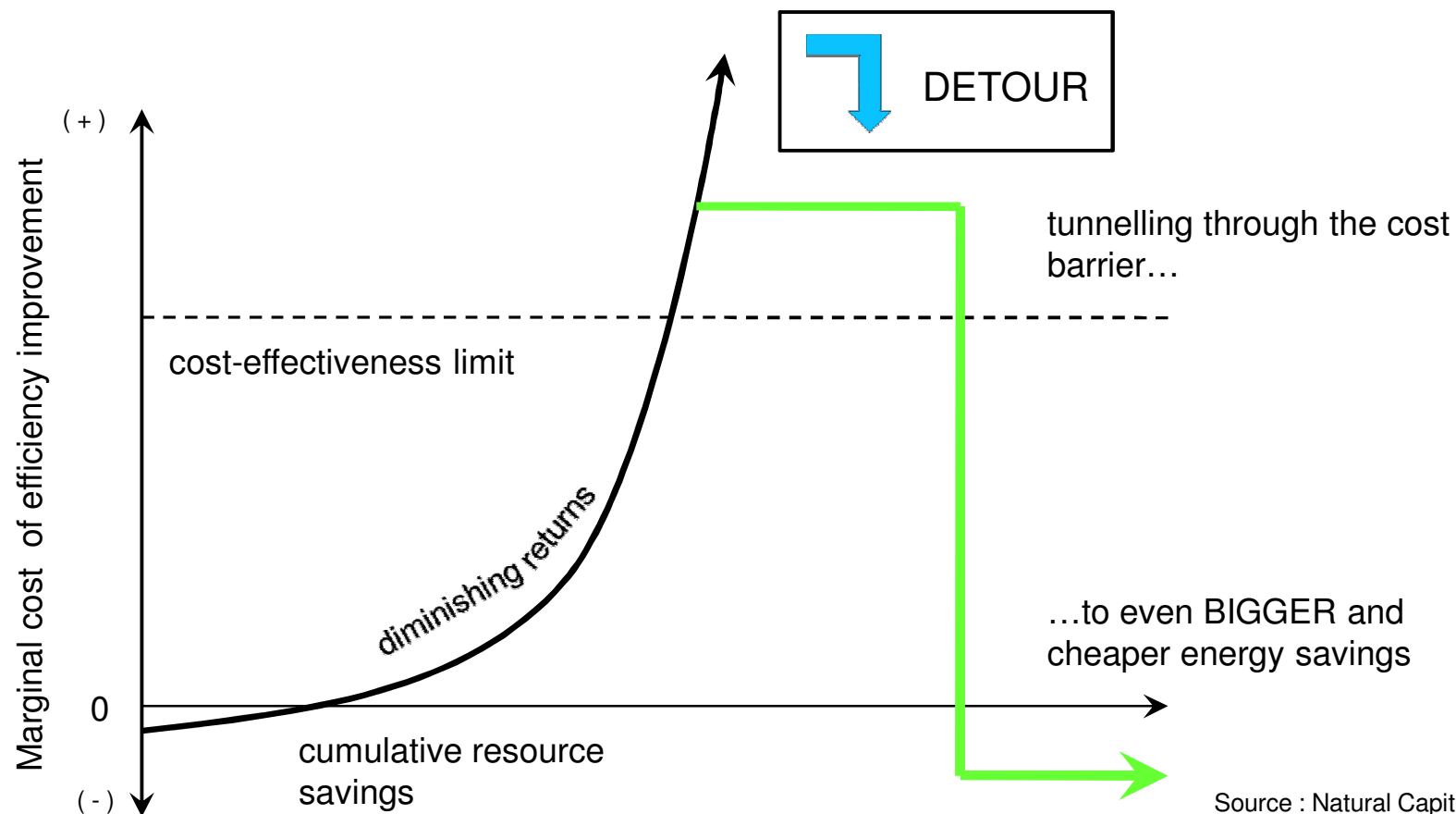
## Intelligent Systemic thinking

- Looking for synergistic solutions which address and resolve multiple problems and issues simultaneously
- Working within the constraints of natural systems, whilst fully exploiting the opportunities offered by nature to ventilate, heat, cool and illuminate our buildings.
  - Delivers huge social, human, environmental and economic benefits
  - Optimising the whole system by designing out waste and improving efficiency
  - Doing more with less by tunnelling through cost barriers





# Tunnelling through the cost barrier



Source : Natural Capitalism  
Paul Hawken, Amory B Lovins,  
L Hunter Lovins



# Example of Whole System Thinking and Tunnelling Through the Cost Barrier

The German PassivHaus approach

## The Requirement

- No central heating system
- Not style or construction method prescriptive

## The Solution

- Very high standard of insulation
- Ultra-high performance glazing
- Air-tightness of less than  $1\text{m}^3/\text{hr}/\text{m}^2$  @50Pa

## The achievement

- Over 6000 houses built-to-date
- Healthy, comfortable
- Incredibly low running cost
- No risky/complex technologies
- No conventional central heating system
- Controlled ventilation with heat recovery
  - Substantially reduced incidence of childhood asthma





# Designing out the need for technology and unmanageable complexity

What will the future look like?



Hopefully, not like this!





Or like this?





Or this?





# Three Exemplars

## Housing



**greenoak**  
housing association



**Commercial Building**  
**Beaufort Court (RES Group and Inbuilt HQ)**  
**– Zero Carbon Refurbishment of an Egg Farm**



# Delivering Genuine Sustainability



- Sustainability is a complex web of interrelated issues
- **a whole systems approach is essential**
- Collaborative, integrated multi-disciplinary team working
  - “designing-out” technical complexity and cost by rethinking, challenging and improving
  - finding synergistic solutions which address and resolve multiple issues simultaneously





# Summary

Let's start looking through the correct end of the telescope and focus on the real imperatives:

- The **existing** building stock
- Installing large-scale renewables where they will be most cost-effective
- Ensuring that the new buildings are ultra-low carbon and incorporate renewable technologies which are correctly sited, cost-effective and reliable (including the optimised use of passive renewables)
- Adopting a “whole system” approach and deliver spaces, places and buildings which are **genuinely sustainable**
  - Healthy, safe, productive and inspiring
  - Fit for people and the planet
- Sustainability is more than zero carbon and can't be bolted-on:
  - it must be “in-built”



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