Sustainable Construction

Introduction

The World Commission on Environment and Development has defined 'sustainability' as ***'meeting the needs of the present without compromising the ability of future generations to meet their own needs'.***

Sustainable construction involves the application of ***sustainable development*** within the construction industry. The construction industry includes clients, planners, consultants, building contractors, civil engineering contractors, maintenance contractors, materials manufacturers and suppliers.

Sustainable development involves ensuring a better quality of life for all, both now and for future generations. This should be achieved by means of :

- social policies that improve the quality of life for everyone
- minimising the use of resources
- minimising the damage to the natural environment
- ensuring developments will be acceptable to future generations

Sustainable development, therefore, involves what has become known as the '***triple bottom line***' :

1. social responsibility
2. environmental accountability
3. economic accountability

while, at the same time, improving the profitability of the construction industry.

Thus, sustainable development is the objective that forward looking organisations can work towards by means of a balanced approach to development.

Sustainable construction is **NOT** perfection. However, it does require the construction industry to strive for continual improvement in the way it deals with social, financial and environmental issues.

There are many websites dealing with various aspects of sustainable construction including :

www.bre.co.uk/envprofiles

www.defra.gov.uk/environment/statistics/des/index.htm

www.environmentagency.gov.uk

www.envirosearch.com

www.cig.bre.co.uk/connet/mie

www.m4i.org.uk

www.cbpp.org.uk

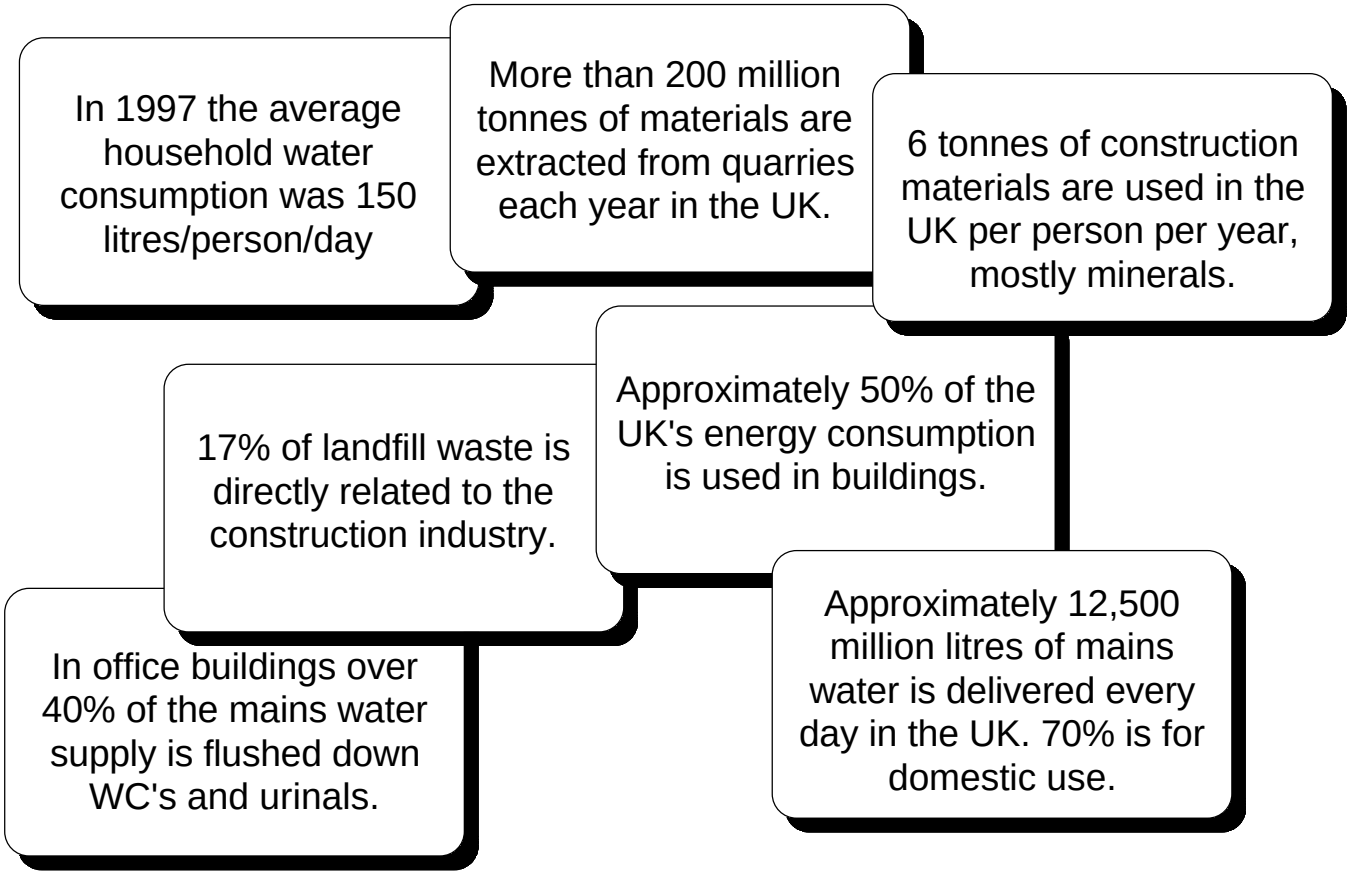
Copyright © Meadowbank Educational Services 2003

The Construction Industry

The construction industry has a key role to play in government policies relation to sustainable development because the built environment has such a significant effect on all aspects of sustainability, for example:

- social
  - regeneration of housing
  - reduction of car use
- economic
  - revitalisation of town centres
  - effective use of energy
- environmental
  - management of mineral extraction
  - protection of the countryside

Construction statistics



Copyright © Meadowbank Educational Services 2003

BREEAM

BREEAM stands for the ***Building Research Establishment Environmental Assessment Method***. This is a tool that allows designers, owners and users of buildings to assess their environmental performance throughout the life of the building.

BREEAM assesses the performance of buildings in the following areas:

- overall management policy and procedures issues
- energy use - operational energy and carbon dioxide (CO_2) issues
- land use - greenfield and brownfield sites
- environmental implication of building materials, including life cycle impacts
- health and well-being - both indoor and external issues
- pollution - air and water pollution issues
- transport related issues
- ecological conservation and site enhancement issues
- water consumption and water efficiency

It is a widely accepted scheme that sets a benchmark for environmental performance. It is based on many years of construction and environmental research carried out at BRE together with input from the construction and property industries, Government and building regulators.

A BREEAM assessment for offices comprises three parts.

- a core assessment of the building fabric and services
- an optional assessment of the quality of design & procurement
- an optional assessment of management & operating procedures

BREEAM brings significant benefits

- reduced energy and other running costs
- making office buildings more lettable
- potentially higher rental incomes
- creating a better place for people to work more productively
- providing a healthier, more comfortable indoor environment

Although it was originally developed as a tool to encourage the design of more environmentally friendly buildings, it is now widely accepted and used both as a property specification tool, a design tool and as an environmental review tool in environmental management strategies.

Copyright © Meadowbank Educational Services 2003

Environmental Performance Indicators

The **Movement for Innovation** is developing a set of indicators for environmental performance. These six ***Environmental Performance Indicators (EPI's)*** will provide a means of setting targets for most common types of building.

The proposed ***Environmental Performance Indicators*** are:

1. Operational CO_2 emission (kg CO_2 / m^2 / year)

This is the carbon dioxide produced **from fossil fuels** for the day to day operation of a building or structure.

Ways of reducing CO_2 emissions include :

- maximising the use of daylight and solar gain
- employing sources of renewable energy (wind, solar)
- using natural ventilation
- using energy efficient lighting, heating / cooling systems

2. Embodied CO_2 (kg CO_2 / m^2)

This is the carbon dioxide produced during extraction, manufacture, fabrication and transportation of construction materials and components.

Ways of reducing embodied CO_2 include :

- avoidance of materials having high embodied CO_2
- increasing the prefabrication of components
- reduction of waste in both design and construction

3. Water (m^3 / person / year)

This is the amount of mains water used in the day to day operation of a building or structure.

Ways of reducing water consumption include :

- collection and use of rainwater
- recycling and use of 'grey water'
- rapid detection and repair of water leaks
- use of water saving devices

Copyright © Meadowbank Educational Services 2003

Environmental Performance Indicators

4. Waste in the construction process (m^3 / 100m^2 floor area)

This is the waste sent for disposal (not recycling) from site operations.

Ways of reducing waste include:

- avoidance of waste in the design process
- reuse of materials
- recycling of materials
- correct handling / storage / and use of materials on site

5. Biodiversity (still being developed)

This performance indicator will be used as a measure of the actions taken to protect and improve the flora and fauna on a site.

Ways of protecting and improving site conditions may include:

- minimising the use of herbicides
- maximising the use of biodegradable materials
- providing areas of uncut grasses rather than lawn
- protecting hedges, trees and water courses

6. Transport (still being developed)

This performance indicator will measure the impact of transport used to deliver staff and materials to a site during construction.

Ways of reducing transport could include:

- minimising the transport distance for materials
- promoting car sharing schemes among employees
- using minibuses to transport staff
- using cleaner fuels for transport

For each EPI, benchmarks will be developed for different types of construction work

- housing
- offices
- retail outlets
- education buildings
- hospitals
- civil engineering / infrastructure

Copyright © Meadowbank Educational Services 2003

Assessment

Sustainable Construction

Questions 1 to 5 - Select the correct response for the following questions :

1. Which of the following is not a means of achieving sustainable development?

   A social policies that improve the quality of life for everyone
   B minimising the damage to the natural environment
   C using new tendering and materials procurement processes
   D ensuring developments will be acceptable to future generations

2. How much construction material is used in the UK per person per year?

   A 1 tonne
   B 2 tonnes
   C 4 tonnes
   D 6 tonnes

3. What percentage of landfill is directly related to the construction industry?

   A 7%
   B 17%
   C 27%
   D 37%

4. Which of the following is **not** part of the ***'triple bottom line'*** ?

   A social responsibility
   B environmental accountability
   C political liability
   D economic accountability

5. What percentage of mains supplied water is flushed down WC's and urinals in office buildings in the UK?

   A approximately 10%
   B approximately 20%
   C approximately 30%
   D approximately 40%

Copyright © Meadowbank Educational Services 2003

Questions 6 to 10 - Decide whether each statement is True (T) or False (F).

6. i) BREEAM is a tool that allows designers, owners and users of buildings to assess their environmental performance throughout the life of the building.
   ii) Carbon dioxide emissions can be reduced by maximising the use of daylight and solar gain.

   Which option best describes the two statements?

A	i)	T	ii)	T
B	i)	T	ii)	F
C	ii)	F	ii)	T
D	ii)	F	ii)	F

7. i) Embedded carbon dioxide can be reduced by restricting the amount of prefabrication of components.
   ii) The amount of water used in buildings can be reduced by the collection and use of rainwater.

   Which option best describes the two statements?

A	i)	T	ii)	T
B	i)	T	ii)	F
C	i)	F	ii)	T
D	i)	F	ii)	F

8. i) Waste in the construction industry can be reduced by careful design.
   ii) Biodiversity on a site can be improved by maximising the use of herbicides.

   Which option best describes the two statements?

A	i)	T	ii)	T
B	i)	T	ii)	F
C	i)	F	ii)	T
D	i)	F	ii)	F

9. i) Transport related to the construction process includes the transportation of people as well as materials.
   ii) EPI stands for the Environmental Protection Initiative.

   Which option best describes the two statements?

A	i)	T	ii)	T
B	i)	T	ii)	F
C	i)	F	ii)	T
D	i)	F	ii)	F

10. i) Environmental benchmarks do not cover civil engineering works.
    ii) Environmental performance benchmarks are the same for all types of construction work.

    Which option best describes the two statements?

A	i)	T	ii)	T
B	i)	T	ii)	F
C	i)	F	ii)	T
D	i)	F	ii)	F

Copyright © Meadowbank Educational Services 2003