

Sustainable Buildings: Local and Affordable Best Practices



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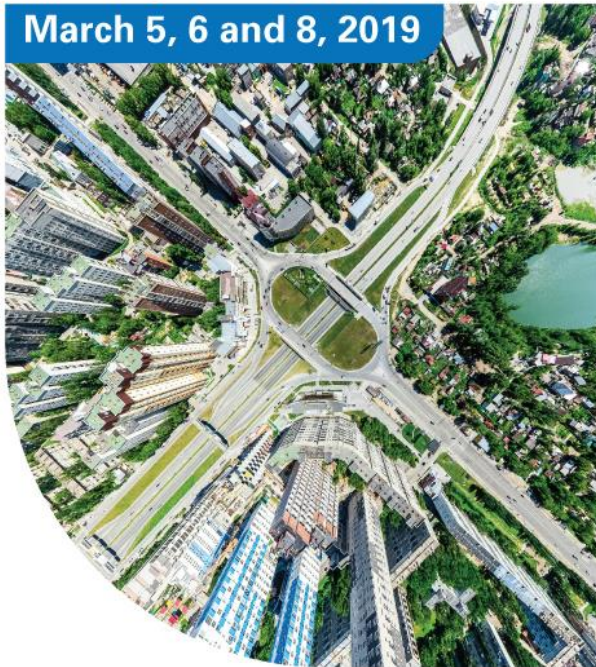
Acknowledgement



BUILDING GREEN: EXPERIMENTS AND EXPECTATIONS

DEPARTMENT OF ARCHITECTURE
RAMEZ G. CHAGOURY FACULTY OF
ARCHITECTURE, ARTS & DESIGN

March 5, 6 and 8, 2019



Content

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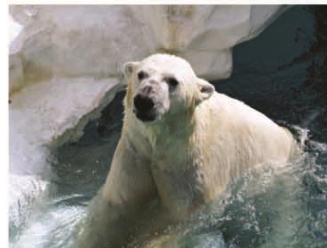
Introduction



Megatrends

Megatrends

- Carbon Emissions
- 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 health- 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

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

VS



PERFORMANCE GOALS

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

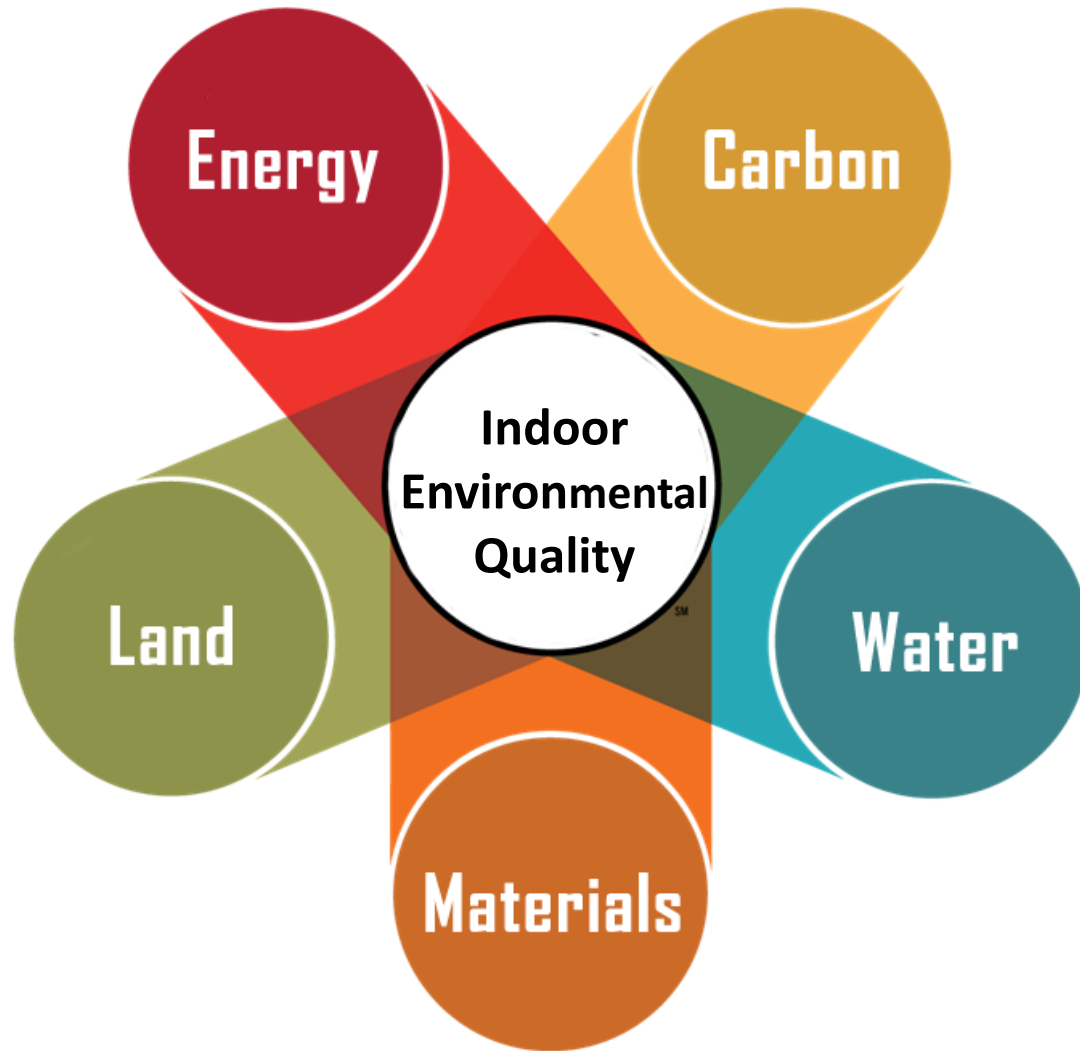


Build a **green economy**



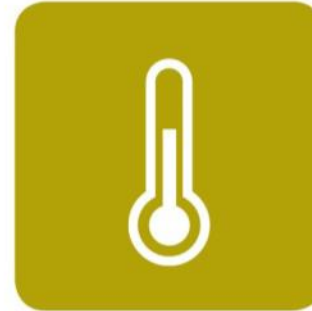
Enhance **community quality of life**

Assimilated Definition

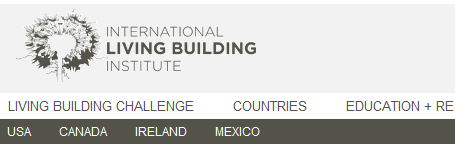


KPI's and Assessment Metrics

You can't
manage
what you
don't
measure.



Existing Rating Systems



BUILDING



breeam



ÖKOPASS

**Österreichisches Institut
für Baubiologie und Bauökologie**

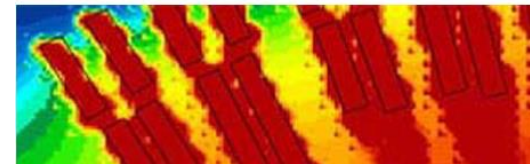


EPBD

CASBEE™

HQE
Haute Qualité Environnementale

Belgian Sustainable Building Council



TASK 40 / ANNEX 52



Passivhauszertifizierung



**Österreichische Gesellschaft
für nachhaltiges Bauen**



Usability of Green Building Rating Systems in MENA

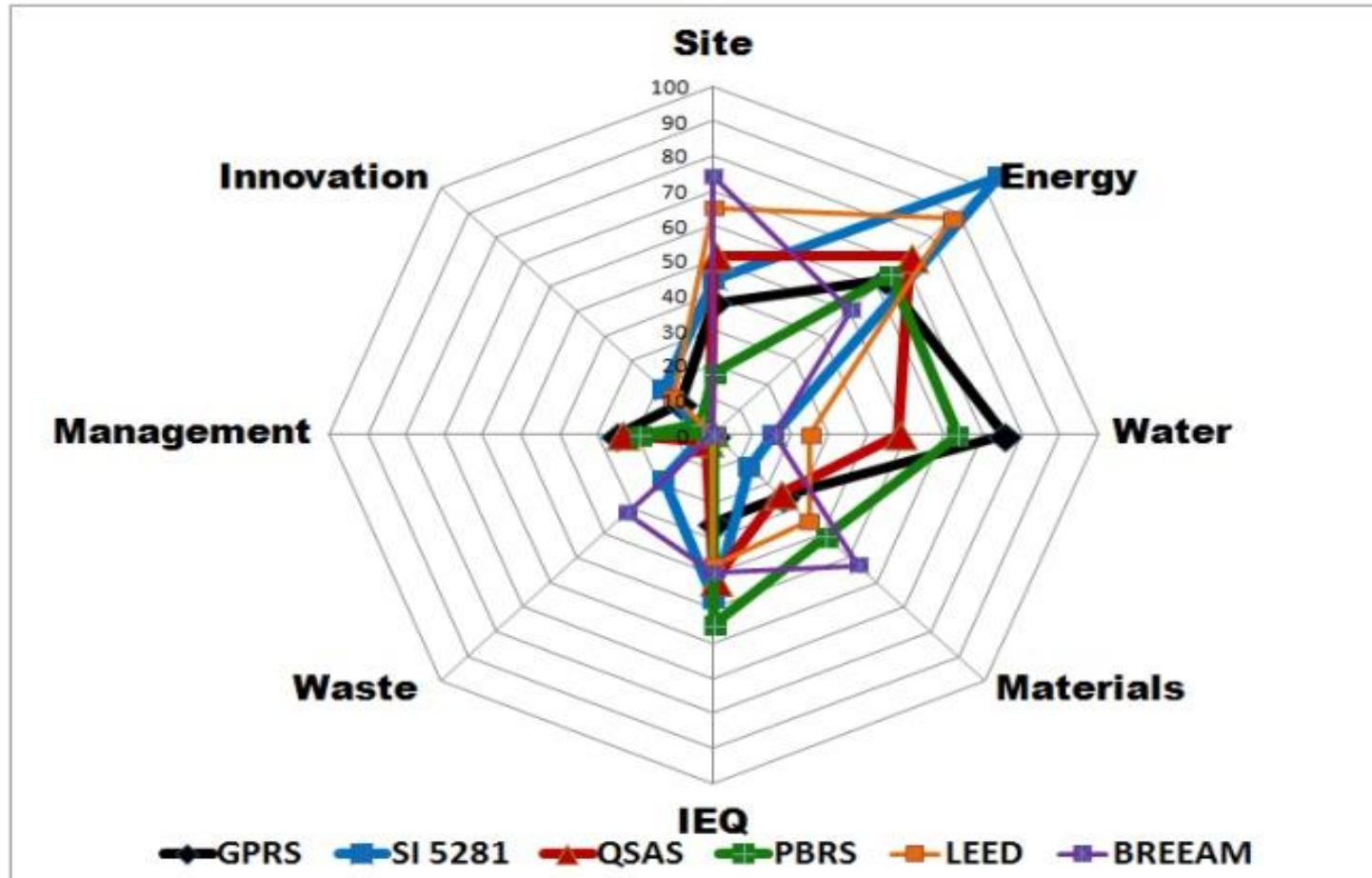
Table 2 Criteria analysis and results summary

| | Checklists | Performance Goals | Computer Programs | Monitoring & Commissioning |
|---|------------|-------------------|-------------------|----------------------------|
| Prerequisites and Rating System Credits | | | | |
| GPRS | 51% | 31% | 6% | 12% |
| SI 5281 | 33% | 44% | 9% | 14% |
| QSAS | 45% | 36% | 6% | 13% |
| PBRs | 39% | 35% | 8% | 18% |
| LEED NC | 38% | 40% | 8% | 14% |
| BREEAM | 40% | 35% | 9% | 16% |

Table 3 Comparing GPRS, SI 5281, QSAS, PBRs, LEED & BREEAM regarding criteria assessment categories.

| Items of comparison | Green building rating system | | | | | |
|---------------------|------------------------------|---------|------|------|------|--------|
| | GPRS | SI 5281 | QSAS | PBRs | LEED | BREEAM |
| Site Selection | 15 | 22 | 51 | 12 | 26 | 28 |
| Energy Efficiency | 25 | 40 | 72 | 44 | 10 | 19 |
| Water Efficiency | 30 | 6 | 48 | 43 | 35 | 6 |
| Materials | 10 | 5 | 24 | 28 | 14 | 20 |
| IEQ | 10 | 18 | 42 | 37 | 15 | 15 |
| Management | 10 | 1 | 24 | 13 | - | 12 |
| Waste | - | 2 | - | - | - | - |
| Culture & Economics | - | - | 39 | - | - | - |
| Innovation | - | 7 | ? | 3 | 4 | - |

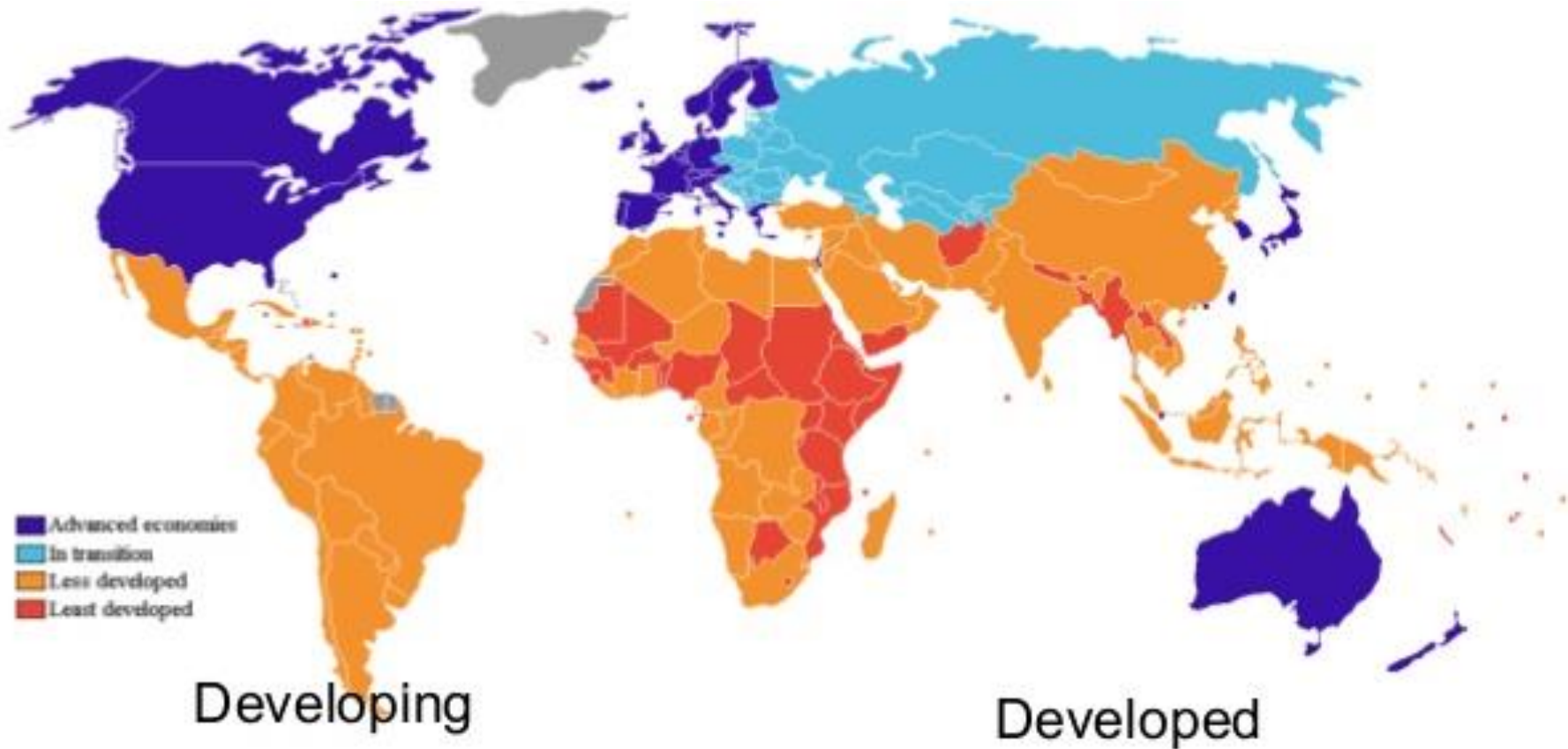
Usability of Green Building Rating Systems in MENA



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
- High aspiration for developed countries



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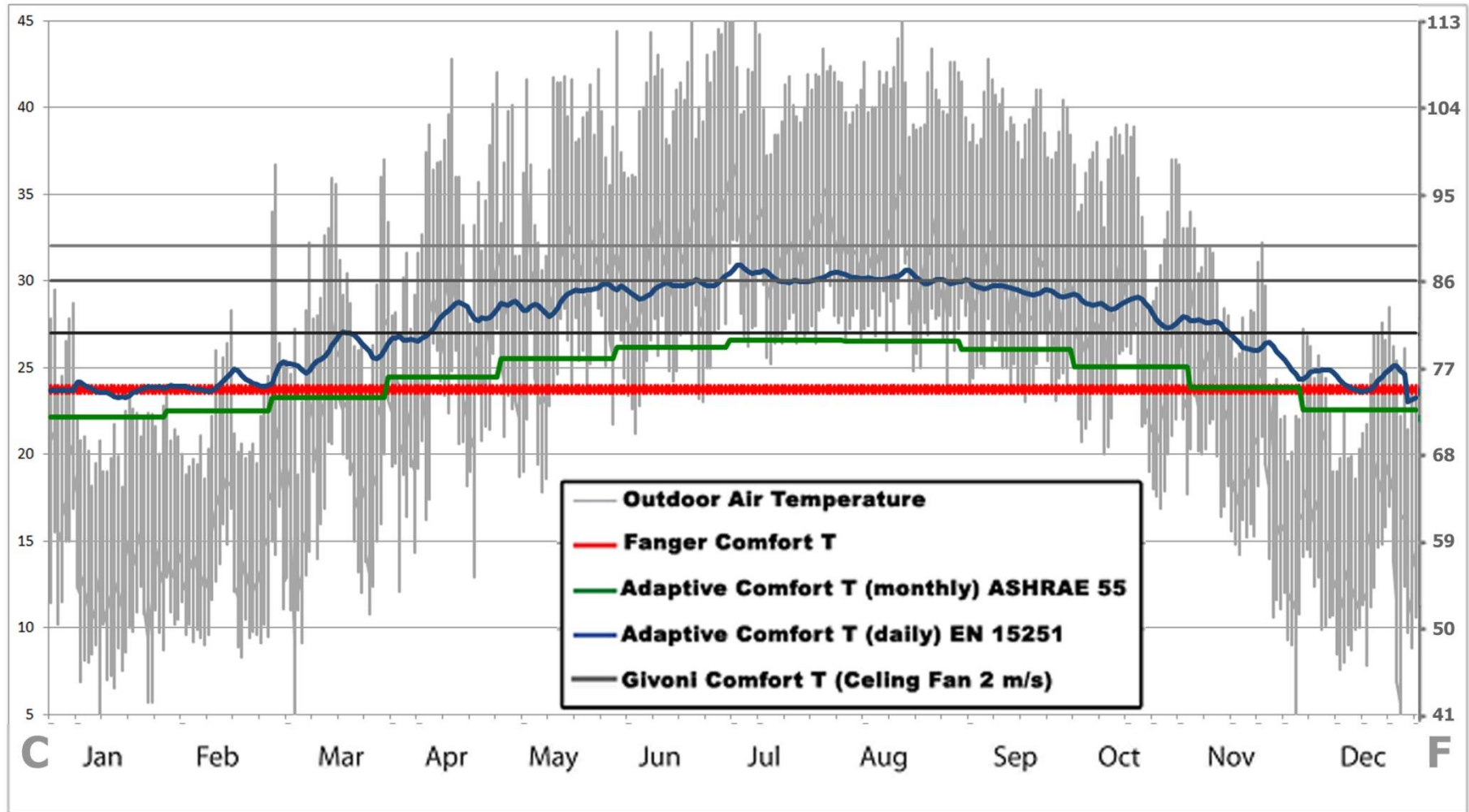
Static Comfort vs Adaptive Comfort



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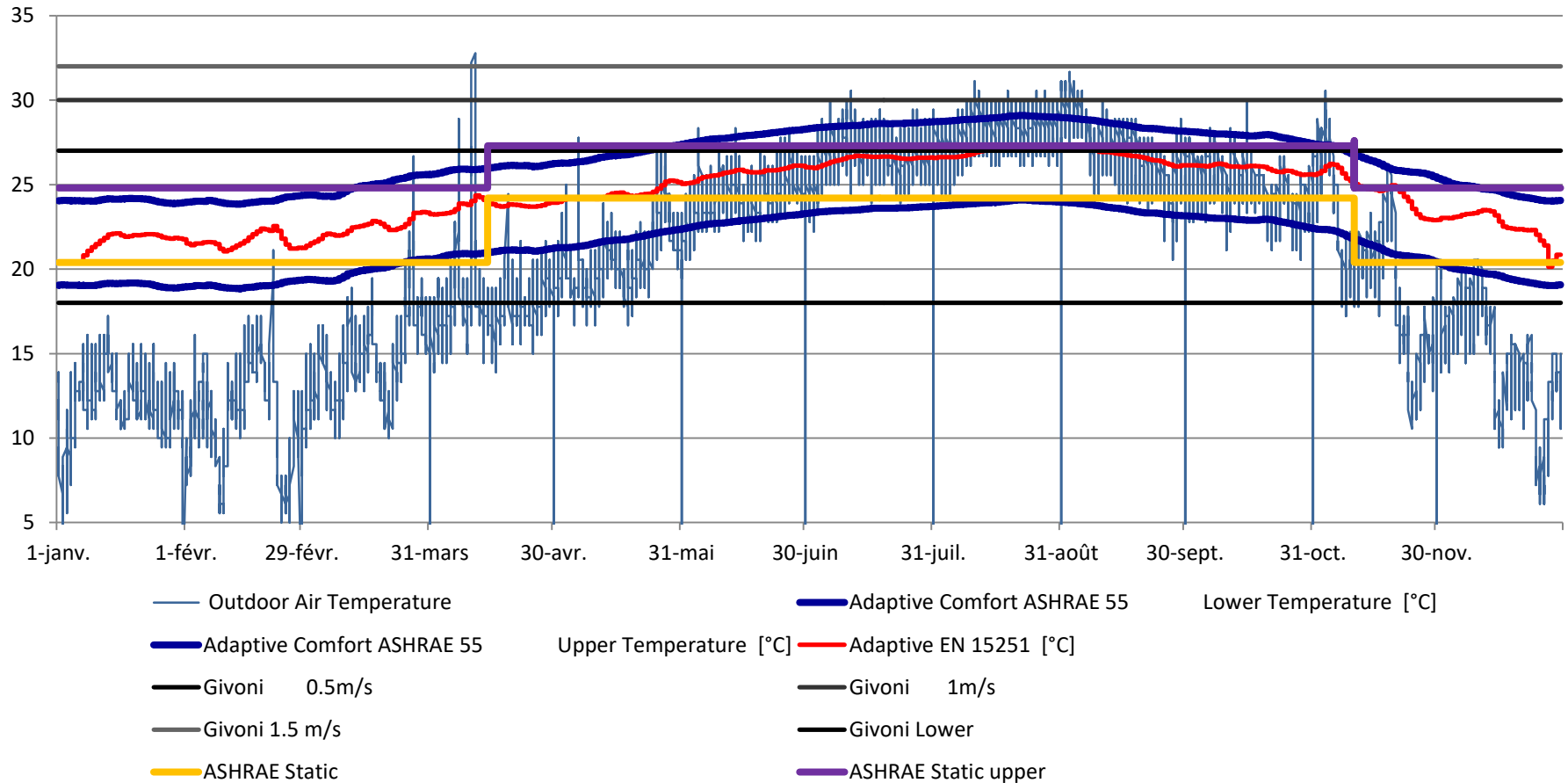
- Market that drive value of buildings
- Strong regulated market
- Innovations market

Static Comfort vs Adaptive Comfort



Static Comfort vs Adaptive Comfort

Beirut, Lebanon



What is new?

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

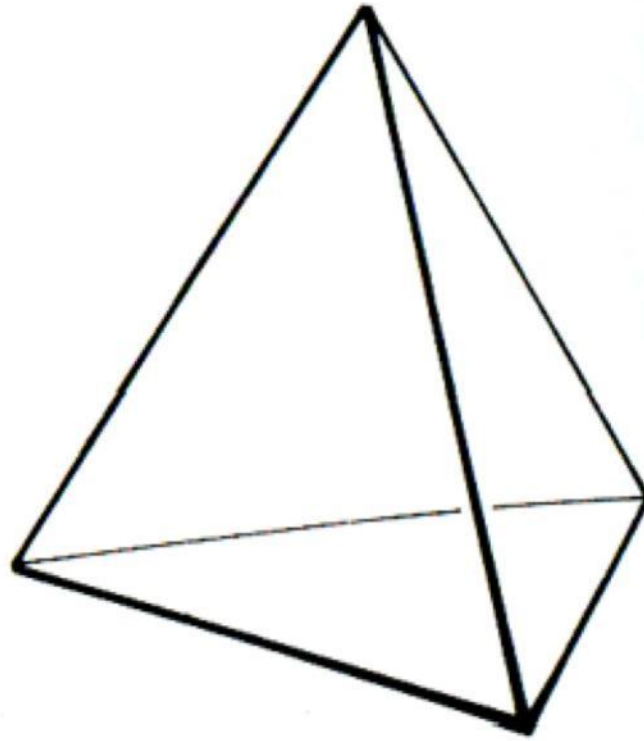
environmental impact assessment of local and affordable sustainable buildings should be comparable and enable building professionals to better design and lead the construction in the developing World.

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

NEW MEXICO



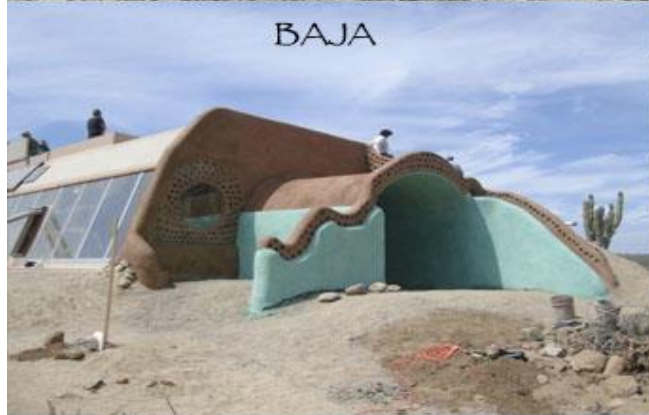
ALBERTA



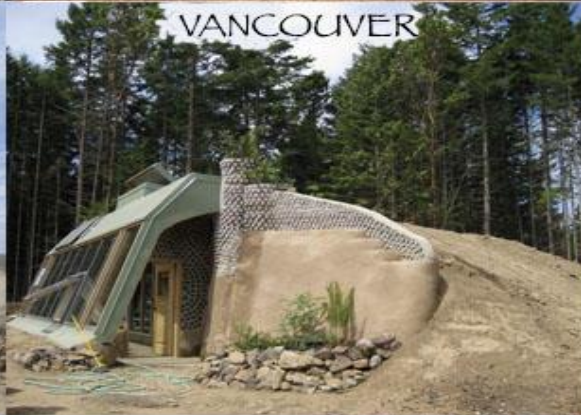
MONTANA



BAJA



VANCOUVER



FRANCE



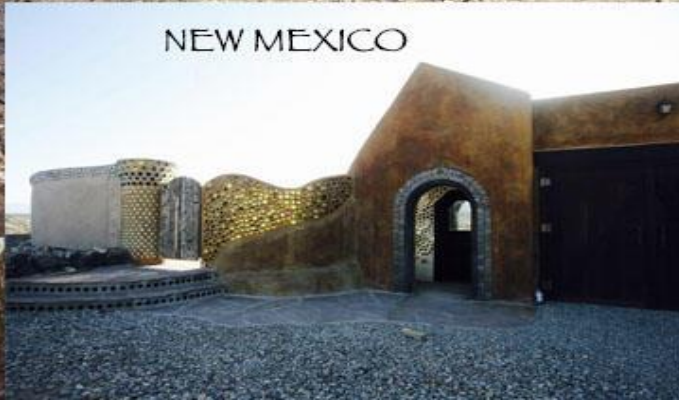
HOLLAND



JAPAN



NEW MEXICO







Lycée Français, Damas, Akaa / Alhadi Albaridi



KAPSARC Villa B-19 in Riyadh, Saudi Arabi by SK Engineering & Construction





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

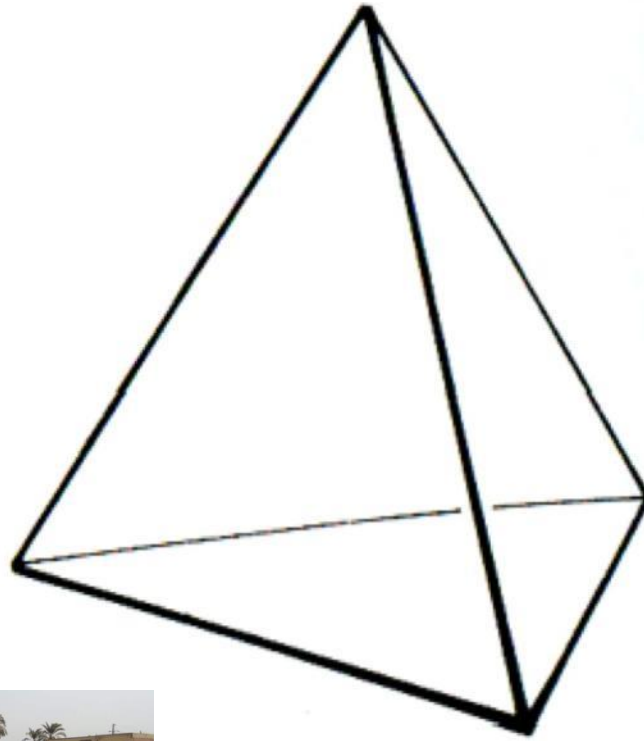


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Construction Technology & Materials



Sustainable Buildings: Local and Affordable



**Bioclimatic
Architecture**

Shade + Ventilate + Insulate



**Construction
Technology & Materials**

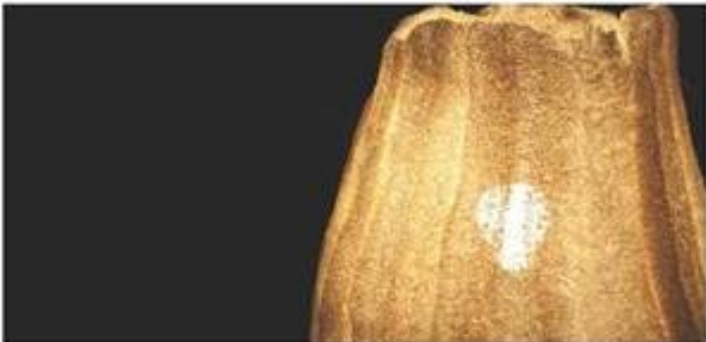
Circularity + Biobased + Earthen + Waste

Bio based Materials

□ Harvestable maturity in 10 years or less

Leafa

Finding out a new function for a daily used material using loofah in everyday 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 Biblotheca 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

الأربعاء 12 من جمادى الآخرة 1428 هـ 27 يونيو 2007 السنة 131-العدد 44032

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

تحقيق: وجيه الصقار



** صناعة نوعية جديدة من الطوب, توصل إليها باحث مصري, وتدخل في مكوناتها الرمال والقش إضافة للأسمنت, لتكوين طوبة متميزة عالميا تسهم في منع التلوث, وتحقيق فائدة مزدوجة في استخدام الخامات المهتردة من قش الأرز الذي أصبح سببا من أسباب تلوث البيئة وانتشار السحابة السوداء مما يفتح مجالا للصناعات الصغيرة القائمة على صناعة الطوب بالقرى والمدن, واستيعاب طاقات الشباب, وملاحقة 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.



Abu Gaddan Community School under construction. Photo credit: Hand Over. Founded by construction engineer Radwa Rostom.



Abu Gaddan Community School under construction. Photo credit: Hand Over. Founded by construction engineer Radwa Rostom.



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



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



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

Recommendations:



West Africa, the Falatow Jigiyaso Orphanage



West Africa, the Falatow Jigiyaso Orphanage



Social housing in Formentera, Spain



Posedonia Oceanica, which can be found in large volumes in the Mediterranean, has been dried and reused to insulate the roofs



Social housing in Formentera



Social housing in Formentera



Ricola Factory, Martin Rauch



Ricola Factory, Martin Rauch

Container Medical Compound for Salam Centre, Emergency Ngo



Key:

- 1. Bamboo sun baffle
- 2. Metal roof
- 3. Solar collectors
- 4. Thermal insulation
- 5. Bathroom
- 6. Container structure
- 7. Opened container doors
- 8. Window frame



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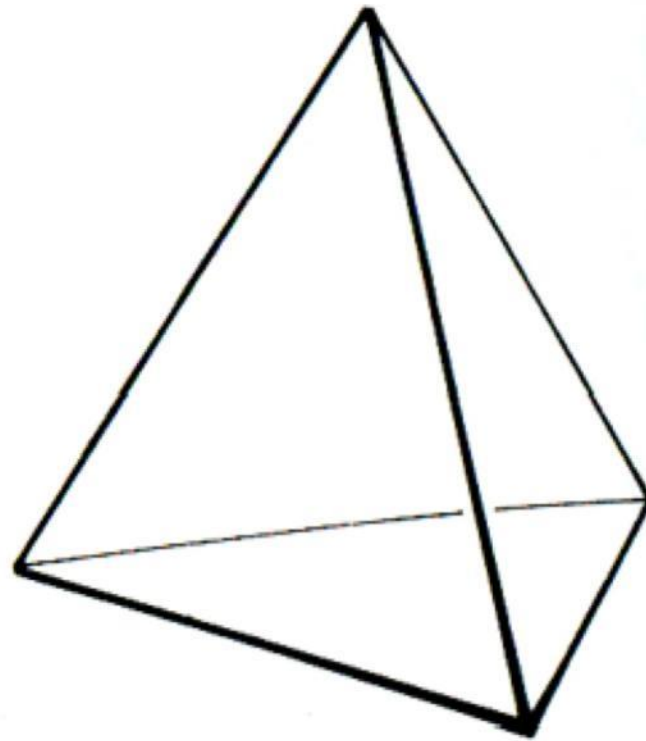


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Building Services



Sustainable Buildings: Local and Affordable



**Building
Services**



**Bioclimatic
Architecture**

Shade + Ventilate + Insulate



**Construction
Technology & Materials**

Circularity + Biobased + Earthen + Waste







US - 119,000



EU - 550,000



INDIA - 587,000

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 indoors 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.







Văn Thiệp

ĐÀN-KE-INOX - MĂNG XÔI
MĂNG HÚT KHÔI - THÙNG CÁC LOẠI
NHẬN ĐẶT HÀNG THEO YÊU CẦU

THẢO PHƯƠNG

CHUYÊN NHẬN ĐẶT MÁI HIỆN DI ĐỘNG
NHẬN LẮP ĐẶT MÁI HIỆN DI ĐỘNG

CHUYÊN LẮP ĐẶT : MÁI HIỆN DI ĐỘNG

UPNT

ỦY BAN NHÂN DÂN THÀNH PHỐ HỒ CHÍ MINH

TRƯỜNG ĐẠI HỌC Y KHOA
PHẠM NGỌC THẠCH

UNIVERSITY OF MEDICINE PHAM NGOC THACH

86/2 THÀNH THÁI, P.12, Q.10, TP. HCM

ĐT: 38652435 FAX: 38650025

092 74 74 75

THUÊ

Micro-spirométrie





L'appartement est situé dans un immeuble à R+3 et à structure de poteaux-poutres en béton.



Une coursière 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.

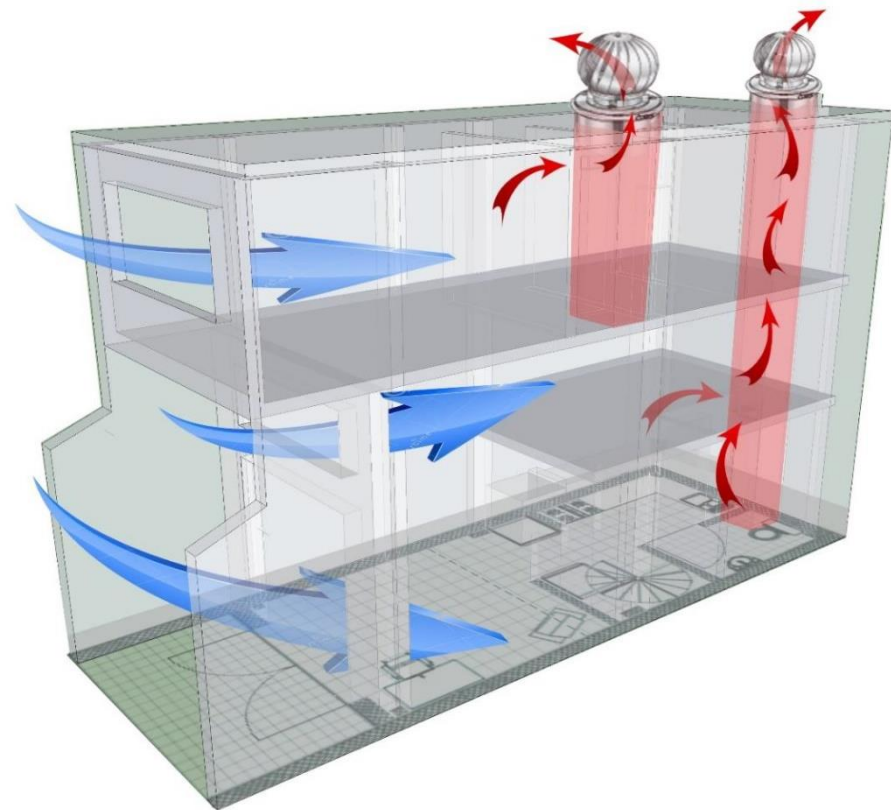


La cuisine dispose d'une fenêtre horizontale donnant sur un espace extérieur.

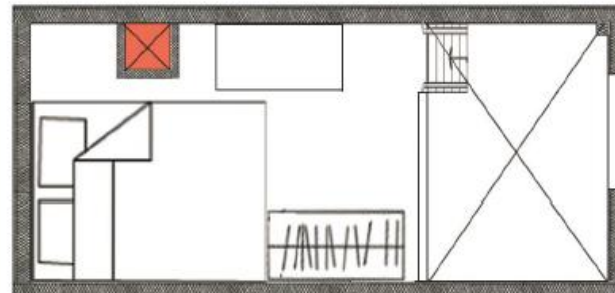
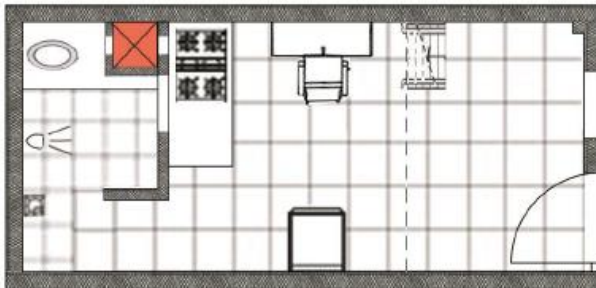
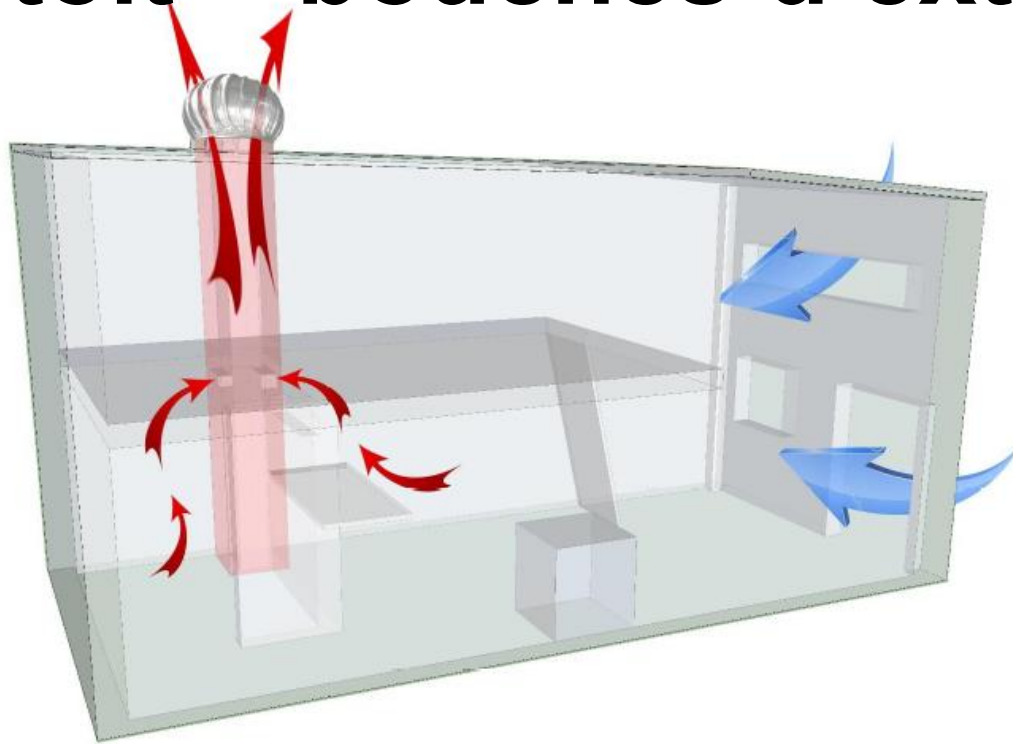


Chambre du fond.

Improvement of the Indoor Air Quality in Housings of Ho Chi Minh City (Vietnam)

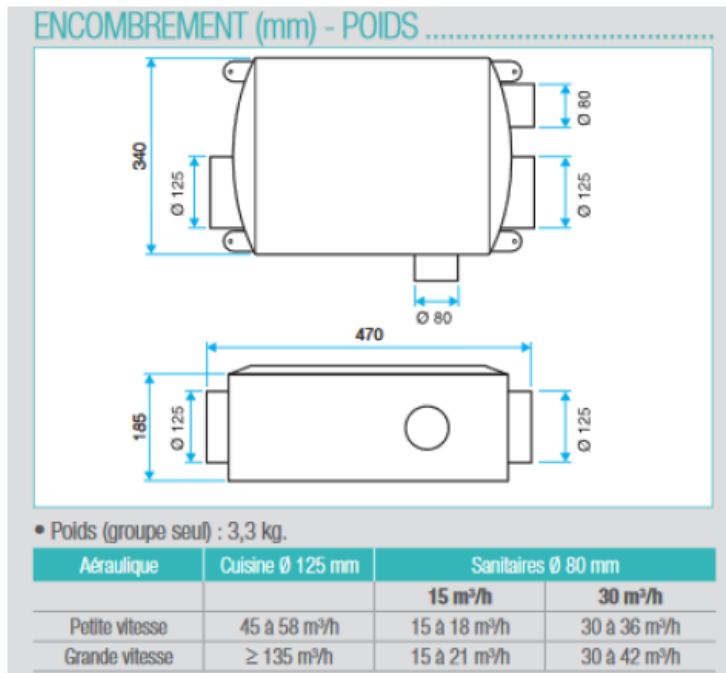


Installation d'une turbine rotative sur le toit + bouches d'extraction



Houmam Milliani, Improvement of the Indoor Air Quality in Housings of Ho Chi Minh City (Vietnam)

Choix de la VMC :



Ventilation individuelle simple flux

VMC - simple flux autoréglable

COMPACT



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

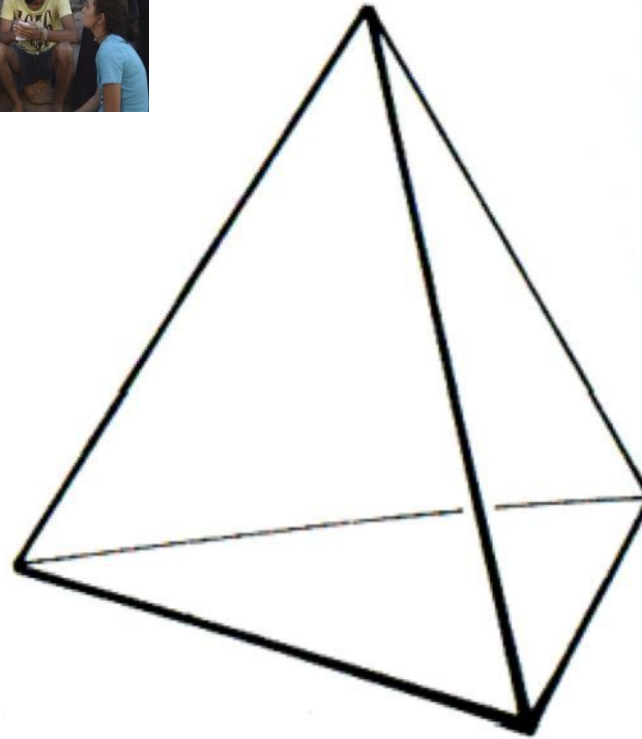
Social Acceptance



Sustainable Buildings: Local and Affordable



Social Acceptance



**Building
Services**



**Bioclimatic
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Human Centered Design approach



Stories

1. PV Street Lamps

2. Water Pump

3. Singer Machine

4. Toilette

5. Open Kitchen



-Co-Creation

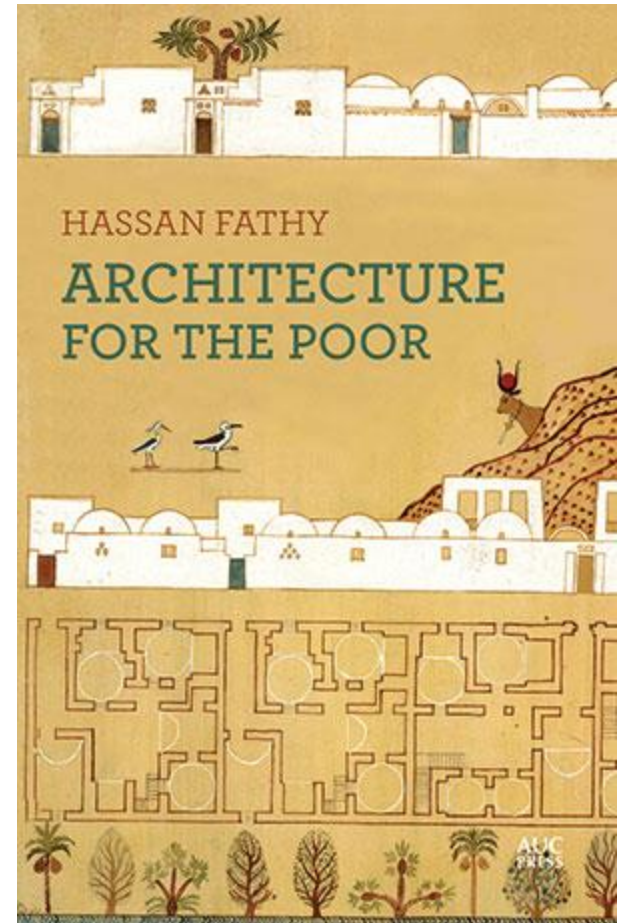
-Share needs and preferences embedded in their current cooking practices.



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



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Sustainable Buildings: Local and Affordable Best Practices



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