

CHAPTER TWO

2.1 What four areas does the Chartered Institute of Building recommend construction industry members evaluate?

- A. Energy: reduce energy consumption, be more energy efficient and use renewable energy as well as 'alternative technologies'.
- B. Materials: choose, use, re-use, and recycle materials during design, manufacture, construction, and maintenance.
- C. Pollution: produce less toxic materials to reduce water and spatial pollution.
- D. Waste: produce as little waste as possible and recycle more.

2.2 Discuss the results obtained from the Los Alamos National Laboratory thermal test facility and how the results might influence the use of sustainability in engineering design and construction?

The thermal test facility is a building showcase for integrated energy-efficiency features considerably reducing energy costs. The additional costs for implementing sustainable designs only increased costs of construction by 4%. The energy costs for the thermal test facility were 63% less than for other similar buildings built to the Federal Energy Code (10CFR435). The energy cost savings includes a 40% reduction in energy consumption and a 30% peak power reduction. Approximately 75% of the lighting needs were met by using daylight (LANL, 2002).

2.3 What are the government agencies providing information on environmental regulations for the countries of Japan, United Kingdom, China, Saudi Arabia, and Russia?

- A. Japan—The Ministry of the Environment <http://www.env.go.jp/en/>
- B. The United Kingdom—The Department for Environment Food and Rural Affairs <http://www.defra.gov.uk/>
- C. China—State Environmental Protection Administration <http://english.sepa.gov.cn/>
- D. Saudi Arabia—The Meteorology and Environmental Protection Administration <http://www.pme.gov.sa/esoon.asp>
- E. Russia—The Federal Service for Hydrometeorology and Environmental Monitoring http://www.meteorf.ru/en_default.aspx

2.4 What are the two types of materials used in the construction industry that already have sustainable alternatives and what are the alternatives?

The types of materials used in the construction industry that already have sustainable alternatives are steel and concrete.

The steel industry has already achieved high levels of sustainability by using over 90% recycled steel.

One alternative helping reduce greenhouse gas emissions caused by cement production is to use coal fly ash, or granulated blast furnace slag, in concrete in place of some of the cement (LANL, 2002).

2.5 Which agency is responsible for regulating environmental laws in the United States?

The Environmental Protection Agency (EPA).

2.6 Discuss how if the Department of Engineering Building Technology Program *Energy and the Environmental Guidelines for Construction* were followed they would help to increase the sustainability of construction?

If these guidelines were followed they would help protect vegetation, lower the impact on the surrounding environment during the clearing and grading of the site, provide protection from run-off, and lead to increased recycling of unused construction materials.

2.7 Of the drivers listed for implementing sustainable development practices which ones have the most influence and why?

- A. Government legislation—environmental legislation makes sustainability requirements mandatory
- B. Media—increases the awareness about global warming and other environmental issues projects
- C. Owners—the engineers working for owners write contracts and specifications requiring sustainable practices to be implemented on construction
- D. Public awareness—consumers drive implementation with their purchasing power

2.8 Discuss the major barriers to implementing sustainability practices?

Implementing sustainable development practices in the engineering and construction industry is difficult because of the short duration of construction projects, the limited amount of time firms have to operate at construction job sites, and the pressure to complete projects as quickly as possible. The divisions between the construction trades also makes it harder to effectively communicate sustainable practices and to ensure they are being properly implemented on projects. Another barrier is the reluctance of members of construction firms to implement innovative methods and processes during construction projects because of liability issues causing members of construction firms hesitant to implement new products or processes (Lindley, 2002).

2.9 Which country was one of the first to adopt sustainable development objectives and what do their objectives focus on?

The first country to adopt sustainable objectives was Sweden.

The environmental objectives of Sweden focus on the following (European Commission Enterprise, 2001a):

- A balanced marine environment, sustainable coastal areas, and archipelagos
- A good urban environment
- A magnificent mountain landscape
- A non-toxic environment
- A protective ozone layer
- A safe radiation free environment
- A varied agricultural landscape
- Clean air
- Flourishing wetlands
- High-quality groundwater
- Limited influence on climate
- Natural acidification only
- No eutrophication
- Sustainable forests
- Sustainable lakes and watercourses

2.10 What are the four major global environmental treaties and conventions responsible for the initial emphasis on sustainability?

- A. Basel Convention
- B. Kyoto Protocol Treaty
- C. Stockholm Convention
- D. Rio Declaration