

Construindo o futuro. Hoje.

SBCS 08 - I Simpósio Brasileiro de Construção Sustentável



Realização



Conselho Brasileiro de Construção Sustentável

Painel 5

Arquitetura e cidades sustentáveis.
Sustainable Cities and architecture.

Construindo o futuro. Hoje.

SBCS 08 - I Simpósio Brasileiro de Construção Sustentável

Building Ecology: First Principles for a Sustainable Built Environment

Dr. Peter Graham
United Nations Environment Programme

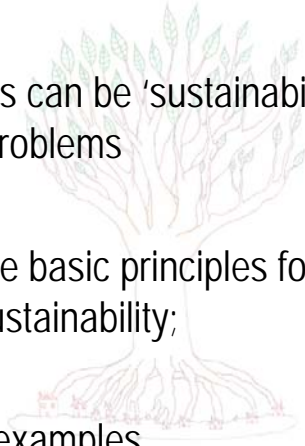


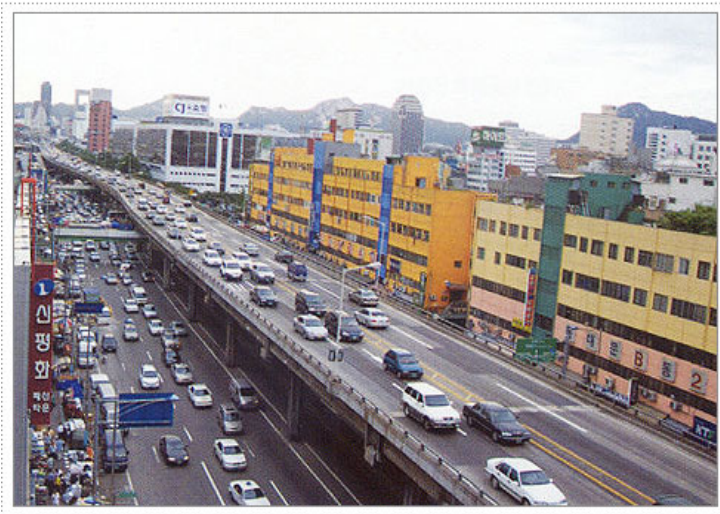
 

Conselho Brasileiro de Construção Sustentável
I SIMPÓSIO BRASILEIRO DA CONSTRUÇÃO SUSTENTÁVEL

Aims

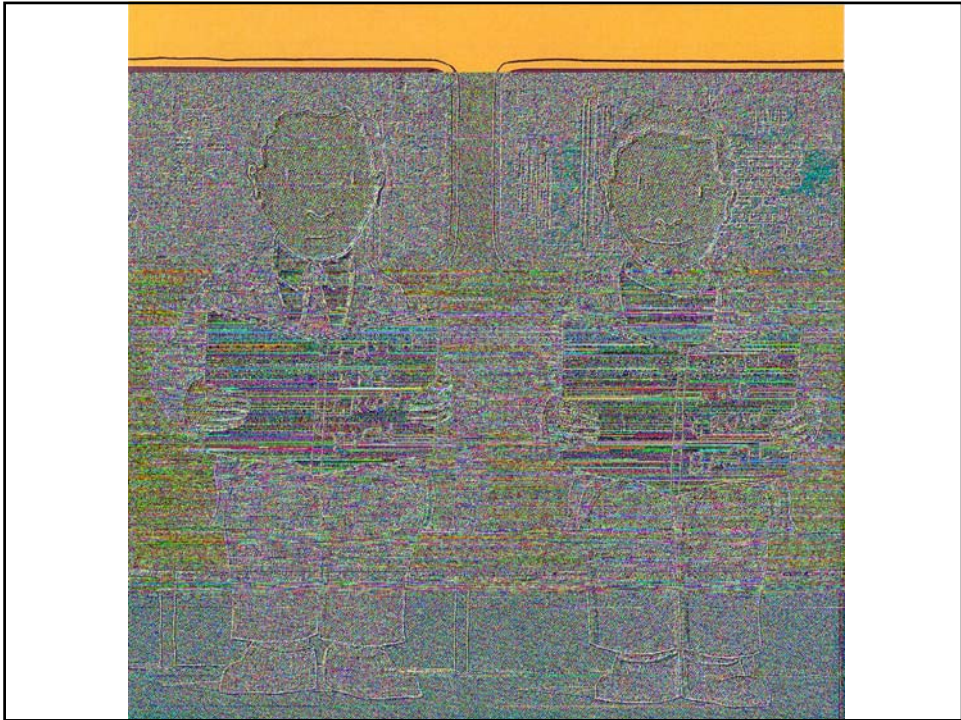
- How buildings can be 'sustainability' solutions rather than problems
- To explain the basic principles for Building Ecological sustainability;
- Show some examples.

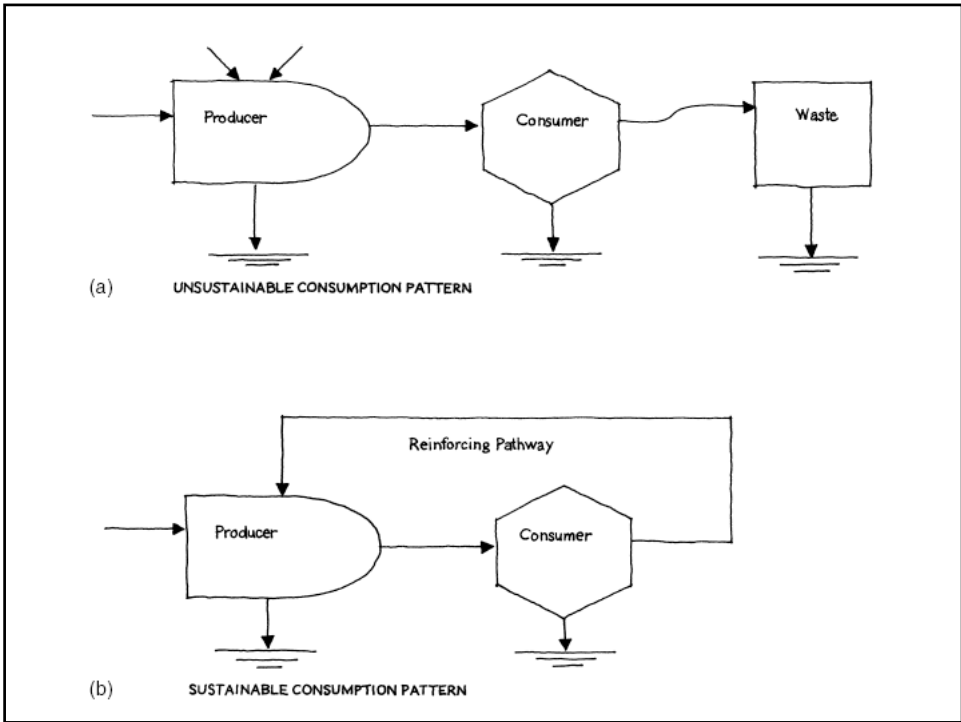




[\(http://www.metro.seoul.kr/kor2000/chungaehome/en/seoul/2sub.htm/\)](http://www.metro.seoul.kr/kor2000/chungaehome/en/seoul/2sub.htm/)







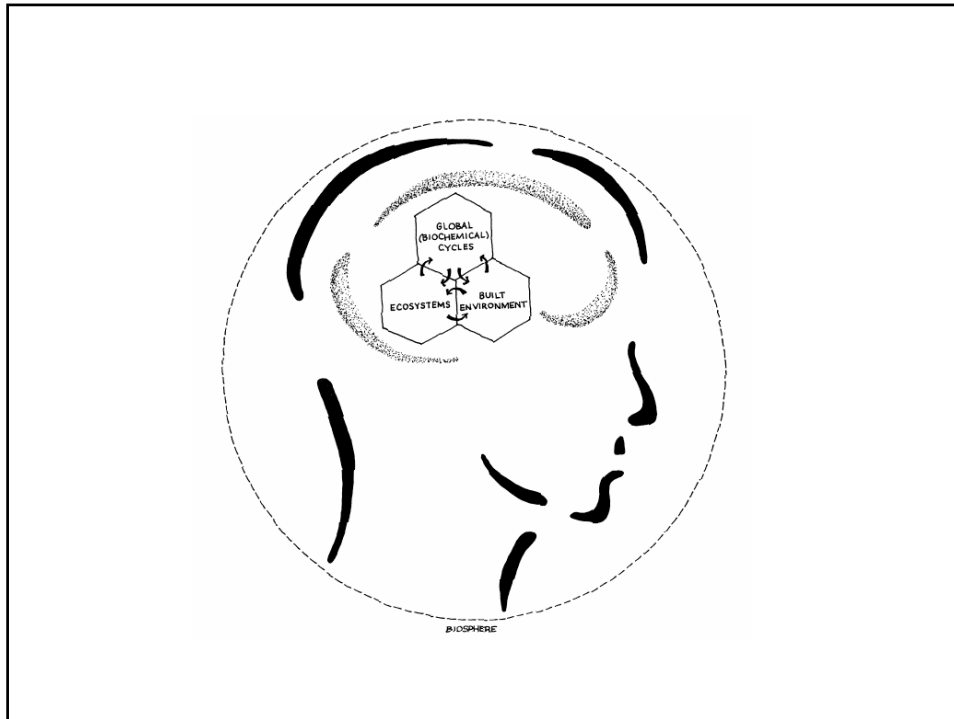
Building Ecology... a 'systems approach'

Interdependency

Thermodynamics

Change

The block contains three illustrations. 'Interdependency' is a tree with roots and leaves. 'Thermodynamics' is a bee surrounded by a circular flow of energy. 'Change' is a landscape with a sun, clouds, and a tree growing over time.

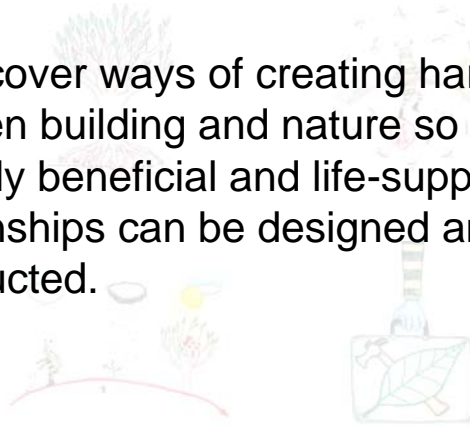


Building Ecology Is:

- The study of how our built home effects our natural home;
- The study of the interdependencies and effects of building and natural environments on each other;
- About discovering the interactions between building and nature and the effects of those interactions.

Building Ecology's Objective Is:

- To discover ways of creating harmony between building and nature so that mutually beneficial and life-supporting relationships can be designed and constructed.



The Principles

Interdependency

- Practice Life-Cycle Thinking



Thermodynamics

- Use New Things Least
- Turn Waste into Food
- Consume no more than can be regenerated



Change

- Protect and Enhance Diversity
- Encourage Learning & Innovation
- Let Solutions Grow from Place



Interdependency



*“To see the world in a grain of sand and heaven in a wild flower
hold eternity in the palm of your hand and eternity in an
hour...”*

William Blake

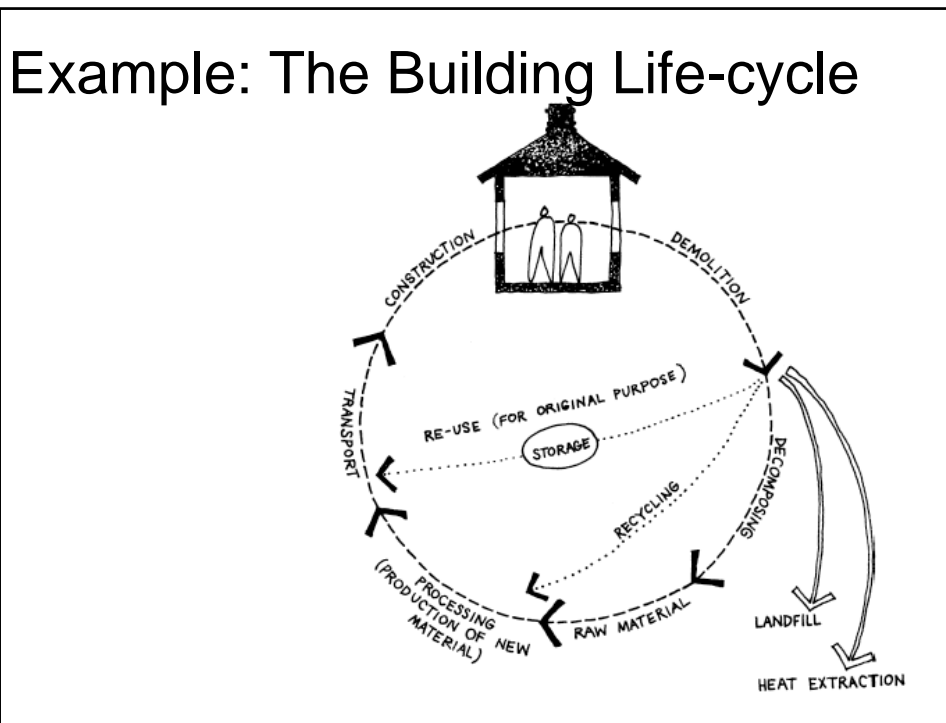
Principle: Practice life-cycle thinking
Key Concept: Accumulate material resources
Strategies: Adaptable design/LCA/LCC/Ecolabels

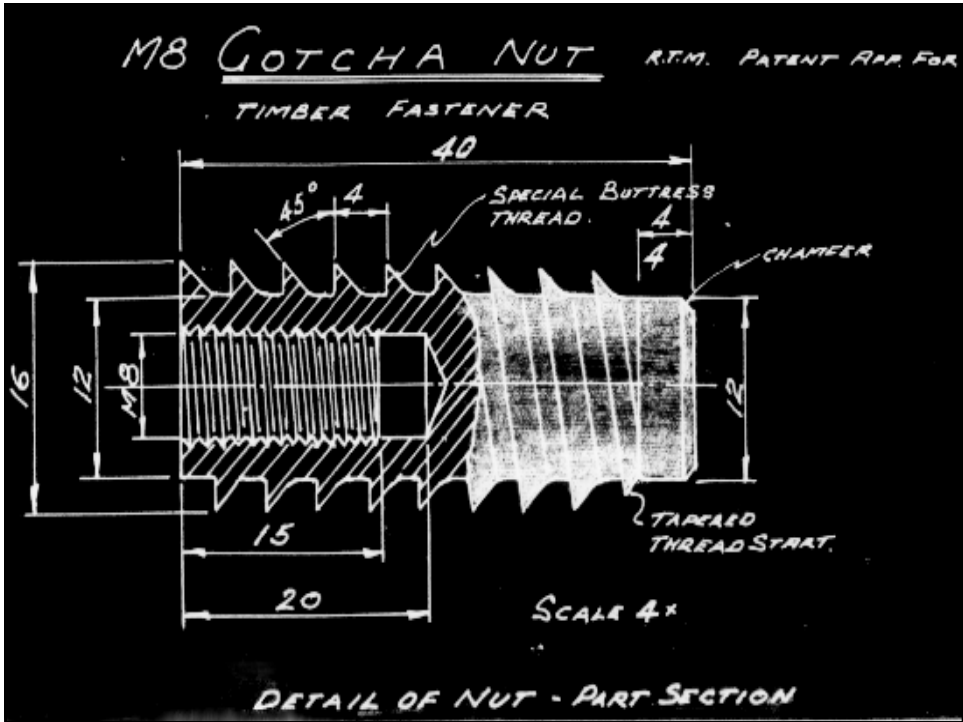


**PRACTICE
LIFE-CYCLE THINKING**

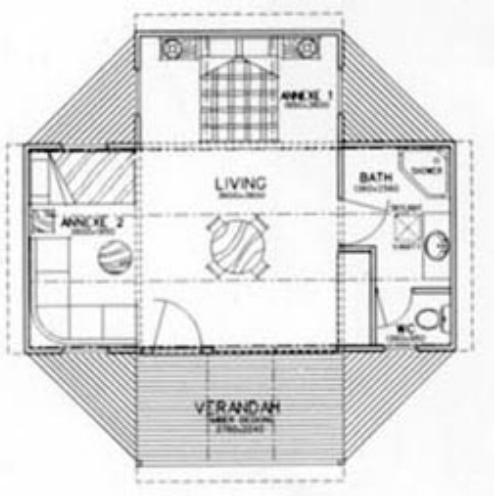
Life-Cycle Thinking

- Consider the whole System First;
- Consider effects through time.





Life-Cycle Design





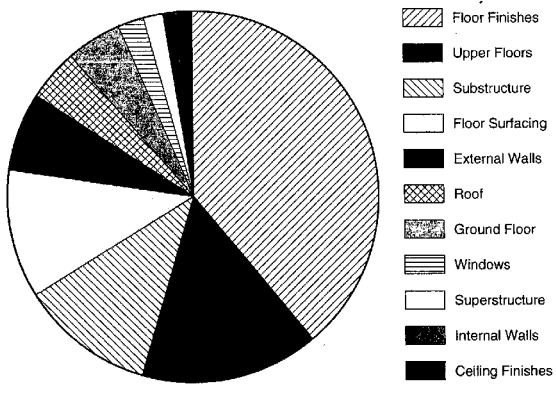




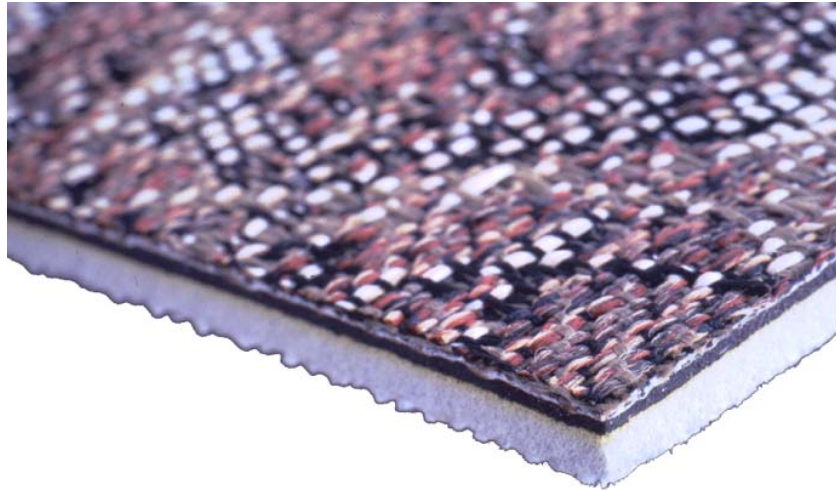


Floor finishes have the greatest impact [in office buildings...up to 40%] they are replaced as many as 12 times in a 60yr life span.

“Changing to a recycled rubber or natural fibre underlay can reduce the overall impact of floor finishes by up to two-thirds” BRE, 2002



Contribution of building elements to typical building impact



Solenium Carpeting, Interface, Inc.

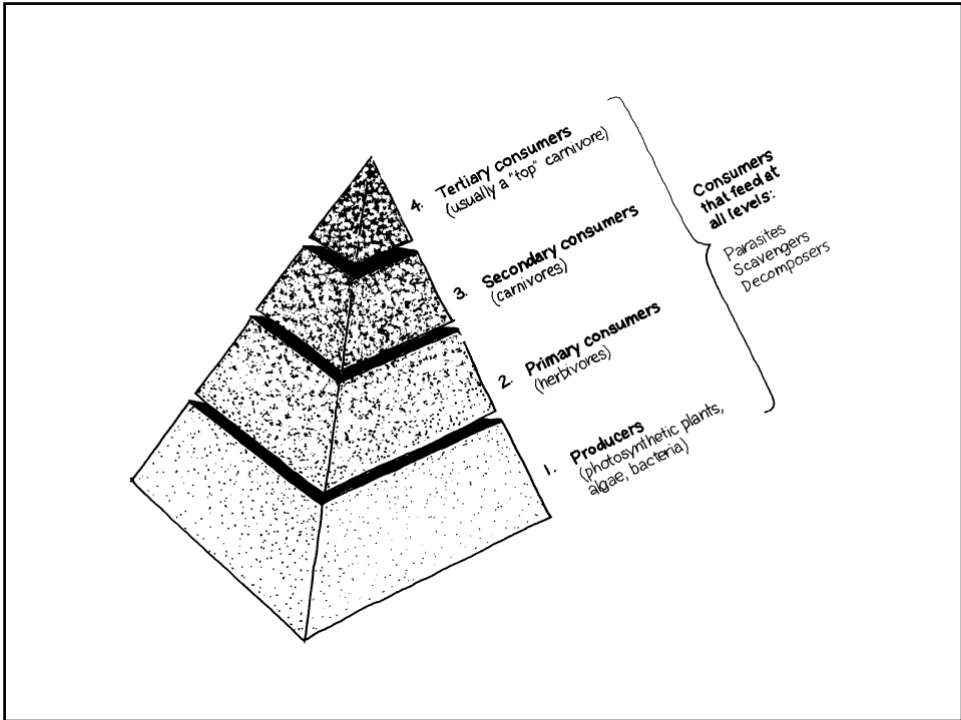
Thermodynamics



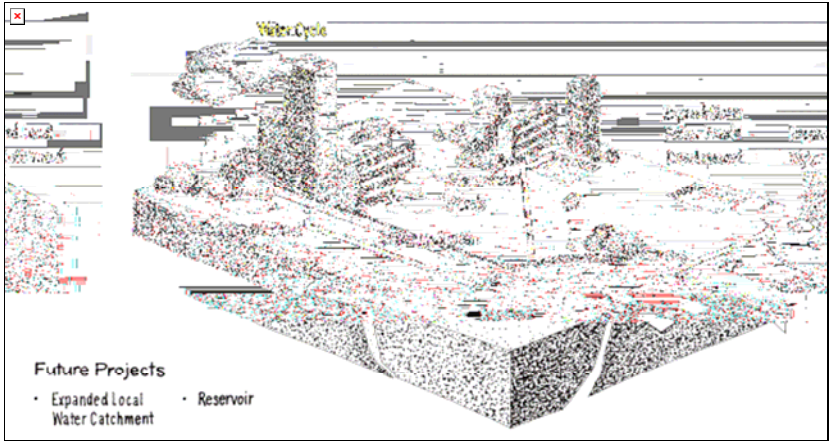
Principles: **Use New Things Least**
 Turn Waste Into Food
 Consume no more than can be
 regenerated.

Key Concepts: 1st, 2nd & 4th Laws of
Thermodynamics,

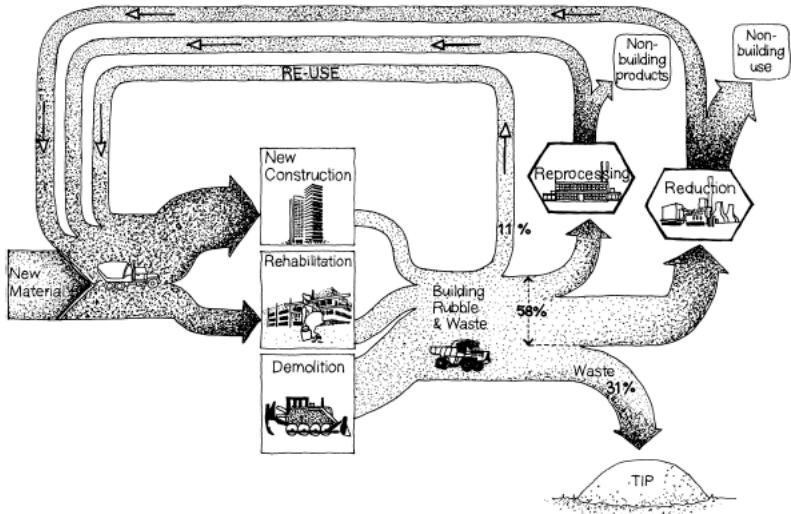
Strategies: Bioclimatic design, Adaptable design,
 Ecocycle-design, Metabolism.



Urban Metabolism - water



The Industrial Metabolism



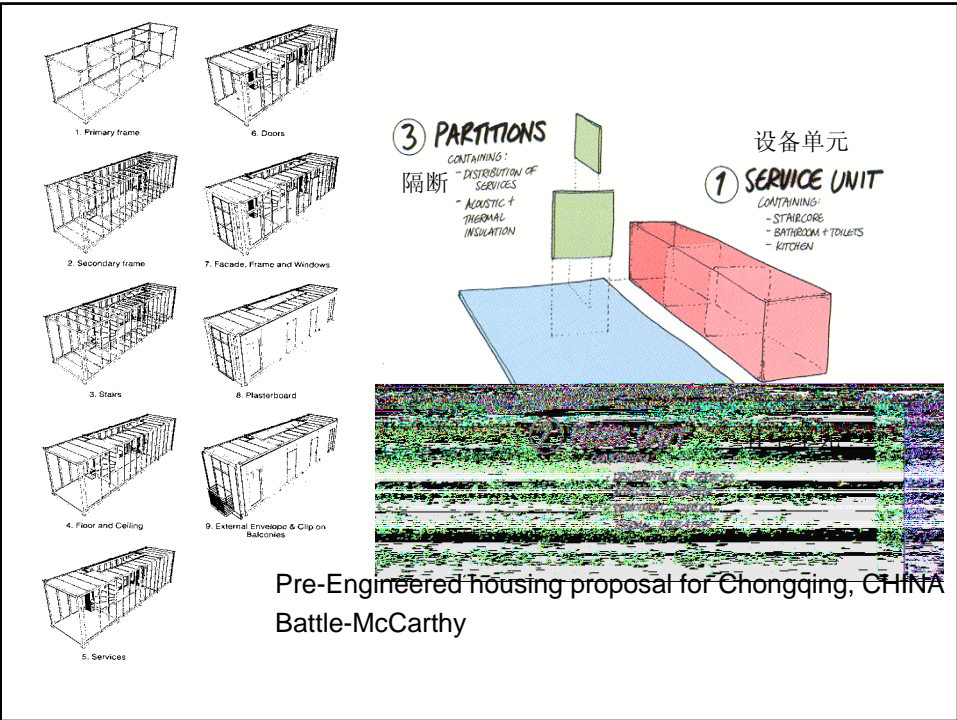
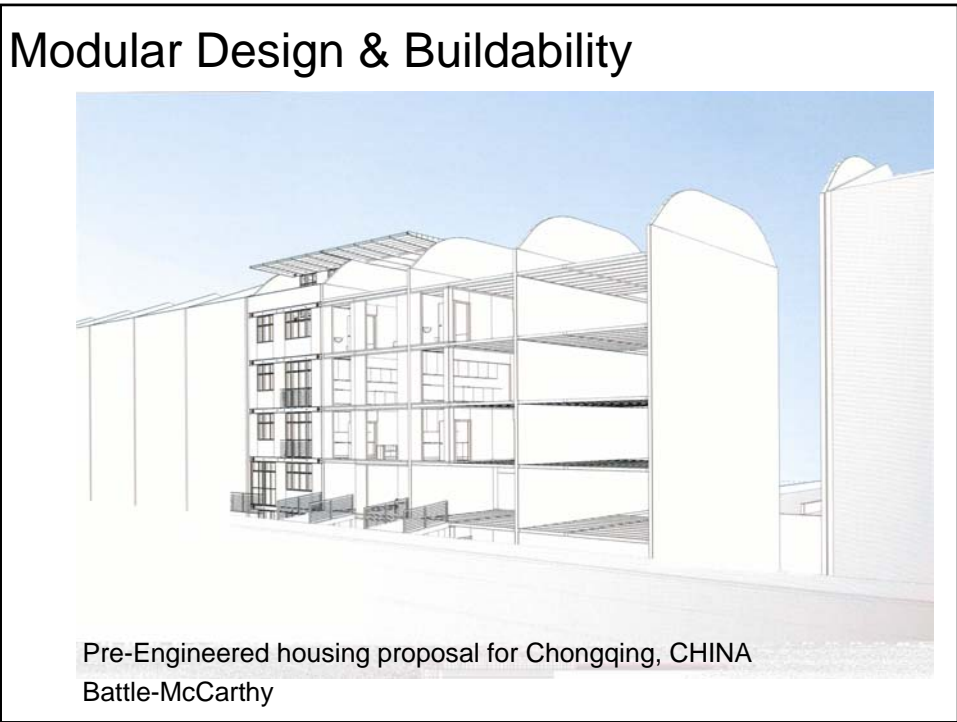
Sydney Airport Rail Tunnel - Fly Ash Concrete Used



Reusing Buildings

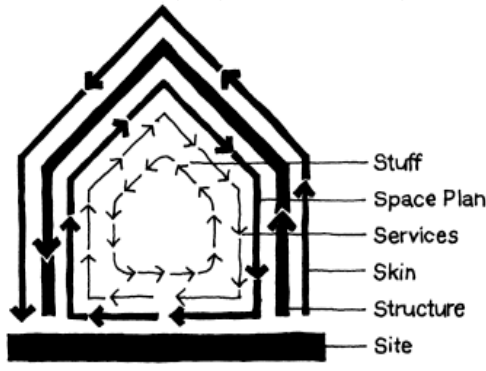
- Saves:
 - 1.67GJ/m² of embodied energy;
 - 0.45 tonnes of CO₂/m²;
 - 1.25 tonnes/m² of resources;
 - and
- Eliminates:
 - ~120 kg/m² of solid waste.

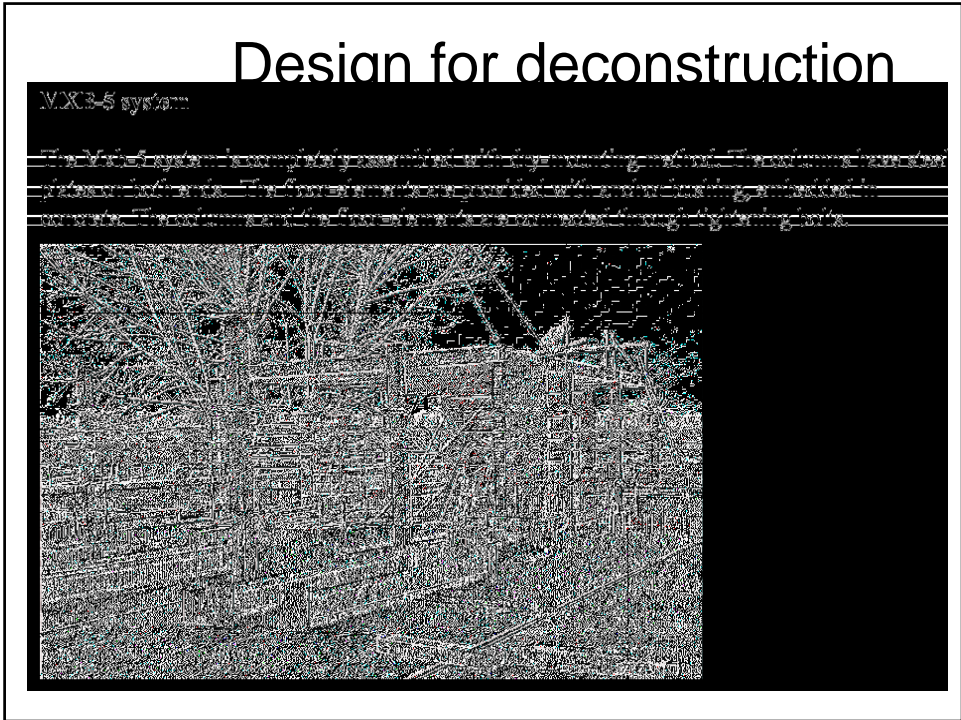
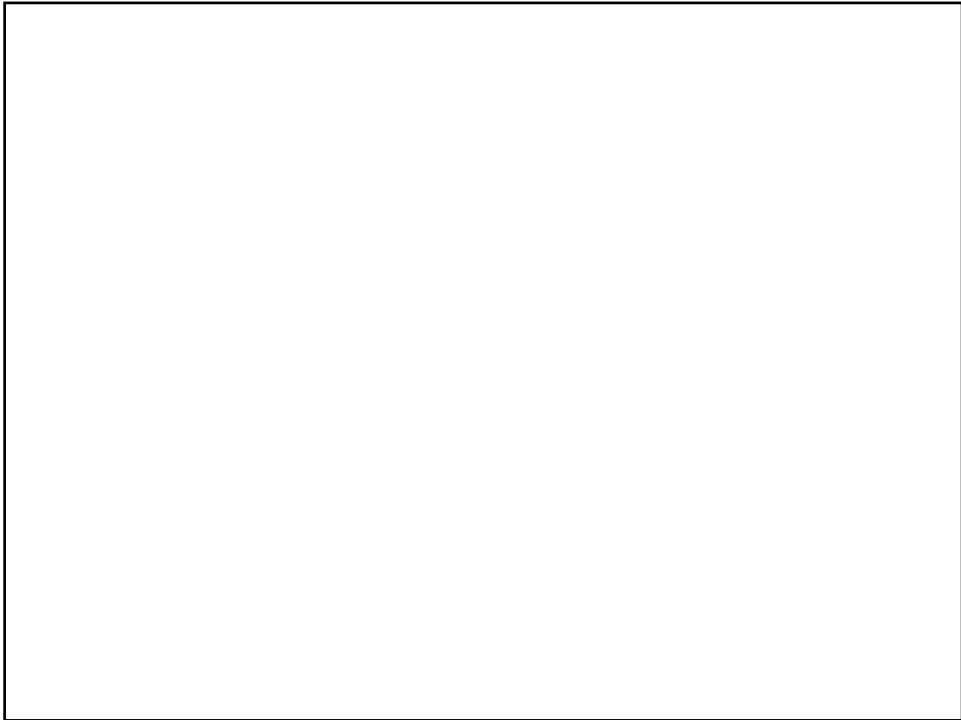




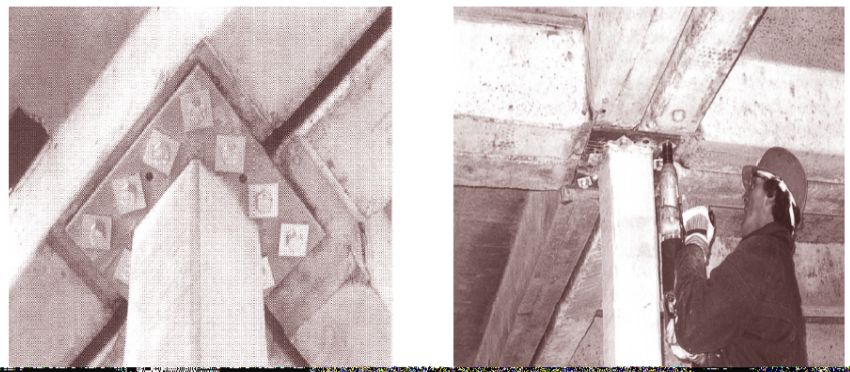
Materials cycles planning

- Fast-cycling materials and systems need to be able to be replaced without damaging slow-cycling materials



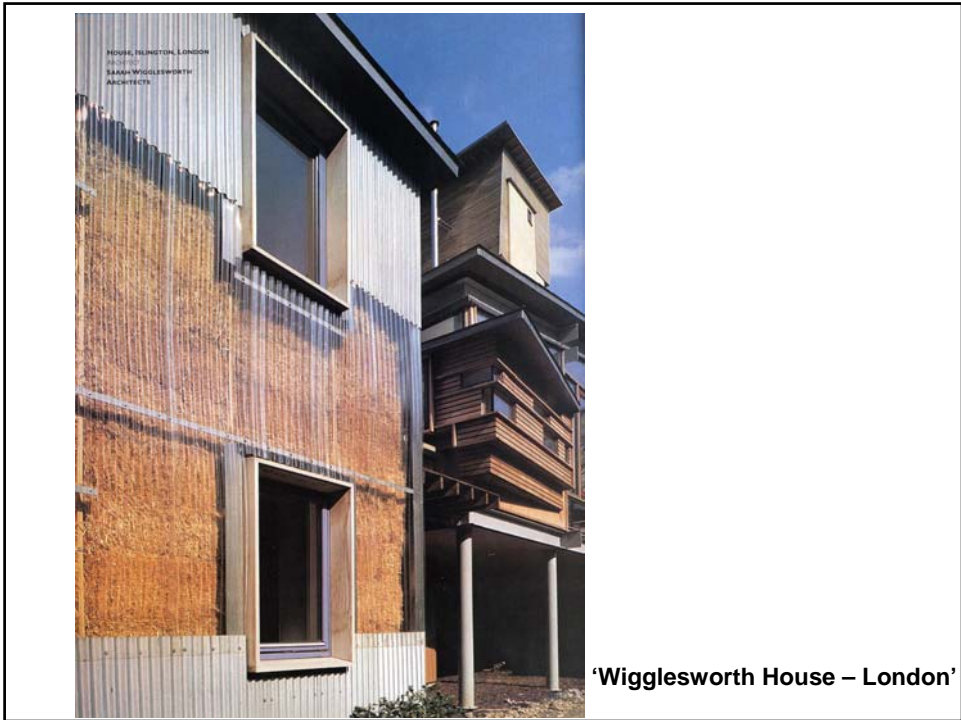


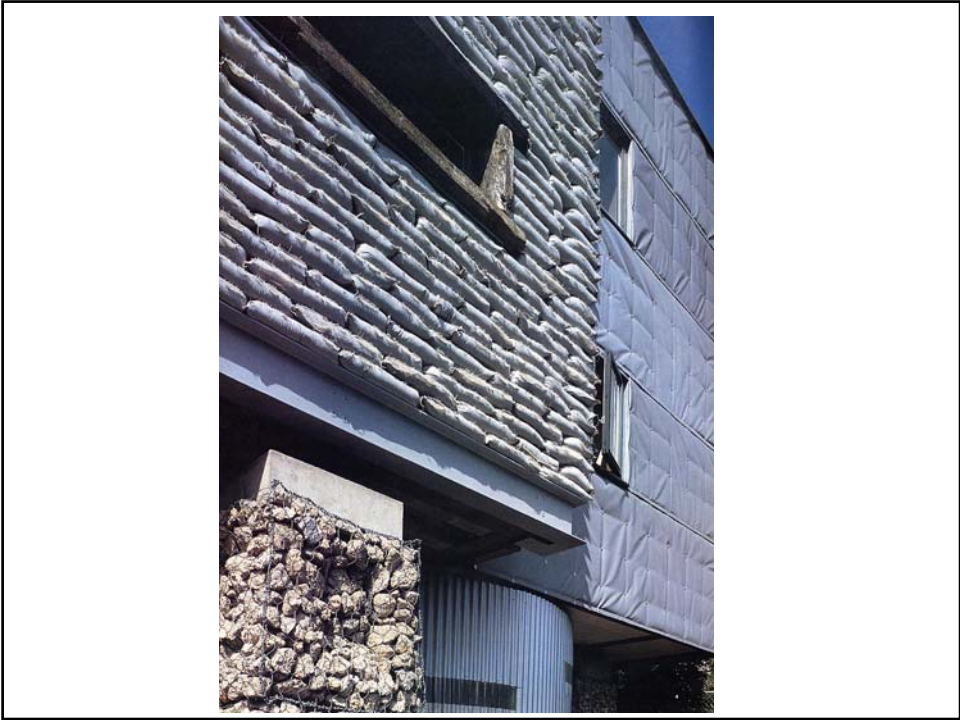
Standardized floor-elements : 3600 mm x 5400 / 7200 mm
Standardized columns : 200 x 200 mm / 300 x 300 mm
Mounting speed : 800 m2 / day
Permissible Load : 10 kN/m2, rib floor, thickness: 60/320 mm



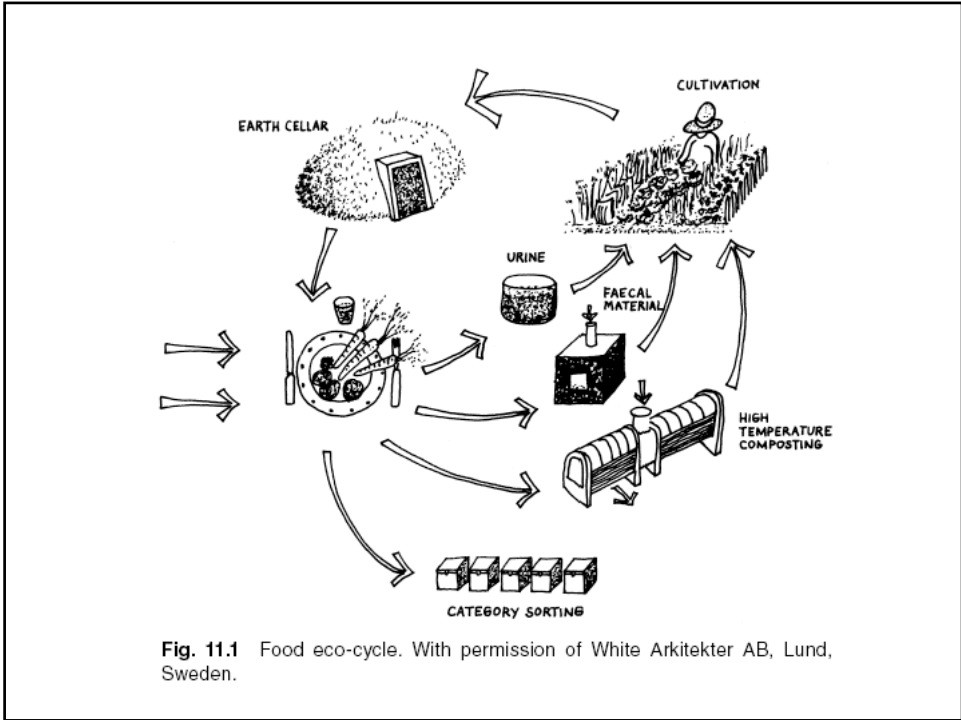
Materials you can build with – rather than only ‘building materials’



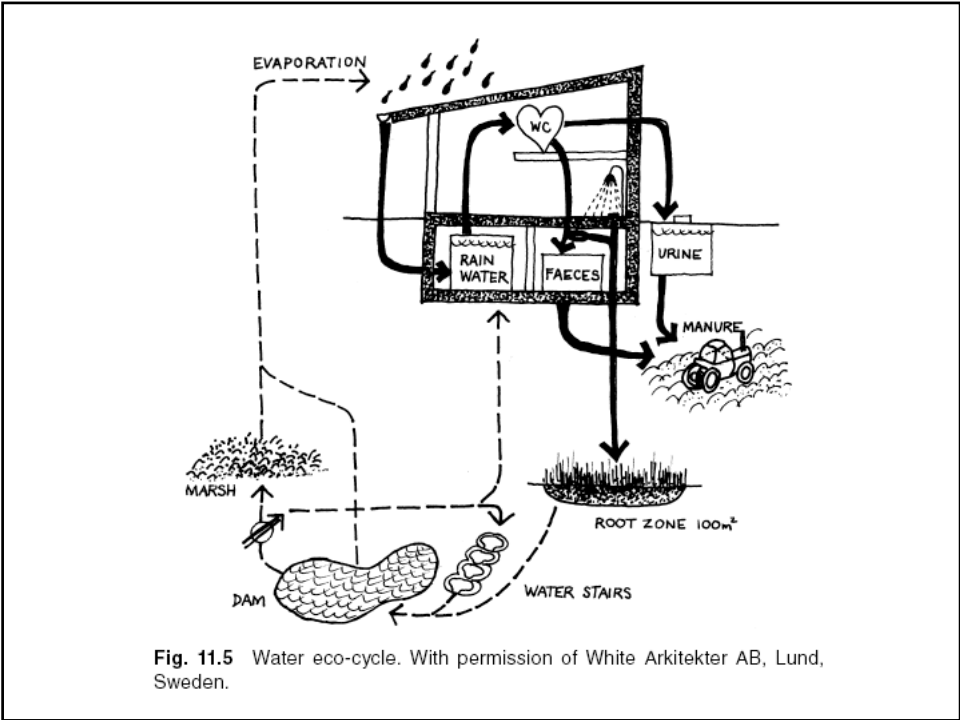












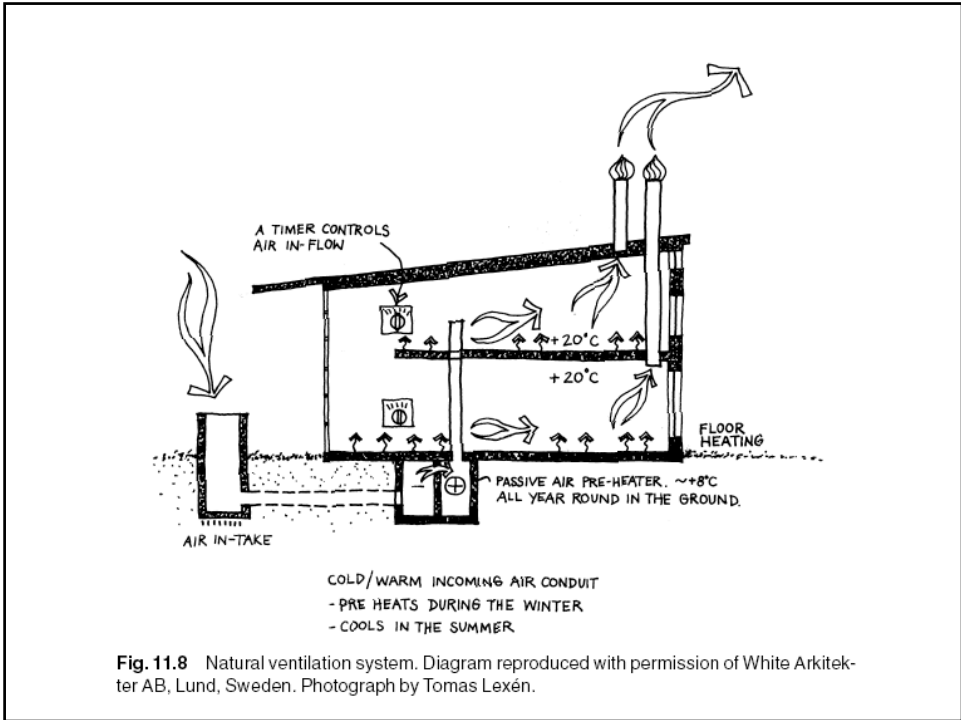


Fig. 11.8 Natural ventilation system. Diagram reproduced with permission of White Arkitekt AB, Lund, Sweden. Photograph by Tomas Lexén.



CH2 Melbourne

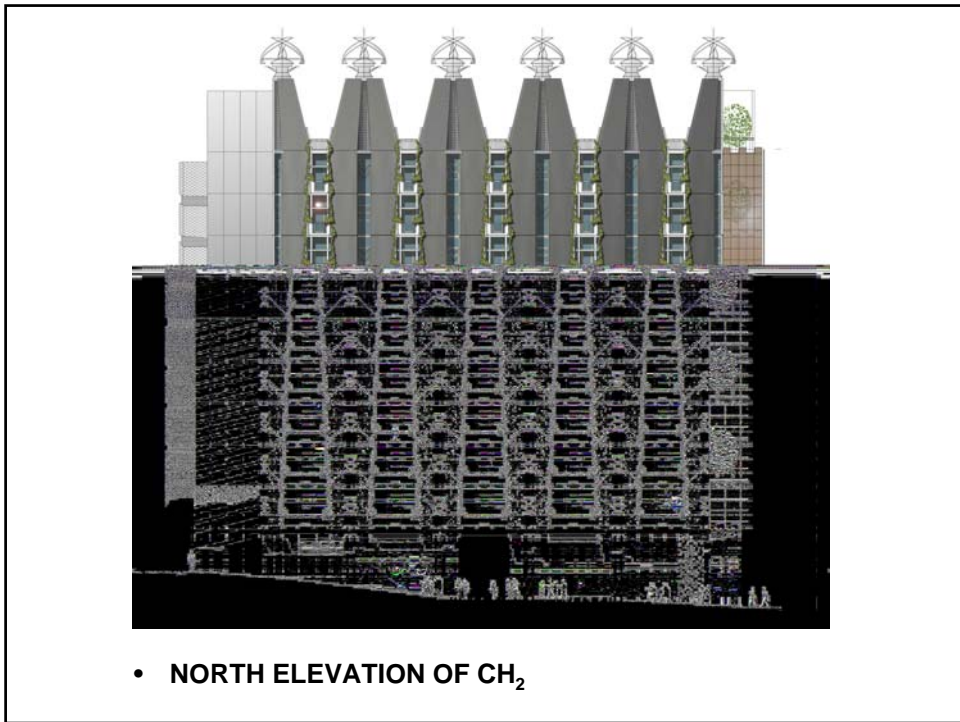
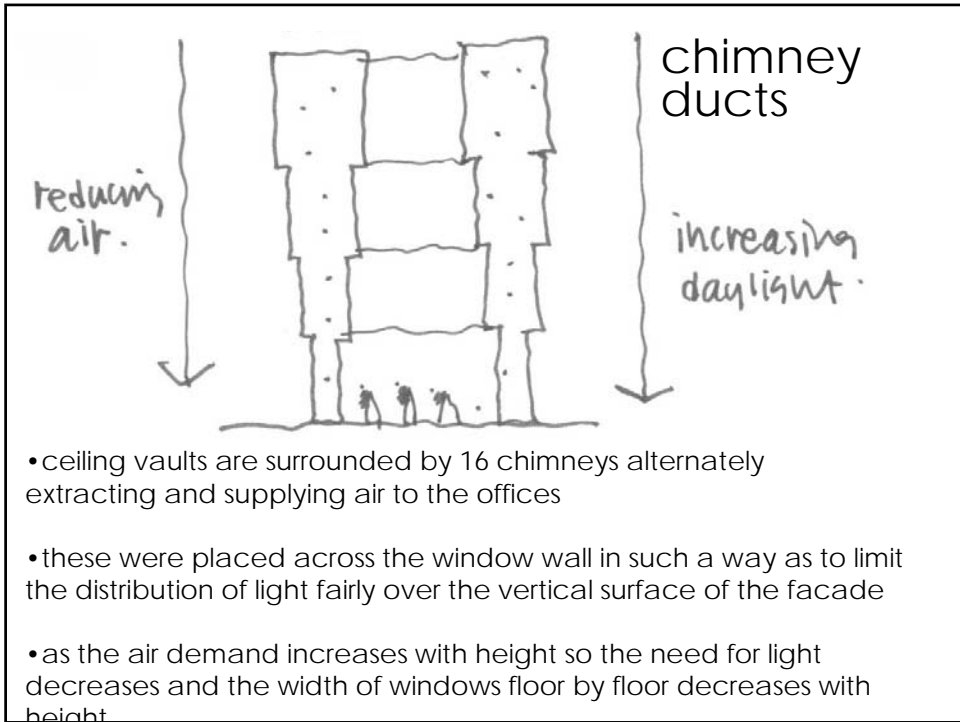
Architect: Mick Pierce

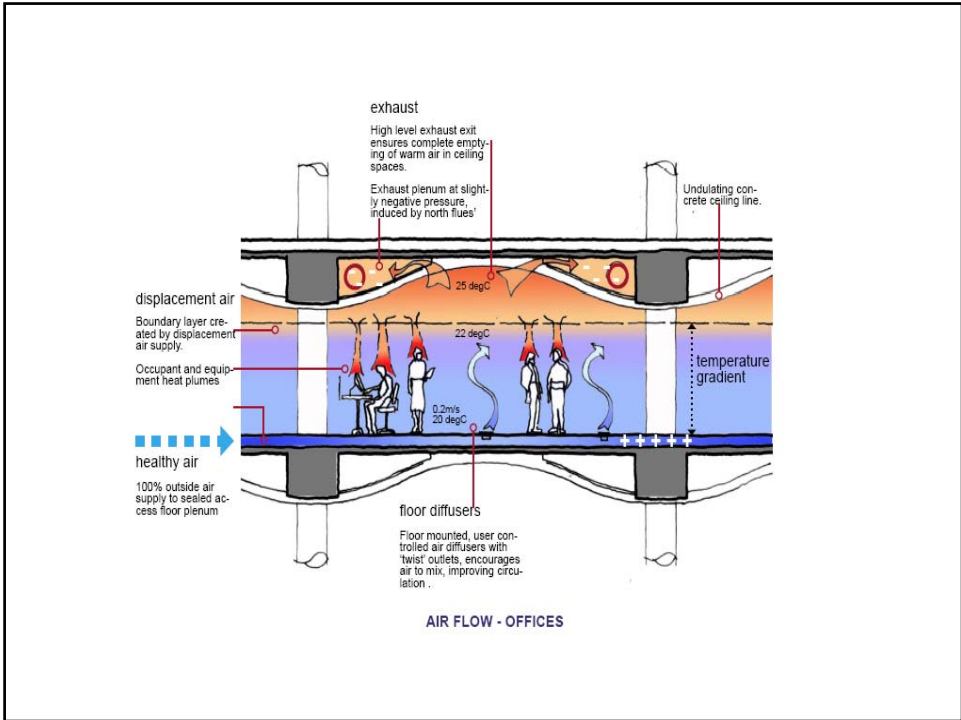
6 star rating



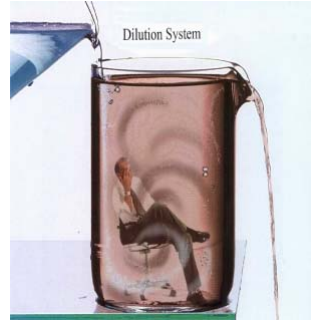
Source: Professor Rob Adams - Design & Culture: City of Melbourne





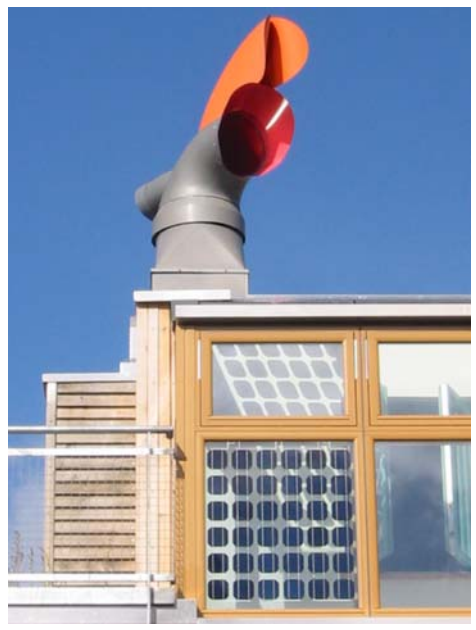


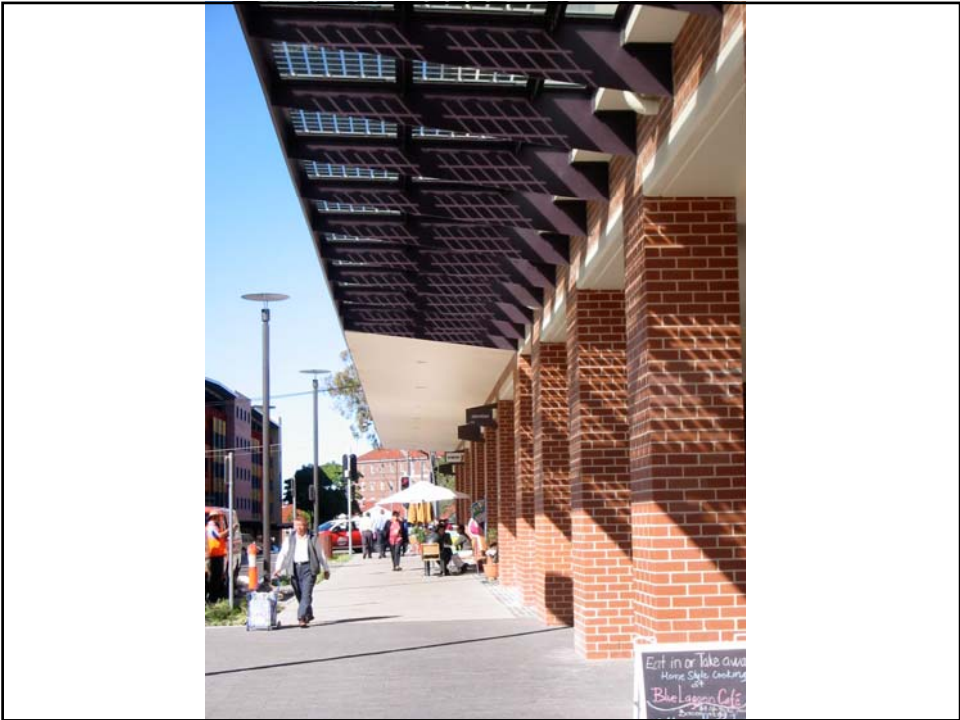
Displacement Ventilation Improves Indoor Air Quality

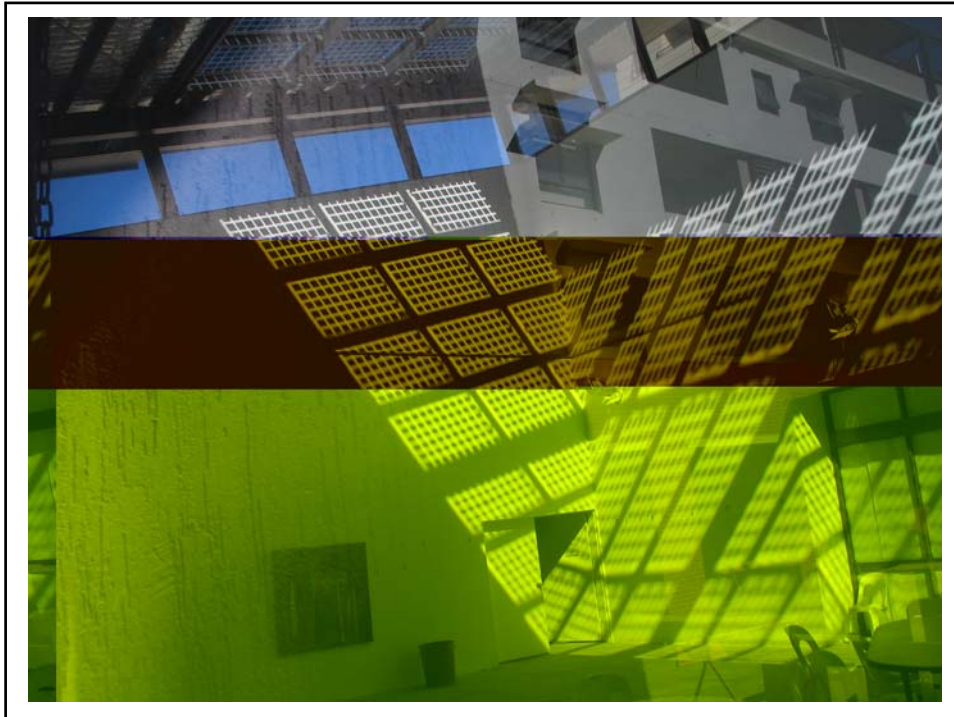


BedZED

- “Wherever possible...all activities will be powered by renewable energy.”





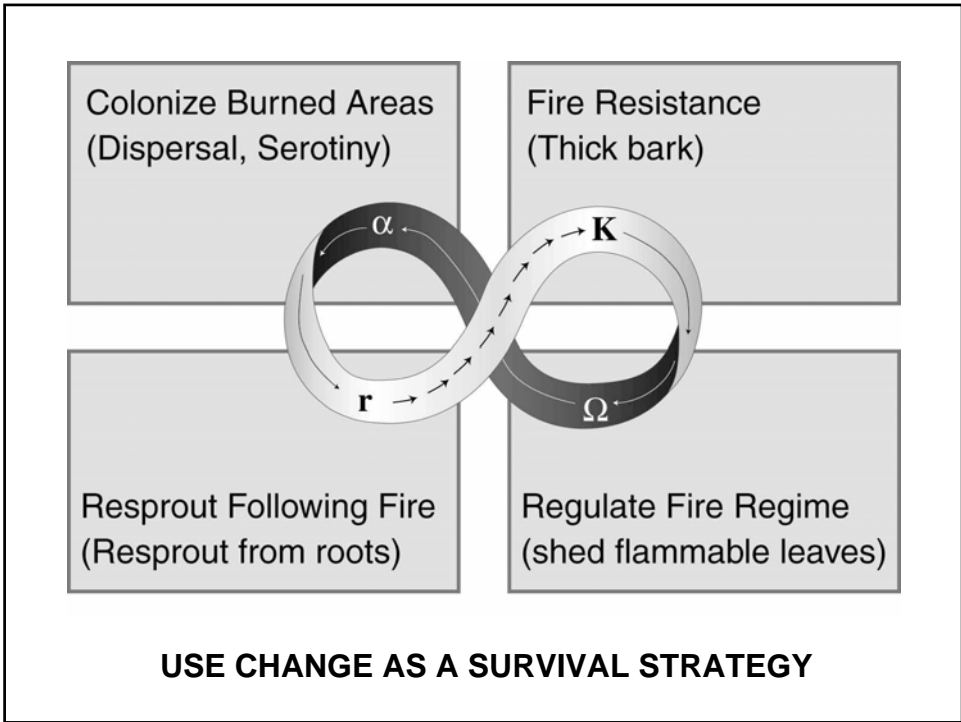


Change



CHANGE IS OUR SURVIVAL STRATEGY

- Principles:** Protect & Enhance Diversity
Encourage Learning & Innovation
Let Solutions Grow from Place
- Key Concept:** Intentions & Surprises
- Strategies:** Renewables, use biology rather than technology, monitoring & feedback.



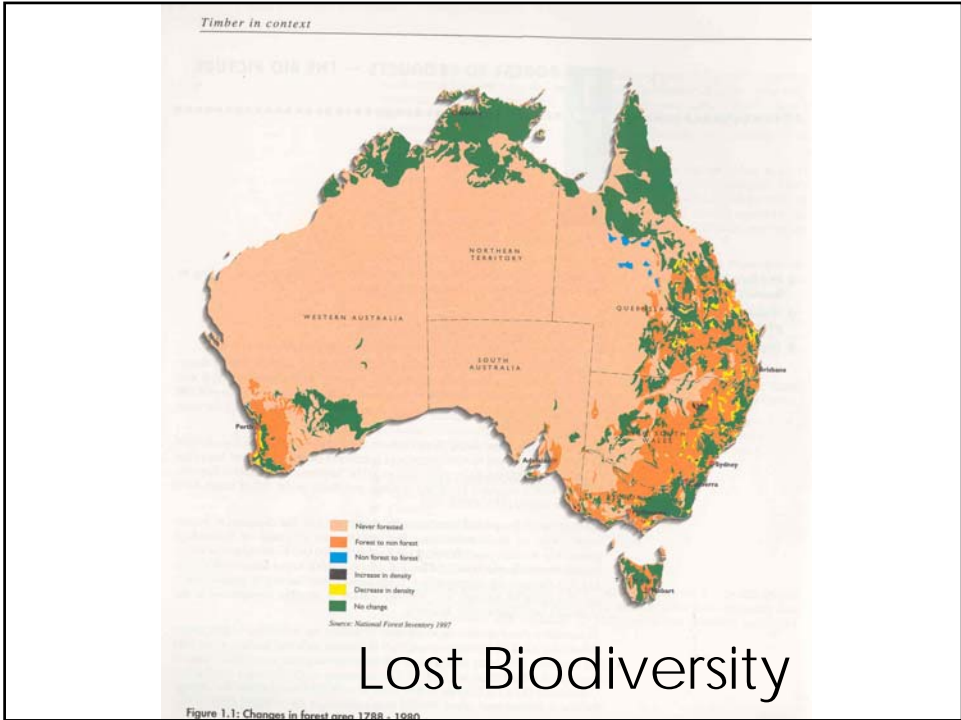
Diversity

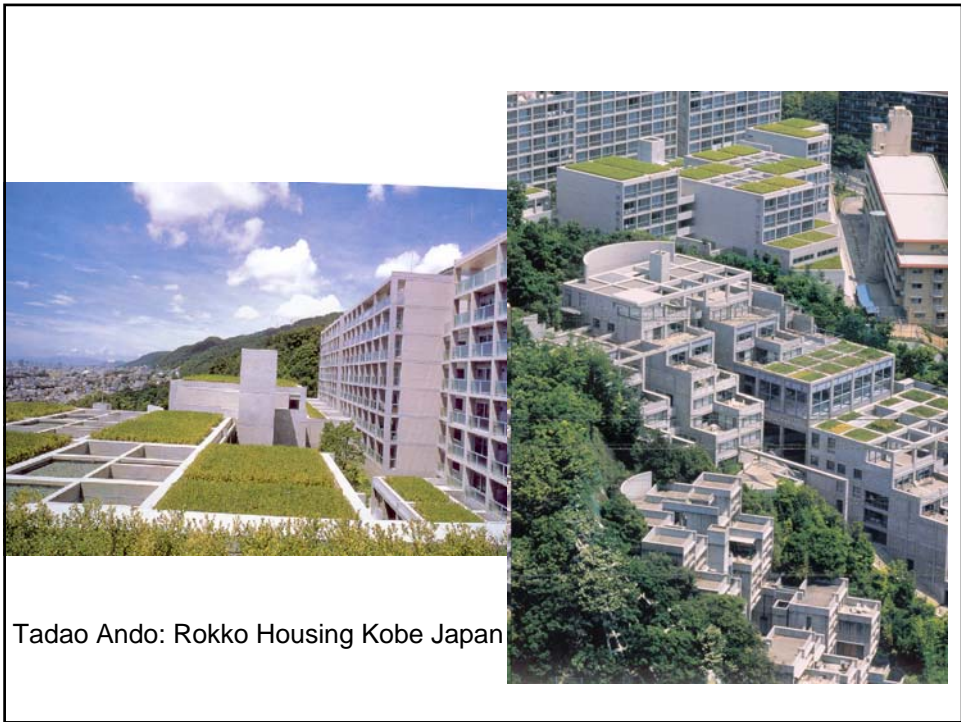
- We need biodiversity for resilient ecosystems;
- We need economic diversity for resilient markets;
- We need diversity of cultures and experience for resilient people.

Styx Valley - Tasmania



Renewable resources can be used in unsustainable ways





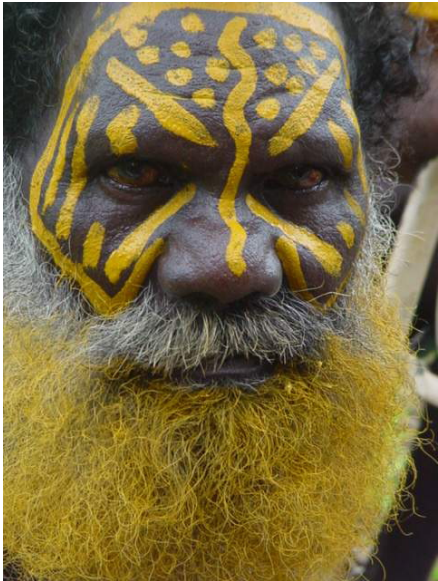
Enhancing Biodiversity



Diversity of Materials



Diversity of Culture & Experience



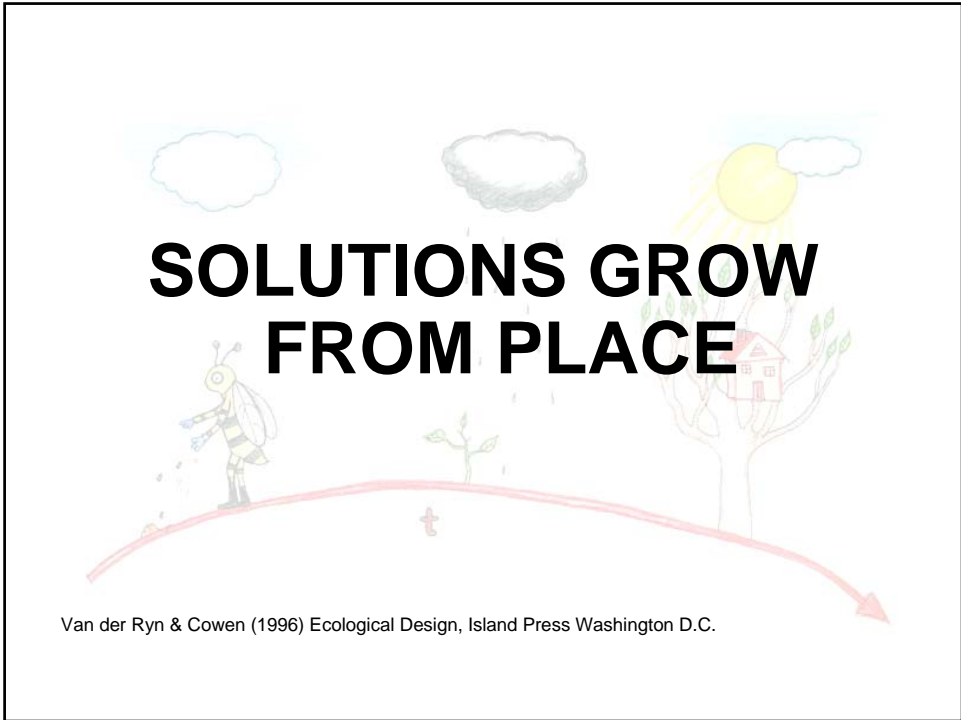
American Indian Housing Initiative – Penn State University

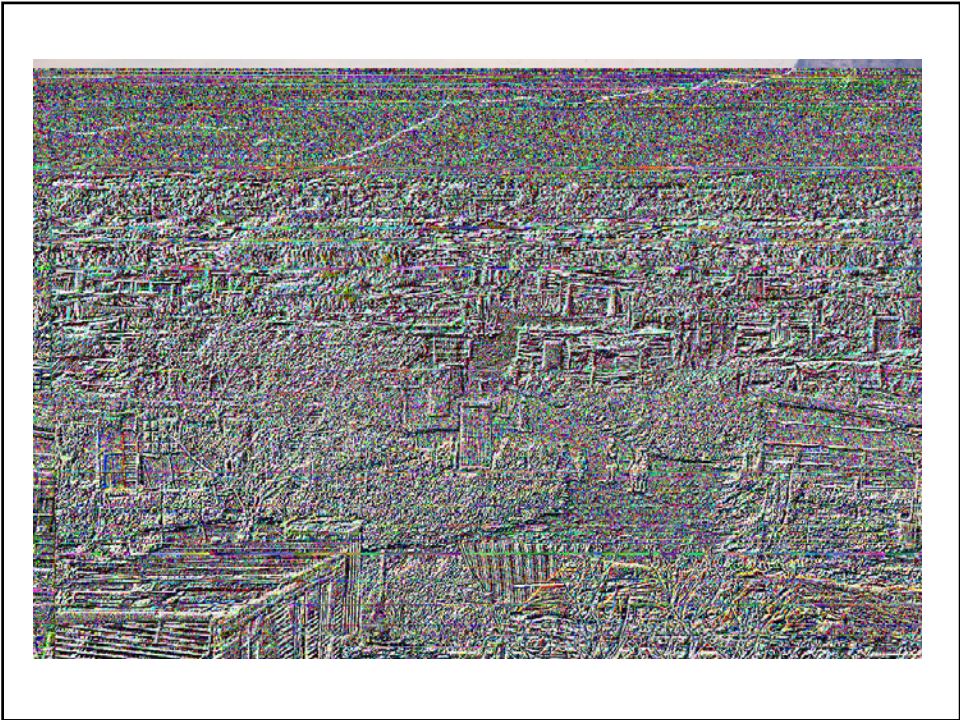


2002: **Literacy Center**
Northern Cheyenne reservation
Lame Deer, Montana
Size: 1600 SF
Cost: \$102,000















The Principles Again

Interdependency

- Practice Life-Cycle Thinking



Thermodynamics

- Use New Things Least
- Turn Waste into Food
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Change

- Protect and Enhance Diversity
- Encourage Learning & Innovation
- Let Solutions Grow from Place



Remember ...

- Sustainable building is a process of continually identifying and eradicating *unsustainabilities*;
- Together with a process of reflecting on action taken and learning;
- It is a positive **process** of building resilience, adaptive capacity and durability in both human and eco-systems;
- Buildings themselves are a means of generating ecological and social services;
- Building ecology is necessary for ecologically sustainable cities.

