

# **SUSTAINABILITY IN ENGINEERING DESIGN AND CONSTRUCTION**


## **CHAPTER TWO**

### **SOURCES OF INFORMATION ON SUSTAINABILITY REQUIREMENTS**

# **SUSTAINABILITY REQUIREMENTS - FOCUS AREAS**

- 1.Environmental impacts and environmental impact statements.**
- 2.The social and community impact of projects.**
- 3.Supplier and vendor environmental and social responsibility including responsible supply chains and procurement.**
- 4.Resource efficiency including reducing energy consumption during construction.**
- 5.Renewable energy.**
- 6.Sustainable design.**
- 7.Material cradle to grave ecological costs including whether materials are reused or recycled, and reducing energy use during the manufacturing and transporting of materials.**

# **SUSTAINABILITY REQUIREMENTS - FOCUS AREAS**

- 8. The environmental impact of production operations.**
  - 9. The environmental footprint of structures.**
  - 10. Producing less waste.**
  - 11. Recycling more waste during construction.**
  - 12. Less toxicity in pollution or generating less pollution.**
  - 13. Reducing noise and spatial pollution.**
  - 14. Deconstruction and the recycling of the by-products of deconstruction.**
  - 15. The long-term affects of not considering sustainability during construction.**
  - 16. The ISO 14,000 Environmental Management Standards.**
  - 17. Compliance with government regulations.**
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# EARLY ADOPTERS OF GOVERNMENT SUSTAINABILITY OBJECTIVES

- **SWEDISH PARLIAMENT SUSTAINABLE DEVELOPMENT OBJECTIVES (1999)**
  - **Clean air**
  - **High-quality groundwater**
  - **Sustainable lakes and watercourses**
  - **Flourishing wetlands**
  - **A balanced marine environment, sustainable coastal areas, and archipelagos**
  - **No eutrophication**

# EARLY ADOPTERS OF GOVERNMENT SUSTAINABILITY OBJECTIVES

## ➤ SWEDISH PARLIAMENT SUSTAINABLE DEVELOPMENT OBJECTIVES (1999)


- Natural acidification only
- Sustainable forests
- A varied agricultural landscape
- A magnificent mountain landscape
- A good urban environment
- A non-toxic environment
- A safe radiation free environment
- A protective ozone layer
- Limited influence on climate

# DUTCH ENVIRONMENTAL VALUE STANDARDS

1. Raw materials
2. Emissions
3. Energy
4. Waste
5. Nuisance



# **DUTCH GOVERNMENT RECOGNIZED ENVIRONMENTAL IMPACTS**

- **Depletion of raw materials**
  - **Depletion of fuel resources**
  - **The greenhouse effect**
  - **Damage to the ozone layer**
  - **Summer smog**
  - **Human toxicity**
  - **Ecotoxicity in water**
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# **DUTCH GOVERNMENT RECOGNIZED ENVIRONMENTAL IMPACTS**

- **Acidification**
- **Eutrophication**
- **Use of non-renewable energy sources**
- **Waste**
- **Hazardous waste**
- **Radioactive waste**





# **BARRIERS TO IMPLEMENTING SUSTAINABILITY PRACTICES**

- **The short duration of construction projects**
- **The limited amount of time that firms have to operate at construction job sites**
- **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 that they are being properly implemented on projects**
- **the reluctance of members of construction firms to implement innovative methods and processes during construction projects because of liability issues that make members of construction firms hesitant to implement new products or processes**

# Drivers for Implementing Sustainable development Practices

- Owners
- Non-governmental organizations
- Government legislation
- Public awareness of sustainability issues
- The media
- Competitive differentiation
- Profit
- Quality of life for future generations



# Drivers for Implementing Sustainable development Practices

- Financial gains
- Enhanced corporate reputation
- Improved government relations
- Increased technology and innovation skills
- Increased risk management skills
- Brand loyalty
- Employee loyalty
- Increased ease of recruitment




# Sustainability in the Construction Sector

- Department of Engineering Building Technology Program - *Energy and the Environmental Guidelines for Construction* to promote sustainability:
  - Explain methods for protecting vegetation, such as designating access routes and parking.
  - Require methods for clearing and grading sites that lowers the impact as much as possible.
  - Examine how runoff during construction may affect sites. Consider creating storm water management practices, such as piping systems or retention ponds or tanks that could be used after the building is complete.
  - Be sure that the infrastructure for recycling construction and demolition materials is ready and operating from the beginning of projects. Set up an on-site system to collect and sort waste for recycling, or for reuse, and monitor the system consistently throughout all phases of construction.

# Sustainability in the Construction Sector

- Department of Engineering Building Technology Program - *Energy and the Environmental Guidelines for Construction* to promote sustainability:
  - Create plans for recycling that set goals to recycle or salvage a minimum of 50 percent (by weight) of construction, demolition, and land clearing waste from construction sites, and aim for a minimum of 75 percent.
  - If possible, choose products and materials with minimal or no packaging.
  - Obtain materials in the sizes that are necessary, instead of cutting materials to size at jobsites.
  - Always monitor the amount of waste being produced during construction and compare it with pre-existing goals and guidelines.

# Pollution and Waste Management

- The Chartered Institute of Building (CIOB) in the United Kingdom, in their report on *Sustainability and Construction*, state that the starting point for all members of the construction industry who wish to move toward sustainability as a business opportunity should evaluate their operations in four key areas (Chartered Institute of Building, 2004, p. 2):
  - **Energy:** reduce energy consumption, be more energy efficient and use renewable energy as well as “alternative technologies”.
  - **Materials:** Choose, use, re-use, and recycle materials during design, manufacture, construction, and maintenance.
  - **Pollution:** Produce less toxic materials to reduce water and spatial pollution.
  - **Waste:** Produce as little waste as possible and recycle more.
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# Global Environmental Treaties

- The implementation of sustainability practices on engineering and construction projects is being affected by many different drivers, one of which is the requirements that have been set in various global treaties. Some of the environmental treaties that are driving the implementation of sustainability practices are the United Nations Framework Convention on Climate Change (UNFCCC) and:

- The Kyoto Protocol Treaty
- The Basel Convention
- The Rio Declaration
- The Stockholm Convention

THESE TREATIES ARE DESCRIBED IN CHAPTER TWO

# Foreign Government Environmental Regulations

- In each country in the world there is an agency that provides information on the government environmental regulations, such as the Environmental Protection Agency in the United States and the Department of the Environment and Heritage in Australia.
- It is important to review the foreign government environmental requirements before performing any work in that country.



# Chapter Two Summary

- This chapter covered the Sources of Information on Sustainability Requirements including domestic and global agencies that regulate environmental issues throughout the world.
  - This chapter also provided information on the early adopters of sustainability objectives and the drivers and barriers for implementing sustainable development practices.
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