Sustainable Buildings: Local and Affordable Best Practices

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Acknowledgement
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• Sustainability Assessment Approaches
• Principles of Sustainable
• Examples of Local and Affordable Best Practices
• Conclusion
Introduction
Megatrends

Carbon Emmissions
Climate Change
Water Problem
Scarcity of Resources
Depletion of Fossil Fuel
Population Growth
Urbanization

Globalization & Urbanization
- Global players/trade volume increase
- 2030: 60% of population in cities
- Energy/buildings/mobility/water infrastructure are key

Demographic Change
- 65+ generation will nearly double by 2030 (from 7% to 12%)
- Need for adequate infrastructures as well as heath- and elder care

Climate Change
- Cities responsible for 80% of Green House Gasses
- Need for resource efficiency and environmental care

Global Building Assessment

ENVIRONMENTAL IMPACT  VS  PERFORMANCE GOALS

- CLIMATE CHANGE
- INDOOR ENVIRONMENTAL QUALITY
- RESOURCE DEPLETION
- HUMAN HEALTH CRITERIA
- WATER INTAKE
- HUMAN HEALTH - CANCEROUS
- ECOTOXICITY
- EUTROPHICATION
- HABIT ALTERATION
- HUMAN HEALTH - NONCANCEROUS
- SMOG FORMATION
- OZONE DEPLETION
- ACIDIFICATION

- CLIMATE CHANGE
- HUMAN HEALTH
- BIODIVERSITY
- WATER
- SUSTAINABLE MATERIALS
- COMMUNITY
- ECONOMY
Global Building Assessment

- Reduce contribution to global climate change
- Enhance individual human health
- Protect and restore water resources
- Protect and enhance biodiversity and ecosystem services
- Promote sustainable and regenerative material cycles
- Build a green economy
- Enhance community quality of life
Assimilated Definition

Energy

Carbon

Land

Water

Materials

Indoor Environmental Quality
KPI’s and Assessment Metrics

You can’t manage what you don’t measure.
Existing Rating Systems

- IBO ÖKOPASS
- Österreichisches Institut für Baubiologie und Bauökologie (ÖBIB)
- ÖKOPASS
- EPBD
- CasBEE™
- HQE
- Liège University
- Verde
- GBC España
- ÖGEB
- SBD Lab
- USGBC LEED
- Cradle to Cradle
- BREEAM
- BREEAM NL
- Passivhauszertifizierung
- Österreichische Gesellschaft für nachhaltiges Bauen
Usability of Green Building Rating Systems in MENA

Table 2 Criteria analysis and results summary

<table>
<thead>
<tr>
<th></th>
<th>Checklists</th>
<th>Performance Goals</th>
<th>Computer Programs</th>
<th>Monitoring &amp; Commissioning</th>
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<td>Prerequisites and Rating System</td>
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<td>GPRS</td>
<td>51%</td>
<td>31%</td>
<td>6%</td>
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<tr>
<td>SI 5281</td>
<td>33%</td>
<td>44%</td>
<td>9%</td>
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<td>QSAS</td>
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<td>36%</td>
<td>6%</td>
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<td>PBRS</td>
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<td>LEED NC</td>
<td>38%</td>
<td>40%</td>
<td>8%</td>
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<td>BREEAM</td>
<td>40%</td>
<td>35%</td>
<td>9%</td>
<td>16%</td>
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Table 3 Comparing GPRS, SI 5281, QSAS, PBRS, LEED & BREEAM regarding criteria assessment categories.

<table>
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<tr>
<th>Items of comparison</th>
<th>GPRS</th>
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<th>QSAS</th>
<th>PBRS</th>
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<th>BREEAM</th>
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Usability of Green Building Rating Systems in MENA

Sustainability Assessment Approaches
Developed vs Developing World

- Majority of construction activities found here
- High aspiration for developed countries

- Market that drive value of buildings
- Strong regulated market
- Innovations market
Static Comfort vs Adaptive Comfort

- Majority of construction activities found here
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Static Comfort vs Adaptive Comfort

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Static Comfort vs Adaptive Comfort

![Graph showing Static Comfort vs Adaptive Comfort](image-url)
Local and Affordable Sustainable Buildings:

What’s it new?

Targeting the assessment of low-technology buildings with adaptive comfort models is needed in order to make environmental buildings universal. The environmental impact assessment of local and affordable sustainable buildings should be comparable and enable building professionals to better design and lead the construction in the developing World.

A certified building is not like a non-certified building!
Principles of Sustainable Buildings
Sustainable Buildings: Local and Affordable

Bioclimatic Architecture
Shade + Ventilate + Insulate
Bioclimatic Architecture
Earth Ships
TAMassociati, Pediatric healthcare centre, Port Sudan, Sudan, 2014. Image Massimo Grimaldi
TAMassociati, Pediatric healthcare centre, Port Sudan, Sudan, 2014. Image Massimo Grimaldi
Location: Mahallat, Iran (Central Asia), Architect: AbCT - Architecture by Collective Terrain, Tehran, Iran
Architects: Studio tamassociati – Raul Pantaleo, Massimo Lepore, Simone Sfriso, con Pietro Parrino y Gino Strada, Location: Soba, Khartoum, Sudan
Architects: Studio tamassociati – Raul Pantaleo, Massimo Lepore, Simone Sfriso, con Pietro Parrino y Gino Strada, Location: Soba, Khartoum, Sudan
Construction Technology & Materials
Sustainable Buildings: Local and Affordable

Bioclimatic Architecture
Shade + Ventilate + Insulate

Construction Technology & Materials
Circularity + Biobased + Earthen + Waste
Bio based Materials

- Harvestable maturity in 10 years or less

**Leafa**
Finding out a new function for a daily used material using loofah in everday shower gave the chance to observe the material's properties and how its over lying like mesh construction allowed it to emit light, which inspired me to design a lighting unit using the material. Leafa was exhibited in design is a verb in Bibliotheca Alexandria.

**Jereed**
Here we present a smart and utilized table with simple design for laptop or eating while setting on your sofa. The product is all made from palm midribs which is processed to meet the needs of consumers and is considered a green product.
Bio based Materials

- Egyptian Furniture Export Council
- Tree Free Wood
- Palm Leafs
- Cotton straw
- Rice straw

تحقيقات

في إنجاز مصري جديد: طوب يمنع التلوث. ويخدم العمران!
استخدام قش الأرز في صناعة طوب أكثر كفاءة وأقل سعرًا

تحقيق: وجهة الصقر

** صناعة نوعية جديدة من الطوب، توصل إليها باحث مصري، وتدخل في مكوناتها الرمال والقش إضافةً للأسمدة، لتكوين طبقة متميزة عالمياً تسهم في منع التلوث، وتحقيق فائدة مزدوجة في استخدام الخامات المهدرة من قش الأرز الذي أصبح سبيلاً من أسباب تلوث البيئة وانتشار السحايا السوداء مما يفتح مجالًا للصناعات الصغيرة القائمة علي صناعة الطوب بالقري والمدن، واستيعاب طفقات الشباب، وملاحظة حركة العمران بمواد بناء أقل تكلفة، وأعلى إنتاجية.
Bio based Materials

جفت الزيتون
Replacement of steel by bamboo reinforcements in latest generation of concrete!
Abu Gaddan Community School under construction. Photo credit: Hand Over. Founded by construction engineer Radwa Rostom.
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Abu Gaddan Community School under construction. Photo credit: Hand Over. Founded by construction engineer Radwa Rostom.
Radwa Rostom, founder of Hand Over. Photo courtesy of Radwa Rostom.
Façade Design Process

Radwa Rostom, founder of Hand Over. Photo courtesy of Radwa Rostom.
Recommendations:

West Africa, the Falatow Jigiyaso Orphanage
West Africa, the Falatow Jigiwaso Orphanage
Posidonia Oceanica, which can be found in large volumes in the Mediterranean, has been dried and reused to insulate the roofs.
Social housing in Formentera
Community School under construction. Photo credit: Hand Over. Founded by construction engineer Radwa Rostom.

Social housing in Formentera
Container Medical Compound for Salam Centre, Emergency Ngo

Architects: Studio tamassociati —, Location: Soba, Khartoum, Sudan
Architects: Studio tamassociati – Raul Pantaleo, Massimo Lepore, Simone Sfriso, con Pietro Parrino y Gino Strada, Location: Soba, Khartoum, Sudan
Building Services
Sustainable Buildings: Local and Affordable

Bioclimatic Architecture
Shade + Ventilate + Insulate

Construction Technology & Materials
Circularity + Biobased + Earthen + Waste

Building Services
Abu Gaddan Community School under construction. Photo credit: Hand Over. Founded by construction engineer Radwa Rostom.
Almost 2 billion kilograms of biomass are burned daily in low and middle income countries
Approximately 80% of the total global exposure to particulate matter occurs indoor in developing countries.
Develop and implement cooking stoves that are cleaner, more efficient, practical and affordable for slum dwellers.
-Co-Creation

-Share needs and preferences embedded in their current cooking practices.
TRƯỞNG ĐẠI HỌC Y KHOA
PHẠM NGỌC THẠCH
UNIVERSITY OF MEDICINE PHAM NGOC THACH
86/2 THÀNH THÁI, P.12, Q.10, TP.HCM
DT: 38652435 FAX: 38650025
Micro-spirométrie
L'appartement est situé dans un immeuble à R+3 et à structure de poteaux-poutres en béton.

Une coursive fait le tour de l'immeuble à chaque étage desservant les différents appartements.

La porte d'entrée de l'appartement est partiellement ajourée pour laisser passer l'air de l'extérieur.

Nulle séparation entre la chambre à coucher et le séjour.

La cuisine dispose d'une fenêtre horizontale donnant sur un espace extérieur.

Chambre du fond.
Improvement of the Indoor Air Quality in Housings of Ho Chi Minh City (Vietnam)
Installation d’une turbine rotative sur le toit + bouches d’extraction

Houmam Milliani, Improvement of the Indoor Air Quality in Housings of Ho Chi Minh City (Vietnam)
Choix de la VMC :

Cette VMC est capable d’extraire les débits calculés pour la cuisine et les toilettes même à petite vitesse : 58 m³/h pour la cuisine et 30 m³/h pour les sanitaires.

Récapitulatif :

- Coût VMC : **168 euros**
- Conduits :
  - Diamètre 127 mm : reliant la cuisine à la VMC > coût : **40,30 euros**
  - Diamètre 82 mm : reliant les toilettes à la VMC > coût : **36,54 euros**
- Grilles d’amenée d’air : 14.56 + 12.10 = **26,66 euros**.

Total : **271,50 euros**

Improvement of the Indoor Air Quality in Housings of Ho Chi Minh City (Vietnam)
Social Acceptance
Sustainable Buildings: Local and Affordable

Social Acceptance

Bioclimatic Architecture
Shade + Ventilate + Insulate

Construction Technology & Materials
Circularity + Biobased + Earthen + Waste

Building Services
Human Centered Design approach
Stories

1. PV Street Lamps
2. Water Pump
3. Singer Machine
4. Toilette
5. Open Kitchen
Co-creation

Share needs and preferences embedded in their current cooking practices.
Social Acceptance

Occupant comfort aspirations are high.

- Can we provide good comfortable and healthy buildings using bioclimatic and low-tech solutions?

- Many architects are delusioned from the classical architectural education and practice that does not take into account anthropology and middle class aspirations.
Conclusion
Sustainable Buildings: Local and Affordable

- Aesthetics remain an important feature in architecture
- Urban Density & Air Pollution
- Social Acceptance
- Standards
- Regulation

Social Acceptance

Bioclimatic Architecture
Shade + Ventilate + Insulate

Construction Technology & Materials
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Building Services
Conclusion

• Aesthetics remain an important feature in architecture

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