

تأثير التغير البيئي على العمارة

Architecture as a manifestation of
environmental change

PROBLEMS

SUSTAINABLE DEVELOPMENT

SUSTAINABLE URBAN DESIGN

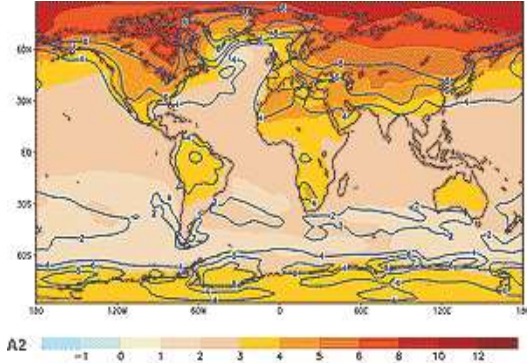
SUSTAINABLE BUILDING DESIGN

RATING SYSTEMS

INTEGRATED DESIGN



GLOBAL WARMING



RESOURCES DEPLETION



تشير الأبحاث إلى أن المباني مسؤولة عن ما يقرب من 45% من إجمالي استخدام الطاقة في العالم، وعن حوالي 80% من استهلاك ناتج المياه، وأن 50% من المواد والموارد تستخدم في هذه المباني. كما أوضحت هذه الأبحاث أن الناس يقضون من 60% إلى 70% من أوقاتهم داخل هذه المنازل. وتخفض الأبنية الخضراء من 35% إلى 50% من انبعاثات ثاني أكسيد الكربون، وتعتمد على تقنيات البناء التي تراعي البيئة في المواد المستخدمة. كما تساعد المباني الخضراء على توفير 40% من إجمالي المياه المستخدمة ونحو 30% من الطاقة المستخدمة.

GLOBAL WARMING

Main Greenhouse gases:

Carbon dioxide (CO₂)

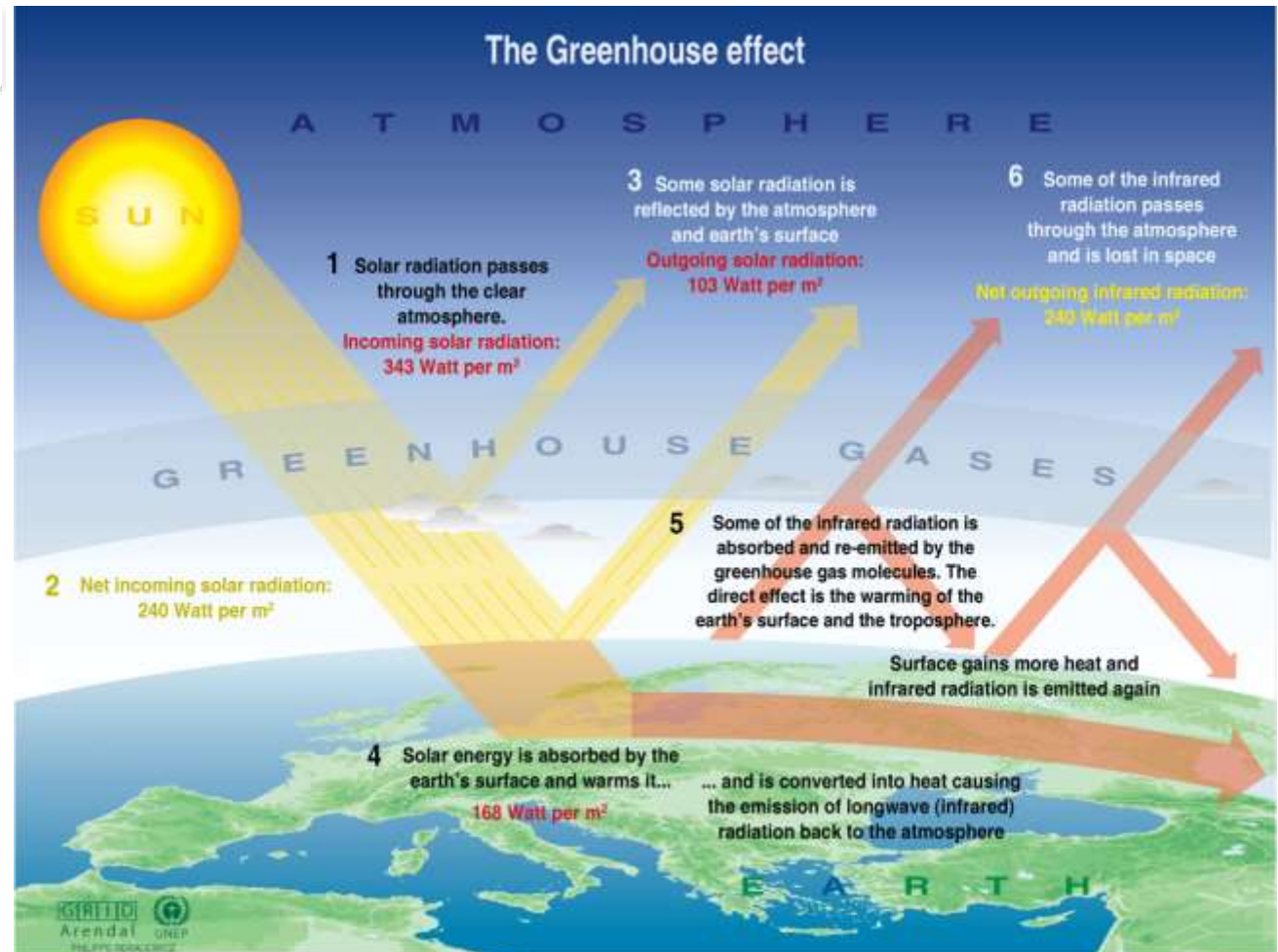
Methane (CH₄)

Nitrous oxide (N₂O)

Hydrofluorocarbons (HFCs)

Perfluorocarbons (PFCs)

Sulphur hexafluoride (SF₆)



Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

GLOBAL WARMING

EFFECTS :

- TEMPERATURE RISE
- CATASTROPHES & DISASTERS
- SEA LEVEL RISE
- INHABITANTS AND LIFE SYSTEM
- WATER RESOURCES IMPACT



RESOURCES DEPLETION

- ENERGY CRISIS

- WATER CRISIS

- MATERIAL DEPLETION



Inductive Prediction

تنبؤ استقرائي

Ken Yeang: العمارة الخضراء المستدامة يجب أن تلبى احتياجات الحاضر دون إغفال احتياجات الأجيال القادمة؛ ذلك لأن القرارات التصميمية لا يقع تأثيرها فقط على البيئة وإنما يمتد تأثيرها لأجيال المستقبل.





Reducing resources consumption

- Renewable energy
- Reduce **Energy** consumption
- Reduce **Material** consumption
- Reduce **Water** consumption



Enhancing The Environment

- THERMAL COMFORT
 - ACCOUSTICAL COMFORT
 - HEALTHY ENVIRONMENT
- (Air, Radiation, Products)**



Reduce Environmental pollution

- Saving the environment



GREEN ARCHITECTURE



space required to transport 60 people



car



bus



bicycle

GREEN ARCHITECTURE



معايير العمارة الخضراء وفق متطلبات LEED

1-تخطيط الموقع العام المستدام

- اختيار الموقع
- اعادة التطوير الحضري
- بدائل النقل
- تقليل التلوث الضوضائي
- إدارة مياه الامطار
- تصميم الفضاءات الخارجية

2- كفاءة المياه Water Efficiency

- ابتكار تقنيات للمياه الضائعة
- خفض استخدام المياه
- كفاءة المياه للمناطق المفتوحة

Energy and Atmosphere كفاءة الطاقة والغلاف الجوى

الحد الأدنى للطاقة

خفض انبعاث الأوزون

أداء أمثل للطاقة

إعادة تجديد الطاقة

الطاقة الخضراء

Materials and resources المواد والموارد

تخزين وتجميع ما هو قابل للتدوير

إعادة استخدام الأبنية

إدارة مخلفات الإنشاء

إعادة استخدام الموارد

مواد محلية وإقليمية

Indoor Environmental Quality نوعية البيئة الداخلية

السيطرة على CO₂

زيادة فعالية وكفاءة التهوية

السيطرة على الملوثات الكيميائية

نظام السيطرة

ضوء النهار والرؤية الخارجية



SUSTAINABLE SITES

Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.



WATER EFFICIENCY

Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.



ENERGY & ATMOSPHERE

Verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents.



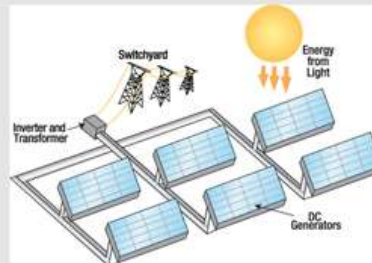
MATERIALS & RESOURCES

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.



INDOOR ENVIRONMENTAL QUALITY

Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.



Sustainable sites



SUSTAINABLE SITES

Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

Ecological site

Protection of
ecological
features

Heat Island
Effect

GREEN ARCHITECTURE

Protection of ecological features

casa-parr-by-pezo-von-ellrichshausen-



Energy Efficiency



ENERGY & ATMOSPHERE

Verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents.

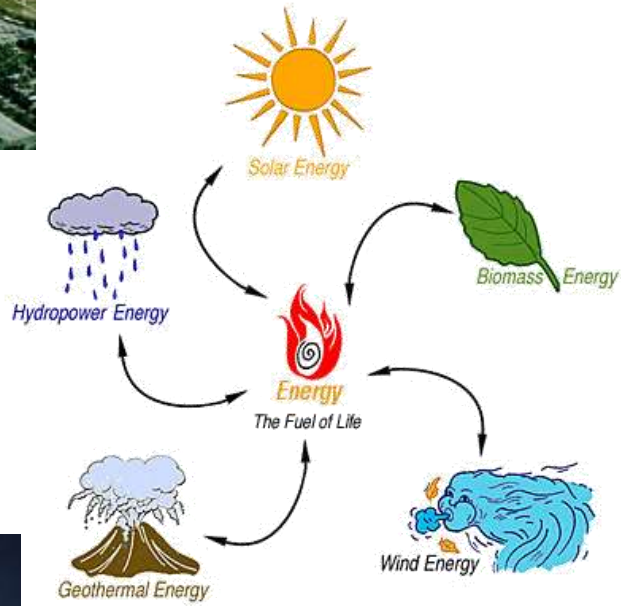
Renewable Energy

Reduction of energy demand

Energy efficient features

GREEN ARCHITECTURE

1- Renewable energy



GREEN ARCHITECTURE

1- Renewable energy

المعلوماتك
منذ عام 2008
أسعار طاقة الفحم
زادت 13 %
وأسعار الطاقة الشمسية
قلت 80 %
GREENPEACE



Solar tree is saving the energy

Solar-Tree helps charge your electric devices by saving electric power form the sun.



In these days, an electric device is with you during 24 hours. It means that the electric device is the essential thing for your life. Even if you are out of your home, it may still be with you. How do you use an electric good outside?

Portable
solar tree
you don't need electric right now?



rechargeable

- mobile
- camera
- mp3 player

•مجمعات شمسية على السقف لأغراض تسخين المياه ومياه حمام السباحة



Digital Building Management System (BMS)

Data of human activity

Sensors Processing
(Sensing human activities)

Controlling lights



Indoor Environmental Quality



INDOOR ENVIRONMENTAL QUALITY

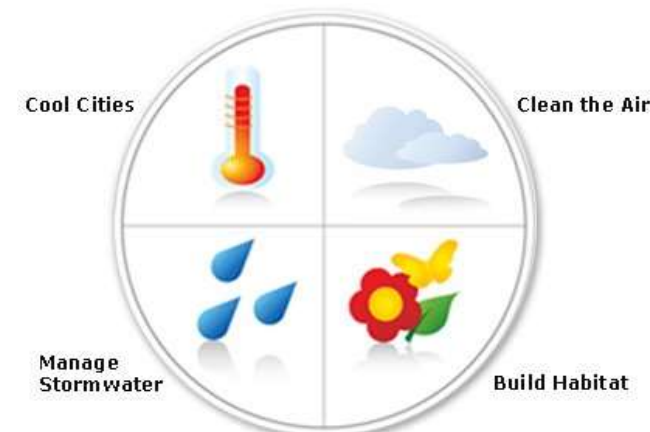
Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

Thermal
Comfort

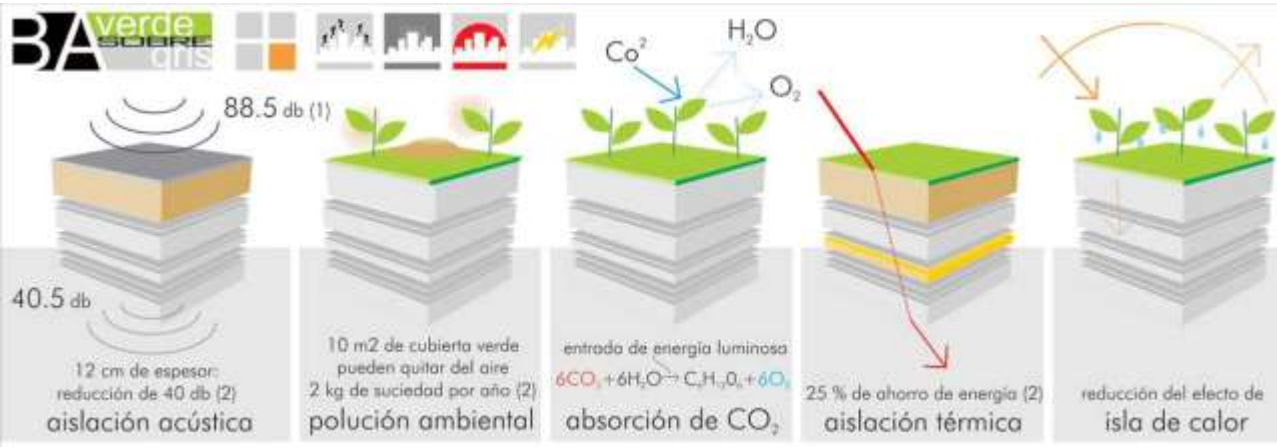
Acoustic
Comfort

Healthy
Environment

2- Passive Design



Green roofs help cool cities, manage storm water, clean the air, and build habitat.



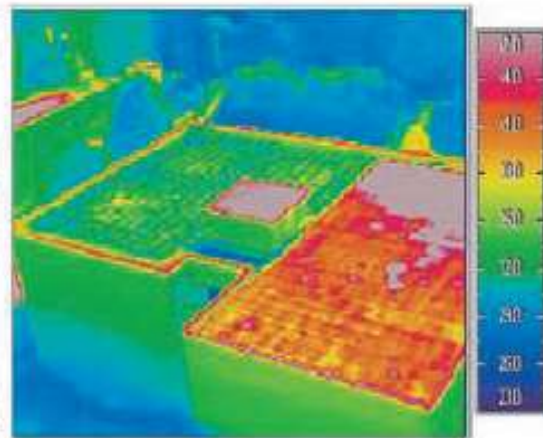
Green Roof Comparison



fuentes:
 [1] "Proyecto Ejecutivo de Obras para la Cuenca Arroyo Maldonado" www.buenosaires.gov.ar
 [2] "Design Guidelines for Green Roofs". Peck and Kuhn, Ontario, Association of Architects

GREEN ARCHITECTURE

2- Passive Design



4.47 Experimental green roof on a building (left) at Yokohama National University, Yokohama, Japan. The left side of the roof has pallets of clover, the right side is a conventional exposed roof surface. Infrared thermography (right) shows the effect of the green roof on surface temperatures. ECOTECH LABORATORY

GREEN ARCHITECTURE

2- Passive Design



2- Passive Design

4-3-Green wall



GREEN ARCHITECTURE

2- Passive Design

4-3-Green wall



2- Passive Design

السقيفة



2- Passive Design

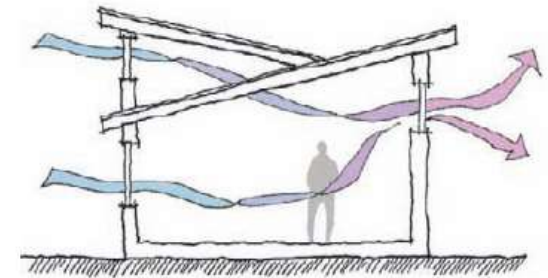
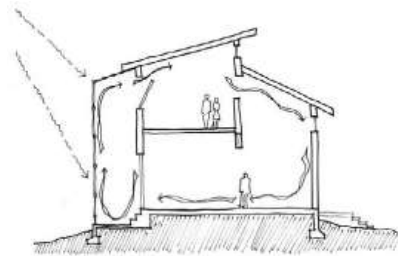
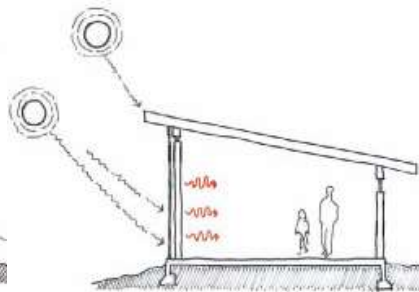
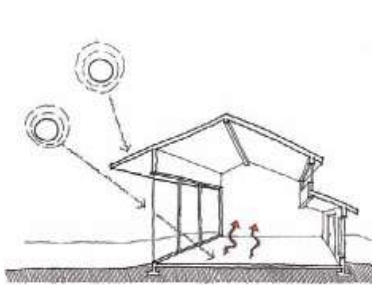
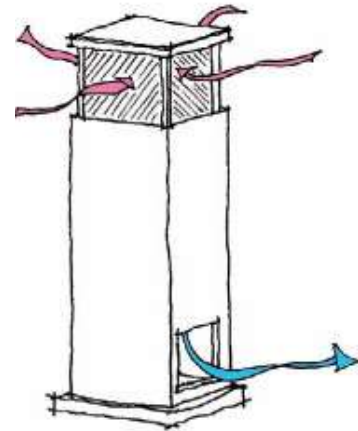
Passive design

- Building design

- Building Orientation
- Building Form and planning

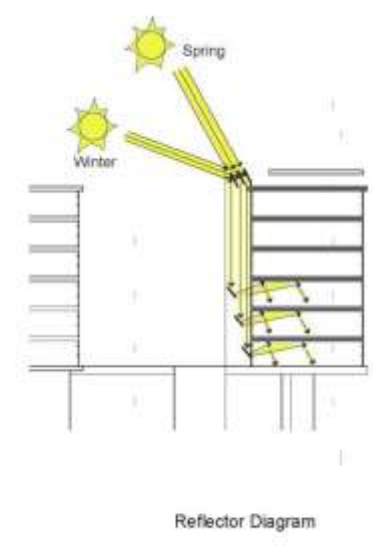
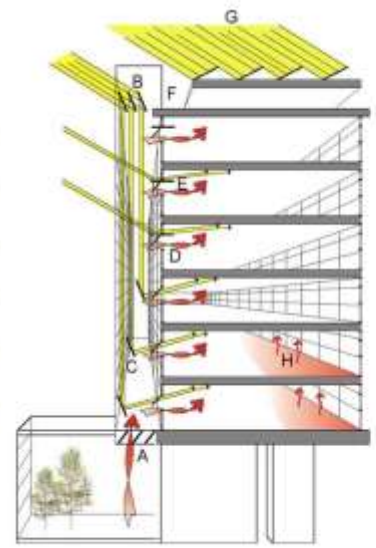
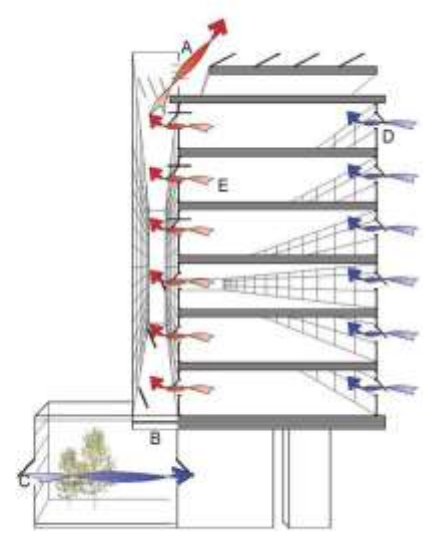
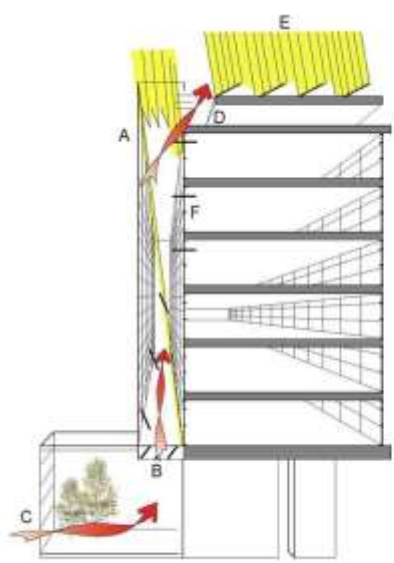
- Cooling and heating techniques

- Building envelope



GREEN ARCHITECTURE

2- Passive Design (living façade)

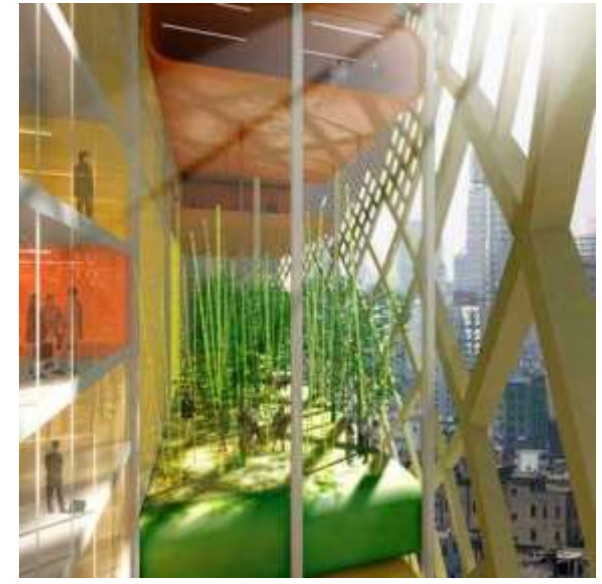


2- Passive Design

Double Skin (living façade)

Passive design

- **Building design**
 - Building Orientation
 - Building Form and planning
- **Cooling and heating techniques**
- **Building envelope**



GREEN ARCHITECTURE

2- Passive Design

(living façade)

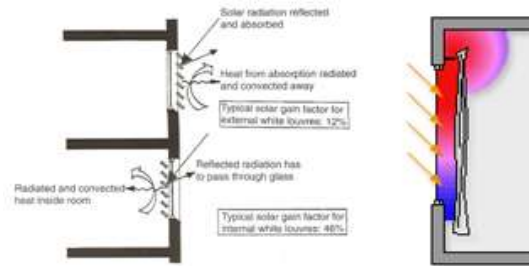


[The Mashrabiya House \(Jerusalem, Palestine\).](#)

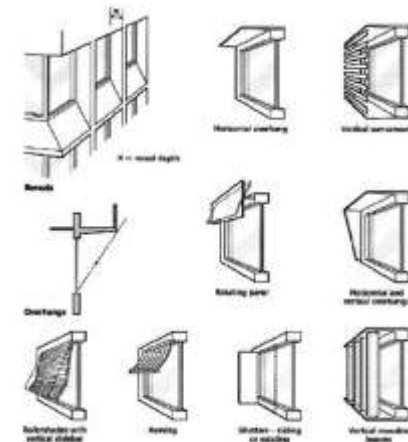
2- Passive Design

A - عناصر التظليل Shading Devices

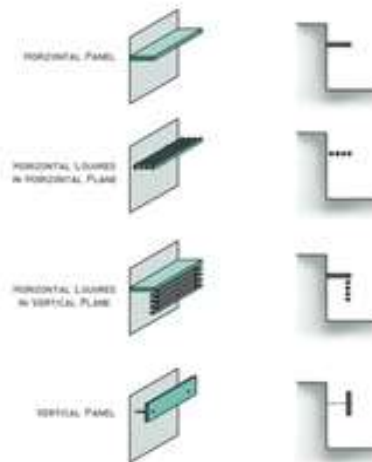
عناصر التظليل الداخلية



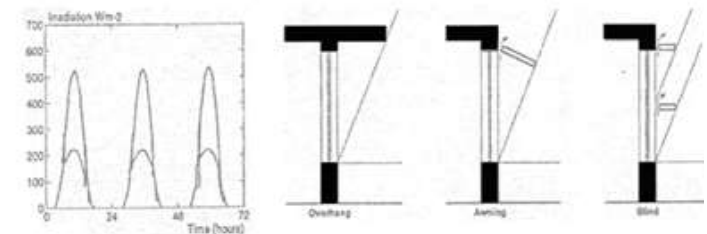
عناصر التظليل الخارجية



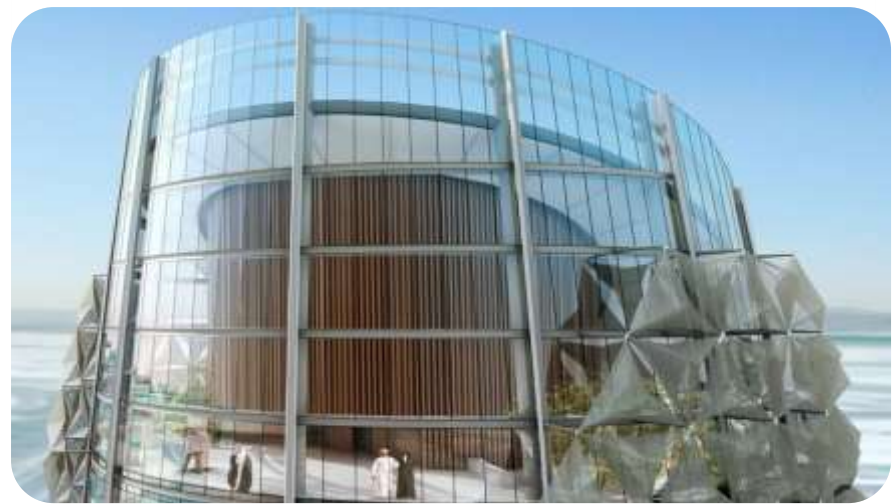
عناصر التظليل الثابتة



عناصر التظليل المتحركة

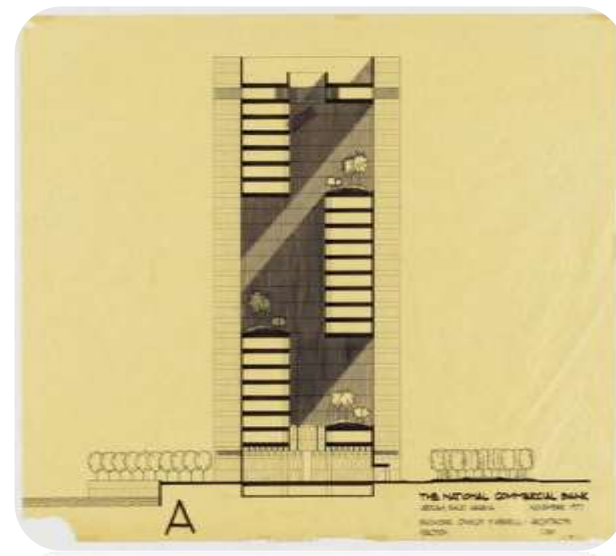


2- Passive Design



2- Passive Design

Sky courts الأفنية المفتوحة - B



GREEN ARCHITECTURE

2- Passive Design

(living façade)



2- Passive Design (living façade)



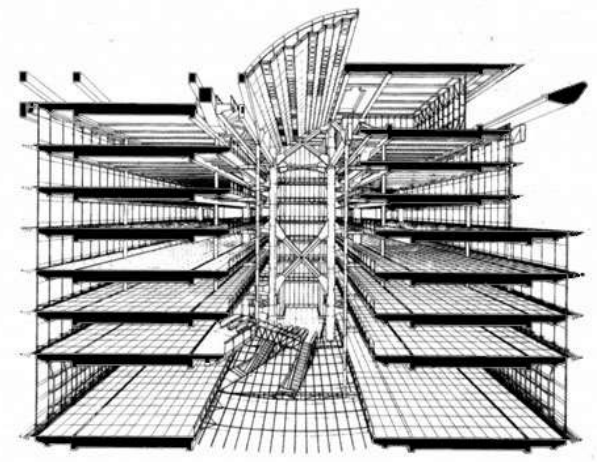
معروض كيفر تكنيك Kiefertechnic



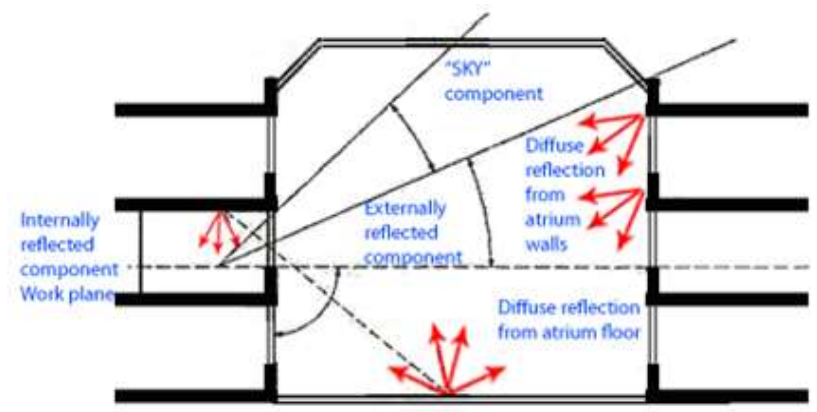
2- Passive Design

Natural Lighting

Mirrors & Reflectors المرايا والعاكسات -B



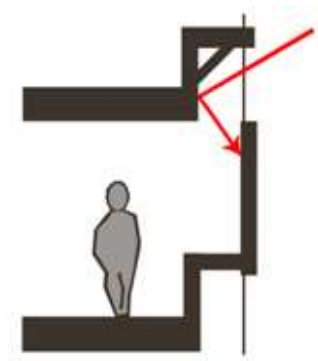
Atrium الفناء -A



Light Shelves رفوف الضوء -D



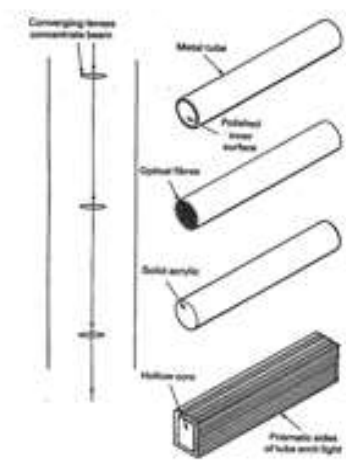
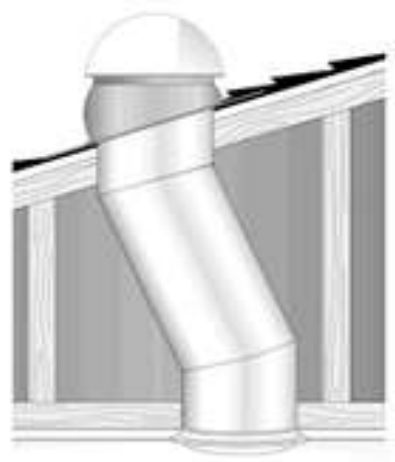
Clearstories ال -C



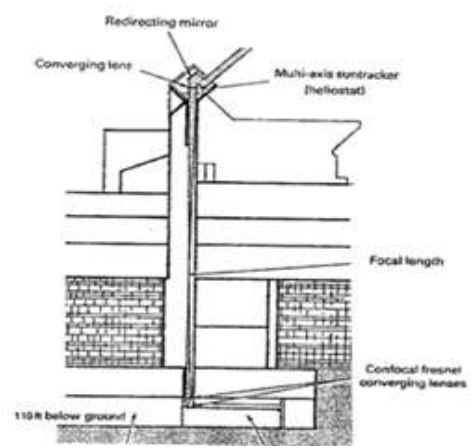
2- Passive Design

Natural Lighting

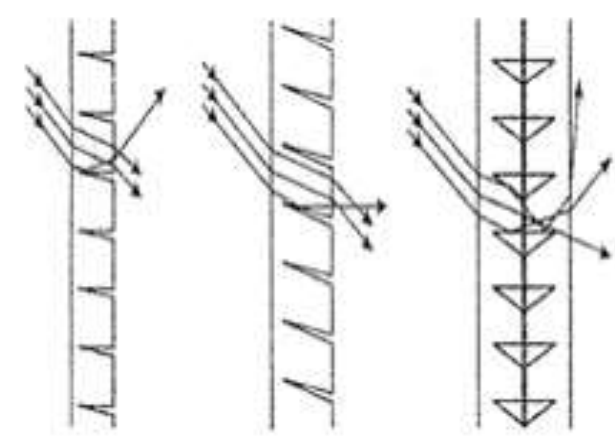
E-أنابيب الإضاءة Light Pipes



G-ال Heliostats



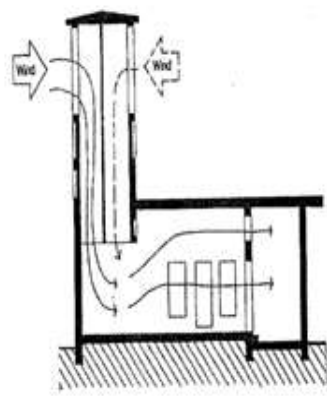
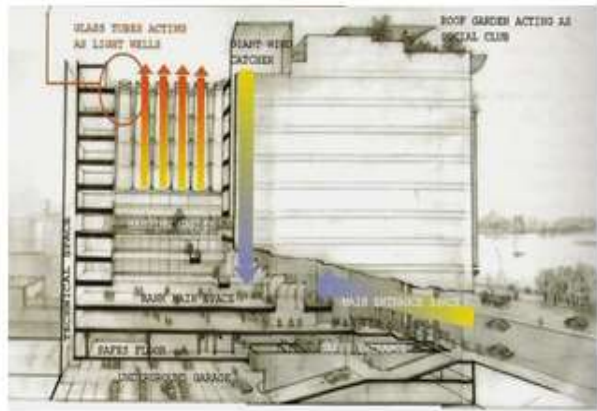
F-Prismatic System



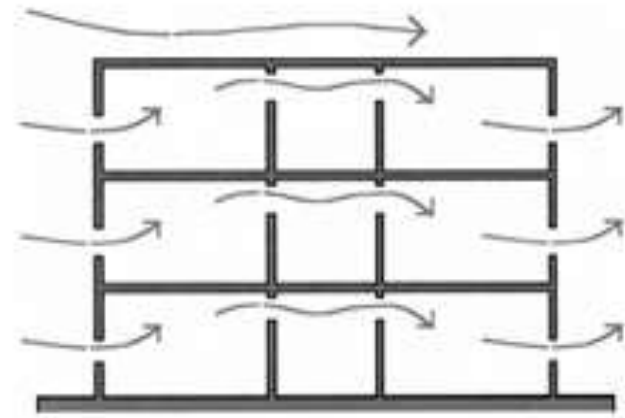
2- Passive Design

Natural Lighting

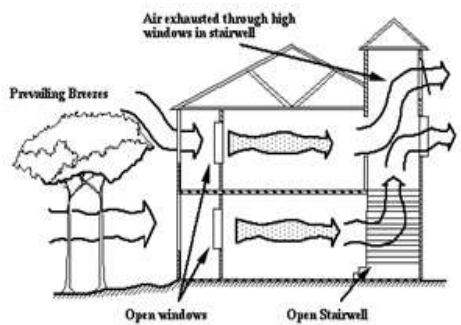
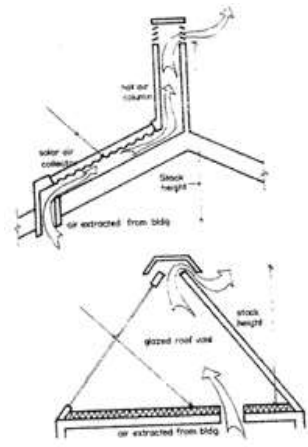
Wind Catchers (Towers) ملاقف الهواء -B



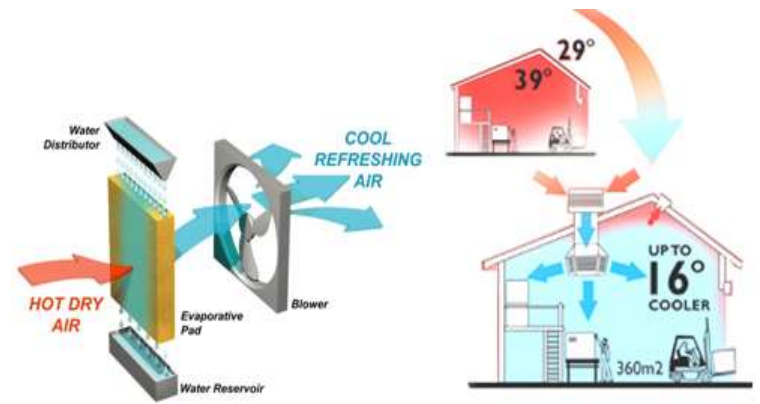
Windows الفتحات - A



Solar Chimney المدخنة الشمسية -D



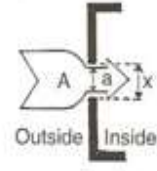
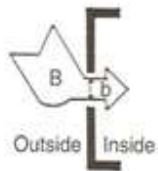
Evaporative Cooler -C



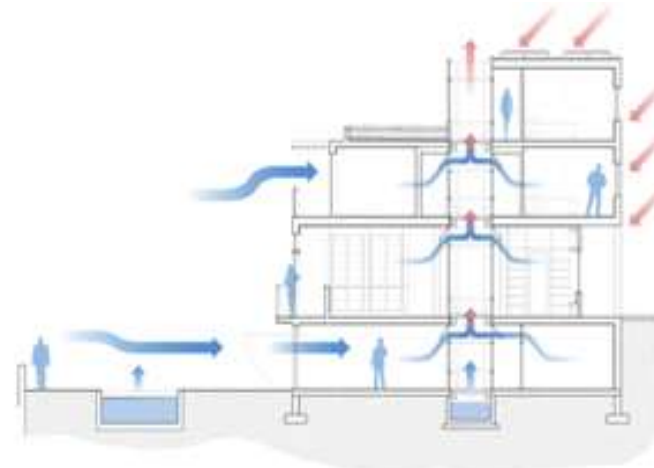
2- Passive Design

Natural Lighting

Wing Wall -F

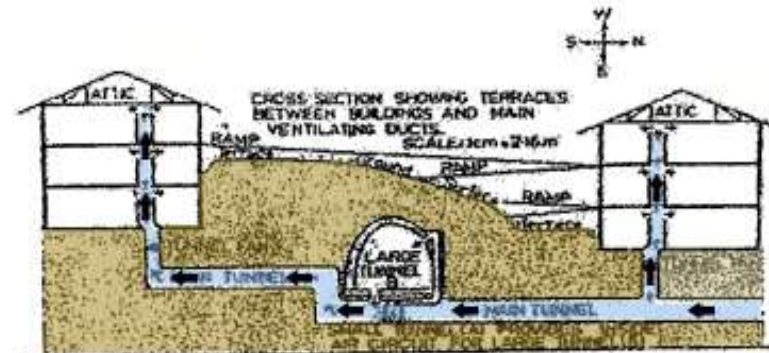


Atrium الفناء -E



Wind Tunnel نفق الهواء -G

	Typical air-cond. office (kwh/sq.m.)	Good practice open-plan office with nat. vent. (kwh/sq.m.)
Heating and hot water	222	95
Lighting	67	32
Fans and pumps	61	5
Refrigeration	33	0
Catering	7	4
Total	390	136



Material Efficiency



MATERIALS & RESOURCES

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

EMBODIED
ENERGY

LIFE CYCLE
ANALYSIS
(LCA)

ENVIRONMENTAL
IMPACT
ASSESSMENT
(EIA)

GREEN ARCHITECTURE

3- Materials (Local materials)



GREEN ARCHITECTURE

3- Materials (Recycled materials)



Water Efficiency



WATER EFFICIENCY

Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.

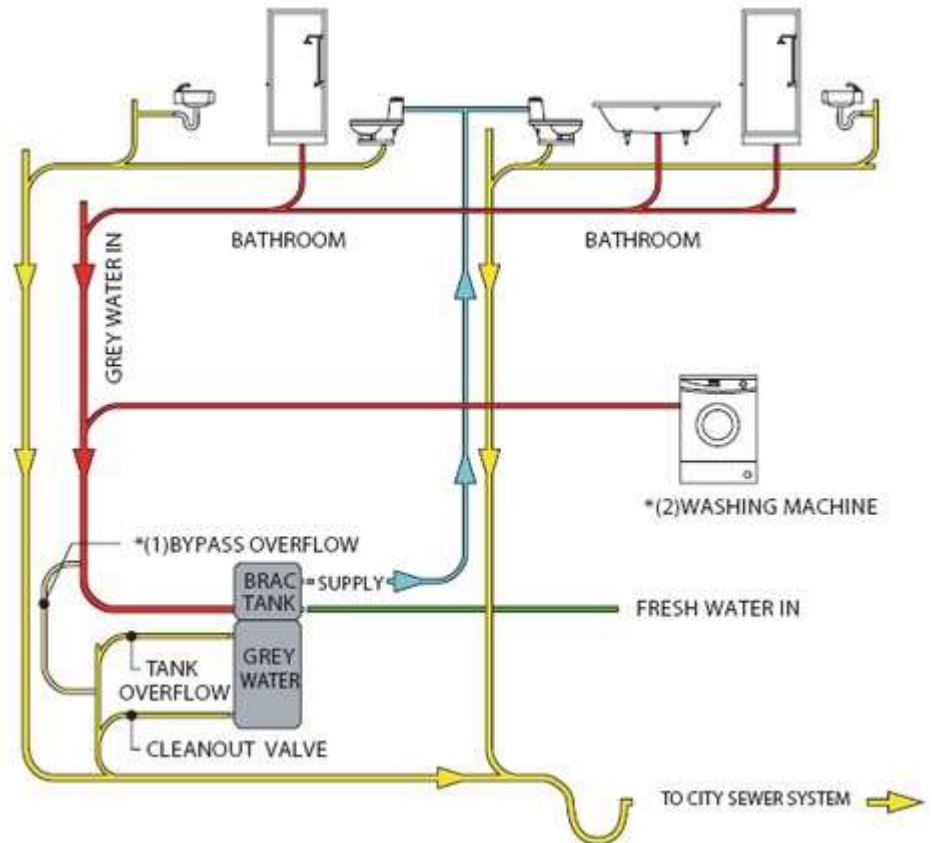
INDOOR
WATER USE

OUTDOOR
WATER USE

WATER
TREATMENT

GREEN ARCHITECTURE

Water (Recycling-gray water)



GREEN ARCHITECTURE

Water (Recycling-gray water)

