REALIZING PERFORMING GREEN BUILDINGS IN KUWAIT

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What is Green?

There is not a clear, simple or universally accepted definition of what is ‘GREEN’

Everyone in this room – and the world – has a different interpretation of what is green!
Most Accepted Definition

United Nations World Commission on Environment and Development defines Sustainability as:

“Development that meets the needs of present generations without compromising the ability of future generations to meet their own needs.”
What is Sustainable Kuwait?

• Saving the Environment
• Enhance Efficiency (Economic Benefit)
• Green Jobs
Energy Use Per Capita

Source – The World Bank – World Development Indicators 2011
Concerns

• Kuwait has one of the highest energy intensities in the region
• GHG emissions are 650% of the average global per capita emissions*
• Being a low lying state, limited capacity to adapt to consequences of climate change
• Resource efficiency is key in an increasingly global economy

* According to Carboun - an advocacy initiative promoting sustainability and environmental conservation in the Middle East.
Resource Efficiency

Why Green Buildings?

We shape our buildings thereafter our buildings shape us

Buildings consume significant amount of resources (energy, water, material, land, time…)

Buildings are responsible directly or indirectly for several emissions and impacts
Buildings

- Buildings account for 48% of all greenhouse gas emissions
- Buildings in U.S. account for 70% of national electricity consumption
- Buildings account for 40% of raw materials use

Source: World Watch Institute
Why Resource Use in Buildings?

• Resource use in buildings makes up a very significant piece of the pie. Thus, it has a direct impact on the greatest challenges of our time, including:
  • Economic well-being for individuals, businesses and governments
  • Dependence on non-renewable sources
  • Global climate change

• Clearly, building resource use must be addressed to protect the interests of individuals, nations, and the world.
Benefits of Green Buildings
Economic Benefits

- Increased building valuation and return on investment (ROI)
- Reduced operating costs
- Competitive first costs
- Decreased staff health costs
- Reduced risk liability
- Improved bottom line
- Marketing advantage
Benefits of Green Buildings

Productivity Benefits

- Increased staff output
- Reduced absenteeism and turnover
- Improved student performance
- Enhanced home atmosphere
- Faster patient recovery
- Superior retail sales
Priorities for Building Occupants

Context of Economic Development

Early Stage

Priority for Occupants is to have a Roof and Meet Functional Needs
Transition Stage

Priority for Occupants Matures Towards more Tangible Benefits such as Quality and Price
Mature Stage

More Sophisticated Markets with Additional Priority for Occupants Moving Towards Intangible Benefits such as Safety, Security, Sustainability etc.
Green is in Mainstream Media
Reality Today in Mature Markets
Green Information Overload
Green Buildings Must Perform

In comparison to the average commercial building:

- Green buildings use 26% less energy
- Green buildings have 13% lower maintenance costs
- Green buildings have 27% higher occupant satisfaction
- Green buildings have 33% less greenhouse gas emissions

Source: USGBC
Green Building Rating Tools

U.S, South America, Far East

Canada

United Kingdom

Australia

Singapore

GREEN MARK

India

Qatar

Abu Dhabi
When we talk of a rating – what is the rating for?

In a sense, similar to a graduation degree – benchmarking and baseline qualification

Does a university degree guarantee vocational performance throughout one’s life?

What makes a building sustainable?
Holistic Approach to Green Buildings

A Performing Green Building must combine Sustainability in:

- Design
- Construction
- Operations and Maintenance
- Occupant Usage

Only then will the building be Economical throughout its “Life Cycle”
Priorities for Building Occupants

Context of Economic Development

**Early Stage**
Priority for Occupants was to have a Roof and Meet Functional Needs

**Transition Stage**
Priority for Occupants Matured Towards Additional Tangible Benefits such as Quality and Price

**Mature Stage**
More Sophisticated Markets with Additional Priority for Occupants Moving Towards Intangible Benefits such as Safety, Security, Sustainability etc.

A good part of market is still in these two phases and it is critical for government to set minimum Standards or Codes for performance in these sectors so that common interest is protected – WHAT IS NEEDED IS A MINIMUM CODE SINCE THESE SEGMENTS WILL NOT VOLUNTARILY PURSUE ANY RATING

A more Mature & sophisticated audience to whom a typical rating system would appeal such as LEED etc. & THEY CAN PURSUE WHAT THEY WANT AS IN A FREE MARKET- Unfortunately this is Still a Very Small Portion of the World
Energy Code Benefits

- Reduced energy consumption
- Reduced CO₂ emissions

Source – US DOE
What Do Building Energy Codes Cover?

For both residential and commercial buildings:

- Building Envelope (roof, wall, fenestration, flooring)
- Mechanical
- Service Water Heating
- Lighting
- Electrical Power
- Equipment
Code Challenges

Code Development – Reaching consensus on details

Code Adoption – uniform adoption across jurisdictions

Code Compliance – includes learning to design using new standards and techniques, implementing new requirements and providing staff and resources to plan, review and inspect

Strong Progressive Building Departments form Enforcement Backbone
Code Development
International Energy Conservation Code
(IECC®)

Code Development Process
Standard Development

ASHRAE Standard Development Process – 90.1

Committee Proposes Standard Changes
Public Review and Comment
Comment Accepted
Committee Approval
ASHRAE Board of Directors Approval
ANSI Approval
New Standards or Addenda Published

Substantive Changes

Appeal of Committee Approval
upheld

denied
Code Adoption

A Code Differs from a Federal Mandate Codes such as the International Green Construction Code will be a “model” code, requiring adoption by a governing jurisdiction before it becomes law.

In this way, the model language can, if necessary, be adapted to address local conditions and allows for legislative bodies to have the final voice in adoption.

Many of the Codes may be adopted without amendment at the state or local level; amended versions often take into account local weather and hazard conditions, regional approaches to building design and construction, and other factors.
Code Compliance

Involves a competent authority to be in place to ensure compliance

Proper education and training of concerned officials is critical

Industry and workforce need to come up to speed with new techniques and practices
Building Departments

Forms the backbone of code enforcement

Critical to adopt international best practices

Will determine proper administration and facilitate future development of national building codes

Accreditation is a worthwhile investment
Why Accredit Building Departments?

Provides recognition that building departments are professionally qualified to serve their jurisdictions

Provides independent third-party recognition on fulfilling specified requirements and is competent to carry out specific code enforcement tasks

Formal recognition for demonstrating that it is technically competent to administer an effective system of code enforcement that is fair, equitable and benefits the community it serves
Why Accredit Building Departments?

Verifies that the Department is operating at the highest legal, ethical and technical standards

Increased department efficiency, fewer complaints from the public and the potential for lower insurance premiums in the long run

Preserves Property Values and becomes part of sound asset management for a county, state or country

For more information: www.iasonline.org
ISO 14064 accepted as the International Standard (this standard is based on the GHG Protocol developed by the World Resource Institute)
GHG Emissions by Building Type

by U.S. Commercial Building Type (% of total)

- Office: 19%
- Shopping Malls: 13%
- Education: 12%
- Food Service: 6%
- Food Sales: 5%
- Other Retail: 5%
- Lodging: 7%
- Health Care: 8%
- Public Assembly: 5%
- Public Safety: 2%
- Houses of Worship: 2%
- Warehouse and Service: 2%
- Other: 5%

En3 Engineering | Environment | Energy
Why Buildings Must Track GHG Emissions

- Enhance the credibility of sustainable buildings and sets up a national GHG inventory for buildings
- Improve the consistency, and transparency of GHG accounting and reporting
- Increase investor confidence
- Facilitate the certification and trade of GHG emission reductions or removal enhancements
- Facilitate the development and implementation of sector specific GHG management strategies and policies
- Allow buildings to track performance and progress in the reduction of GHG emissions and/or increase in GHG removals
- Forms the basis of future performance based green building codes
Manage Building Related Carbon Emissions

The above framework forms the basis of GHG reporting for buildings as outlined in the International Green Construction Code™ (IgCC)
Energy Performance Strategies

- PV Panel
- Light well and Ventilation shaft
- Solar air heater
- Mirror daylight collector
- Plant-roof
- Ventilation shaft
- Insulated wall and window
- Green house
- Self-cleaning glass
- Lens daylight collector
- Double-skin facade, external ventilation
- Double-skin facade, internal ventilation
- Vacuum glazing
- PV street lamp
- Self-cleaning pond
- 4-panel glass
- Horizontal louvers
- Vertical louvers
- Controllable aperture
- Internal window
- PCM risen floor
- Double-skin facade, natural ventilation
Energy Performance Strategies

Passive Strategies -------------- Active Strategies -------------- Renewable Sources

- Insulation reduces heat gain
- All windows passively shaded
- Air cooled by evaporation
- Cool air drawn through rooms

(Images of passive strategies)

- Low-emissivity coating
- Air spaces

(Images of active strategies)

- Well-sealed windows allow cross-ventilation whilst protecting from hot dusty wind
- Summer: Hot air ventilation from rooms
- Winter: Good roof and ceiling insulation
- Good cross-ventilation
- Raised floors to access the breezes

(Images of renewable sources)

- Biomass
- Solar panels
- Wind turbines
Energy Efficiency Strategy for Existing Buildings

The energy efficiency rule of thumb for low hanging fruits in commercial buildings

O&M (Operations & Maintenance) | Occupant Behavior | Lighting | Controls | Equipment | Low Cost | High Cost
Some Learnings from Buildings in Similar Climatic Zones

• Optimal window wall ratios has been found to be around 26 – 32%. Needs to be validated for Kuwait

• Envelope optimization to include good insulated walls and roof – The roof is more critical for low rise buildings and would be good to avoid the envelope from getting heated up during summer. Technologies like Insulated Concrete Formwork (ICF) work well.

• Location and sizing of windows are very critical in balancing thermal and daylighting performance

• Weather pattern suitable to explore free-cooling during Dec-Apr

• Earth air tunnels are worth exploring based on ground temperatures
Life Cycle of Materials

Extraction → Manufacturing → Use → Recycling/disposal → Reuse → Landfill → Transportation

Product life cycle
Sustainable Procurement

- Certification programs
- Life cycle assessments (LCA)
- Sustainability criteria within procurements
- Developing Innovative Contracting
Use labeling schemes

- EU Refrigerator
- China Clothes Washer
- Australia Air Conditioner
Waste Prevention

- Use less material to get the job done
- Provides substantial cost savings
  - **Reduce**
    - Print with only duplex printers
  - **Reuse**
    - Reusing office furniture or other office products
  - **Donate & Exchange**
    - Donate unwanted supplies to local schools/nonprofits.
The Cultural Aspects of Going Green

- Thick insulating walls
- Windcatchers
- Mashrabiya
- Light colored and low temperature materials

- Psychological Cooling (fountains)
- Natural air flow (warm and cool gardens)
- Functional layout

Traditional Cooling Techniques
Framework for Codes, Standards and Ratings
Adoption of Green Buildings
Gartner Hype Cycle

Green buildings are going through this cycle. It is important to manage expectations to realize real underlying benefits.
Greenwash
from Wikipedia

Greenwashing is the practice of companies disingenuously spinning their products and policies as environmentally friendly, such as by presenting cost cuts as reductions in use of resources.
I need this area cleared by tomorrow...

Happy Earth Day
The Cost of Not Going Green

We are not only going to be looking at Initial and Operating costs but also at a Carbon Emissions Cost (even a Carbon Tax) in the future!

![Graph showing the cost of energy over time with different scenarios for increases and reductions in emissions.]
Role of Government is in setting baseline codes and standards for sustainability that will be mandated for all buildings – new as well as existing buildings

Ratings like LEED can still be a tool to incentivize the market to do the right thing by going above and beyond code & help get recognition for projects that go the extra mile to do the right thing thereby raising the ceiling

Balanced approach of codes and ratings with the right incentives will help meaningful adoption of sustainability

It is important to measure, monitor, benchmark, set goals and manage GHG emissions at the national level and evolve strategies to positively contribute towards GHG emission reductions
Way Forward

Sustainability and Resource Efficiency is not ADDITIVE to regular building design and maintenance and should not be conceived as a separate feature or as an add-on.

Ensure the industry is brought up to speed, receives proper training and has the right incentives to adopt sustainable best practices.

Embed sustainability into the Country’s DNA. Start from education in schools at all levels.

Finding the right mix of green practices for each scenario is the key. There is no ‘one size fits all’ solution for sustainability. We need to build-in systems, solutions and practices that will genuinely help the economy and also make a “True Sustainable Difference” to the Environment!
"Nobody made a greater mistake than he who did nothing because he could do only a little"

~ Edmund Burke ~
THANK YOU!

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