

GREEN BUILDINGS

Global awareness of the urgent need to reduce greenhouse gas emissions and other environmental degradation has grown over the last decade. Buildings are a part of infrastructure which also consists of industries, transportation, and telecommunications¹. It has been identified as being responsible for about 25-40 % of energy consumption, 30-40 % of material resource consumption, 30-40 % of waste production, and 30-40 % of the greenhouse gas released globally². Additionally, estimates reveal that about 30 percent of newly built or renovated buildings suffer from “sick building syndrome”, exposing occupants to unhealthy environmental conditions².

To reduce the global impacts of buildings, the Environmentally Sustainable Economic Growth (Green Growth) concept is being promoted as the foremost strategy to ensure the sustainable infrastructural development of any economy. The Green Growth concept has been embraced by some 340 delegates, including representatives from 52 member and associate member countries of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) at the 5th Ministerial Conference on Environment and Development (MCED 2005) held in Seoul, Republic of Korea, in March 2005.

Green Growth emphasizes the need to improve the “ecological efficiency” of the growth patterns of countries in the region so that the region may continue the much needed economic growth necessary for poverty reduction (MDG1) without compromising the environmental sustainability (MDG7) of the region. Eco-efficiency was first promoted by World Business Council on Sustainable Development as a business concept to improve the economic and environmental performance of individual firms. Here eco-efficiency is being suggested as a concept for economy wide application for a country as a whole. Eco-efficiency means improving the efficiency of the use of natural resources, while minimizing the environmental impact of pollution^{3,4}

➤ **What is sustainable infrastructure?**

A common definition for sustainable infrastructure is: "the design, construction, planning and maintenance of infrastructure that meets the needs of the present without compromising the ability of future generations to meet their own needs." Ensuring sustainability requires addressing the environmental, economic and social dimensions of infrastructure in a holistic manner or with a systems approach⁵. Buildings are a key component of infrastructure and when designed to be sustainable (or green), have minimal environmental impacts.

➤ **What are green buildings?**

Green buildings are buildings which are designed so that they are more efficient in the use of resources - energy, water, and materials -while reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal - the complete building life cycle.

➤ **Where are the opportunities for green buildings?**

A myriad of sustainable opportunities are available for green buildings including:

- Energy efficiency
- Water conservation
- Materials reuse and/or recycling
- Indoor environmental quality
- Site location and ecology
- Waste minimization
- Transport

➤ **Building Green**

Design strategies

- Climate sensitive design
- Energy-efficient design
- Design buildings to use renewable energy
- Optimize material use
- Design water-efficient, low-maintenance landscaping
- Smaller is better: Optimize use of interior space through careful design
- Recycle waste (solid, grey water, etc)

- Design for durability
- Design for future reuse and adaptability
- Avoid potential health hazards: radon, mold, pesticides

Siting & land use

- Renovate older buildings
- Encourage in-fill and mixed-use development
- Minimize automobile dependence
- Value site resources
- Locate buildings to minimize environmental impact
- Provide responsible on-site water management
- Situate buildings to benefit from existing vegetation (shading effect)

Materials

- Choose building materials with low embodied energy
- Buy locally produced building materials
- Use building products made from recycled materials
- Use salvaged building materials when possible
- Use durable products and materials
- Choose low-maintenance building materials
- Avoid materials that will offgas pollutants
- Minimize packaging waste
- Seek responsible wood supplies

Equipment

- Install high-efficiency heating and cooling equipment
- Use high-efficiency lights and appliances
- Install water-efficient equipment
- Install mechanical ventilation equipment

Indoor environmental quality (IEQ)

A green building can improve indoor environment quality by:

- Maximizing natural ventilation and day lighting where possible
- Avoiding unnecessary indoor pollution sources
- Ensuring the air is served cool and dry to the occupants
- Providing “personalized air”; that is, a small amount of clean air should be served gently, close to the breathing zone of each individual
- Providing individual control of the thermal environment. Ideal humidity levels are between 30% -70%
- Specifying low noise HVAC and other mechanical systems
- Using plants, earth banks, and screens to block external noise sources
- Designing layouts with sufficient quiet rooms and meeting rooms so staff can have the opportunity for uninterrupted phone conversations and meetings.

Waste minimization

- Reduce, reuse and recycle waste (from Construction, operation and demolition) of buildings

➤ **Barriers to Building Green**

- Lack of client demand
- Added financial cost
- Lack of available information
- Lack of building materials and equipment information
- Inaction and resistance from contractors within the sector

➤ **Challenges to Building Green**

- Outcomes of development should be ecologically sustainable
- There is a need to integrate the principles of sustainability into decision-making that affects the environment and natural resources values
- There is a need to ensure that the environmental and ecological impact of plans and development proposals are considered, and that the impacts of development are capable of being measured and evaluated

➤ **Policy Instruments to Encourage Green Buildings**

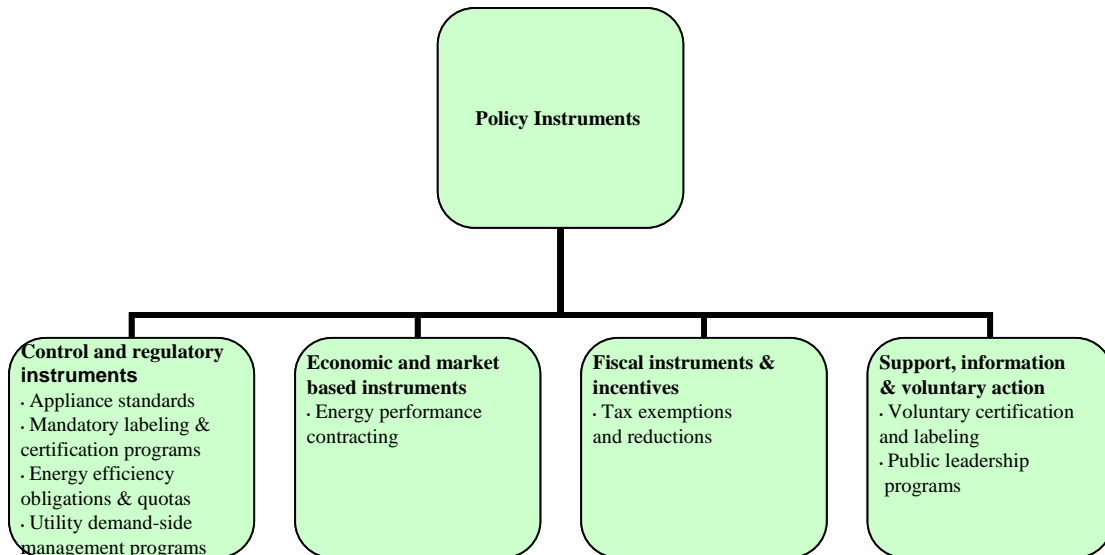


Figure 1 Policy Instruments to Encourage Green Buildings⁶

➤ **How to Develop a Green Building Program**

The development of a green building program should follow a sequence of steps (Figure 2). For each step, specific actions should lead to the development of information that enables stakeholders to make critical decisions regarding the purpose, structure, and implementation of the program.

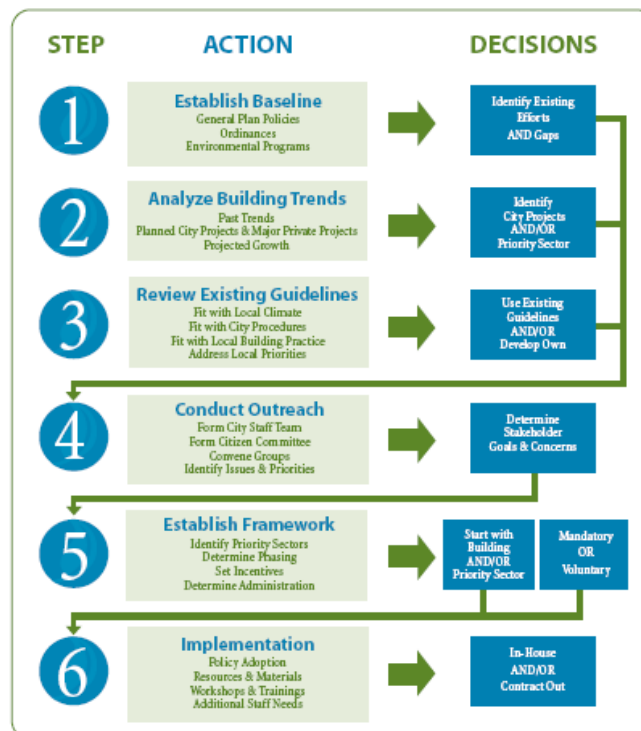


Figure 2 Procedures for the development of a green building program⁷

Stakeholders in a Green Building Program

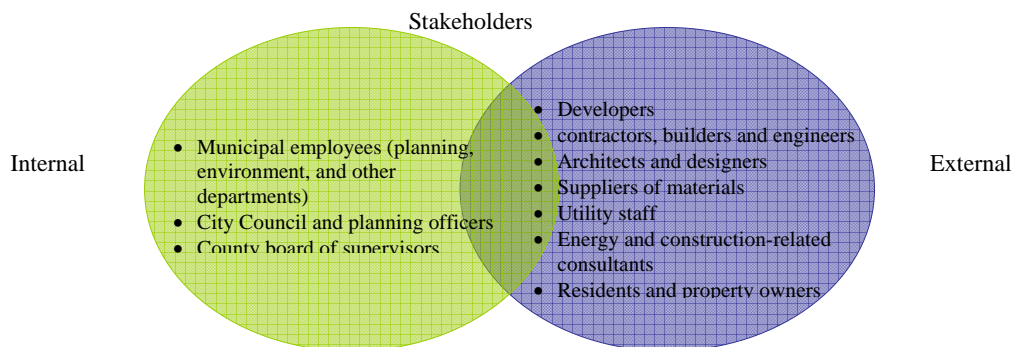


Figure 3 Stakeholders in the development of a green building program⁷

References:

- [1]. United Nations Economic and Social Commission for Asia and the Pacific (2006). "Promoting Sustainable Infrastructure Development: Policy Directions and Recommendations for Sustainable Infrastructure Development in Asia and the Pacific" The First Policy Consultation Forum of the Seoul Initiative on Green Growth. Seoul, Republic of Korea. Available from: http://www.unescap.org/esd/environment/mced/singg/documents/recommendations_final.pdf.
- [2]. Christian Fossen "Sustainable Infrastructure: A crucial research focus area" Norges Teknisk-Naturvitenskapelige Universitet. Available from: <http://www.ntnu.no/sustainability/crucial>
- [3]. Eco-efficiency <http://www.greengrowth.org/eco-ef.asp>
- [4]. Eco-efficiency Available from: <http://en.wikipedia.org/wiki/Eco-efficiency>
- [5]. National Research Council of Canada (2007). "Regina- Sustainable Urban Infrastructure". National Research Council of Canada. Available from: http://www.nrc-cnrc.gc.ca/aboutUs/corporatereports/factsheets/factsheet_regina_e.html
- [6]. World Business Council for Sustainable Development (2008). "Energy Efficiency in Buildings: Business realities and opportunities", <http://www.wbcsd.org/web/eeb>
- [7]. Pamela Cepe, Monica Gilchrist, and Walker Wells Edt. Lisa McManigal Delaney "Developing Green Building Programs: A Step-by-Step Guide for Local

Governments” Global Green USA Available from:

<http://www.globalgreen.org/media/publications/StepByStep.pdf>.