Sustainable Building and Construction: Building a Sustainable Future

Professor Steve Halls
IEMA Oman
Urbanization (1)

- The world is facing explosive growth of urban population, mainly in the developing world.
- Many cities, confronted with hypergrowth, are failing to cope with the challenges of generating employment, providing adequate housing and meeting the basic needs of their citizens.
Urbanization (2)

- By the year 2040 the World’s population will have increased by 50% (7 billion $\Rightarrow$ 10.5 billion people)
- Therefore, an additional 3.5 billion people will need houses, shops, places to work.
- One environmental consequence - the level of energy consumption will increase by at least 25% above current levels
In addition, the level of water consumption and waste production will also increase by at least 30% based upon current development patterns.

If this scenario manifests then a sustainable future will not only be more difficult to achieve, but increasingly less likely to be achieved at all!
Average Energy Consumption of Construction and Building (37.3%)

- Other industries (62.7%)
- Production of materials for construction (10.9%)
- Transportation related to construction (5.0%)
- Construction work (1.3%)
- Operation of Building (10.2%)
- Operation of Facilities (9.9%)
Challenges for those involved in Construction

❖ More people means-
   ➢ More houses, shops, work-places, roads etc
   ➢ More demand of products and services
   ➢ Greater demand for land

❖ More People = More Cities = More Impact

❖ New Ideas, New Paradigms, New Approaches to Building and Construction are URGENTLY needed
Definition of a Sustainable Building

- A Building that can (moderately) maintain or improve:
  - the quality of life and harmonize within the local climate, tradition, culture,
  - the environment in the region,
  - conserve energy, resources and recycling materials, and
  - reduce the amount hazardous substances to which human and other organisms are (or may be) exposed
  - the local and global ecosystem throughout the entire building life-cycle
Sustainable Building and Construction

Therefore it is necessary to design, operate and maintain and ultimately dismantle buildings in a manner that provide:

- Security of building against the natural disaster.
- Maximize energy and resources efficiency.
- Minimize construction waste and domestic waste.
- Minimize water consumption
- Recycle waste water wherever possible
- Optimum use of existing building structure and infrastructure.
- Take maximum advantage of environmentally benign materials.
- Offer suitable indoor environments that address air quality, lighting, acoustics and special aesthetics.
R⁴ for Sustainable Building and Construction

Reuse

Recycle

Recondition

Repair
Building Product Life-Cycle Assessment

- Life-Cycle Assessment Phase 1: Raw Materials extraction and processing
- Life-Cycle Assessment Phase 2: Production of Building Materials
- Life-Cycle Assessment Phase 3: Construction and re-building/Extension of Buildings
- Life-Cycle Assessment Phase 4: Operation and Maintenance of Buildings
- Life-Cycle Assessment Phase 5: Demolition, Re-use and Disposal

Factors:
- Energy
- Fuels
- Raw Materials
- Water

Environmental impacts:
- Atmospheric emissions
- Water pollution
- Wastes and soil contamination
- Other emissions
Some benefits from Sustainable Building and Construction

- Increased employment opportunities
- New markets created
- Better use of resources
- Reduced human health impacts
- Reduced energy consumption
- Reduced waste production
- Reduced disposal of wastes
- Reduced impact upon the Environment
Role of local and national government

❖ Create an enabling environment
  ➢ Planning and Regulatory framework
  ➢ Economic instruments (including fiscal reform)
  ➢ Institutional reform
Role of the private sector

❖ Partnership building - government, NGO's
❖ Technology innovation
❖ Technology transfer
❖ Life-cycle approach
Thank you for your attention!

Professor Steve Halls can be contacted:
Email: oman@iema.net
or
Mobile +968 93501830