CBCS

2nd Brasilian Symposium
Sao Paulo

Brandon Haw

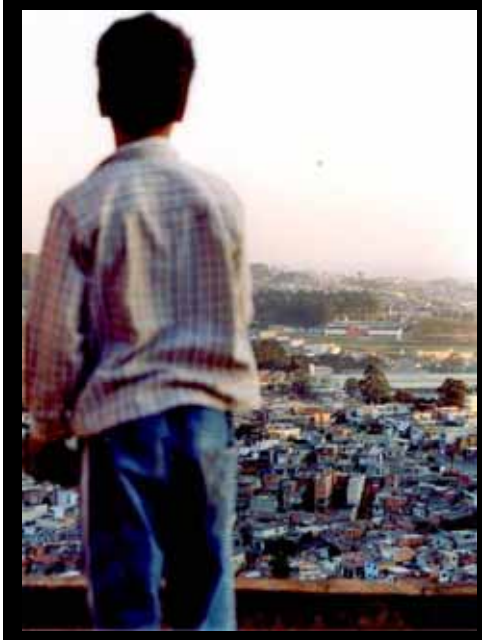
Foster + Partners

August 2009

Foster + Partners

Foster + Partners at a glance

BRASIL



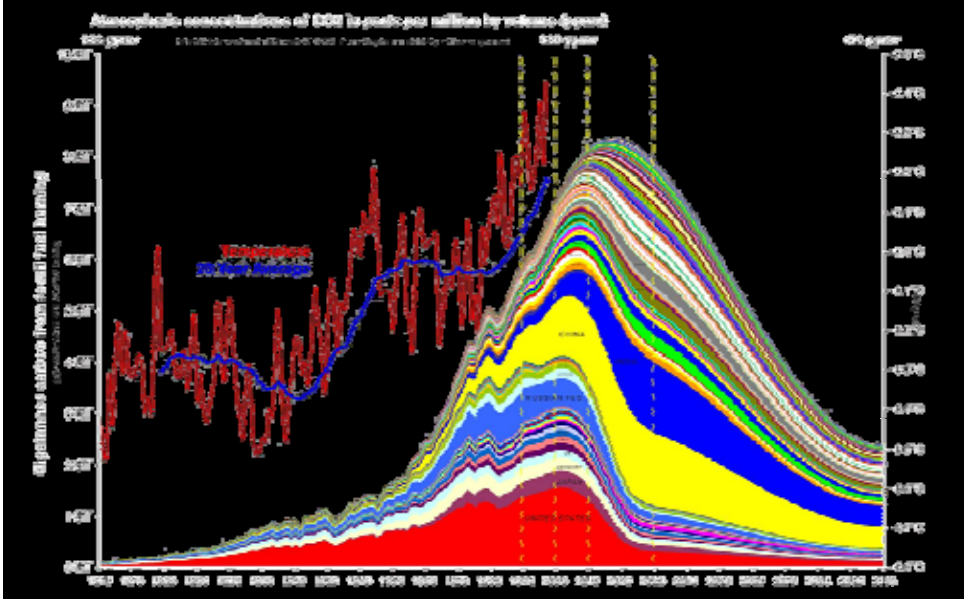
THE GOOD CITY

EQUALITY OF OPPORTUNITY
AMENITY + UTILITY
HEALTH, SAFETY AND EDUCATION
CIVIC JUSTICE
CULTURE
LIVE, WORK + PLAY
EFFICIENT TRANSIT SYSTEMS
ACCESS TO OPEN SPACE

CREATE A SUSTAINABLE REALITY AND QUALITY OF LIFE

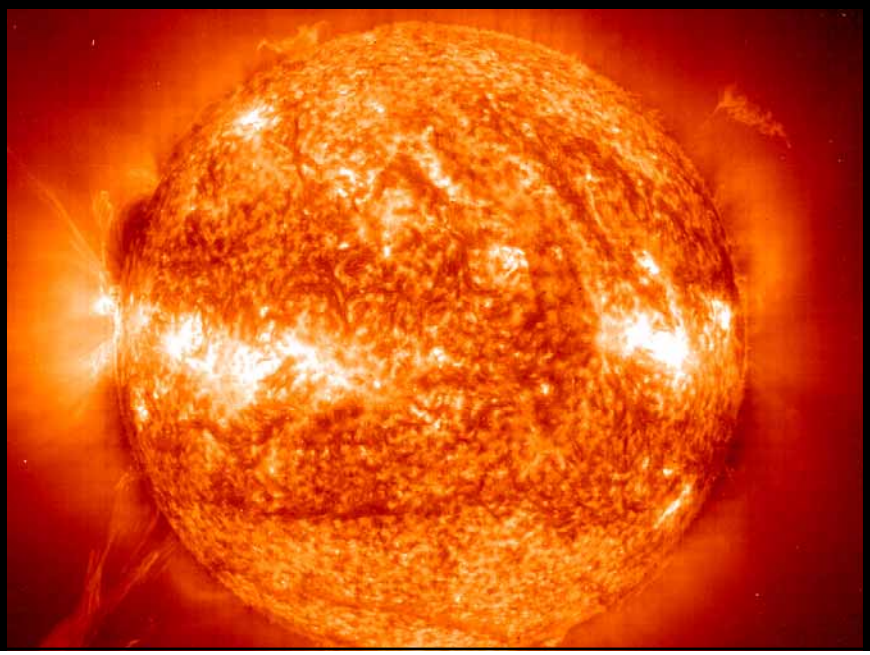
The future?

Contraction and Convergence



Source: Aubrey Meyer

2003:
The hottest European summer on record claims over 52,000 lives



2005: Over $200 billion in financial losses as a result of weather-related natural disasters

Environmental Timeline

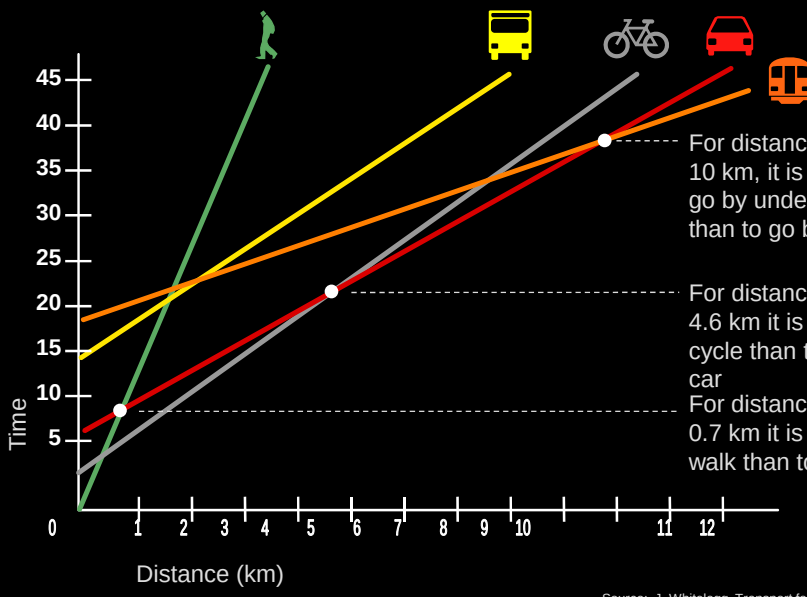
Buildings

Infrastructure and Transport

A well designed car needs less fuel

But you will still cause a traffic jam

Urban Distances



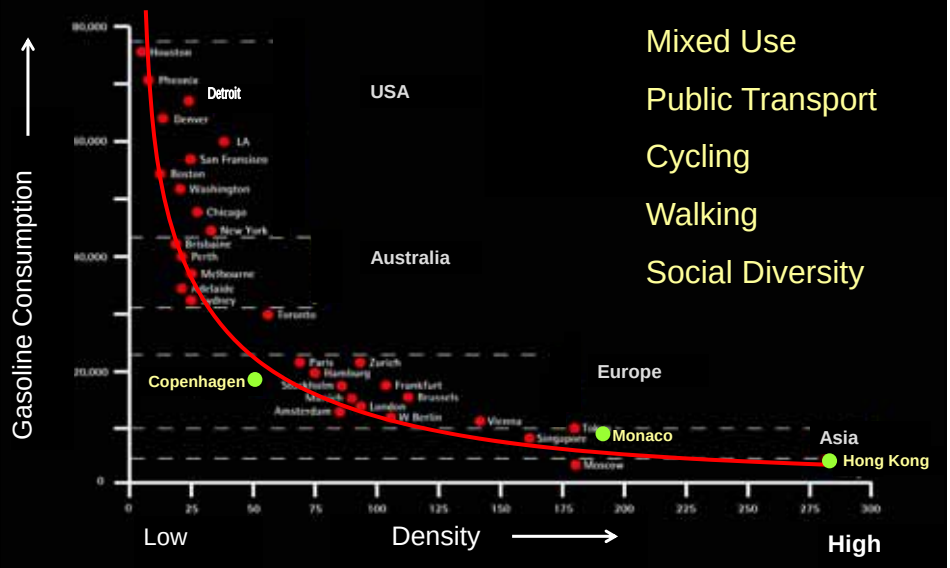
For distances up to 10 km, it is faster to go by underground than to go by car

For distances up to 4.6 km it is faster to cycle than to go by car

For distances up to 0.7 km it is faster to walk than to go by car

Source: J. Whitelegg, Transport for a Sustainable Future

Density versus gasoline use



Source: Newman and Kenworthy

Detroit	2,600 /sq km
Copenhagen	5,800 /sq km

Detroit uses 10x the energy of Copenhagen

Rogers + Partners

Traditional Cities

Istanbul

Florence

Cairo

Athens

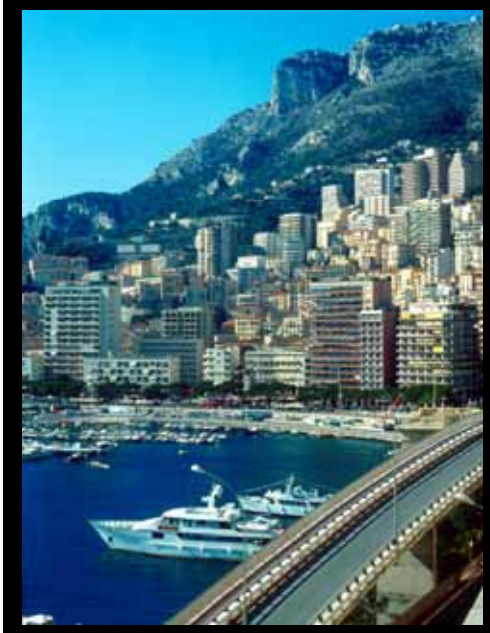
Car-dependent Cities

Los Angeles

Detroit

Houston

Dubai



Hong Kong	17,536 /sq km
Monaco	16,486 /sq km

Notting Hill is currently 200 dwellings per hectare /13,700 persons per sq km

Typical modern development 20-30 dwellings per hectare /4,800 persons per sq km

PRIVATE SECTOR	PUBLIC REALM
PROFITS	TAX INCENTIVES
INVESTOR STAKEHOLDERS	GREEN INCENTIVES
COMMERCIAL SUCCESS	CIVIC SUCCESS AND SOCIAL JUSTICE
FREE ENTERPRISE	GOVERNANCE

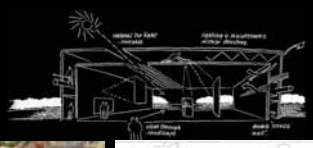
WHAT MAKES A FANTASTIC CITY?

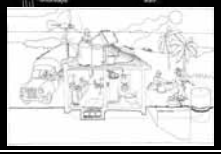
Economically Sustainable

Socially Sustainable

Environmentally Sustainable

40 years of Sustainability

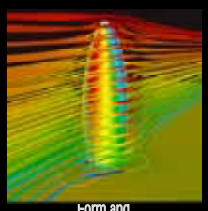




‘67 ‘77 ‘87 ‘97 ‘07

Seven Areas of Sustainable Design

Site and Climatic Response



Form and Massing

External Envelope

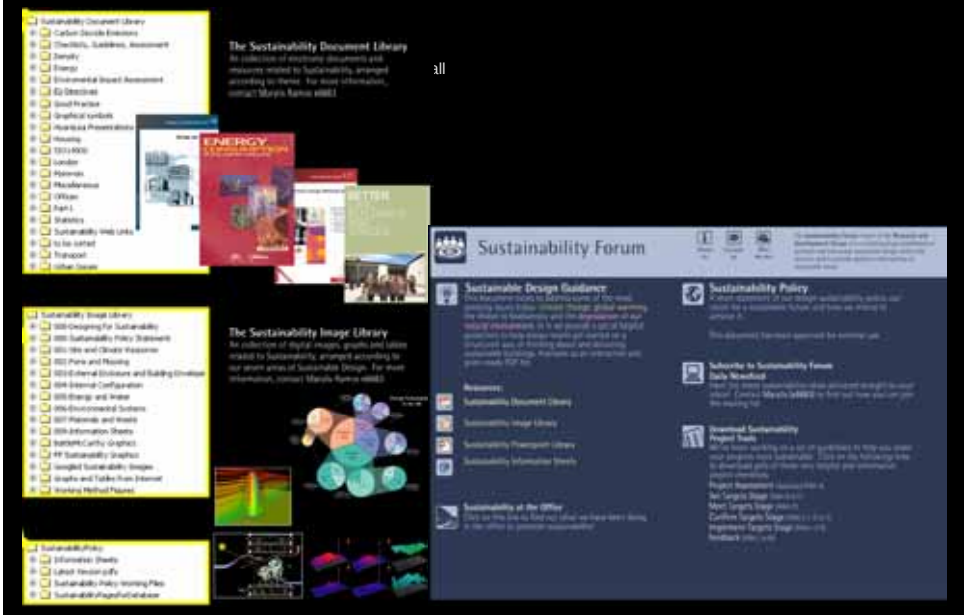
Internal Environment

Environmental Systems

Energy and Water

Materials

The Sustainability Forum



Foster and Partners
Project Sustainability Database
Architect's Sheet

AR

SITE and CLIMATE

Sustainability statement on site selection, transport, density and environmental impact to be included in report

Site Selection/ Development Type

Y / N Have the implications on sustainability of the decision regarding site selection been considered and provided for in the design?

Site Characteristics

Y / N Have the characteristics of the site been considered in terms of sustainability?

Detailed 3D Site Model (physical or digital) showing surrounding buildings and topography

Y / N Has the site's social, economic, and cultural profile been respected or enhanced?

Y / N Have the site's outstanding physical assets and features been maintained and enhanced?

Foster and Partners
Project Sustainability Database
M+E Consultants' Sheet

ME

SITE and CLIMATE

Calculation Parameters, Assumptions, Notes, and Recommended Output:

Transport & Communications

Y / N What is the design stage transport energy consumption of your project?

Transport Energy Consumption: kgCO2/m²/year

Notes:

EXTERNAL ENCLOSURE

Envelope Performance

Y / N What are the specified values for glazing and envelope performance?

Table of Glazing Ratios and U-Values per orientation

	N	NE	E	SE	S	SW	W	NW
Glazing Ratio								
g-Value								
U-Value								

ENVIRONMENTAL SYSTEMS

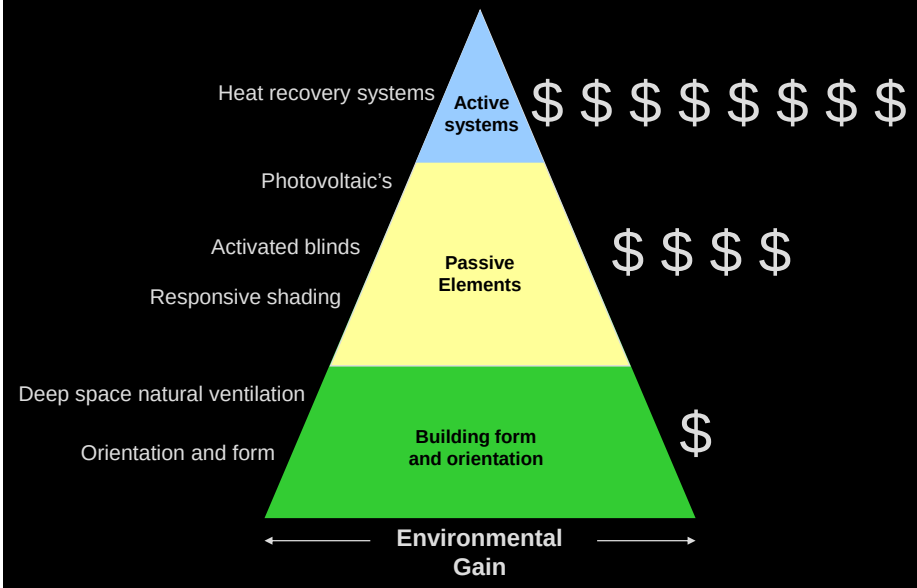
Heating and Cooling

Y / N Are the target temperatures the most appropriate and sustainable?

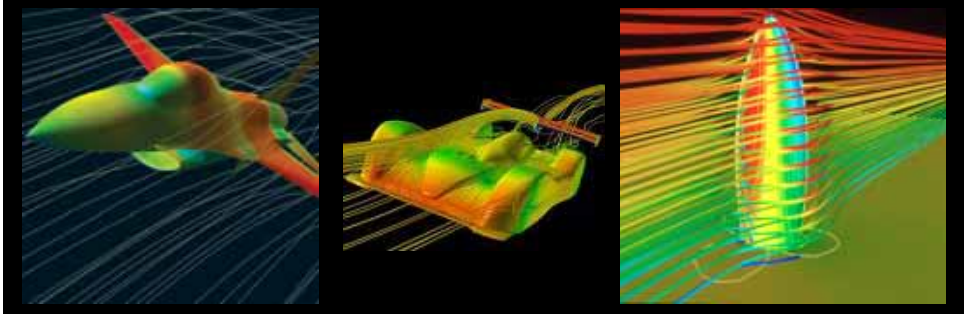
Thermal Simulation

	Min	Max
Summer Temperature	°C	°C
Winter Temperature	°C	°C
% Occupied Hours exceeding 25°C		%
% Occupied Hours exceeding 28°C		%

Design for Sustainability



Form saves energy



SUSTAINABILITY

Cultural Buildings

Commercial Sector Buildings

Housing

Infrastructure and Transport

Educational and institutional Buildings

Urban Regeneration and Cities

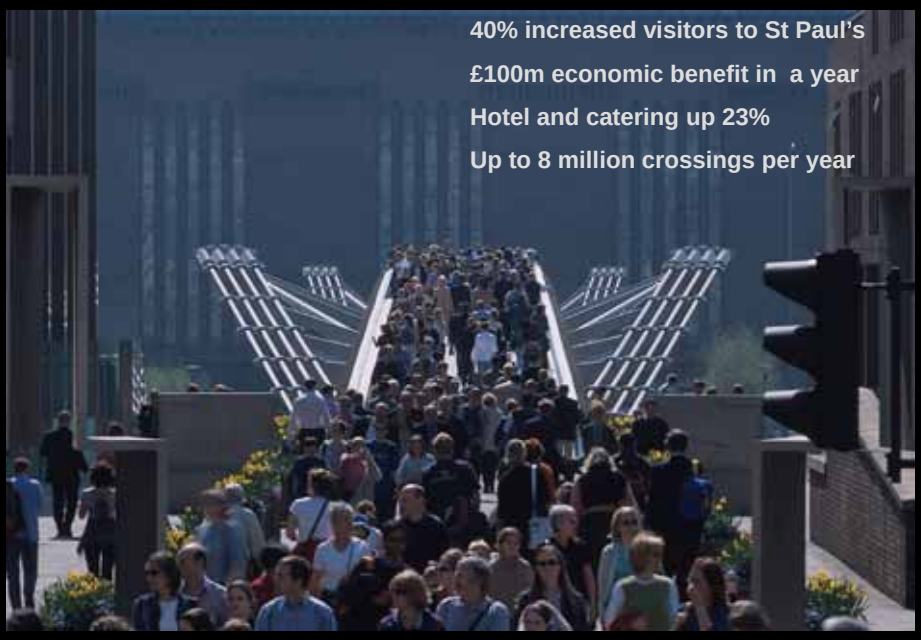
Foster + Partners

INTEGRATED INFRASTRUCTURE

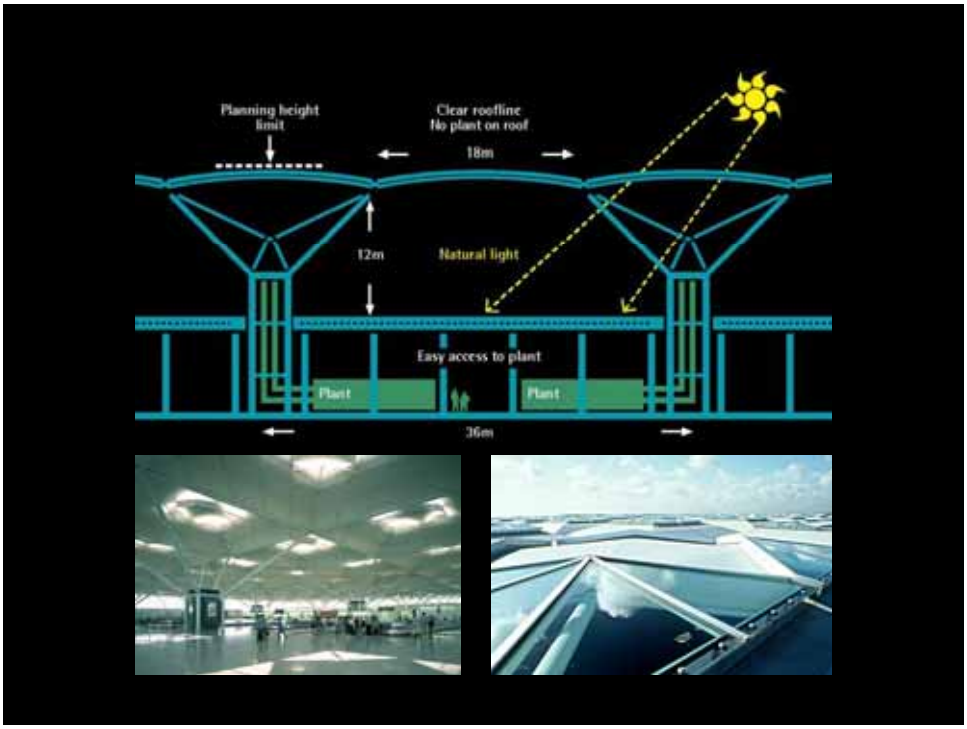
Infrastructure

Millennium Bridge London, UK, 1996 - 2000

Benefits both communities

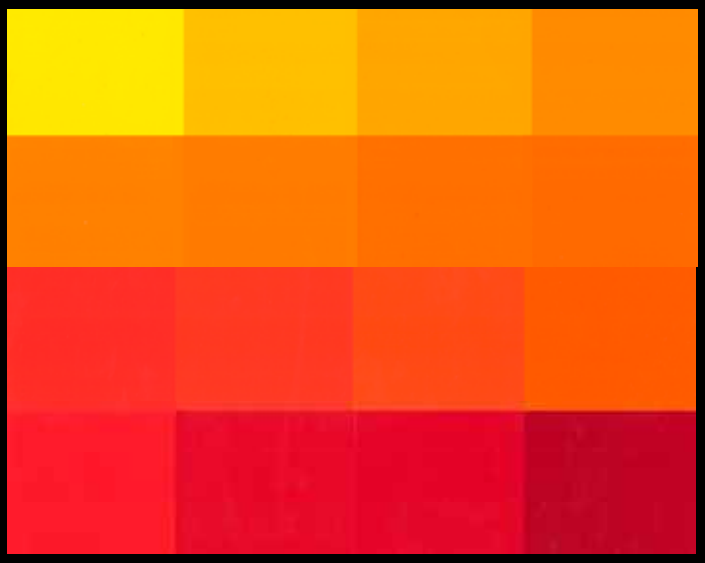


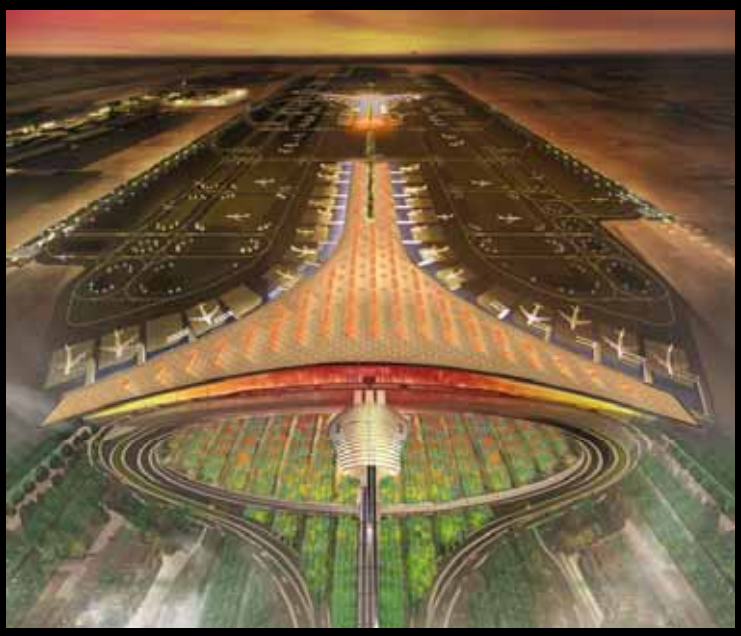
Stansted Airport


Planning height limit
Clear roofline No plant on roof
18m
12m
Natural light
Easy access to plant
Plant
Plant
36m

Scales on the dragon

Richness in traditional Chinese Architecture





Design and construction timeline

December opened new office - 11 in Beijing 38 in London

10 January tender info to preferred contractors

28 March ground breaking

March 2005 sub structure complete

September 2007 Terminal commissioned

2003 2004 2005 2006 2007 2008

November won competition

12 December scheme design to client

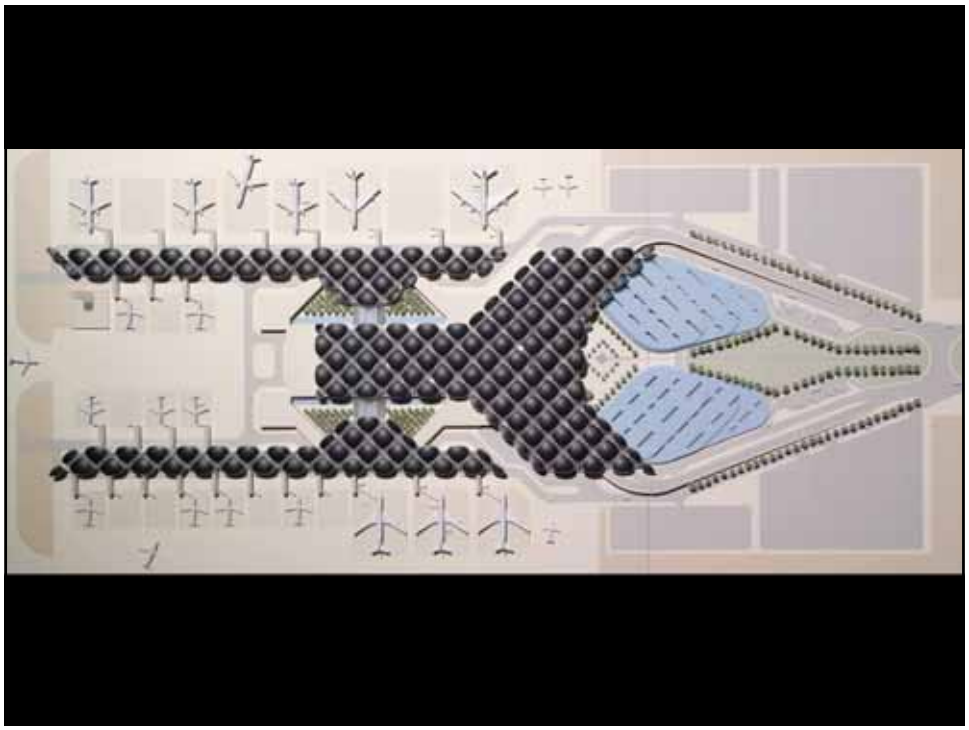
15 March preliminary design

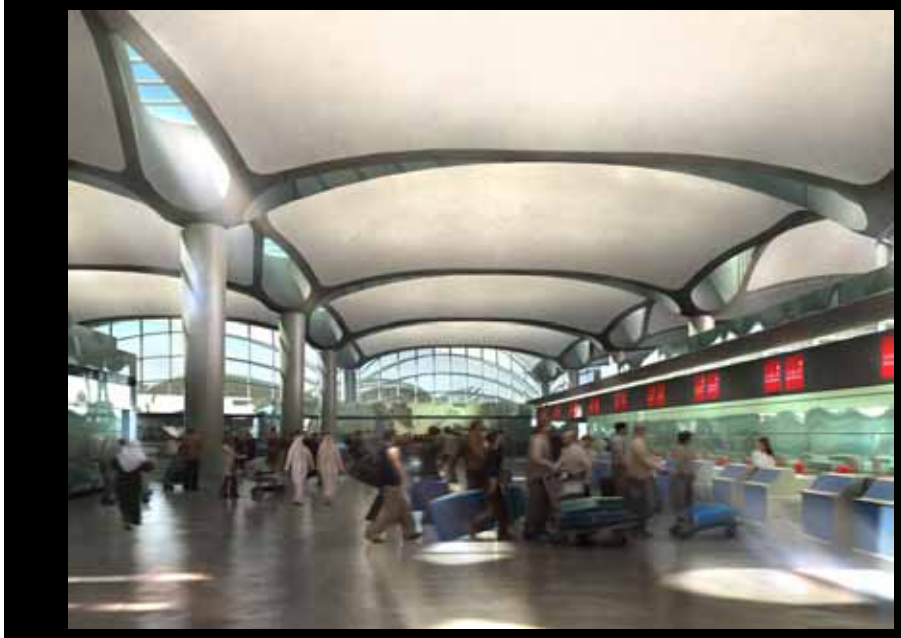
6 April start on site

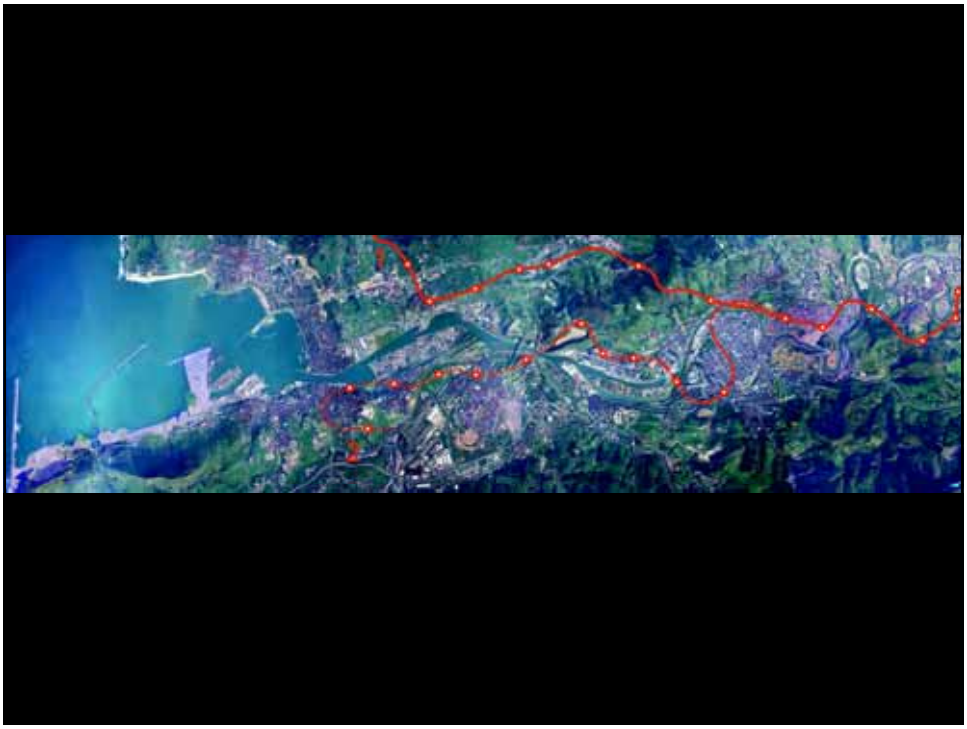
October 2006 Roof complete

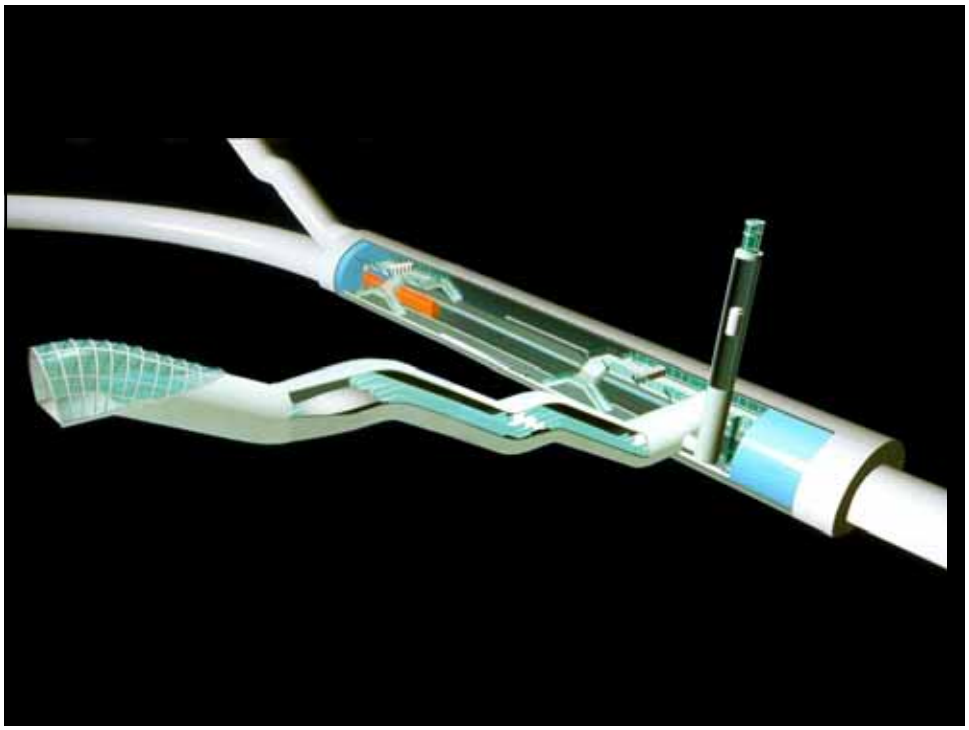
Feb 29 opened – no ceremony

Queen Alia International Airport, Jordan



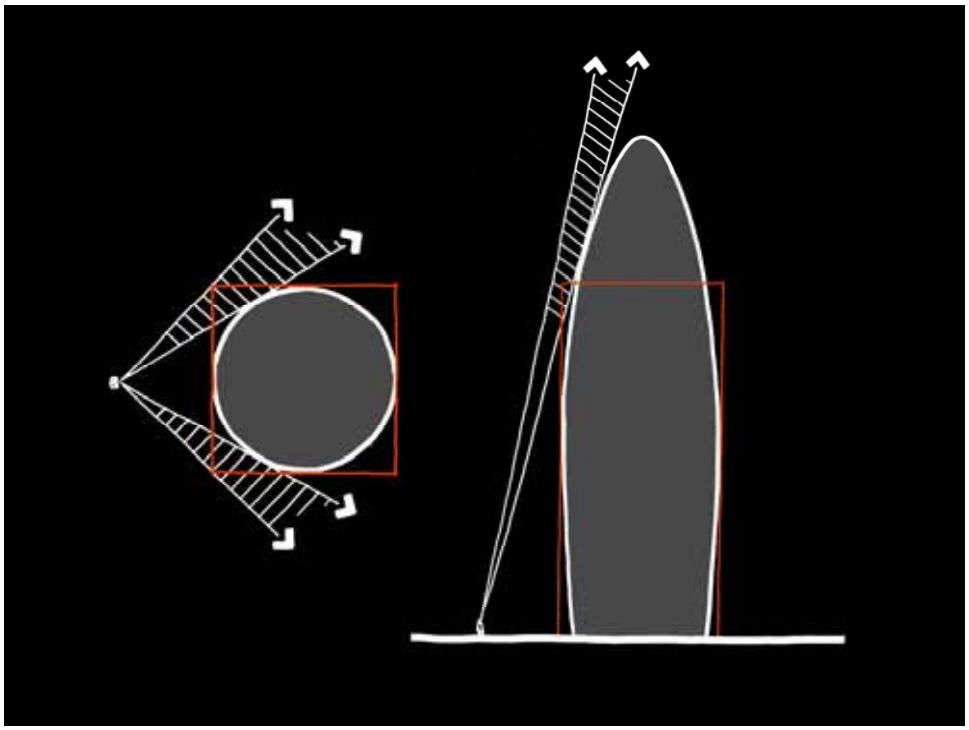


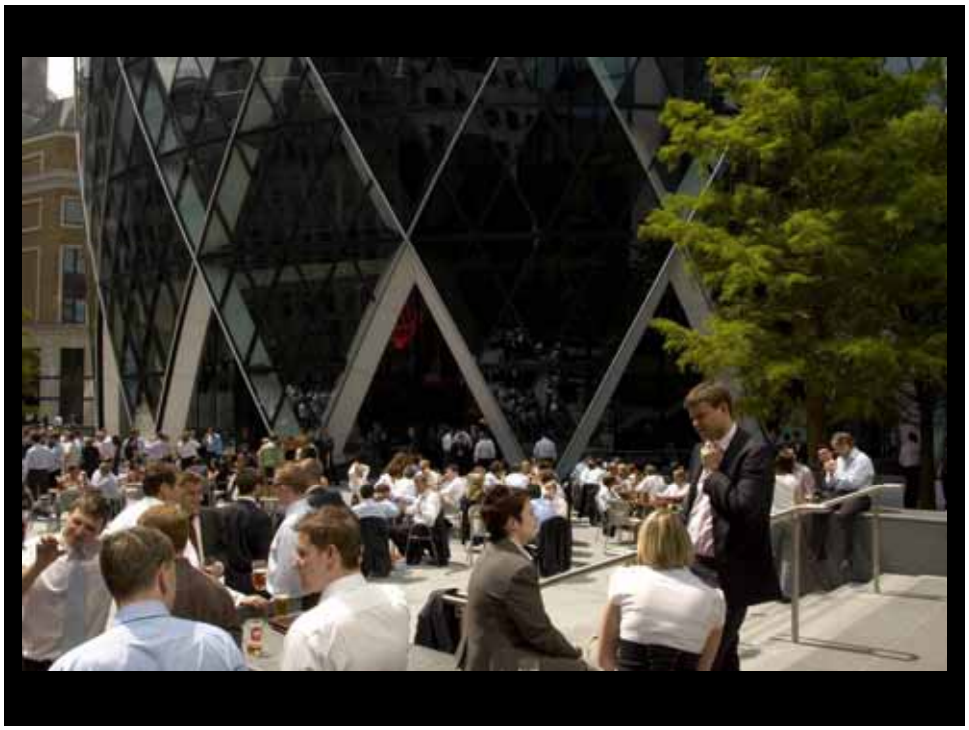


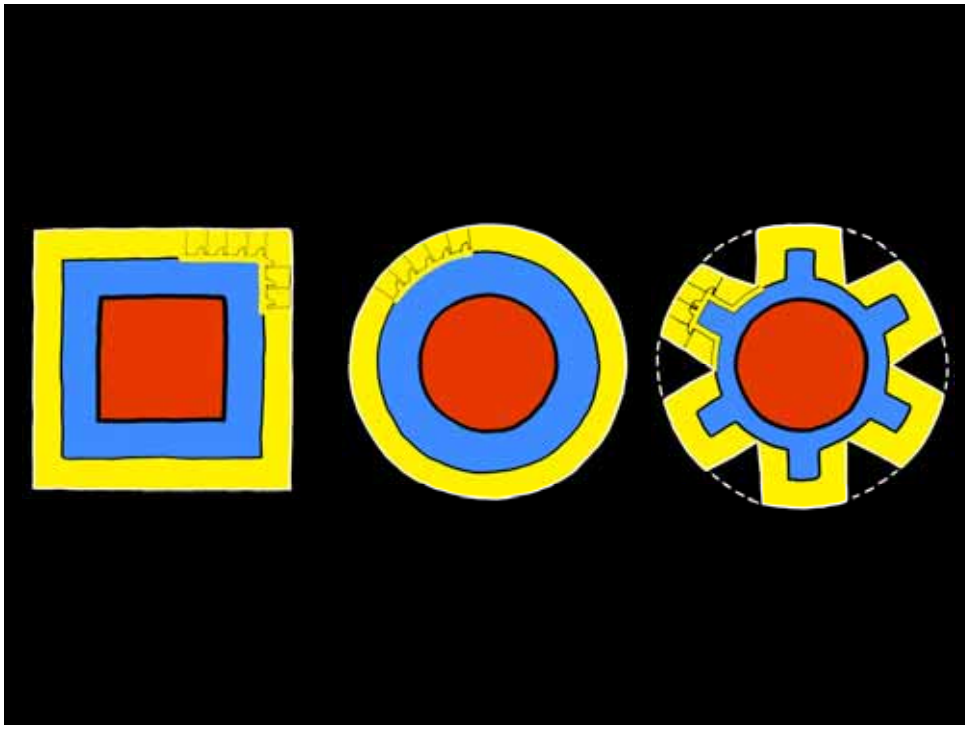


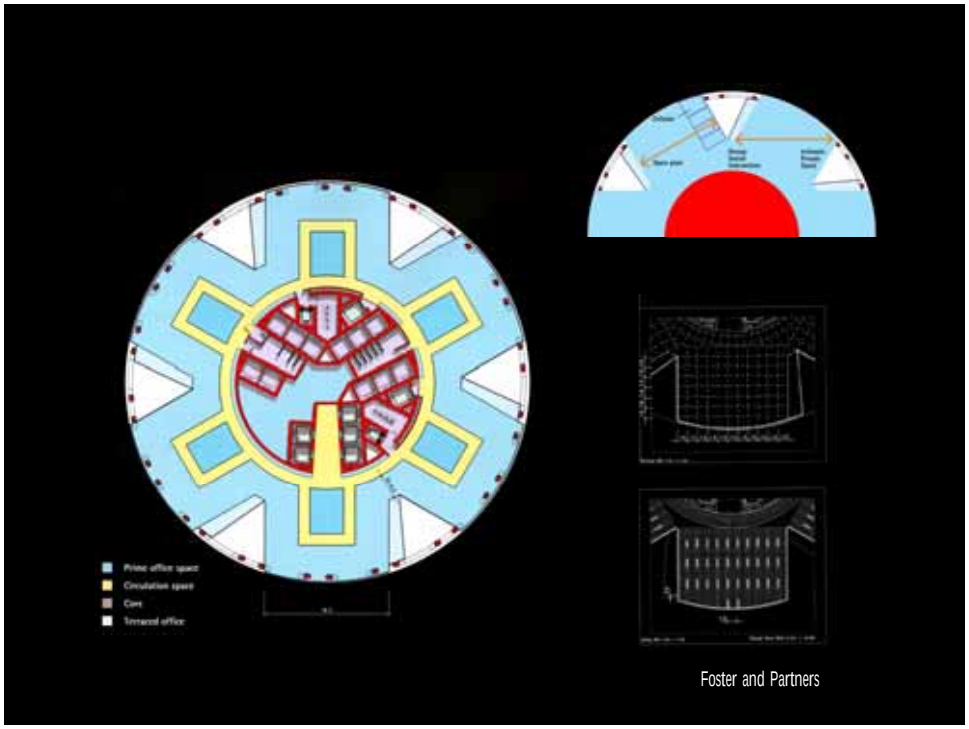
WHERE YOU
WORK AND LIVE

Offices

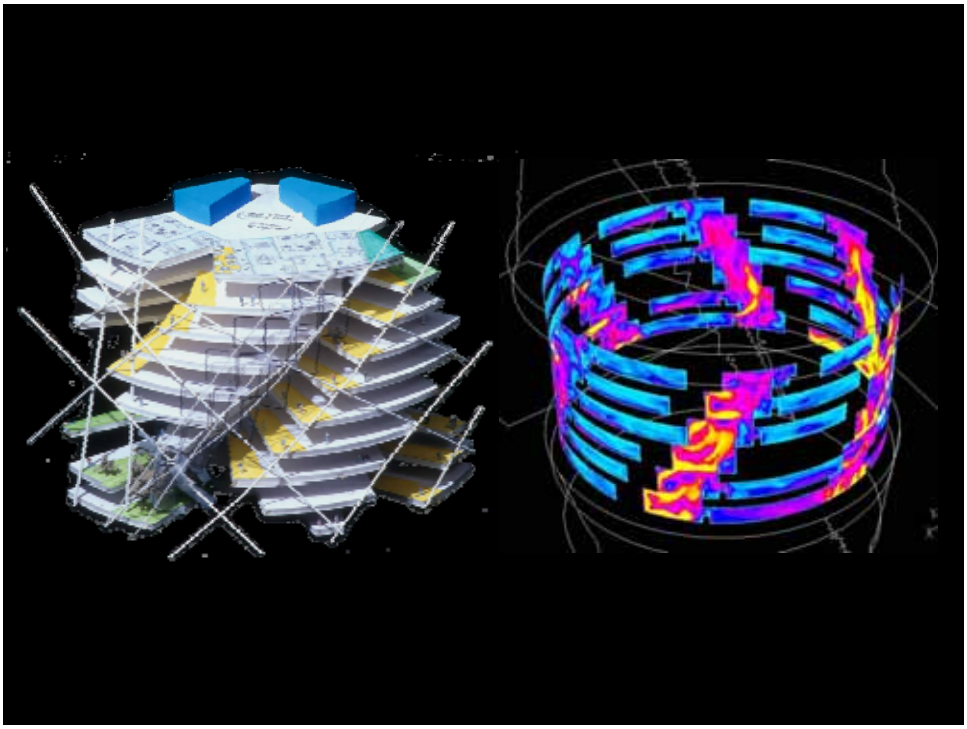


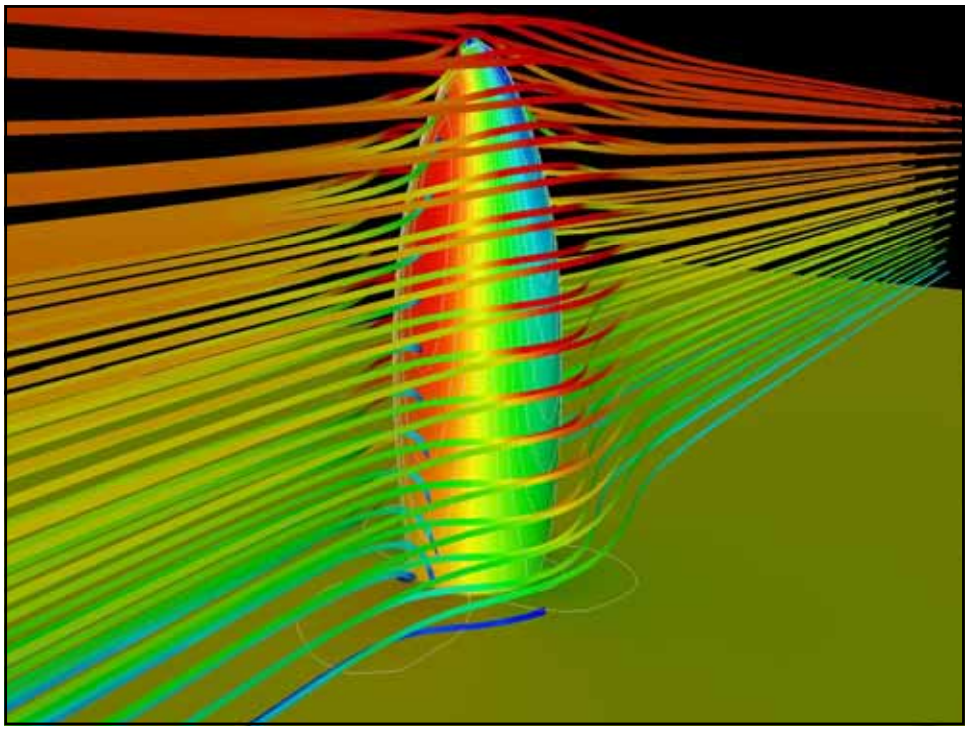


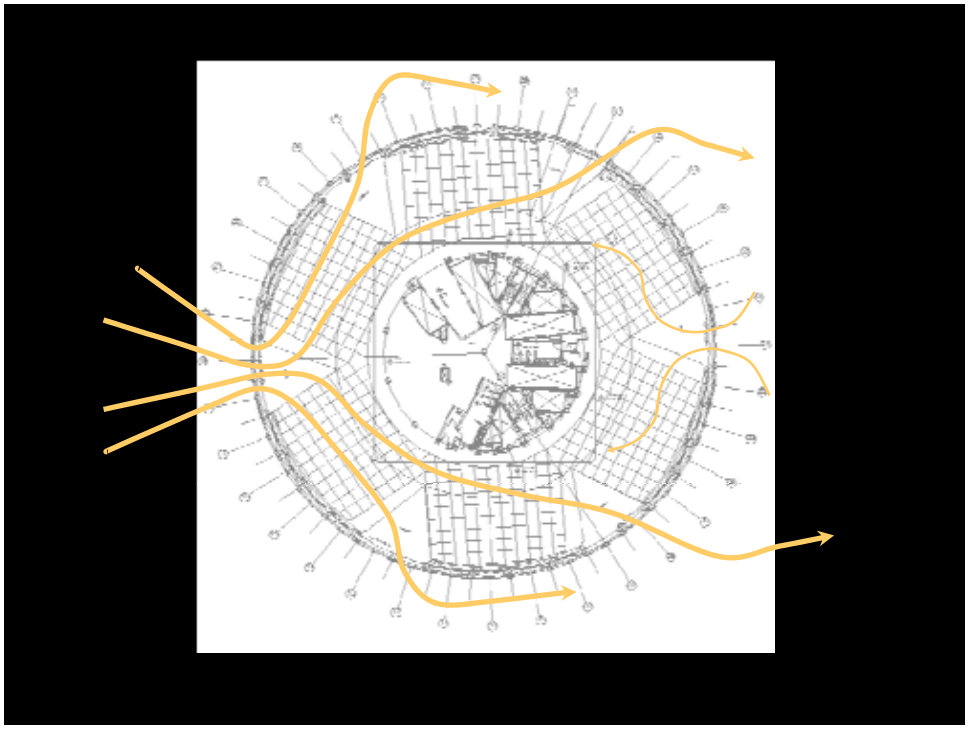


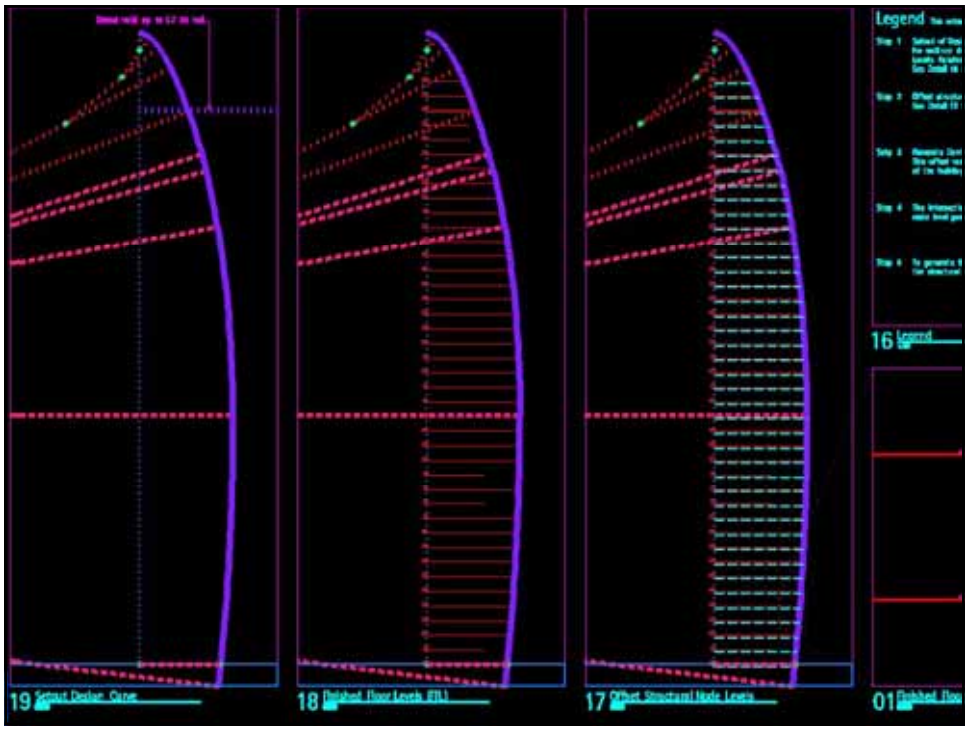

Prime office space
Circulation space
Core
Terraced office
Foster and Partners

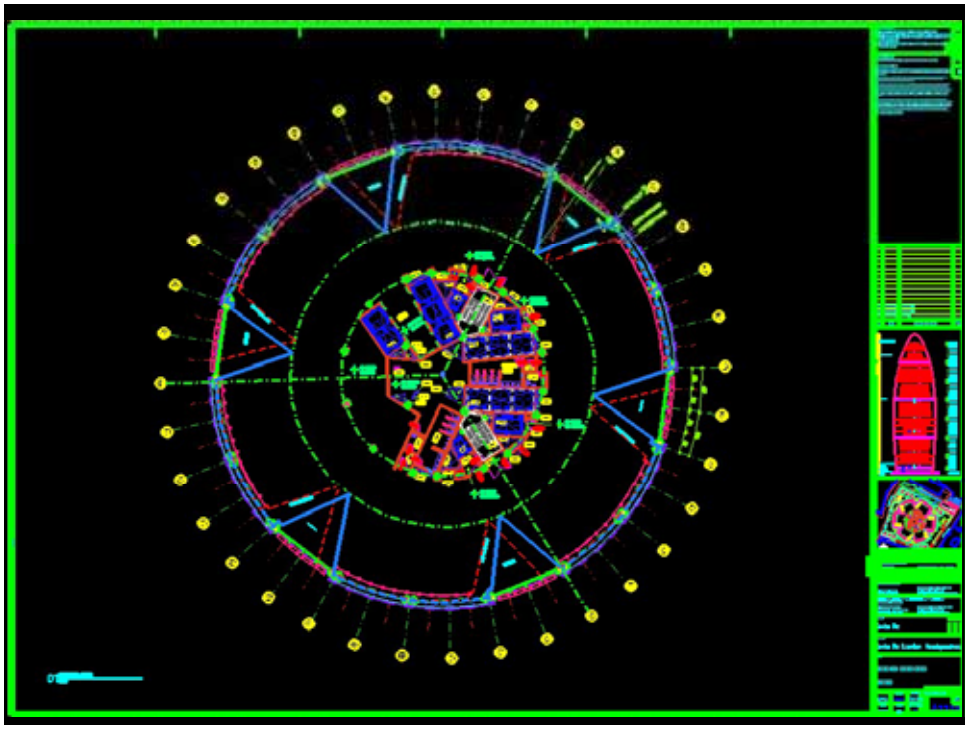
Massing Study

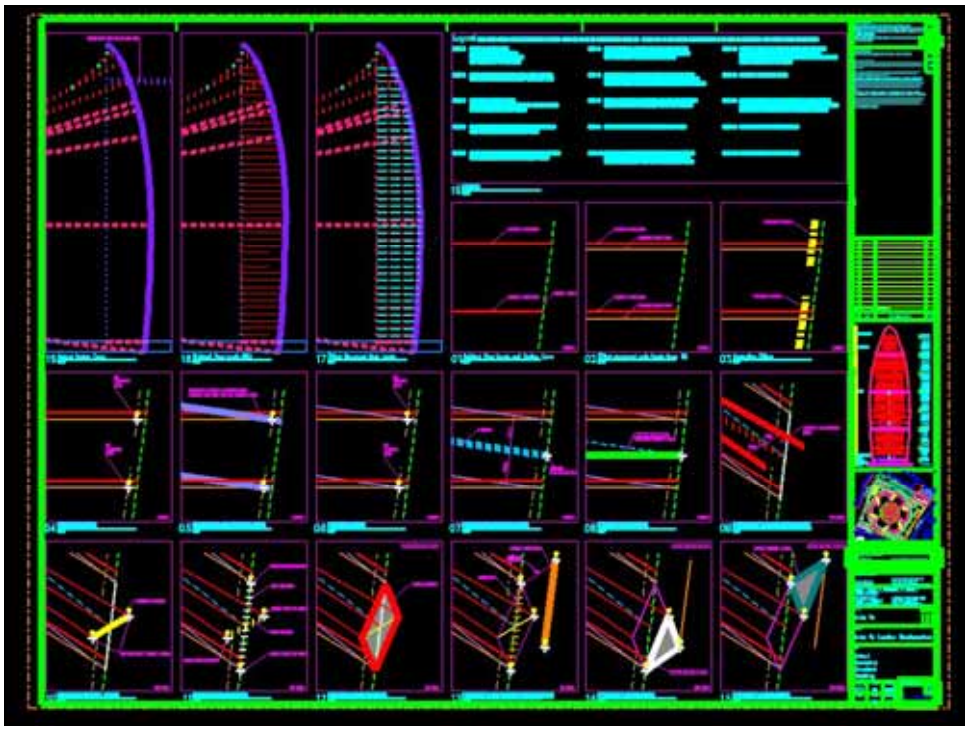


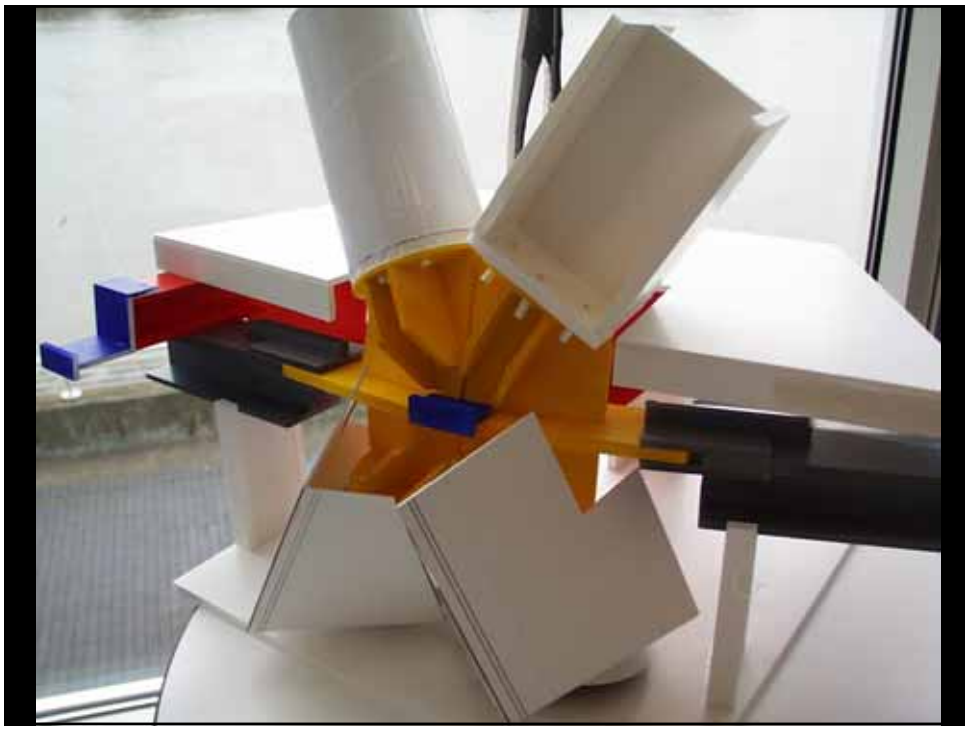


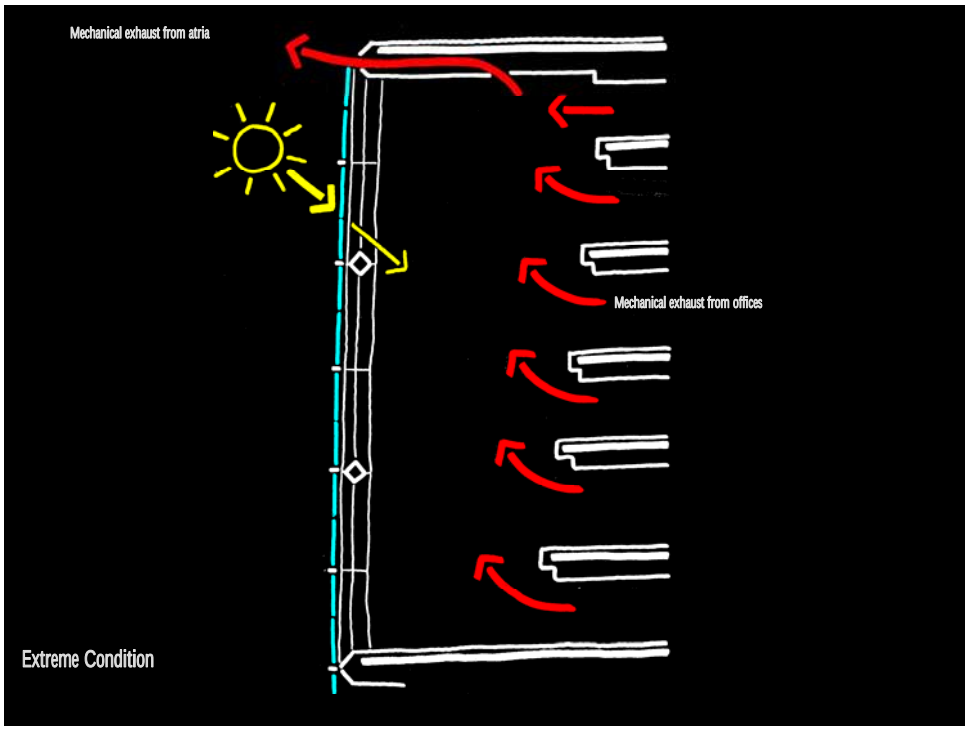


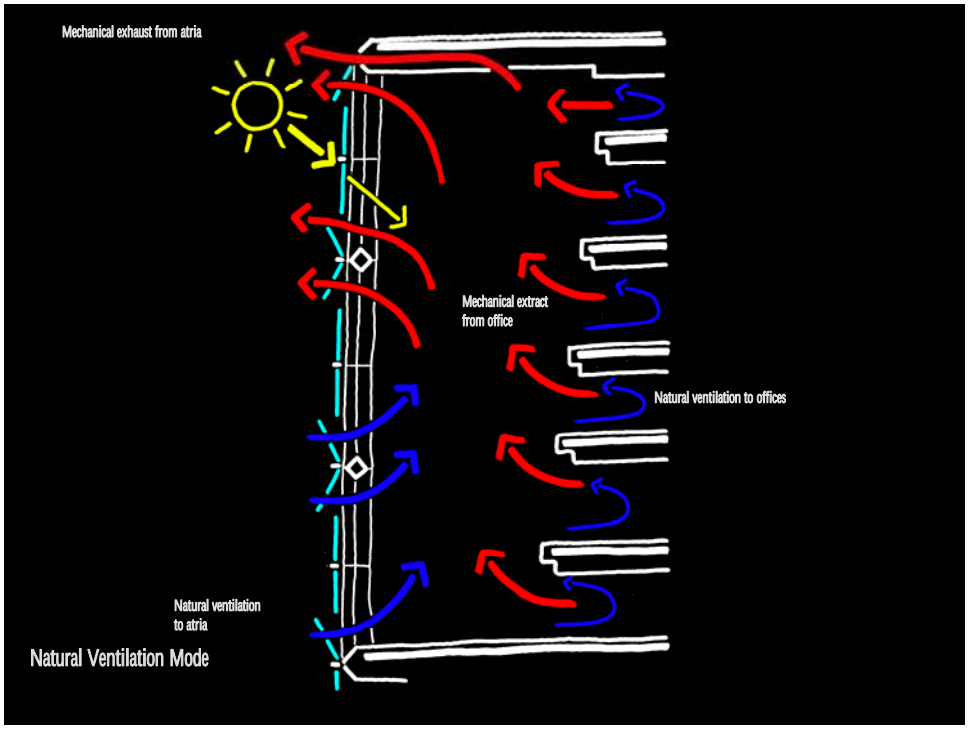

Legend
16 Legend
19
18
17
01

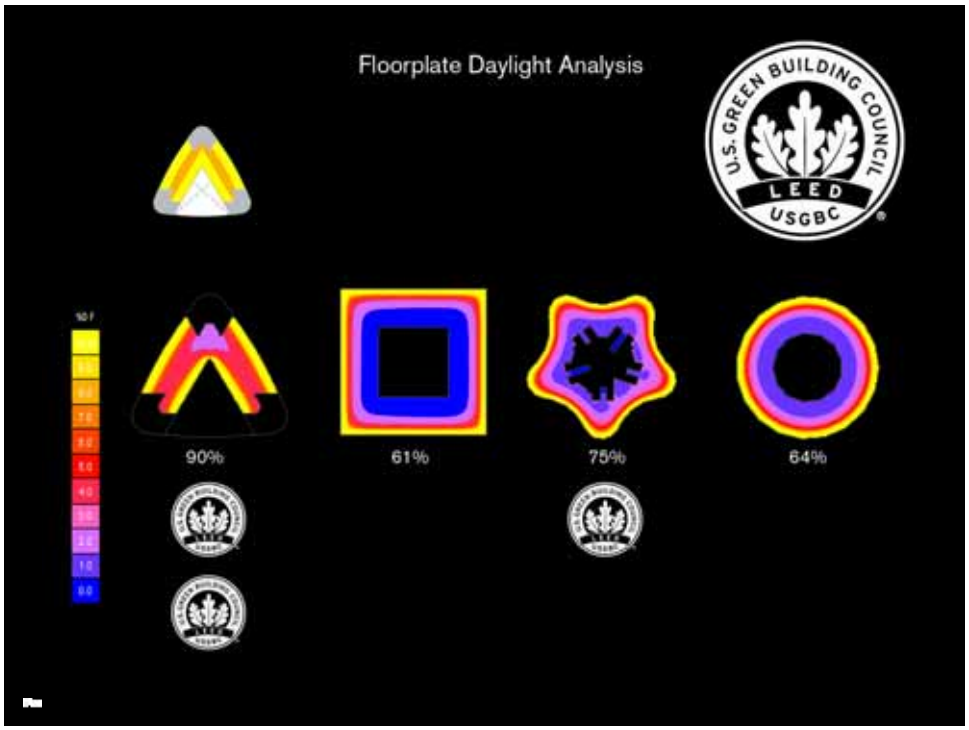


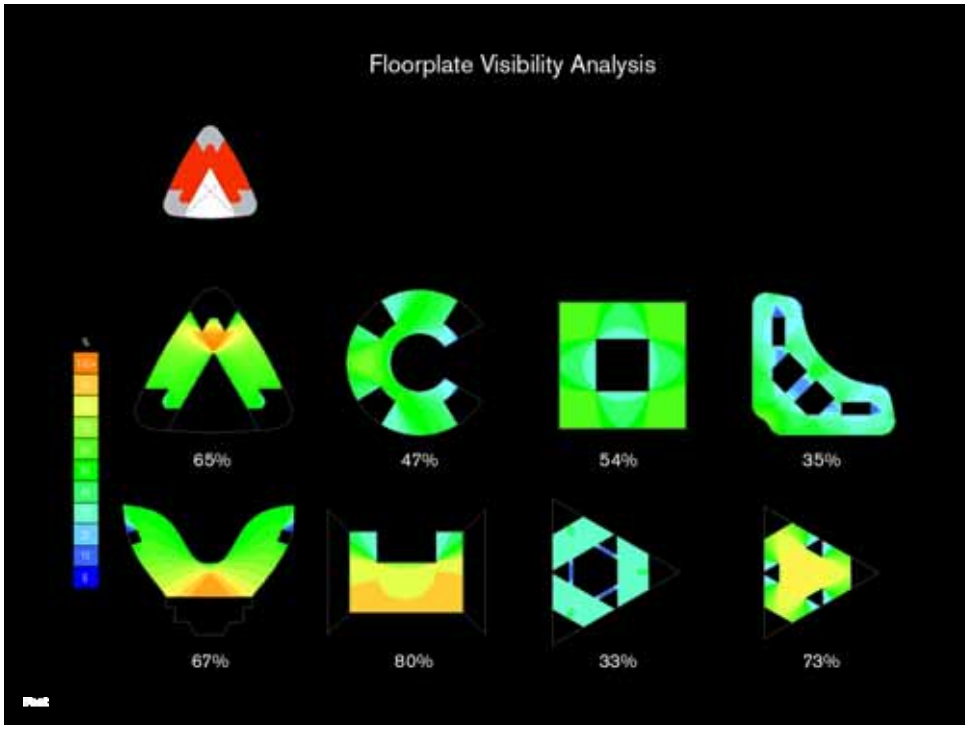





Mechanical exhaust from atria
Mechanical exhaust from offices
Extreme Condition


Mechanical exhaust from atria
Mechanical extract
from office
Natural ventilation to offices
Natural ventilation
to atria
Natural Ventilation Mode


Floorplate Daylight Analysis
U.S. GREEN BUILDING COUNCIL
LEED
USGBC
90%
61%
75%
64%

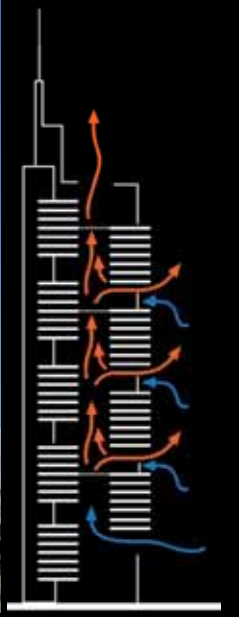

Floorplate Visibility Analysis
65%
47%
54%
35%
67%
80%
33%
73%

Natural Ventilation

Pollution levels inside buildings are **2 – 5** times higher than outside.

$15 Billion in direct medical costs per annum in US due to poor indoor air quality.

60 Million lost working days per annum in US due to poor indoor air quality.

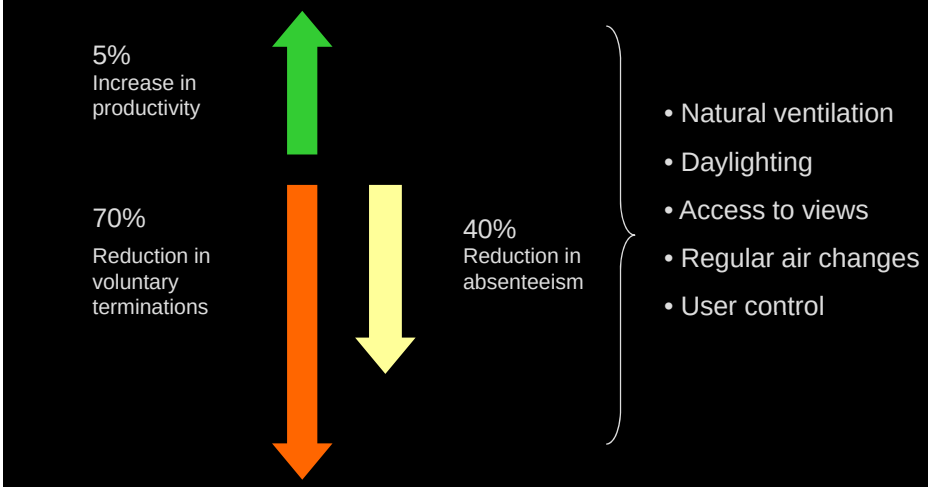


Daylight

Worker productivity can be increased by up to 15% by implementing smart day lighting.

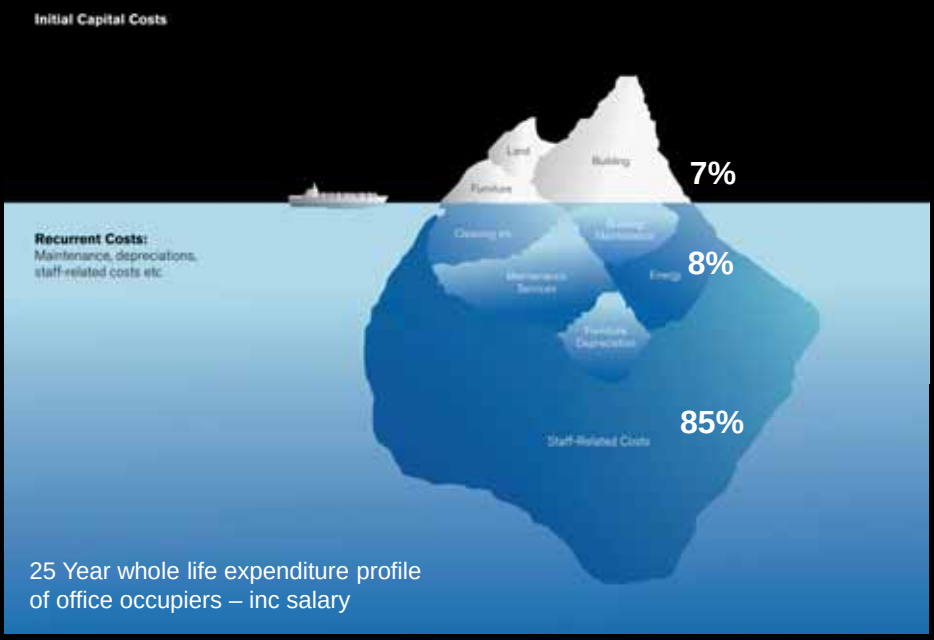
- The U.S Green Building Council's Sustainable Building Technical Manual

Benefits of a healthy indoor environment



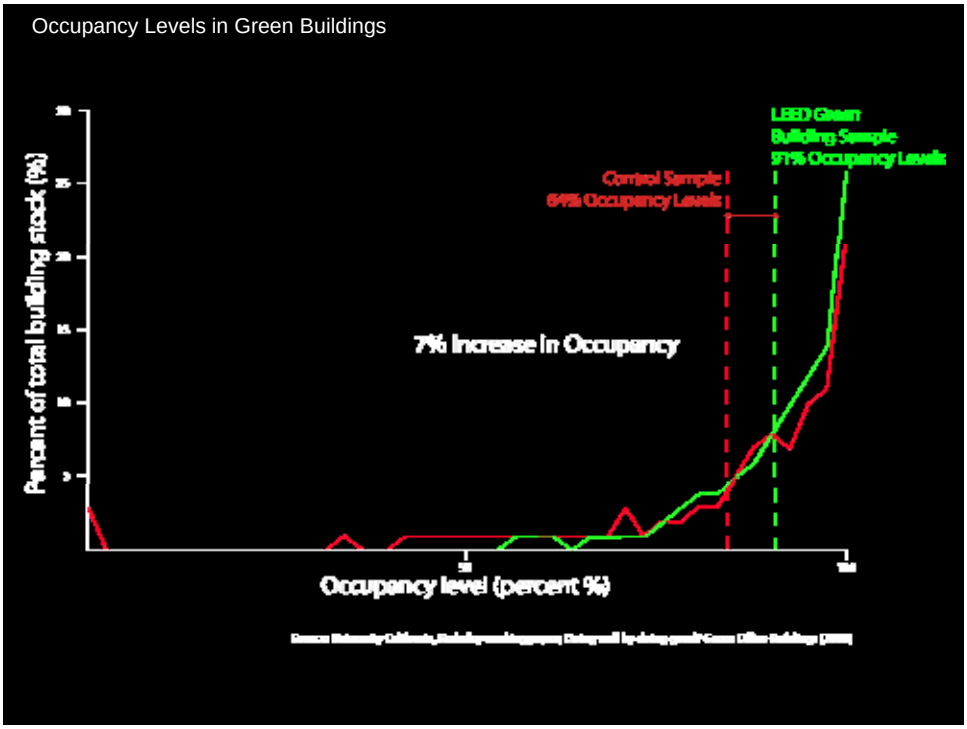
Source: Based on studies in the US from 1998 and 2003

Capital cost – cost in use

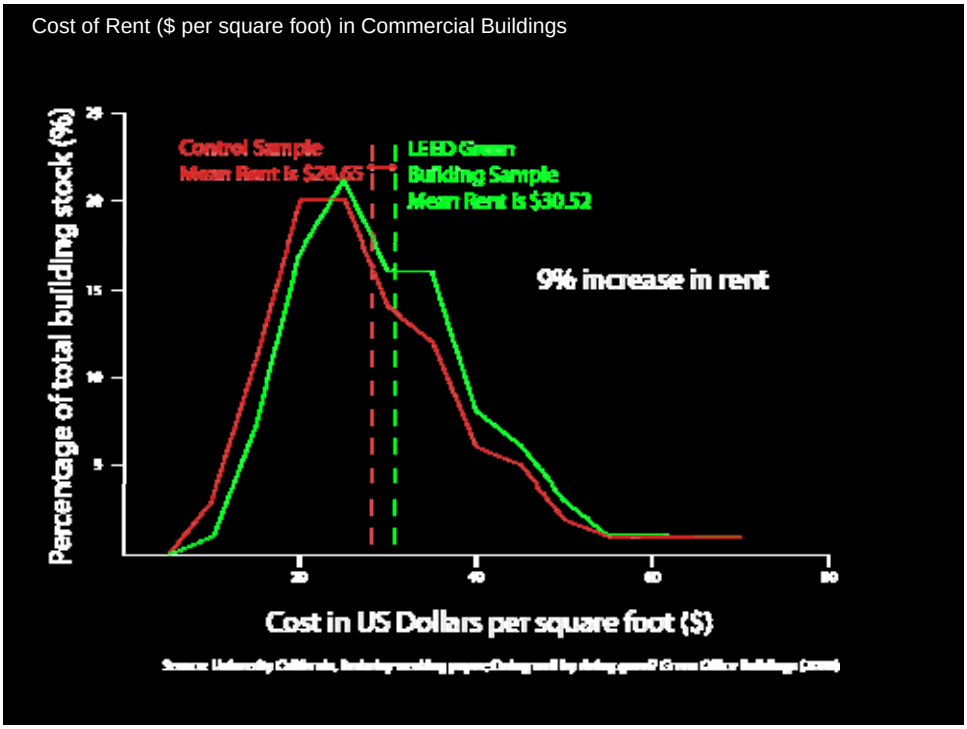


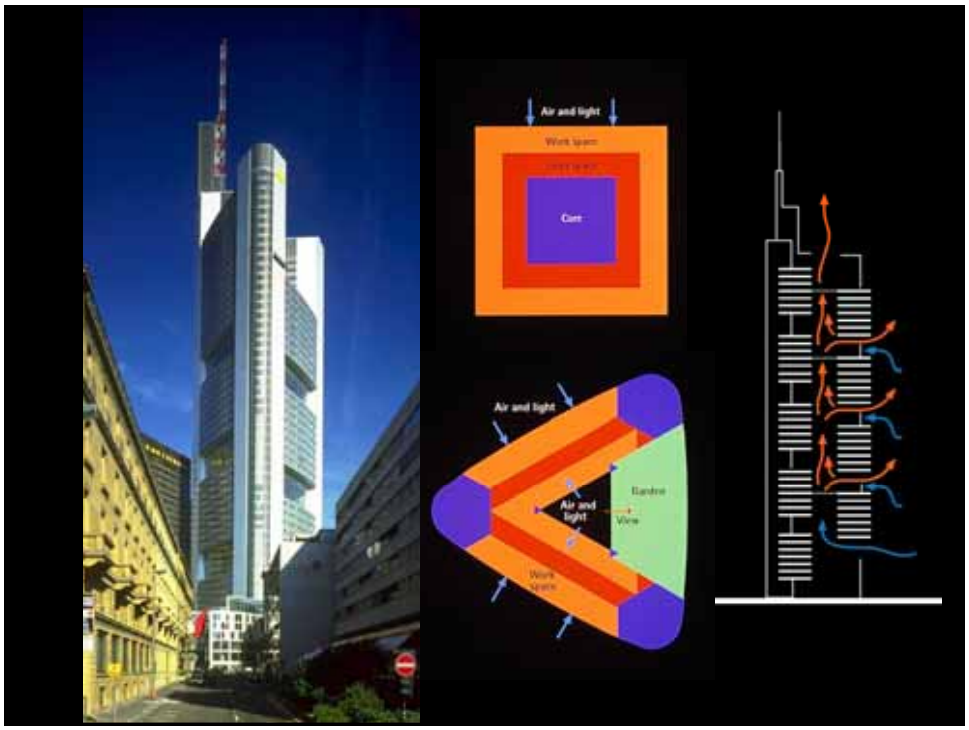
25 Year whole life expenditure profile of office occupiers – inc salary

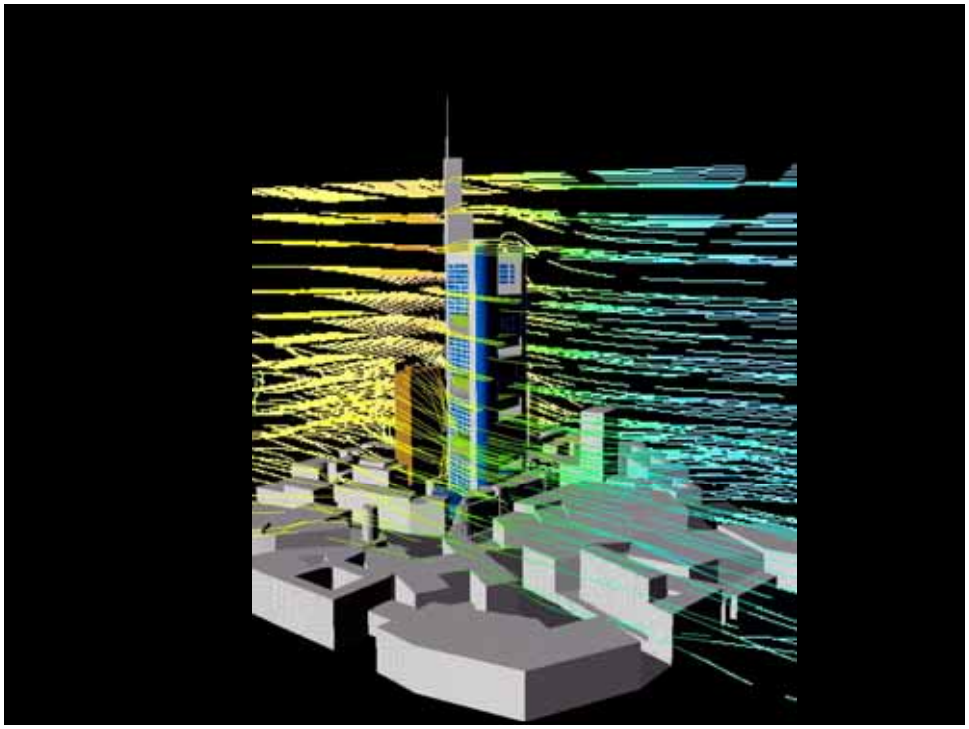
Occupancy Levels in Green Buildings



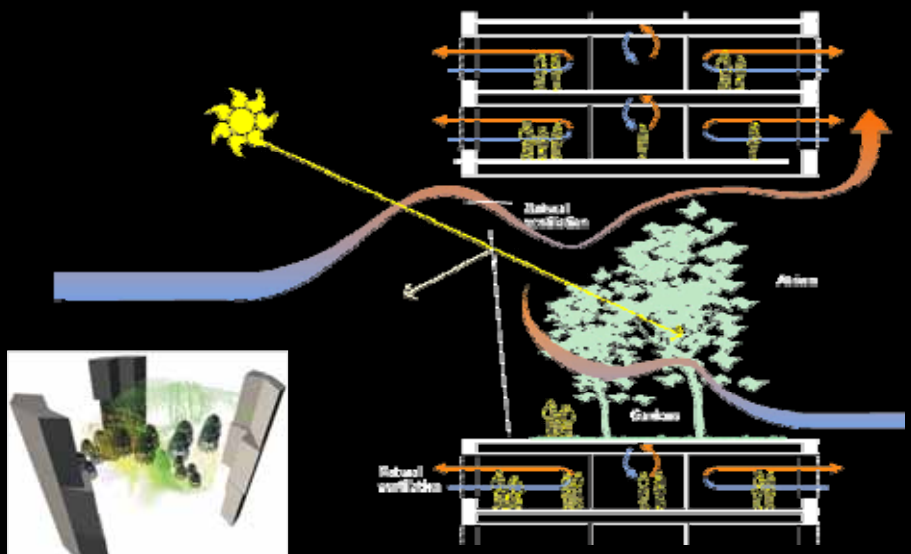
Cost of Rent ($ per square foot) in Commercial Buildings



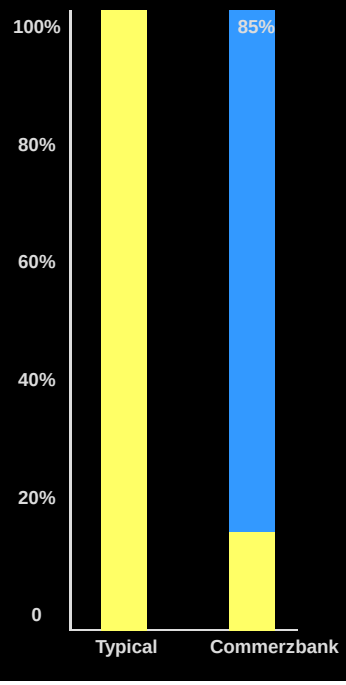

Air and light
Work space
Core
Air and light
Air and light
View
Work space



Commerzbank – Summer Ventilation

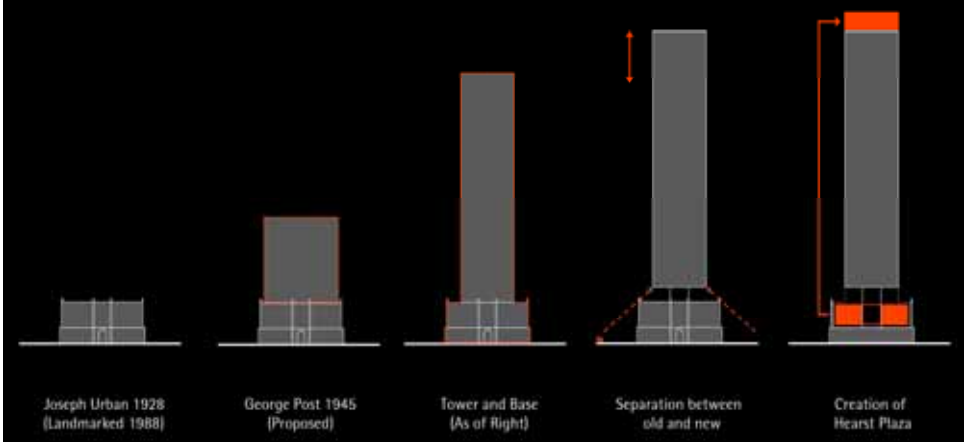


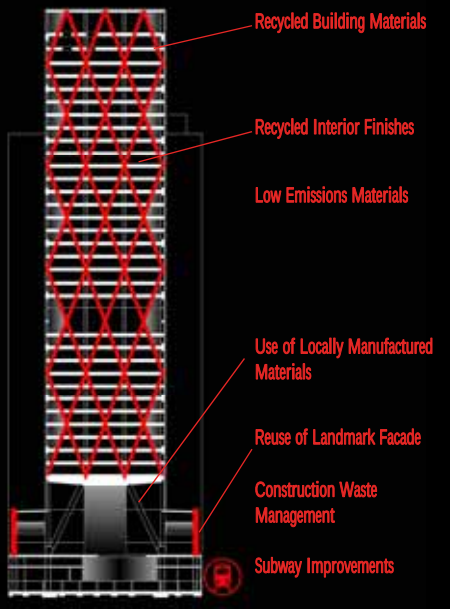
Use of air conditioning/natural ventilation in offices



International Magazine Building 1928

Design Evolution





Recycled Building Materials

Recycled Interior Finishes

Low Emissions Materials

Use of Locally Manufactured Materials

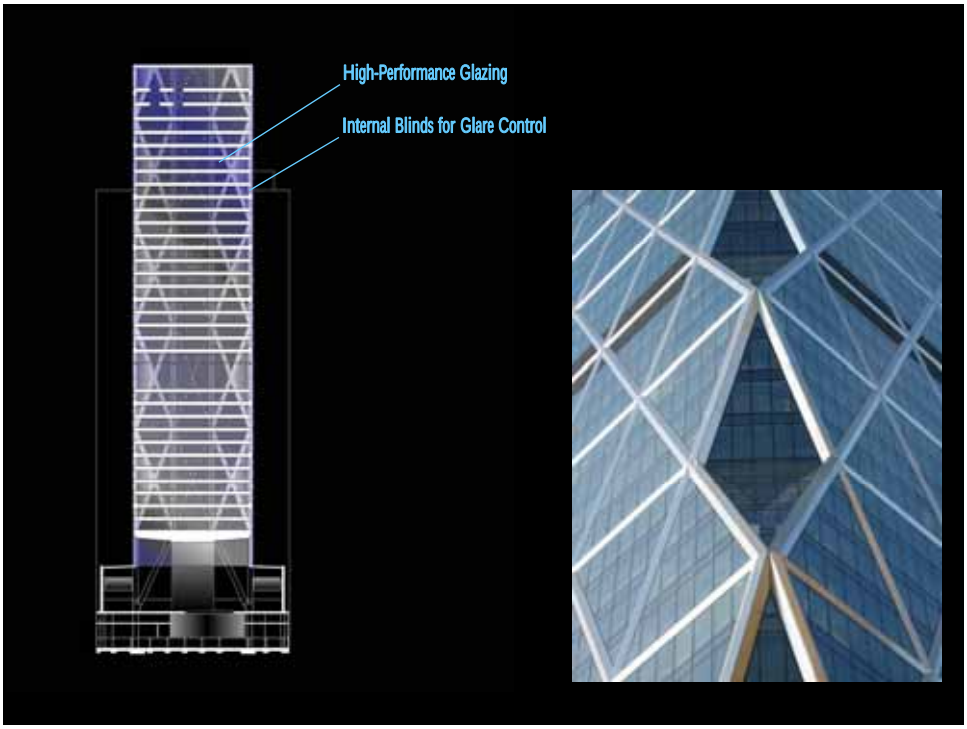
Reuse of Landmark Facade

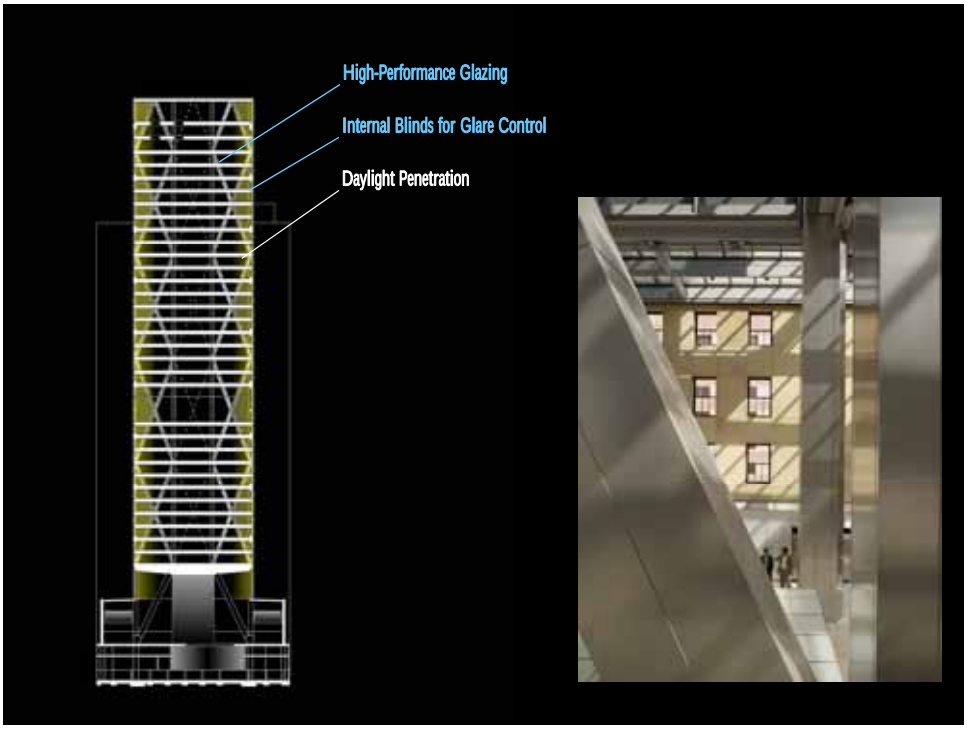
Construction Waste Management

Subway Improvements

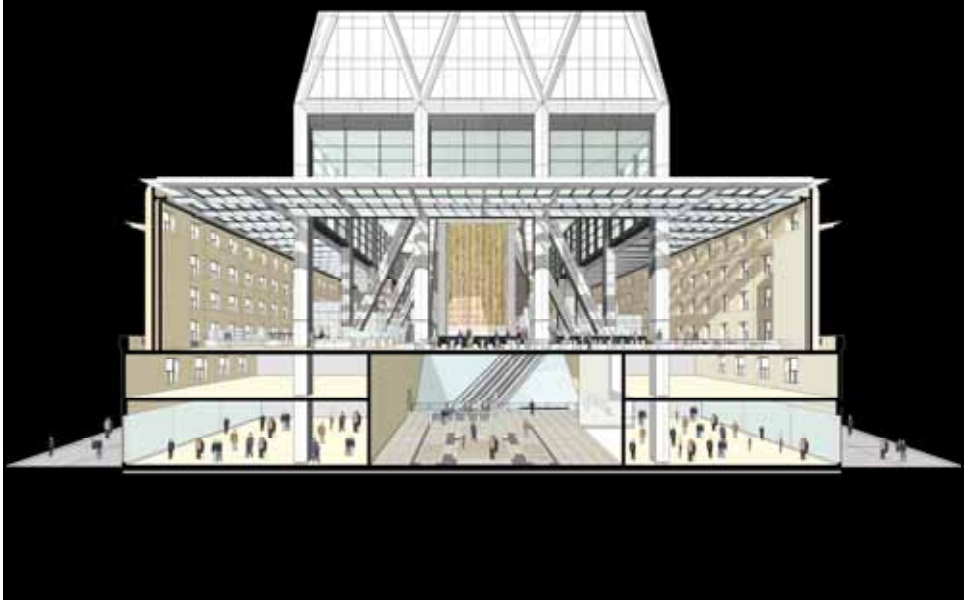
Columbus Circle Station

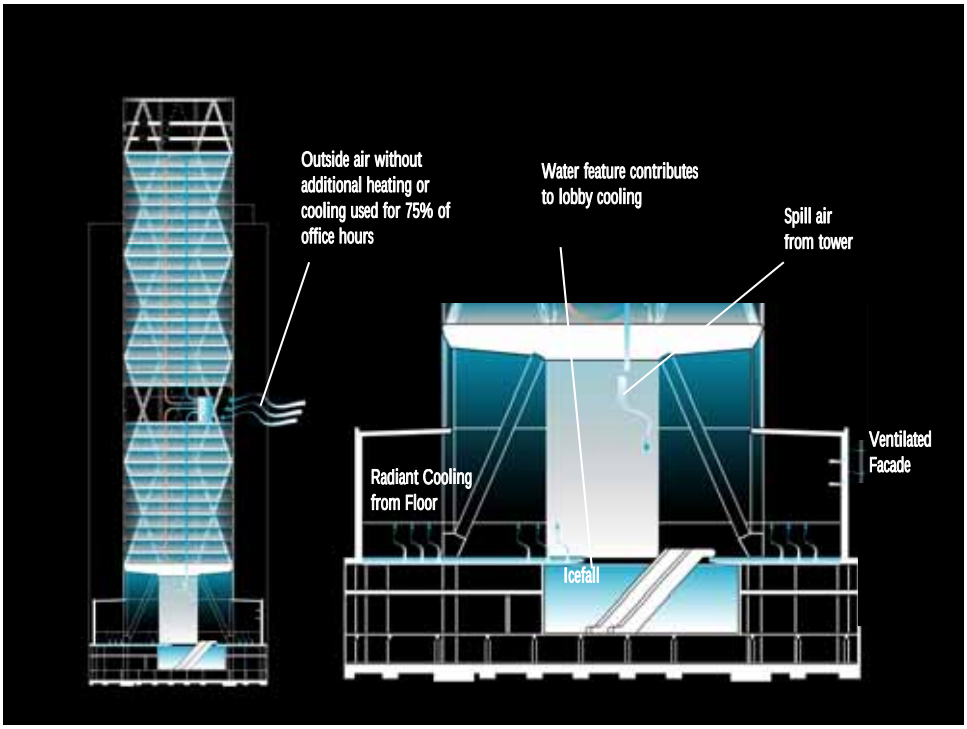
A C B D 1 9

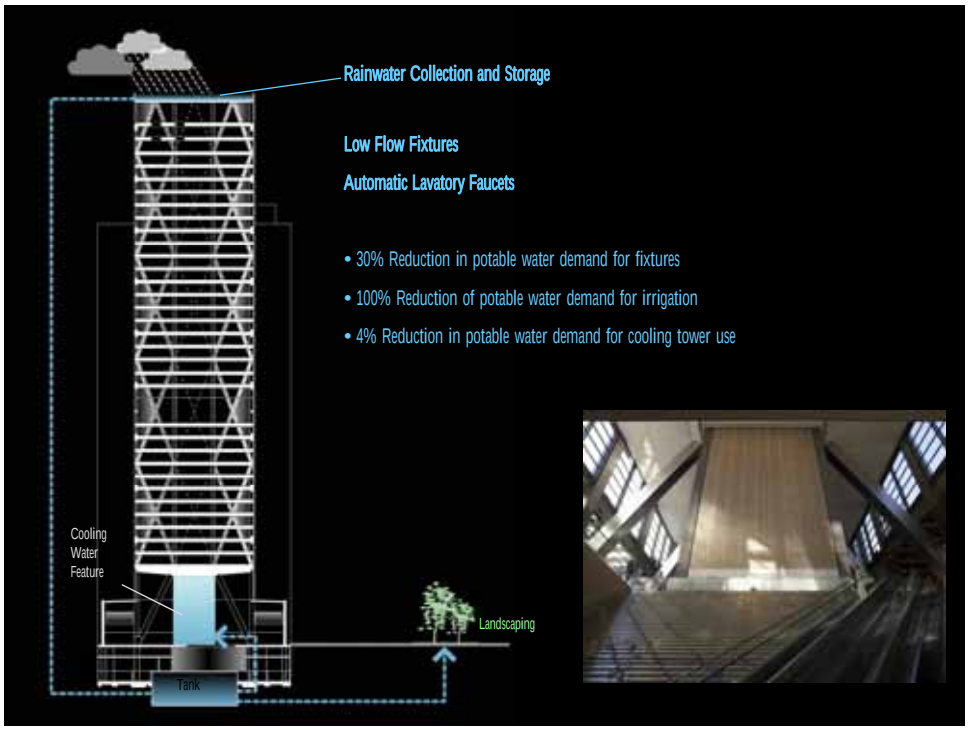

High-Performance Glazing
Internal Blinds for Glare Control

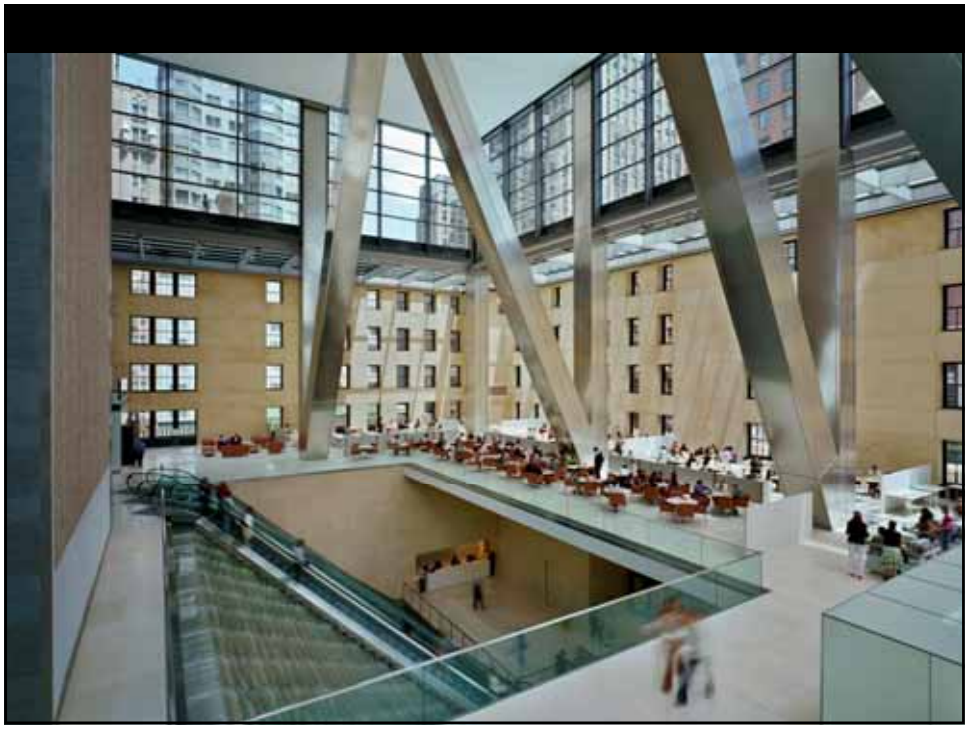

High-Performance Glazing
Internal Blinds for Glare Control
Daylight Penetration

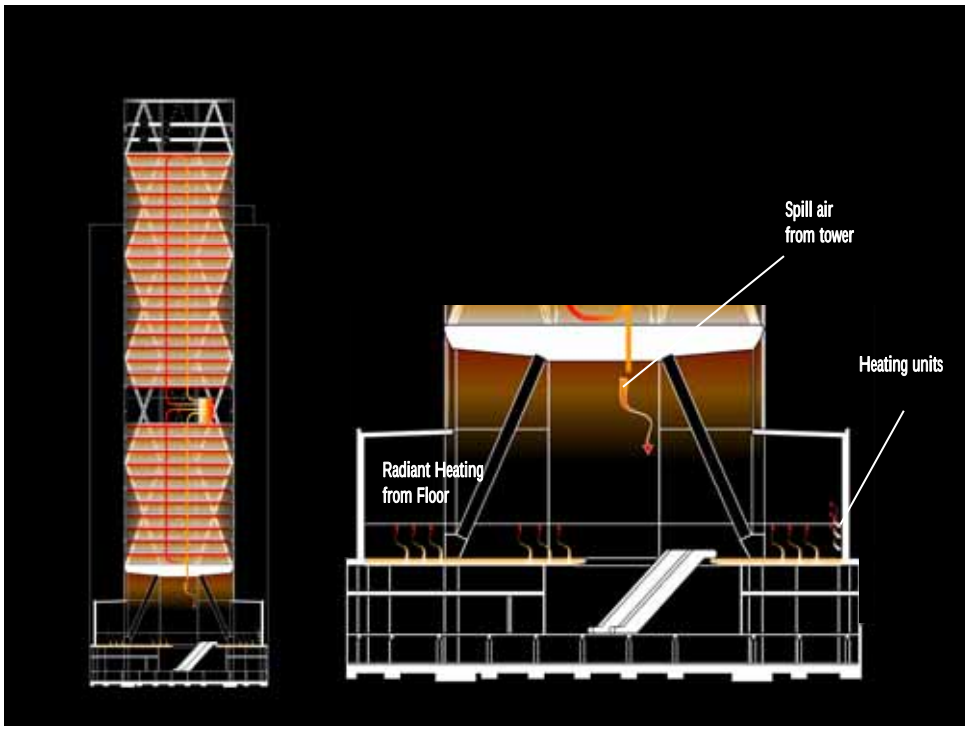
Lobby Concept





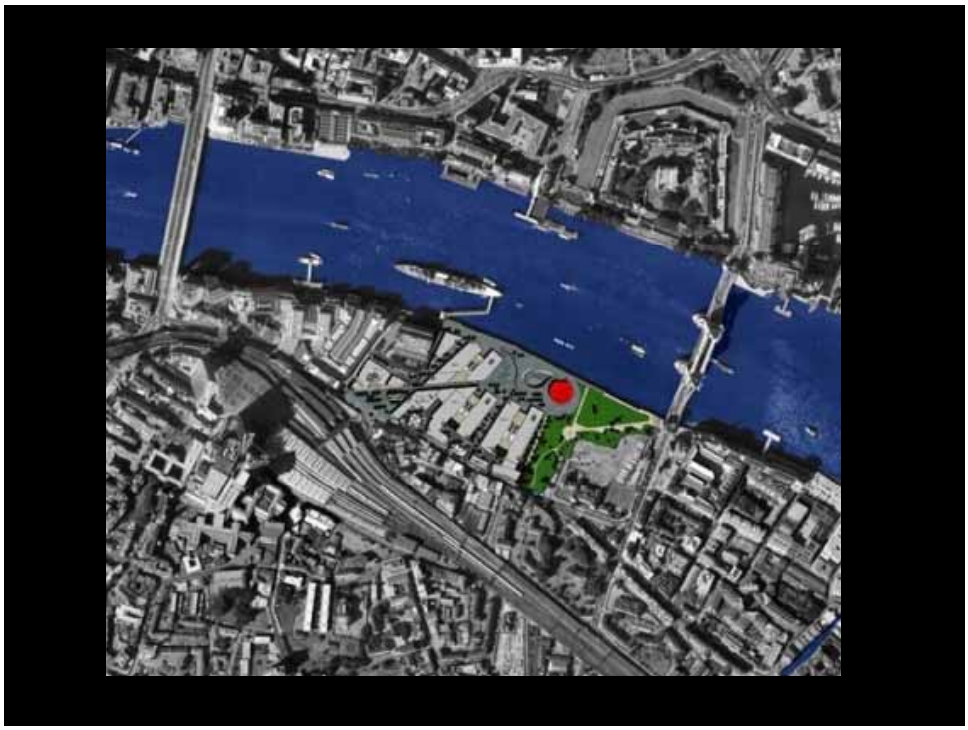

Rainwater Collection and Storage
Low Flow Fixtures
Automatic Lavatory Faucets
• 30% Reduction in potable water demand for fixtures
• 100% Reduction of potable water demand for irrigation
• 4% Reduction in potable water demand for cooling tower use
Cooling
Water
Feature
Landscaping
Tank



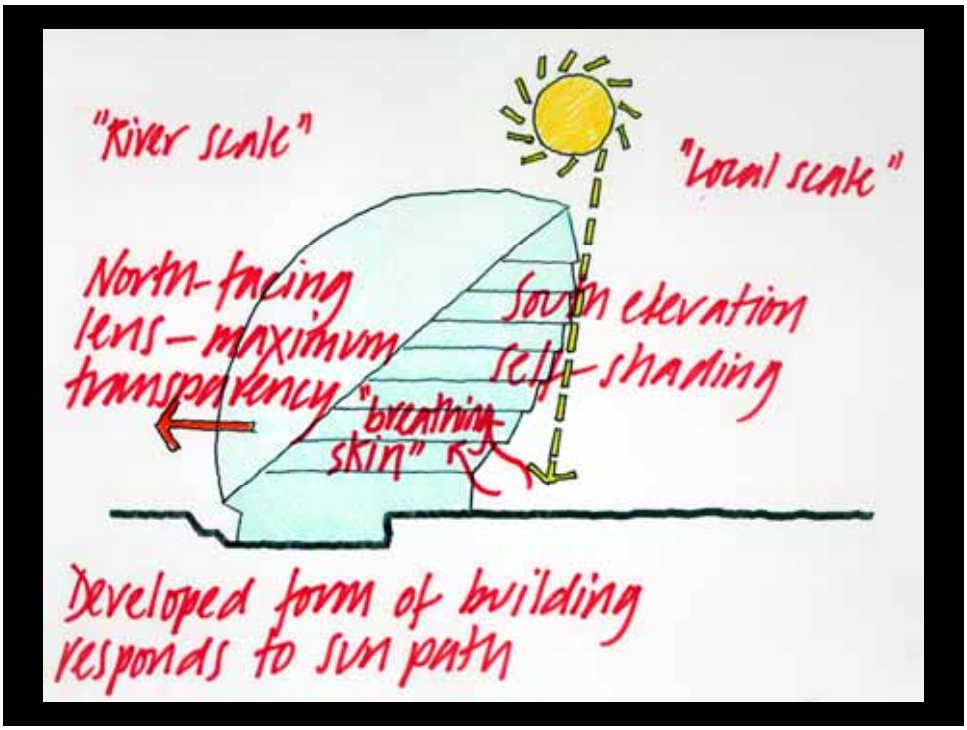

Spill air
from tower
Heating units
Radiant Heating
from Floor

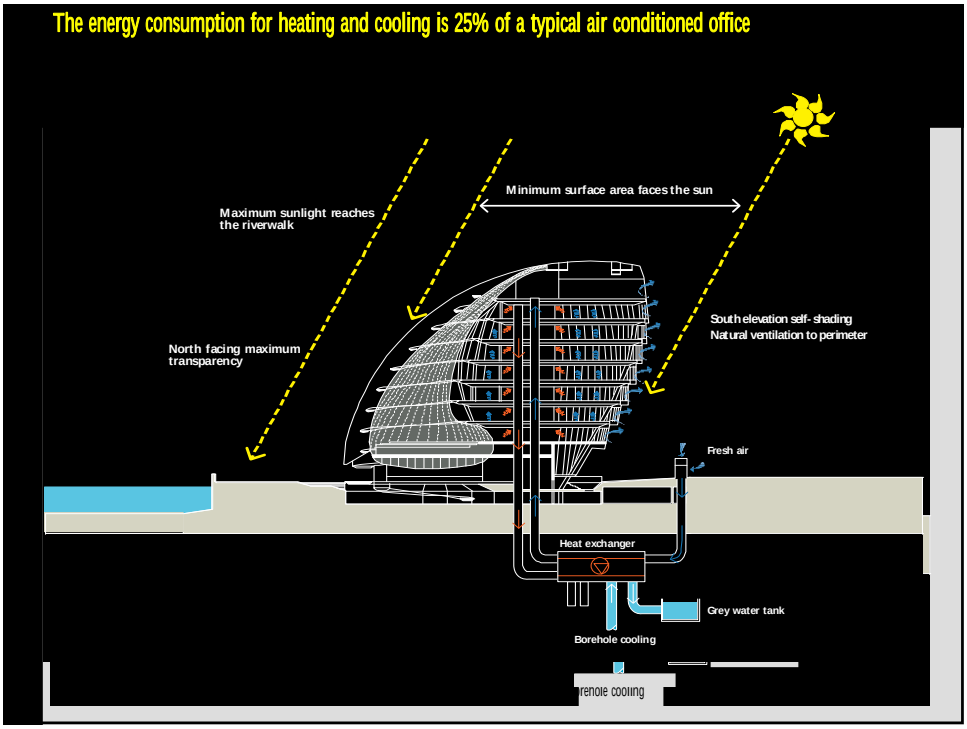
More London Brownfield Site

More london Masterplan

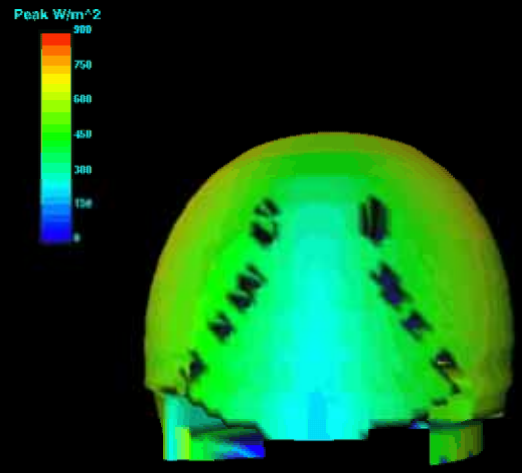


Brief and form analysis

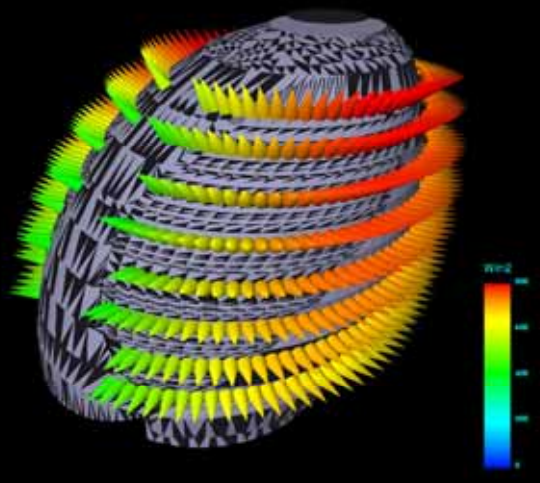

"River scale"
"Local scale"
North-facing lens – maximum transparency
"breathing skin"
South elevation self-shading
Developed form of building responds to sun path

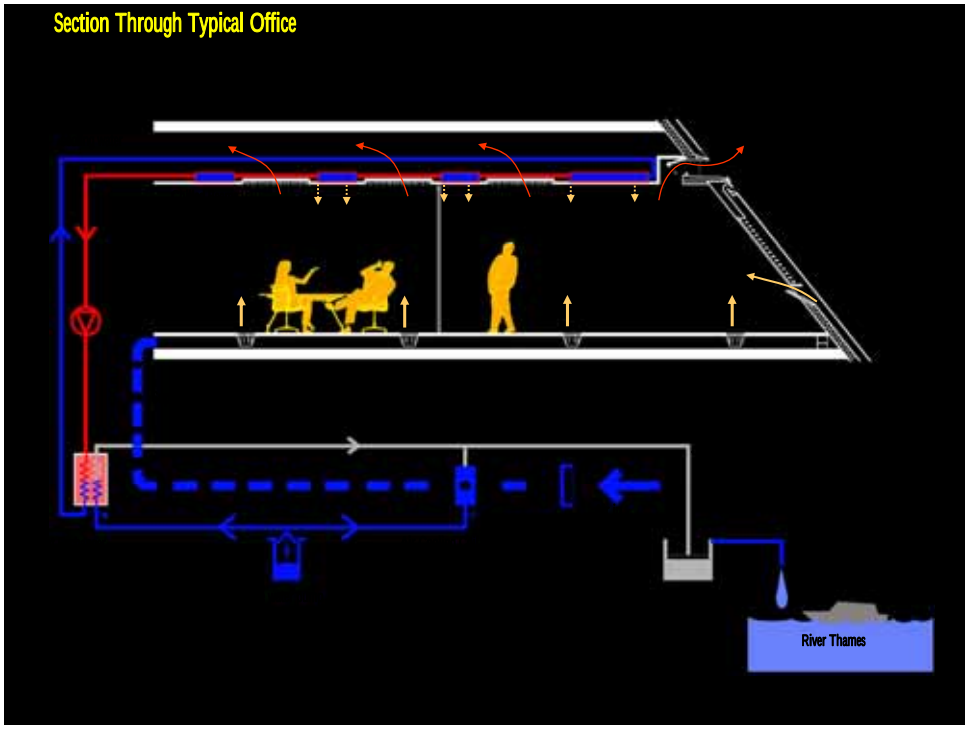

The energy consumption for heating and cooling is 25% of a typical air conditioned office
Maximum sunlight reaches the riverwalk
Minimum surface area faces the sun
North facing maximum transparency
South elevation self- shading
Natural ventilation to perimeter
Fresh air
Heat exchanger
Grey water tank
Borehole cooling

Computer Analysis of Heat Gain on Facade

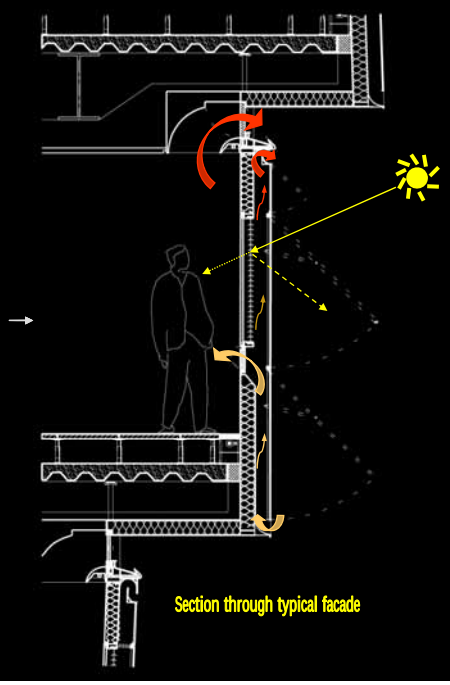


Solar Gain




Section Through Typical Office
River Thames

Façade Performance



Section through typical facade

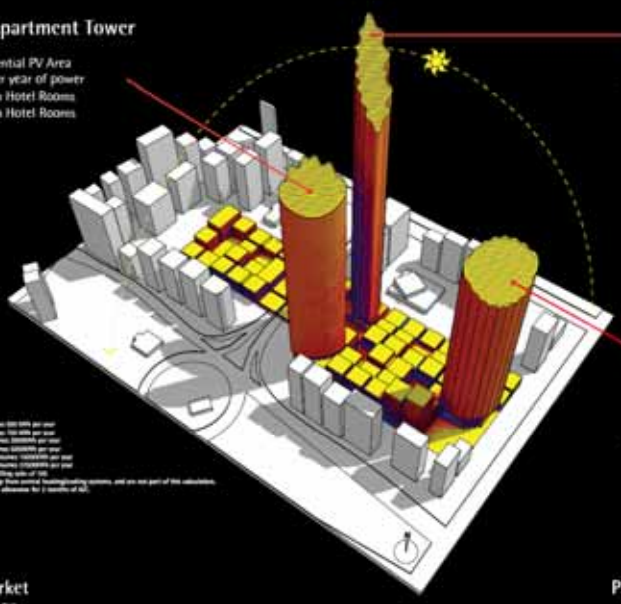
Foster + Partners

Hotel and Serviced Apartment Tower

1,800m² of Potential PV Area
249,400 kWh per year of power
= 500 European Hotel Rooms
= 332 American Hotel Rooms

Residential Tower

2,320m² of Potential PV Area
321,400 kWh per year of power
= 107 European Family homes
= 84 American Family homes



Assumptions

- European hotel room consumes 800 kWh per year
- American hotel room consumes 750 kWh per year
- European family home consumes 3000kWh per year
- American family home consumes 3850kWh per year
- 100m² of European office consumes 15000kWh per year
- 100m² of American office consumes 21500kWh per year
- PV options assume PV panel Wpkg rate of 150.
- Figures do not assume energy from central heating/cooling systems, and are not part of this calculation.
- The office figure includes an allowance for 2 months of AC.

Office Tower

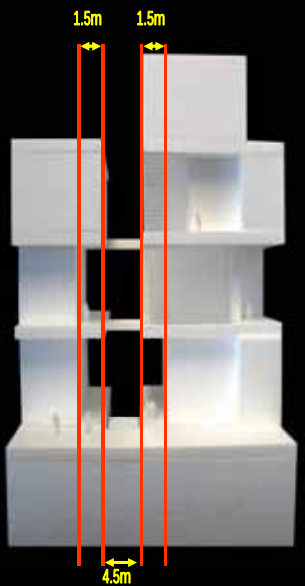
3,020m² of Potential PV area
418,400 kWh per year of power
= 2800m² of European Office
= 1900m² of American Office

Central Market

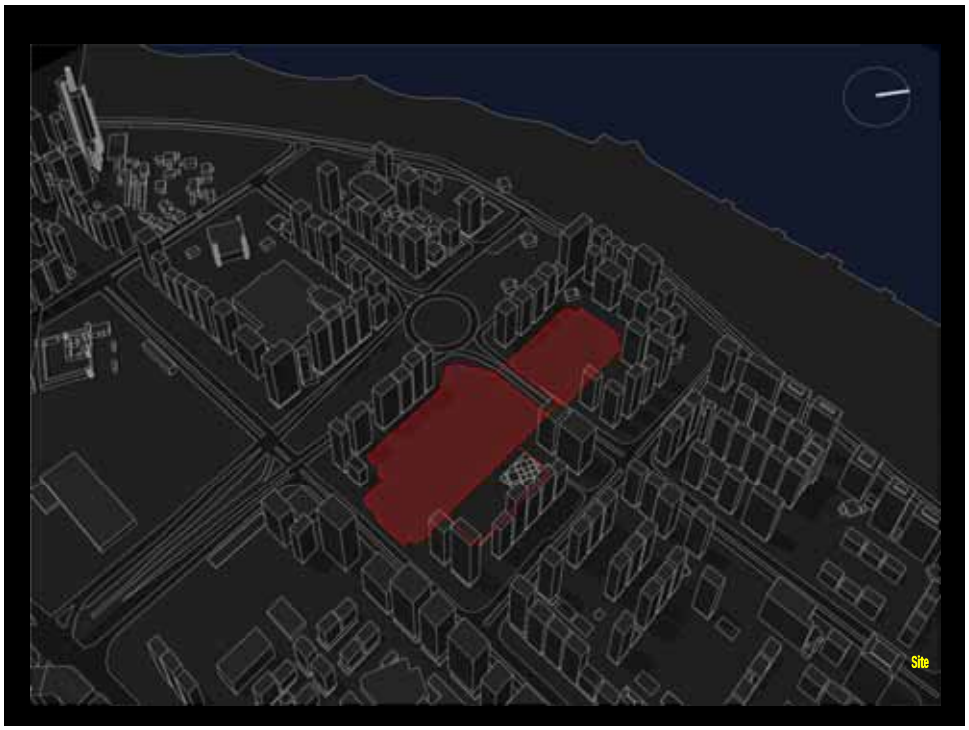
Foster and Partners

Photovoltaic Generation Design Evolution

The Souk



Souk Proportions

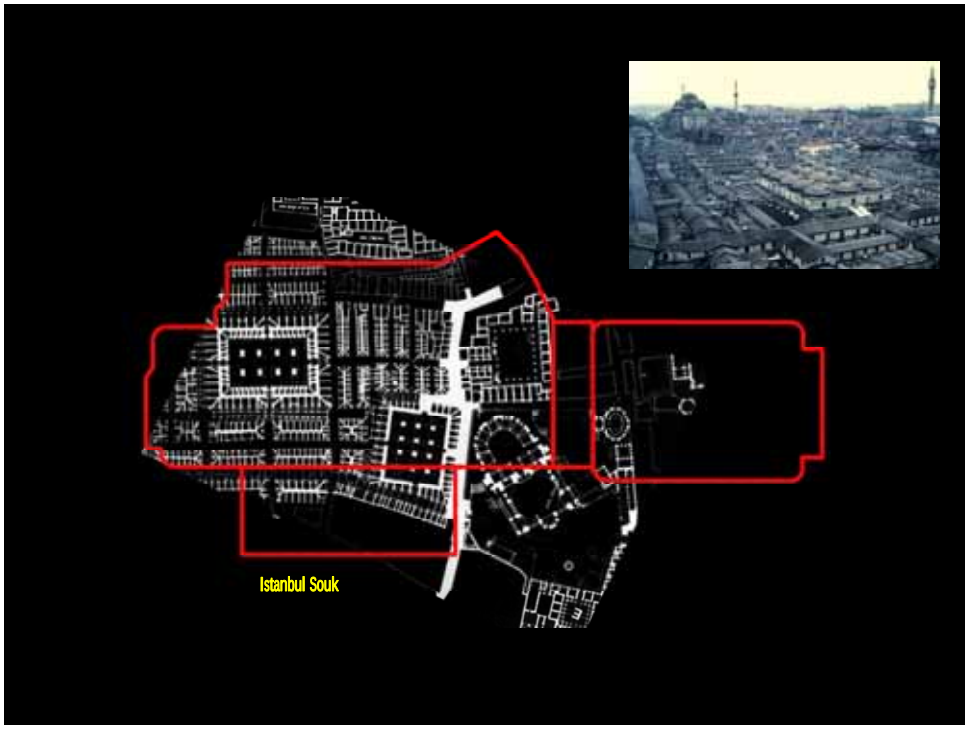

Site

Airport Road
Road Connections

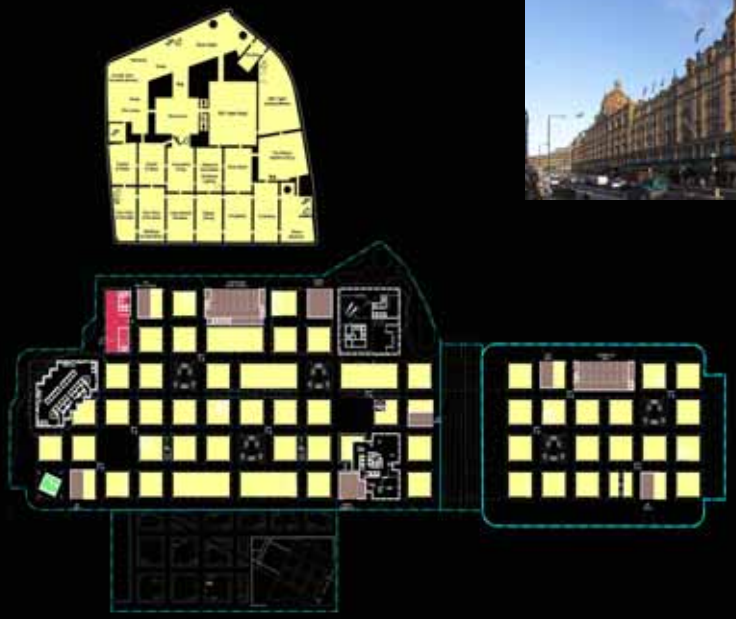
Airport Road
Hamdan Street
Road Connections

Airport Road
Khalifa Street
Hamdan Street
Road Connections

High Level Views out over the
Corniche and Lulu Island
Views

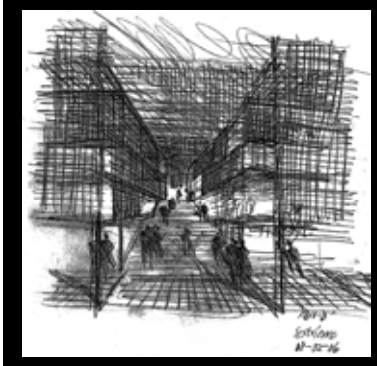

Istanbul Souk

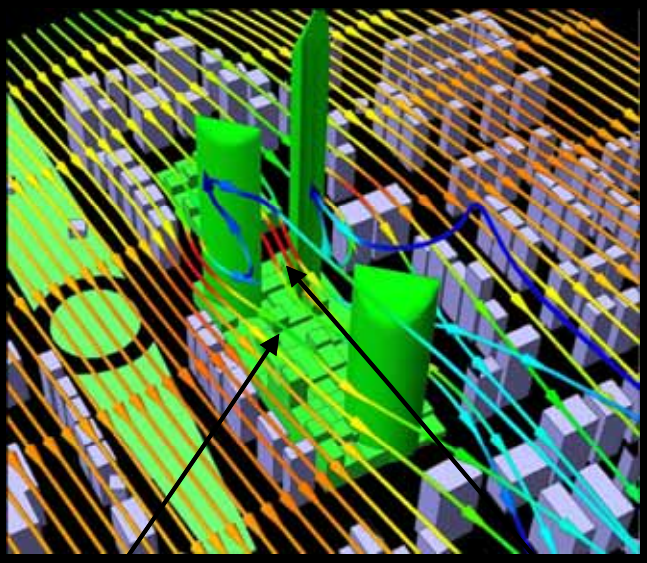
Harrods

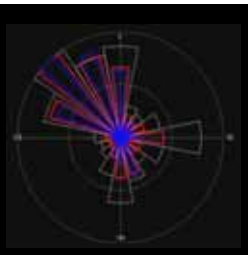


Scale Comparison

Central Markets Abu Dhabi





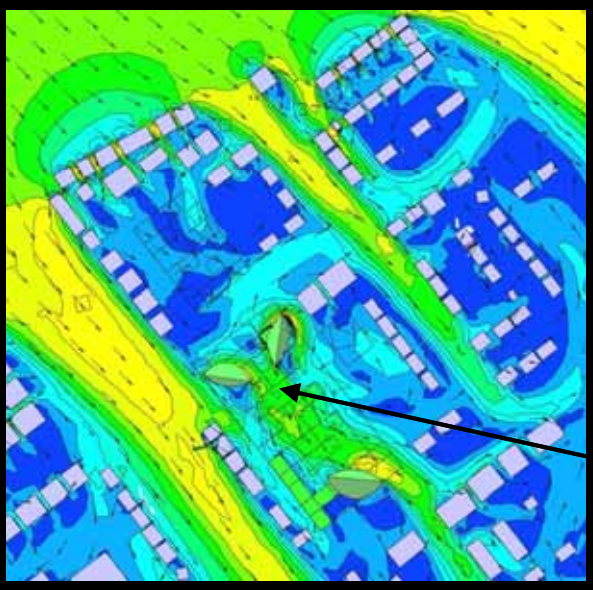


Natural Downdraught Effect directs wind flow down towards the site

Towers channels local wind streams, accelerating wind flow

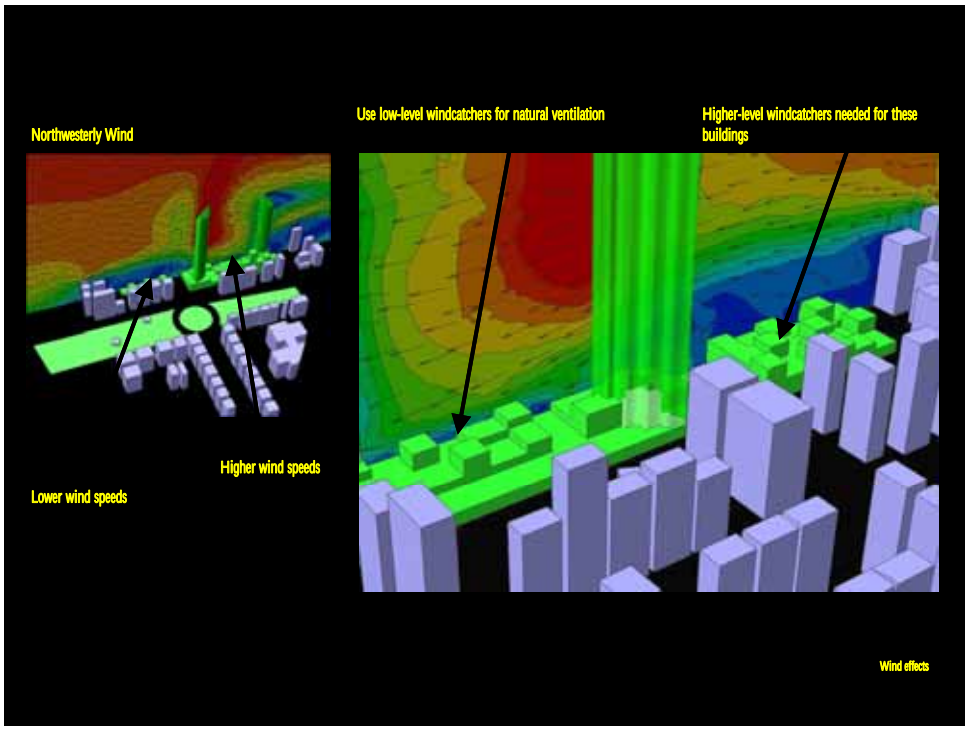
Wind effects

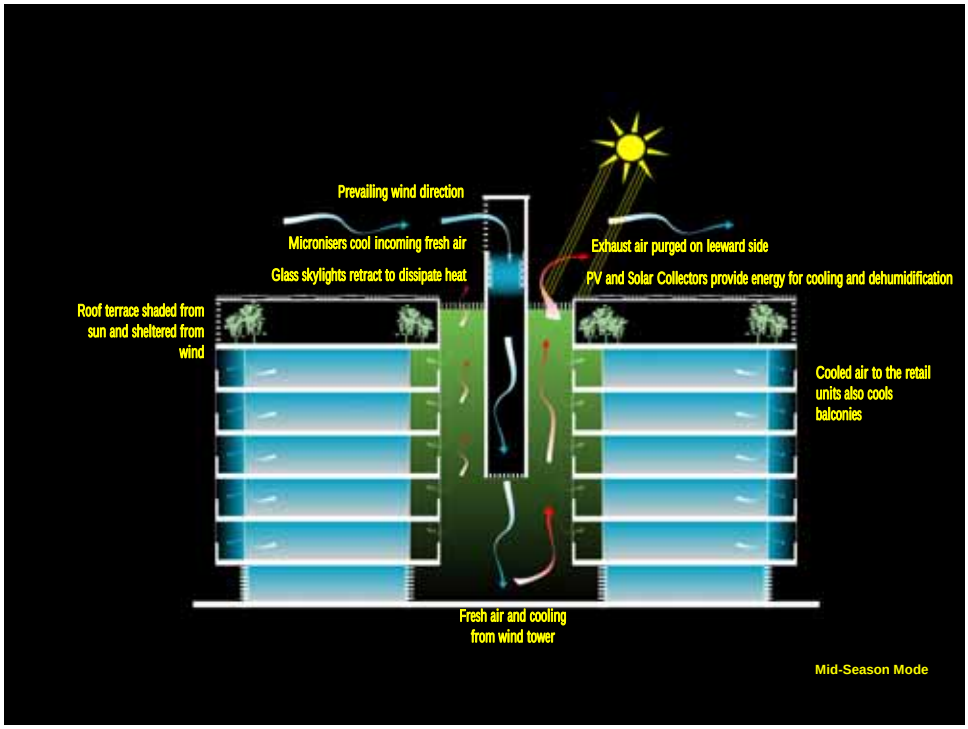
Wind Flow at Roof level

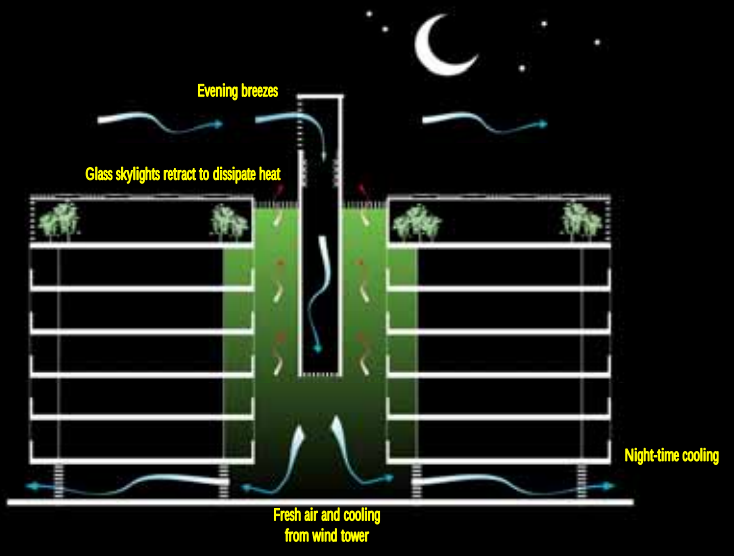


Good natural ventilation potential for the roof gardens

Wind effects


Northwesterly Wind
Use low-level windcatchers for natural ventilation
Higher-level windcatchers needed for these buildings
Higher wind speeds
Lower wind speeds
Wind effects


Prevailing wind direction
Micronisers cool incoming fresh air
Glass skylights retract to dissipate heat
Exhaust air purged on leeward side
PV and Solar Collectors provide energy for cooling and dehumidification
Roof terrace shaded from sun and sheltered from wind
Cooled air to the retail units also cools balconies
Fresh air and cooling from wind tower
Mid-Season Mode



Night Mode (All Year)

CULTURE

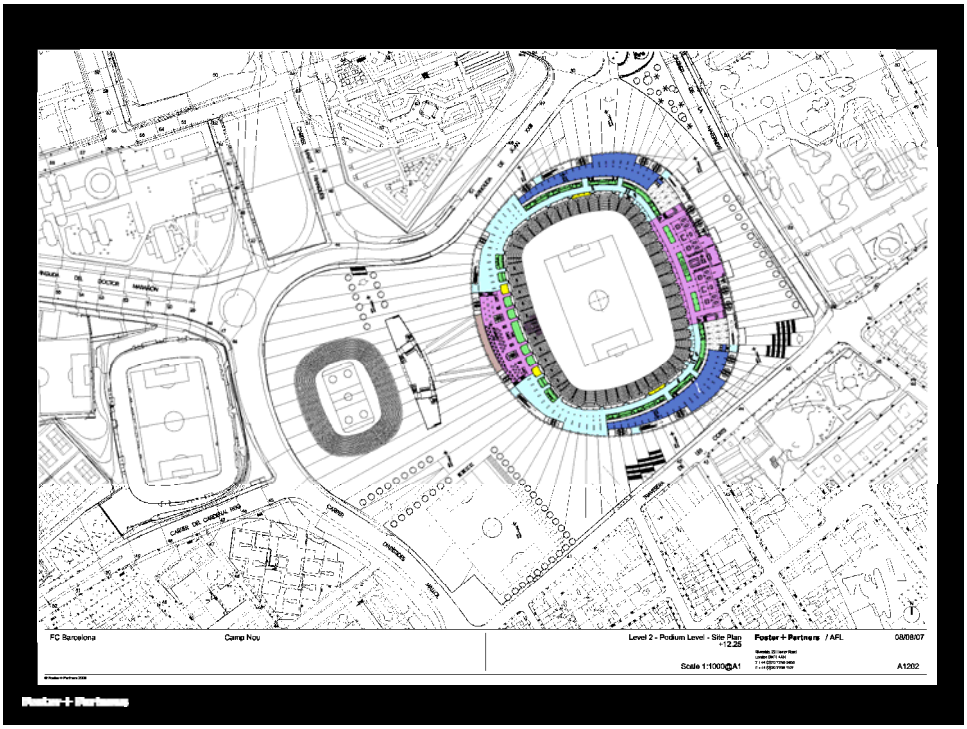
Design as part of the cultural landscape

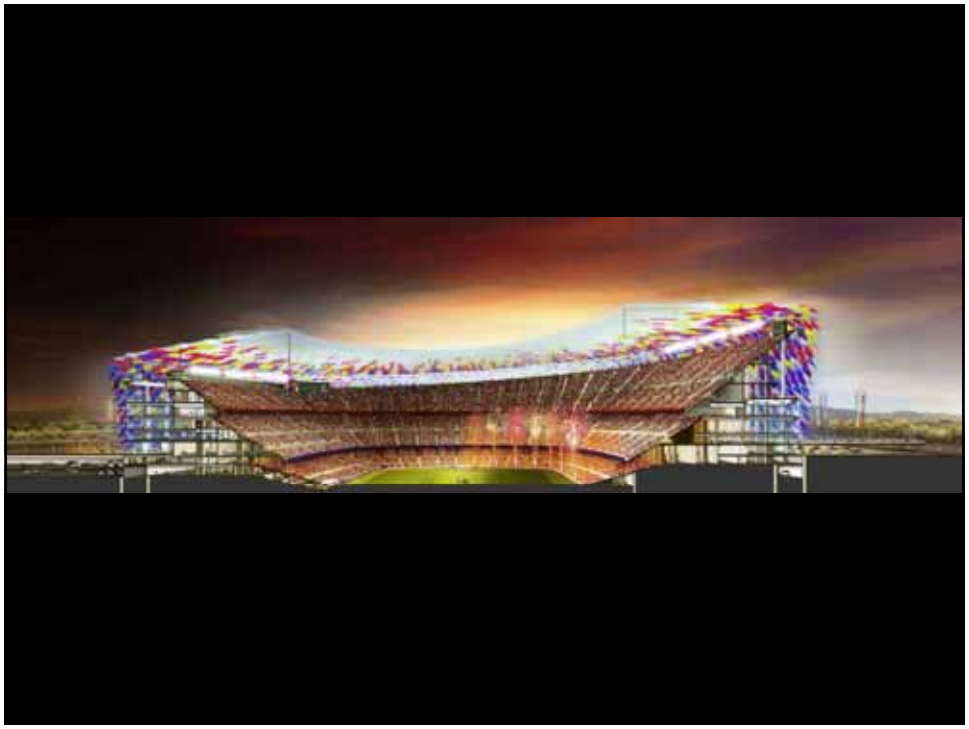
Design as part of the cultural landscape

Wembley Stadium, London

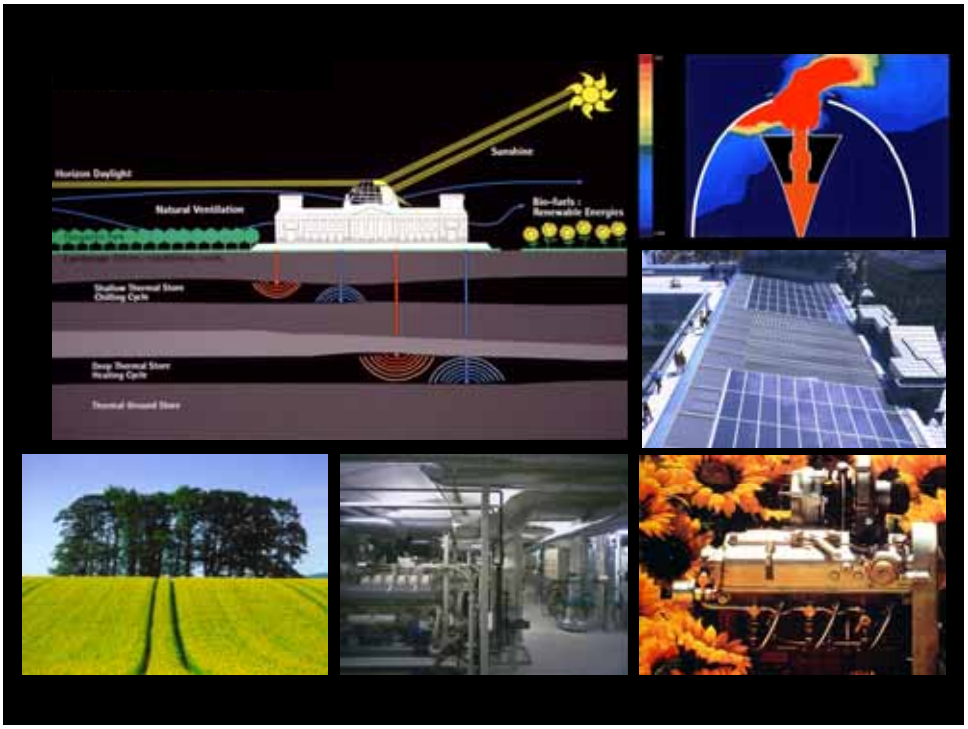
Foster + Partners

Foster + Partners


FC Barcelona
Camp Nou
Level 2 - Podium Level - Site Plan
+12.25
Foster + Partners / ARL
08/08/07
Scale 1:1000@A1
A1202
Foster + Partners



DEM DEUTSCHEN VOLKE


Horizon Daylight
Sunshine
Natural Ventilation
Bio-fuels :
Renewable Energies
Shallow Thermal Store
Chilling Cycle
Deep Thermal Store
Heating Cycle

EDUCATION

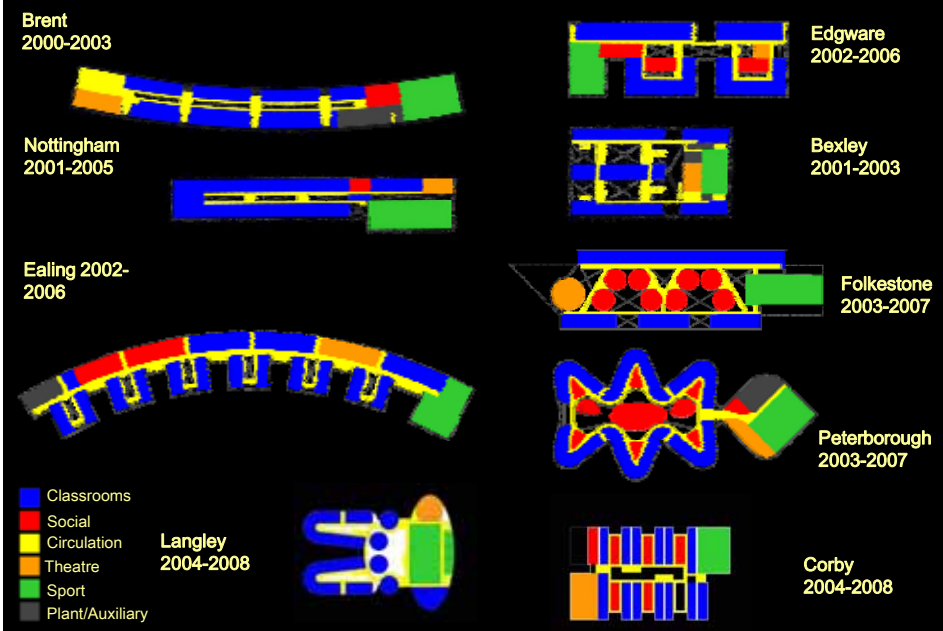
Petronas University, Kuala Lumpar, Malaysia

City Academies

Key Design Issues

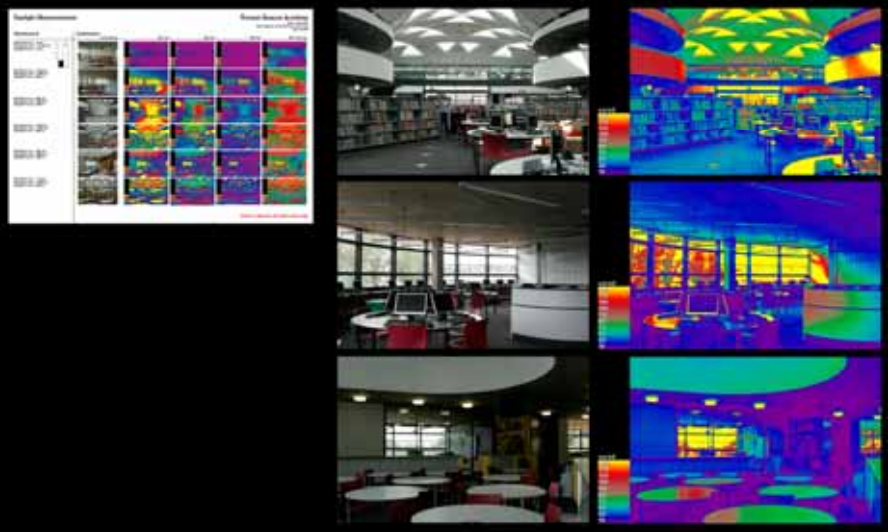
- Enable pupil supervision
- Visibility
- Security
- Image
- ICT
- Adaptability
- Phased developments
- Sustainability
- Community Access

A comparison of our Academy Projects



Bexley Business Academy

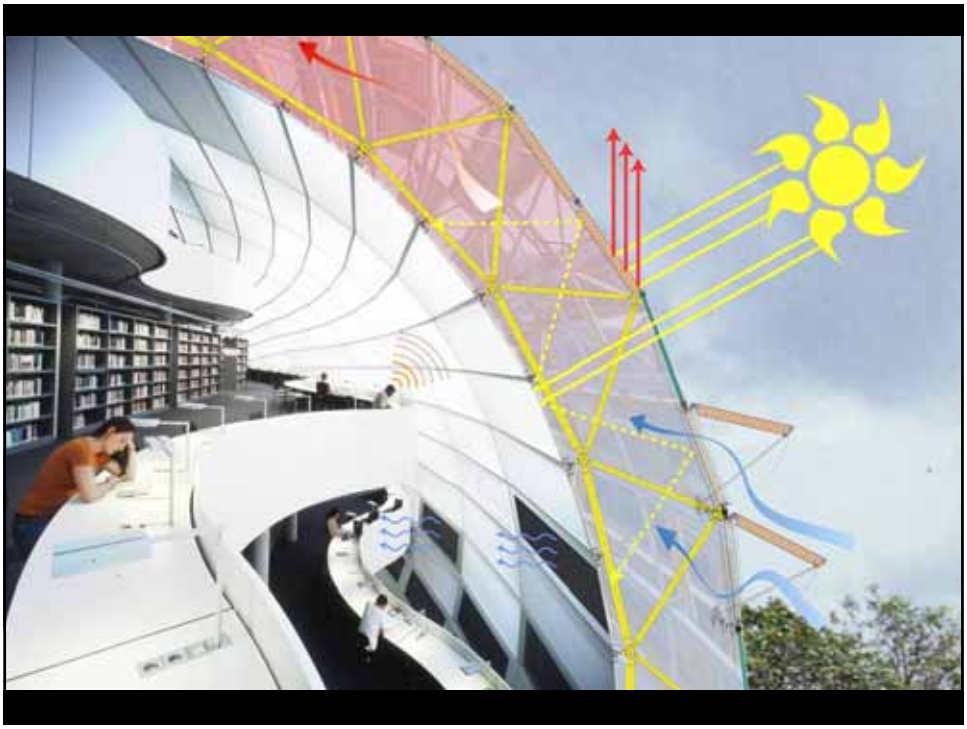
Real Light Catalogue



Thomas Deacon Academy luminance and illuminance study

Thomas Deacon Academy, Peterborough

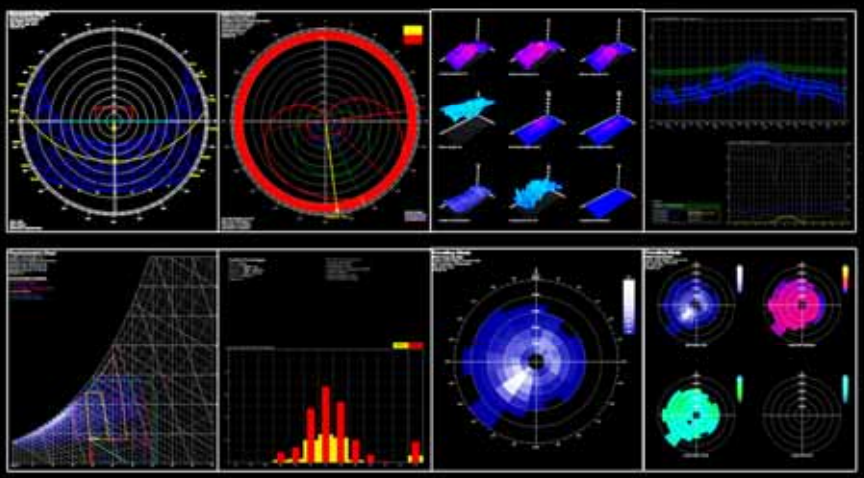
Folkestone Academy

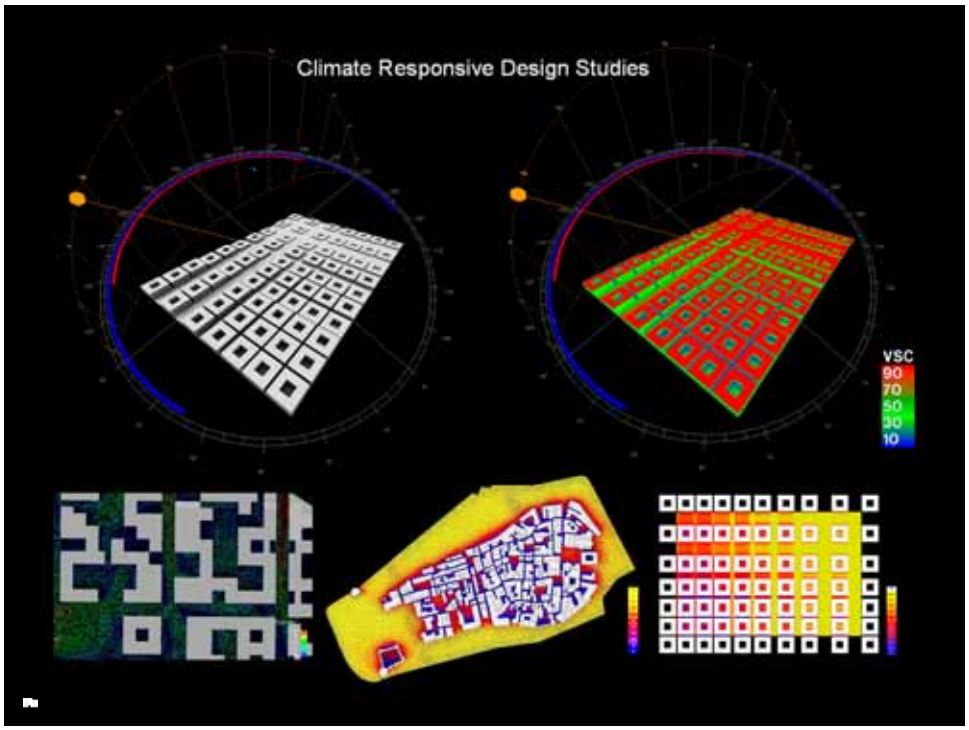


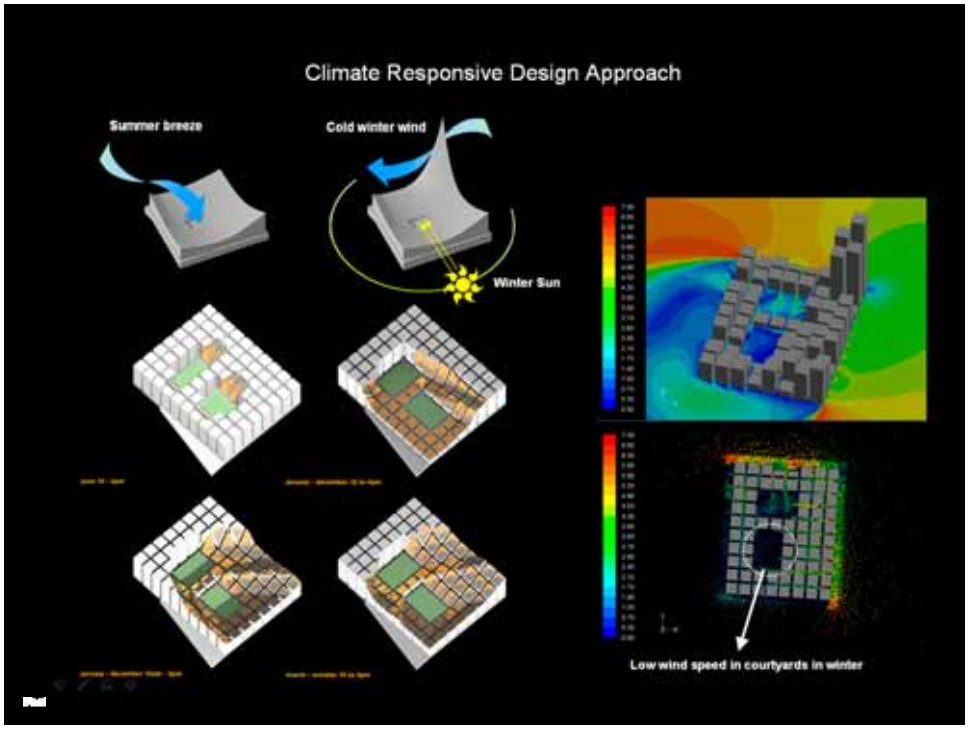
CITIES AND PUBLIC REALM

Masterplans and urban planning

Climate Analysis

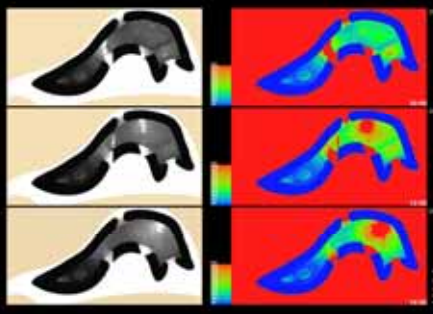


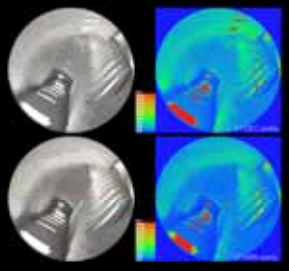

Climate Responsive Design Studies
VSC
90
70
50
30
10


Climate Responsive Design Approach
Summer breeze
Cold winter wind
Winter Sun
Low wind speed in courtyards in winter

Daylight Analysis

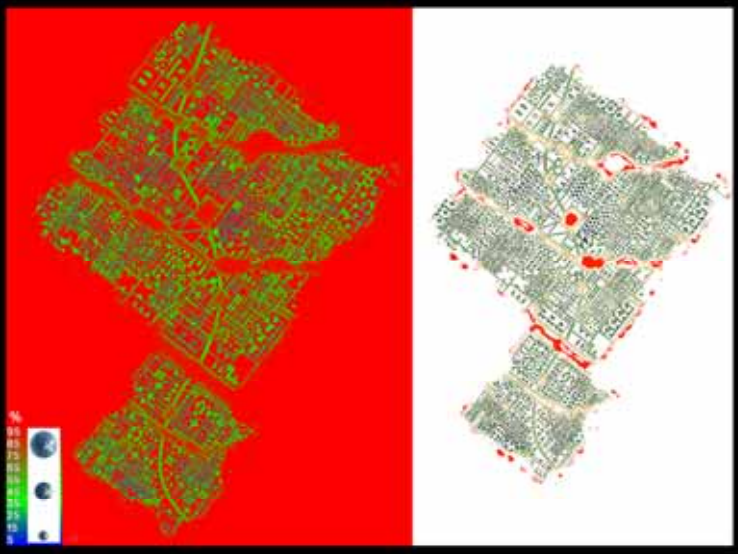
LIGHT LEVELS: 21 DEC, SUNNY



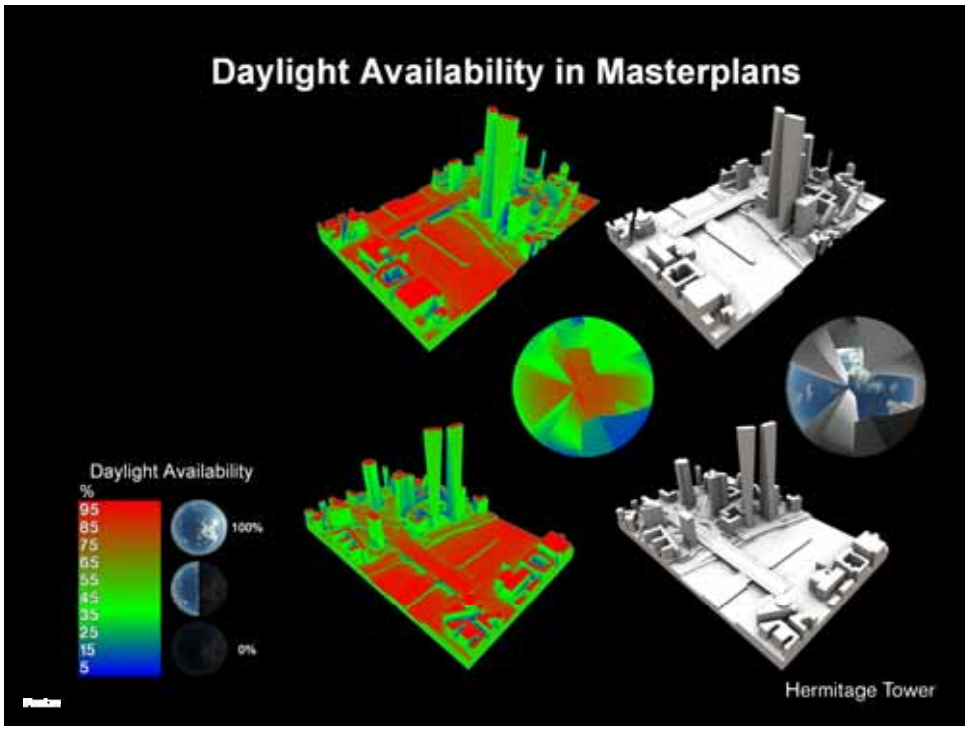


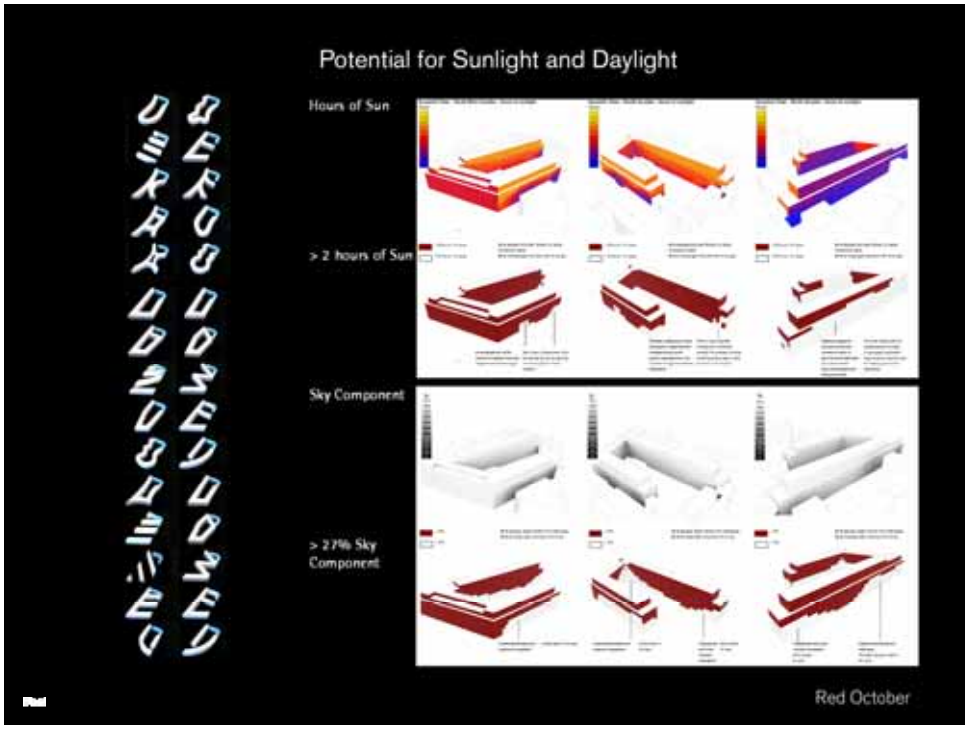
Aldar Al Raha Beach

Daylight Availability in Masterplans



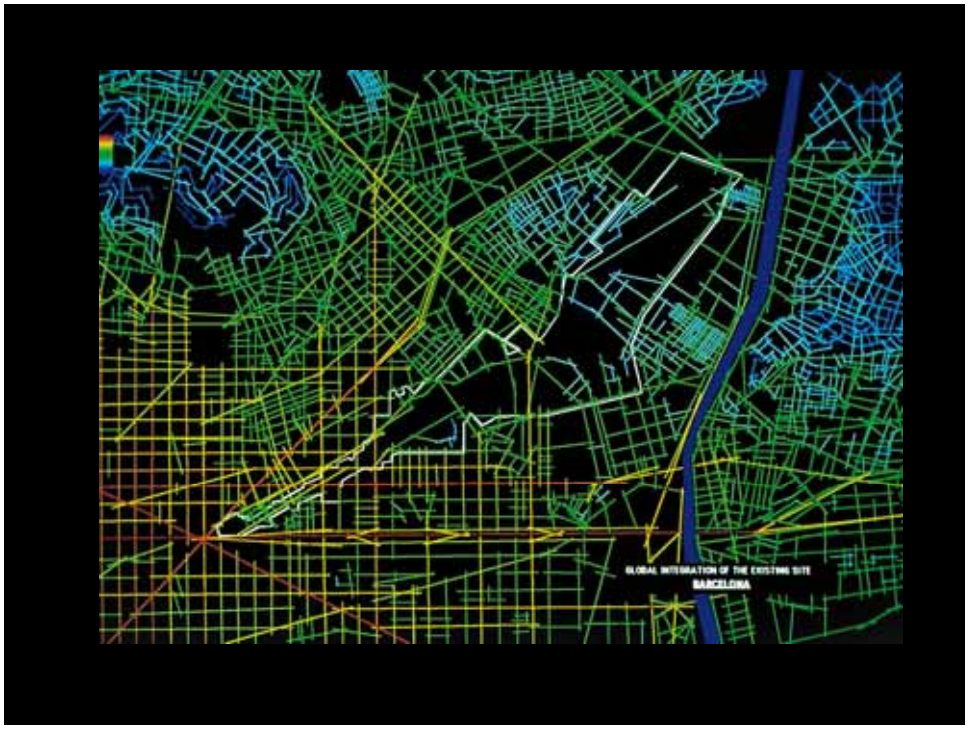
Masdar


Daylight Availability in Masterplans
Daylight Availability
%
95
85
75
65
55
45
35
25
15
5
100%
0%
Hermitage Tower

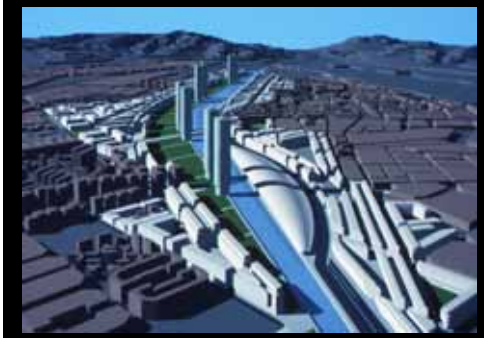

Potential for Sunlight and Daylight
Hours of Sun
> 2 hours of Sun
Sky Component
> 27% Sky Component
Red October

Sagrera disused rail lands , Barcelona

Knitting together the urban fabric


GLOBAL INTEGRATION OF THE EXISTING SITE
BARCELONA

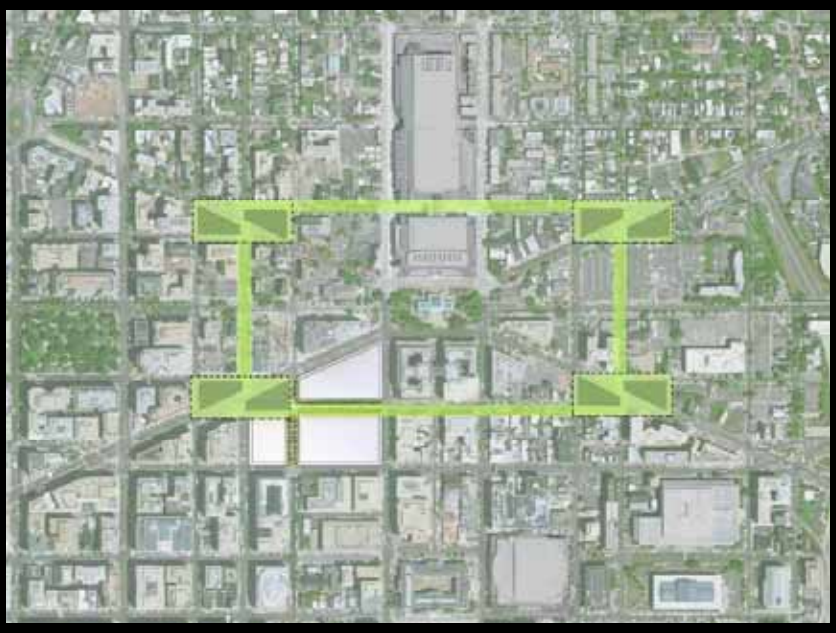
Sagrera Masterplan, Barcelona - 1991



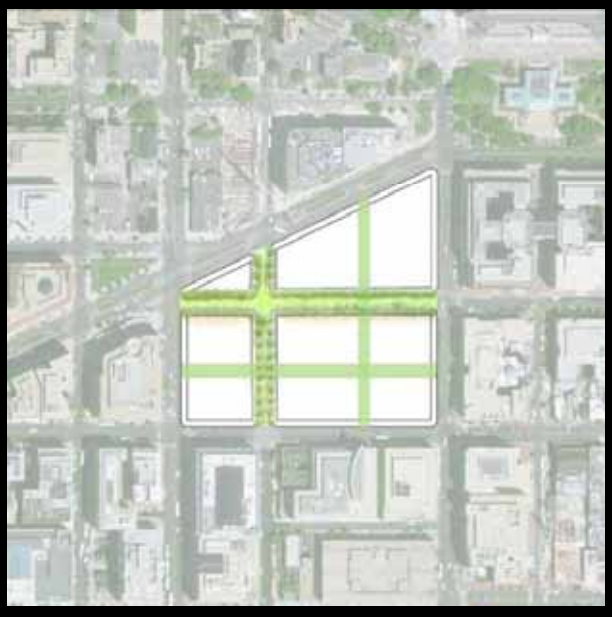
- North-South Axis of Regeneration through City
- Linear Water park
- High Speed Train Network
- New Transport Interchange
- Housing
- Offices
- Restaurants and cafes
- Retail and Shopping

Washington DC, USA.

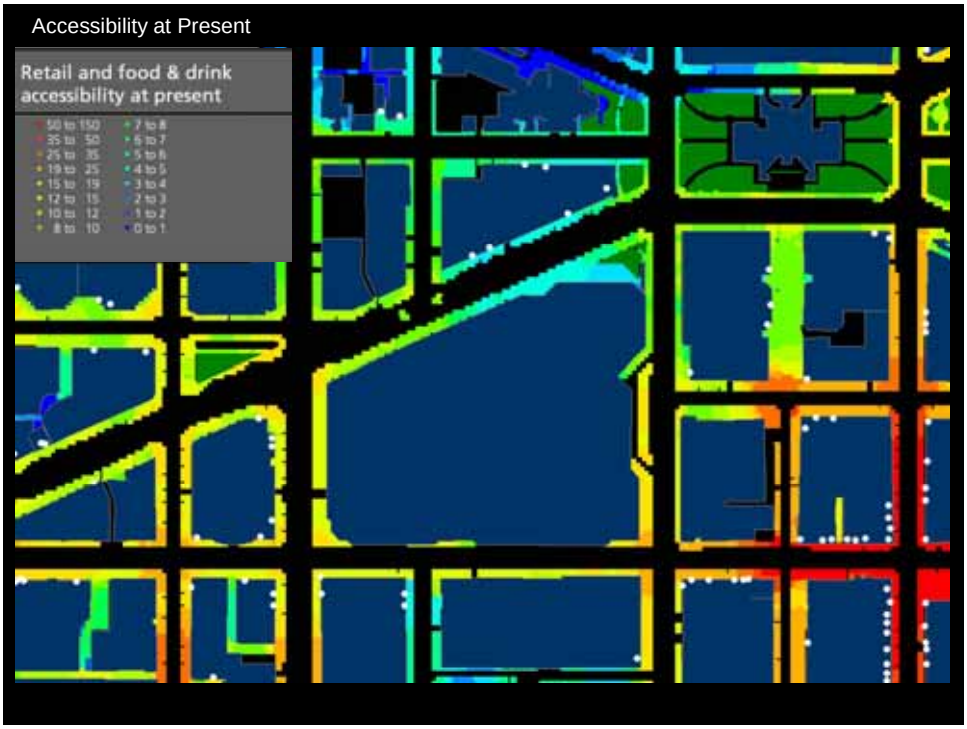
Mount Vernon Square District



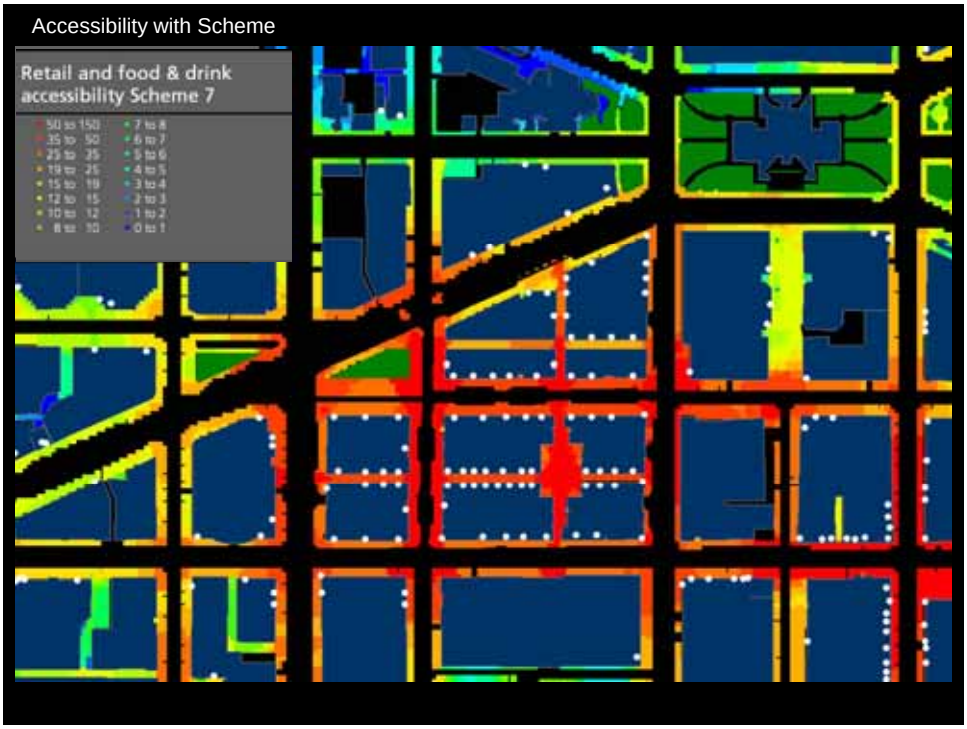
Re establish city grid



Accessibility at Present



Accessibility with Scheme



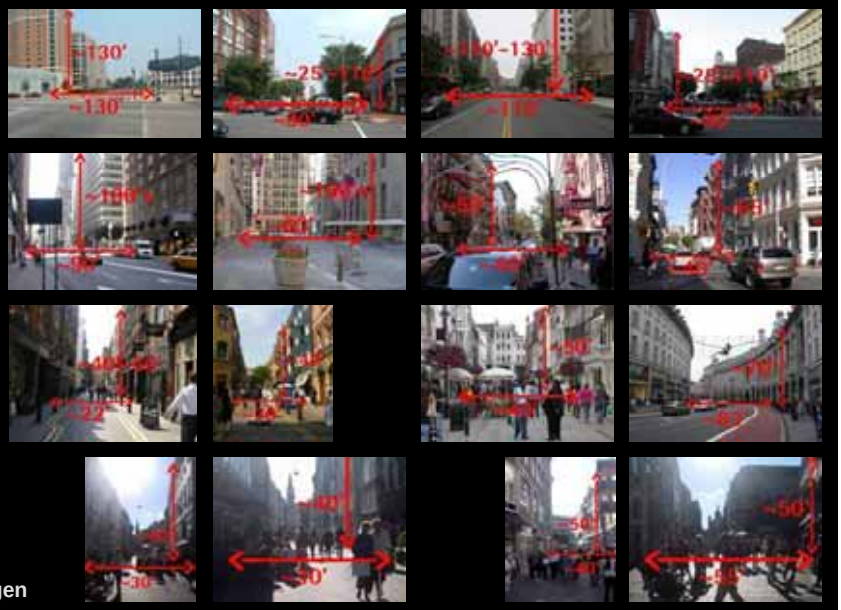
Street Studies

DC

New York

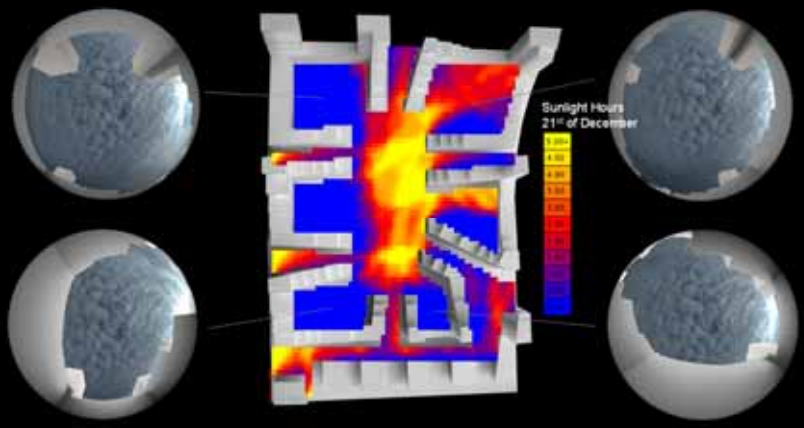
London

Copenhagen



Roofscape

Solar Access for Open Spaces



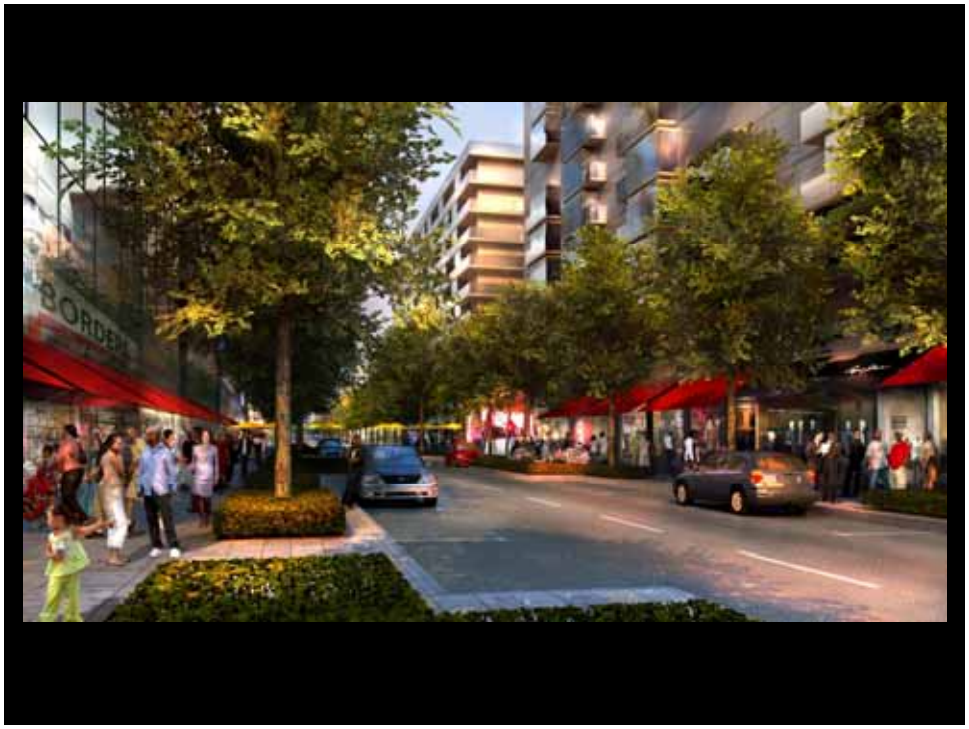
Almaty Masterplan

Public Presentation

Public Feedback

Central Plaza

Office Alley Opt 1



Milano Santa Giulia, Masterplan, Milan, Italy

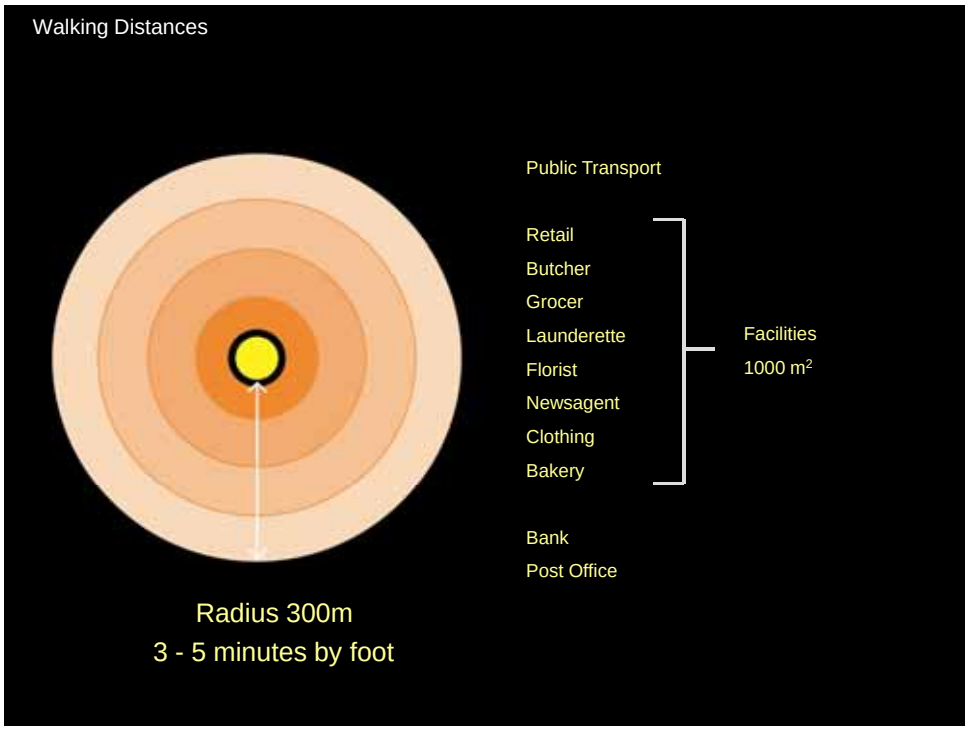
Residents: 10,000

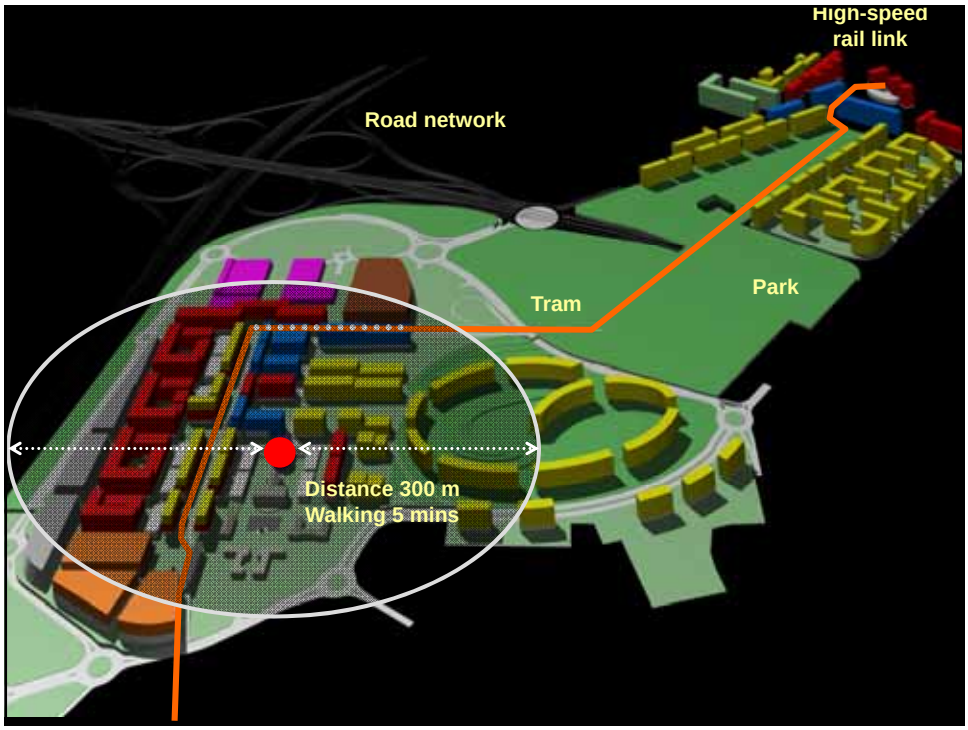
Visitors: 50,000

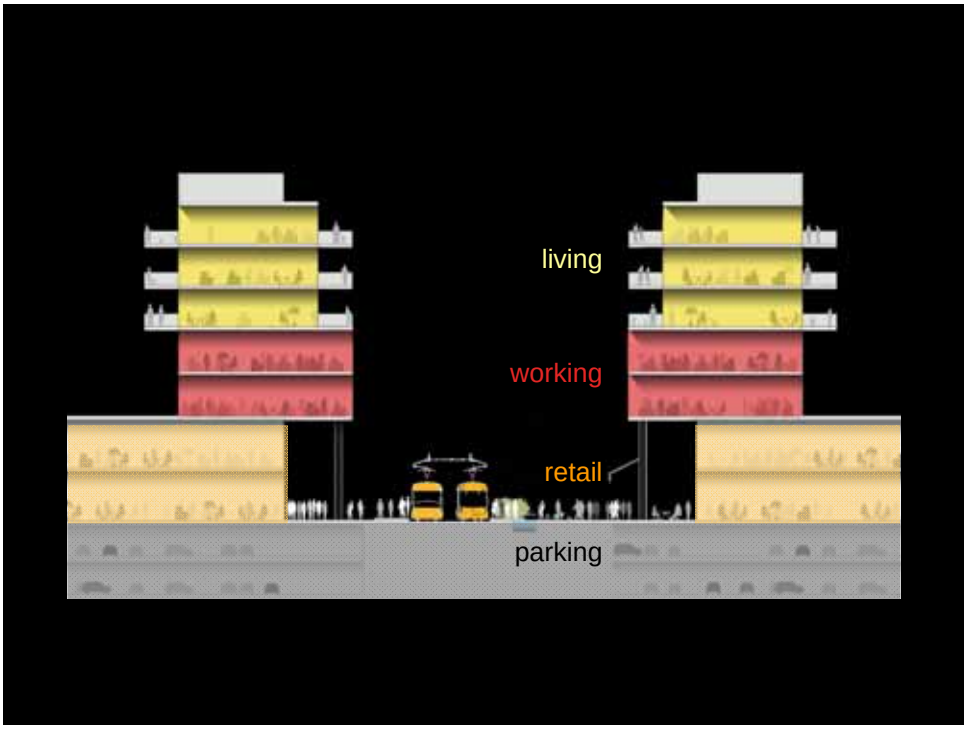
- Hotels
- Offices
- Conference
- Retail and restaurants
- Health club
- Church
- 111-hectare site
- 33-hectare Park

People/sq km: 10,811

Without park 16,600


Walking Distances
Public Transport
Retail
Butcher
Grocer
Launderette
Florist
Newsagent
Clothing
Bakery
Facilities
1000 m2
Bank
Post Office
Radius 300m
3 - 5 minutes by foot

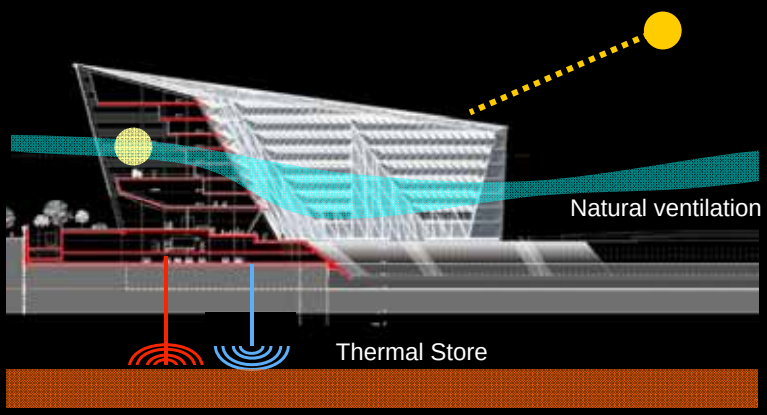

High-speed rail link
Road network
Tram
Park
Distance 300 m
Walking 5 mins


living
working
retail
parking

illy

Inner harbour Masterplan, Duisburg, Germany

The Building Ecology



Internal gardens

Photovoltaics

Bio fuels

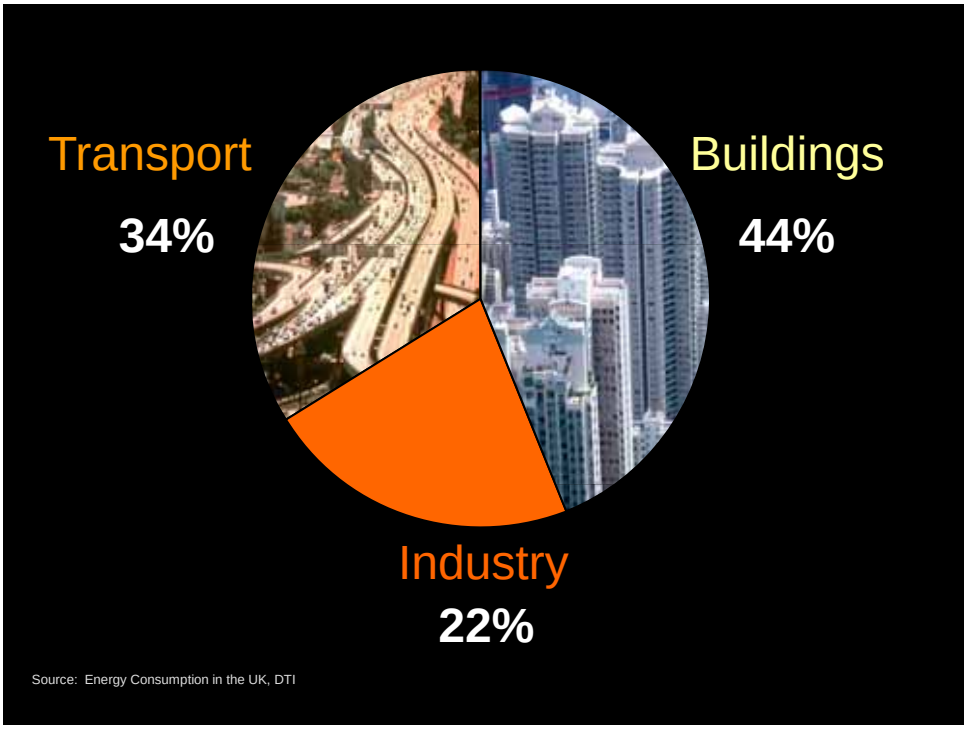
Natural Daylight

Masdar Development, Abu Dhabi

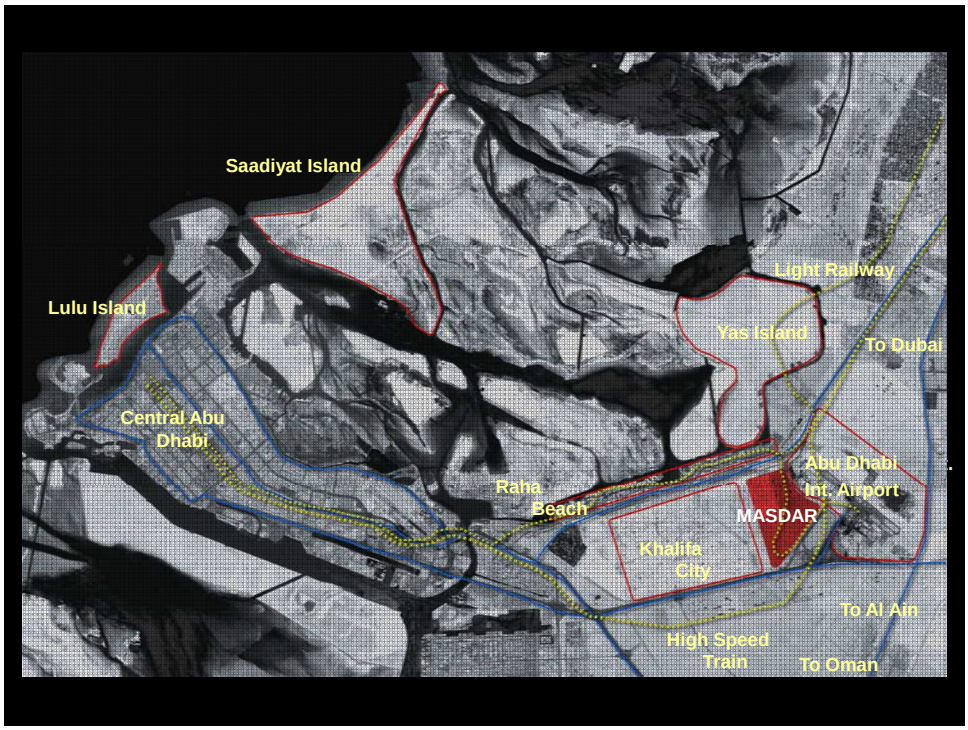
MASDAR

Zero Carbon

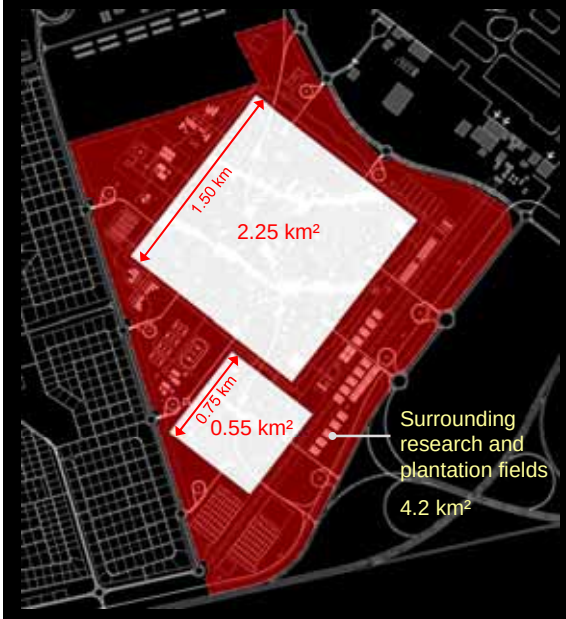
Zero Waste



Source: Energy Consumption in the UK, DTI



Area and population



Total Site Area
7 km²

Total Population
90,000

Residents 50,000

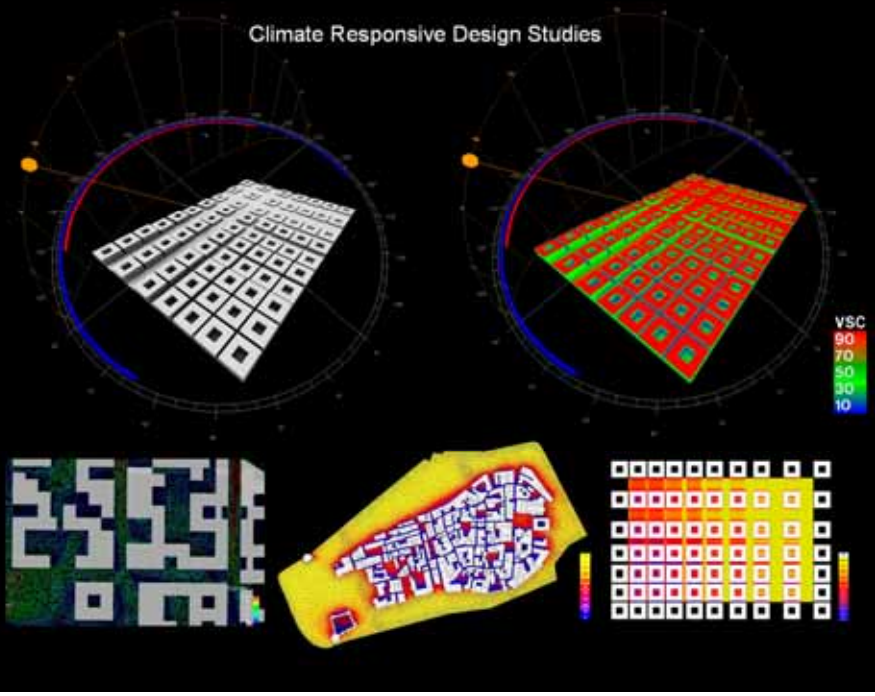
Commuters 40,000

Walled City

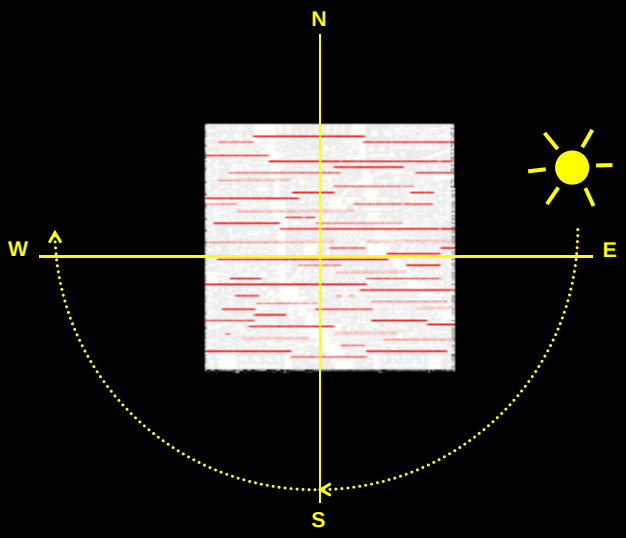
Bagh e Shahzadeh

Shibam

Climate Responsive Design Studies

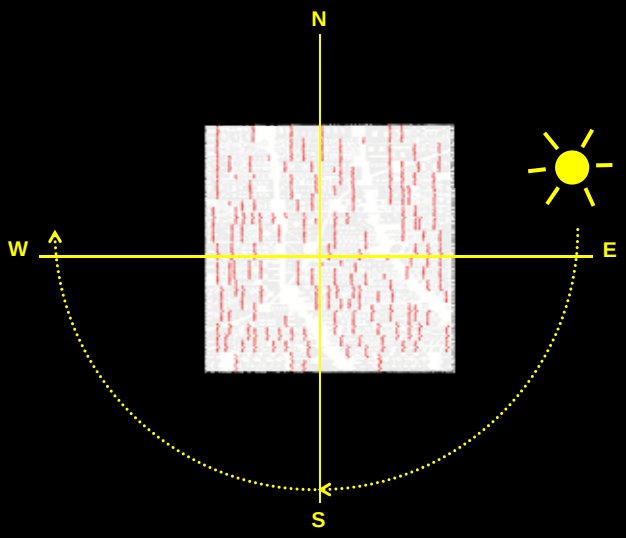


Orientation



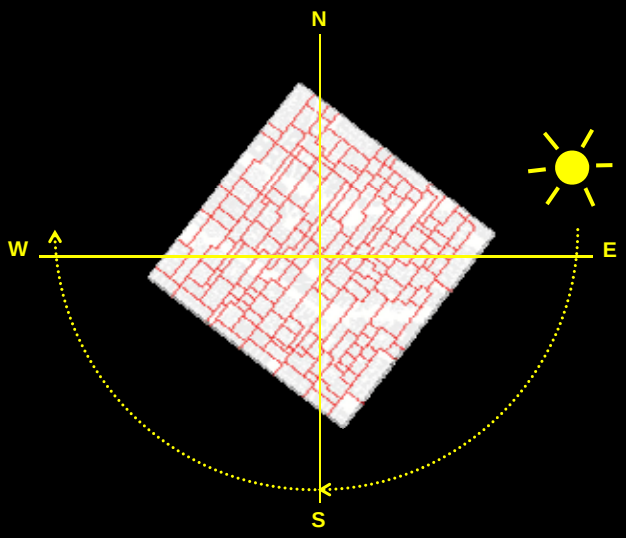
X East – West
maximum heat gain
through sun exposure

Orientation



✓ North – South
minimum heat gain through
natural shading

Orientation



Southeast - Northwest
Optimised Orientation

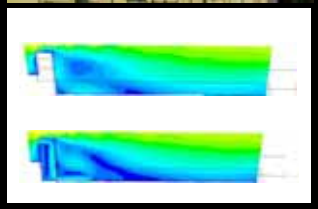
Site – Scale comparison

MASDAR - 135 People / ha

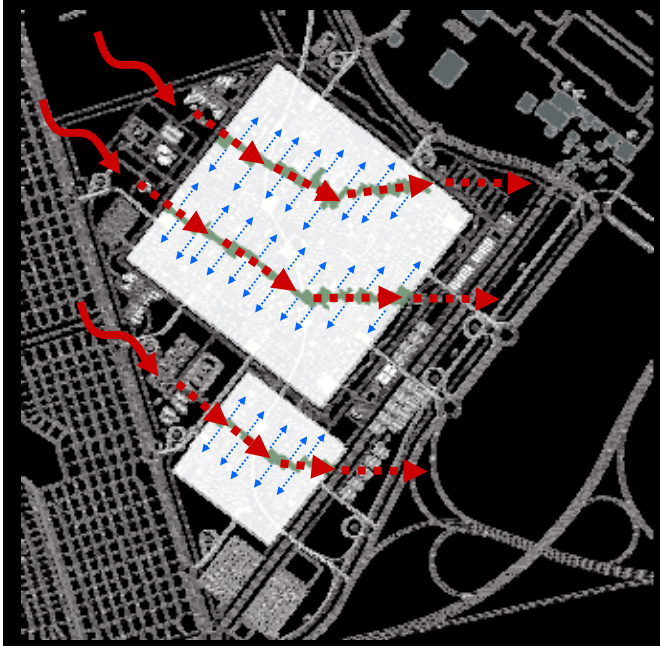
Venice - 115 people / ha

City zones
University
Special Economic Zone
Commercial
Technology Park
Residential
Car Parking
Entertainment / Hotel
Parks

Wind tunnel test

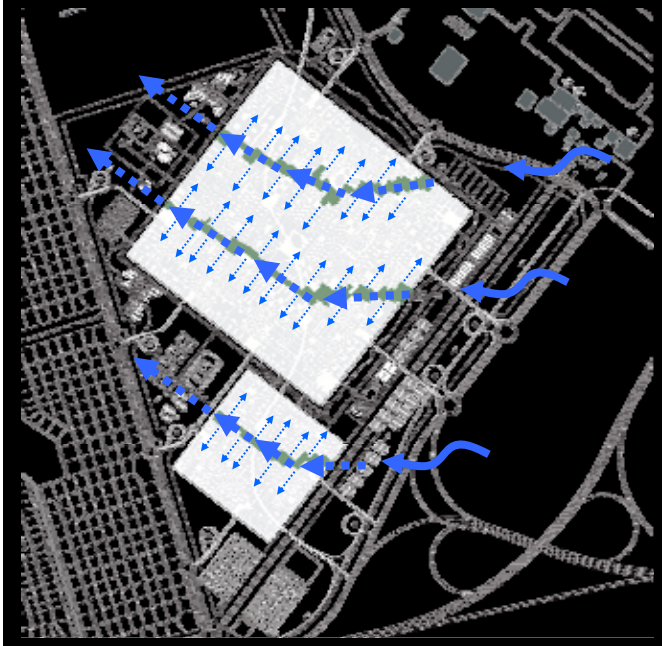


Linear Parks – Daytime wind



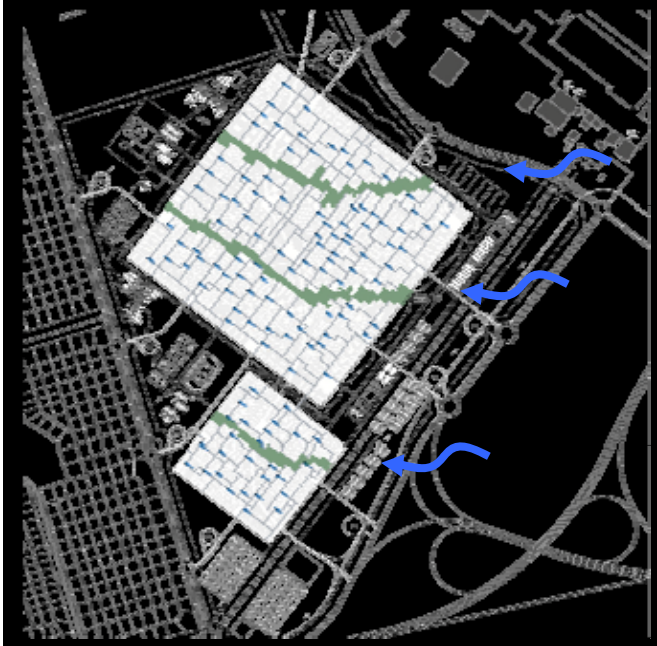
Hot Winds cooled over linear parks provide refreshing street ventilation.

Linear Parks – Night time wind



Cooling of the city through fresh night breeze.

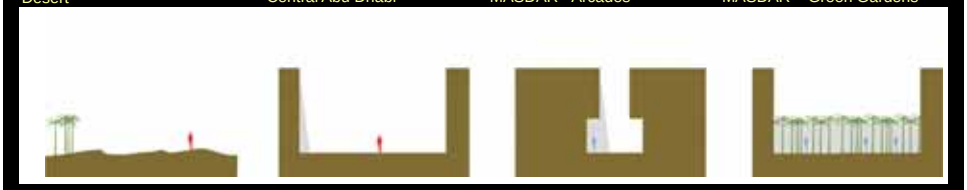
Wind towers – open, cooling the streets

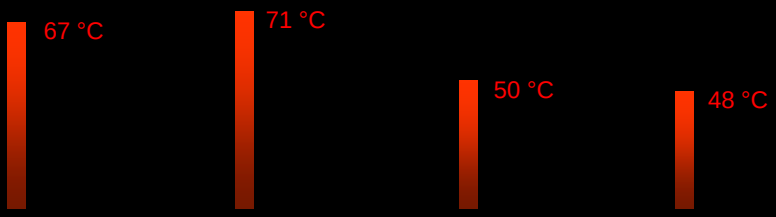


Night-time Cool Winds

Street Microclimate – Felt Temperatures

Desert | Central Abu Dhabi | MASDAR - Arcades | MASDAR – Green Gardens





Street

Private Courtyard

Mobility

Car

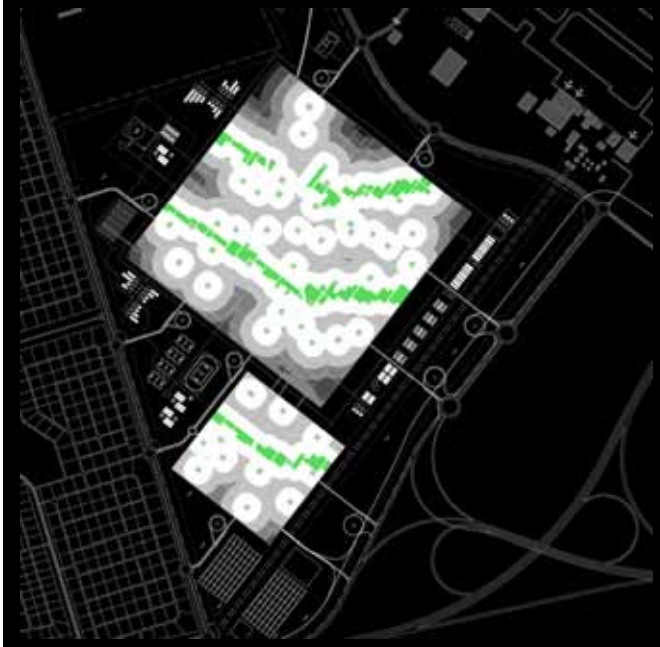
Walking

Cycling

Personal Rapid Transport

Light Rail Transport

Accessible green spaces – Walking distance



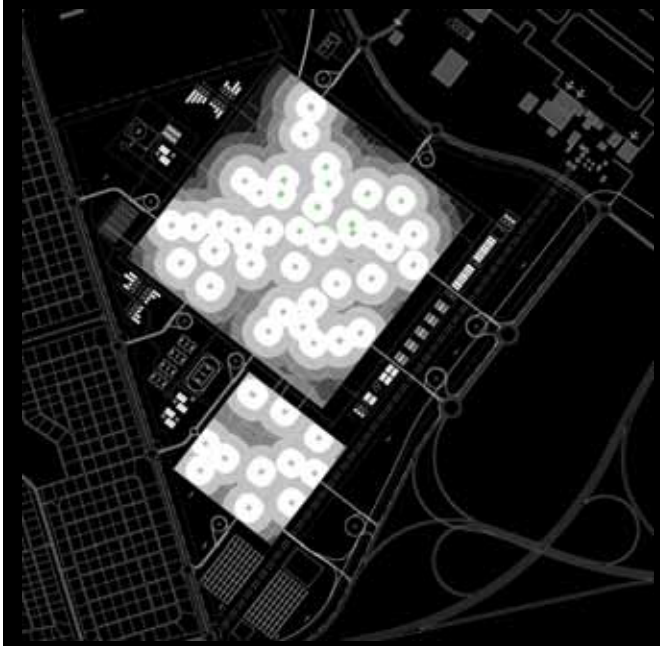
All green public spaces

56%

of the population has access to green space within

1 minute

Accessible public spaces – Walking distance



Public Squares

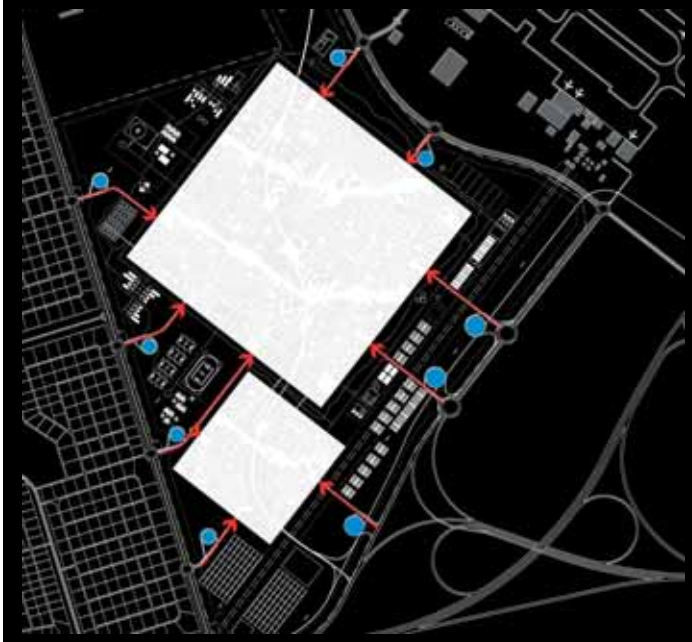
40%

of the population has access to a public square within

1 minute

Central Plaza

Mobility – Car Parking - 50,000 Commuters / Day



Car free City

Layering of the City

Buildings

Pedestrian level

Services

Personal Rapid Transport

Main Infrastructure

Mobility – Light Rail Transport - 50,000 Commuters / Day

Car free City

LRT

Mobility – PRT - 50,000 Commuters / Day

Car free City

PRT

CONVENTIONAL CITY → MASDAR

Building Design	Energy Generation	Waste	Transportation
Conventional	Oil and Gas	Landfill	Fossil fuel
80%		13%	7%

=1,100,000 Tonnes CO_2

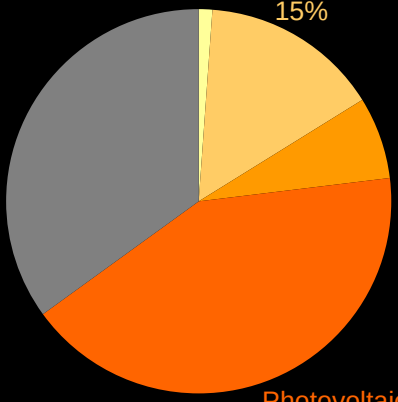
Building Design	Energy Generation	Waste	Transportation
Energy Efficient	Renewable	Recycling / Waste to Energy	Electric / Solar
-56%	-24%	-12%	-7%

-1% Carbon offsetting / Carbon Sequestration

=0 CO_2

Evacuated
Thermal tube
Collector
15%

Wind1%



Concentrated Solar
Power 35%

Waste to energy
7%

Photovoltaic
42%

100% Renewable Energy

MASDAR Water Strategy

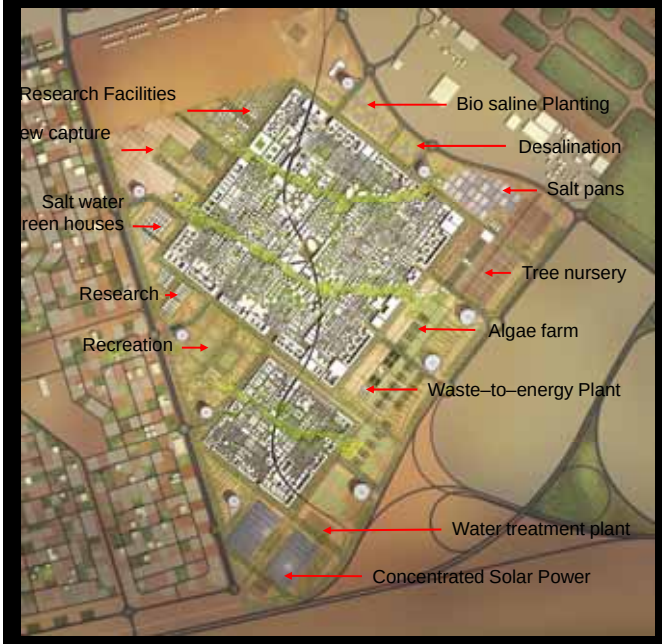
80%
Use of recycled water

75%
Reduction in desalination

Salt recovery
from brine

Landscape strategy

Landscape strategy



© Foster + Partners

© Foster + Partners

The slums of Dharavi – Mumbai

keeping communities together through principles of one planet living
for a secure and sustainable future

Health and Happiness

Case Study: One Planet Living, UAE
Masdar Development
The Masdar development will have a cultural centre where an annual events programme that includes a celebration of festivals for all demographic and religious groups represented at Masdar can take place. Construction projects in the UAE are thought to give little consideration to the working and employment conditions of the labourers but the developers of Masdar City are seeking to challenge this assumption by introducing excellent accommodation, fair wages and world class site safety measures for construction staff.

The Global Problem
Ever increasing consumption is not leading us to increased health and happiness. It is leading to environmental damage.

The Local Problem
There is little provision for formal healthcare locally and no hospital for the 1 million people living in Dharavi. Oral fecal diseases, caused by poor sanitation, are prevalent within the communities. Small, localised industries have significantly contributed to the area's poor air quality, with their use of air kilns and small bakeries. The reality is that these small local businesses cannot afford to ensure the health and safety of their workforce.

Equity and Fair Trade

Case Study: One Planet Living, Morocco
The One Planet Living project in Marrakech has identified ways in which hotels within the tourist development can support local businesses and associations in supplying the items shown above. Fair wages and working conditions will be encouraged for all suppliers to the CIPL development, for example in soft furnishings and linens for the hotel and goods for sale in the hotel boutiques.

The Global Problem
Some in the industrialised world live in relative poverty, while many in the developing world cannot meet their basic needs from what they can produce or sell.

The Local Problem
Barely 10% of the commercial activity within Dharavi is legal. This leaves residents open to exploitation, whether in working conditions or pay and impacts directly on the quality of life for residents and workers. The industries within Dharavi – leather, pottery, food processing, garment factories, jewels, gems and metal work, have made a number of the slum dwellers wealthy – some of these industries are manufacturing goods for a global market and there is local unease about the redevelopment project. Poverty arises from low wages, coupled with informal and uncertain jobs.

Natural Habitats and Wildlife

Case Study - One Planet Living, USA
Sonoma Mountain Village
Sonoma Mountain Village is a 203-acre zero-carbon, zero-waste development in Rohnert Park, California. By restoring seasonal wetlands from their current degraded state and creating ponds and a riparian corridor to link habitats, Codding hope to attract and nurture endangered populations of the California Tiger Salamander. Urban habitat restoration will emphasize diverse species of trees, rooftop spaces, food gardens/chateau garden combinations, and green roofs with undisturbed nesting habitat.

The Global Problem
The global problem is the loss of biodiversity and natural habitats due to development in natural areas and the over-exploitation of natural resources.

The Local Problem
The high density of Dharavi means that much of the district has little or no access to the open space that would support natural habitats and native wildlife. Sector 5 is the location of Mahim Nature Park - a former area of waste ground which is now an educational nature park. Though native species, such as the Gulmohar Tree, are located within Dharavi, they are not properly maintained.

Sustainable Water

Case Study: One Planet Living Morocco
Marrakech
Development in and around Marrakech is creating a significant burden on the already stretched local water provisions. The One Planet Living development seeks to address the issue by using water-efficient fittings and native planting combined with an education programme to reduce consumption and recycle as much water as possible on site, through a blackwater treatment plant for use in toilet flushing and irrigation. Innovative methods of water collection, such as dew collection, are being investigated as innovative sources of water.

The Global Problem
Local supplies of freshwater are increasing this pressure and often result in the depletion of existing stocks.

The Local Problem
Uncontrolled development, with the associated population growth, has led to high demand for water. Not all properties have access to running water, hence the occurrence of water borne diseases. Demand on waste management is far greater than the infrastructure's potential - just 1 toilet for every 1500 people results in open sewers throughout Dharavi. Flood risk is high within Dharavi, through both stormwater and river flooding during monsoon season.

Cuture and Heritage

Case Study: One Planet Living China: Strehan
The project positively promotes the 'culture and heritage' principles through strategies that feature the development of a 'cultural street' and space for the local Cantonese Opera. A NingBan Culture Gallery will be created within the public areas where NingBan art and NingBan Style drawings will be exhibited - this will also provide a platform for the Yue Opera and the building itself will be a symbol of community spirit.

The Global Problem
Local cultural heritage is being lost throughout the world because of globalisation, resulting in the loss of local identity and wisdom.

The Local Context
We see that the key aspects of local culture and heritage that enhance the community of Dharavi include:
- Performance and entertainment – Bollywood
- Religion – many faiths, religious festivals
- Cricket
- Industry and trade – recycling, pottery, cleaning and cooking services for the neighbouring areas.

Local and Sustainable Materials

Case Study: One Planet Living, UK
Brighton NEQ
The development will be constructed using materials that offer high performance in use, but have reduced impacts in sourcing, manufacturing and transportation (including wood fibre insulation and concrete made with recycled materials). The main structure of the two blocks (8 and 10 storeys high) will be a concrete frame with external clay block infill. Developed by Natural Building Technologies, the system is faster and simpler to build with and will outperform other masonry systems while offering similar build costs.

The Global Problem
Destructive patterns of resource exploitation and use of non-local materials in construction and manufacture increase environmental harm and reduce gains in the local economy.

The Local Problem

Sustainable Transport

Case Study: One Planet Living, South Africa
Sibaya
The project seeks to change an 80% private car use to an 80% public transport use through the following strategies:
- Providing facilities within walking distance to reduce the need to travel e.g. local shops, ATM, healthcentre
- Providing free shuttle buses to Durban, linking in to the existing public transport network, with costs covered by monthly service charges
- Reducing the private car parking available.

The Global Problem
Travel by car and airplane both contribute to climate change, air and noise pollution, as well as congestion.

The Local Problem
There is poor public transport planning and implementation, due to the rapid expansion of Dhaka and the haphazard development has resulted in little or no street design. Much of the area is impenetrable to traditional modes of transport – we need to consider emergency vehicle access and the fact that private car and motorcycle ownership is likely to increase in the future.

Zero Waste

Case Study: One Planet Living USA
Sonoma Mountain Village
This plan will limit the total solid waste sent to landfill to 2% by 2020, ensuring that at least 75% of waste by weight is reclaimed, recycled or composted. After designing for waste minimization and future recyclability, Coddings issued a new standard set of specifications to ensure the use of deconstructable assemblies made in a controlled factory environment on site. A new factory (www.coddingsllc.com) produces no garbage, runs on 600% solar power and creates wall, roof and floor assemblies that can ultimately be recycled.

The Global Problem
Waste from discarded products and packaging create a huge disposal challenge and squanders valuable resources.

The Local Problem
Uncontrolled development has led to poor infrastructure planning and development. It is not possible for waste collection vehicles to move easily within the Dhaka and there is no strategy for the collection of waste that is non-recyclable. There is minimal segregation of waste and non-recyclable waste within Dhaka.

Zero Carbon

Case Study: One Planet Living Abu Dhabi Masdar Development

Masdar City will be the world's first zero-carbon, zero-waste, car-free city. Bioregional has led the development of an ambitious Sustainability Action Plan that aims to enable One Planet Living at Masdar, in association with developers Mubadala, the Foster + Partners masterplanning team and WWF UAE. Zero carbon will be achieved through a combination of measures that include narrow streets to keep hot winds out of the city, the shading of buildings and courtyards and high thermal performance of building facades.

The Global Problem

Climate change has been caused by the build up of carbon dioxide (CO2) in the atmosphere. The situation is a result of human intervention.

The Local Problem

Uncontrolled urban sprawl has lead to poor infrastructure planning and development and the pilfering of mains and use of generators to supply power. The rapid growth in Dharavi has been a key factor in increasing power demand.While generation of electricity predicted to triple over the next 15 years, Mumbai will see an increase in energy demands of up to 10% yet where electricity is available, its use is likely to be efficient due to scarcity.

The 'Zero Carbon' principle implements energy efficiency in buildings and infrastructure, supplying Dharavi with energy from on and off-site renewable sources.

Neptune will reduce energy consumption by 70% compared to the baseline and provide external lighting using solar photovoltaics. We plan to supply 100% of energy from renewable sources by 2020.

Passive Design

The masterplan takes full account of the energy efficiency of passive and active measures, reducing energy demands by:

- Minimizing solar gains
- Minimizing mechanical ventilation requirements
- Providing good access to natural light

Where mechanical ventilation is to be used – for sale units, office and commercial properties – passive design responses minimize climatic control.

Energy efficiency

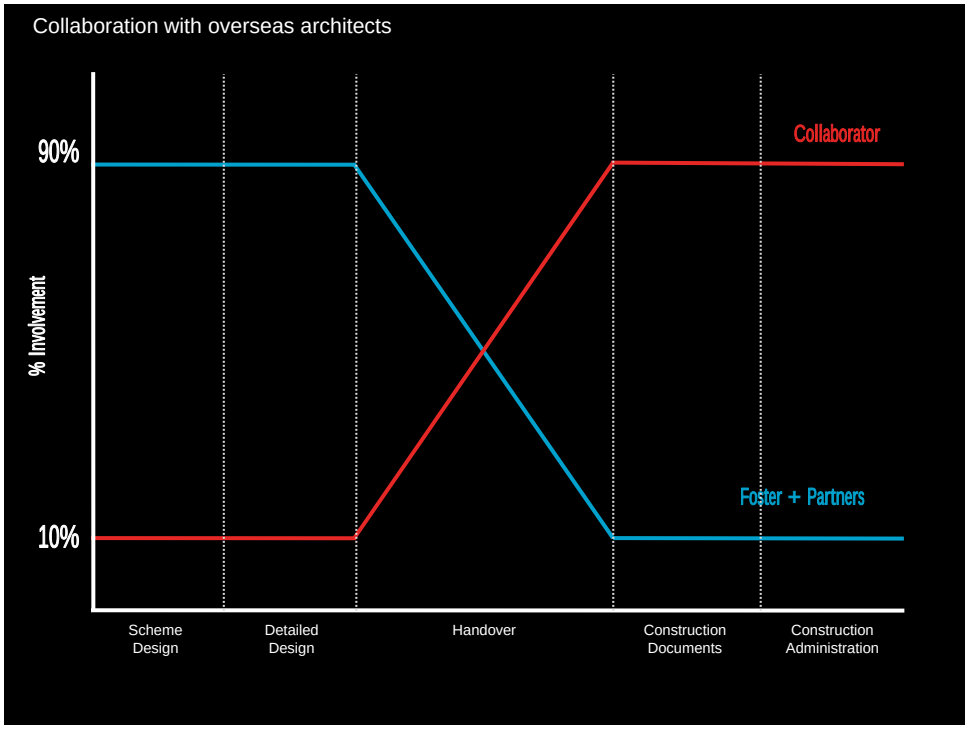
Neptune will ensure that where required, energy efficient appliances and lighting are used to minimize energy demand. The thermal performance of the building will be maximized, providing a comfortable internal environment, and minimising the requirement for mechanical climate control. Use of on-site energy generation will provide carbon reductions and where required, mechanical ventilation or cooling will be provided via tri-generation, thus utilising the waste heat from the energy generation process.

Renewables

Where appropriate, solar water heating will be provided on roofs – this system will contribute to the individual building's hot-water requirements. Additional energy demand can be met with off-site renewable energy facilities and consideration given to the use of an off-site wind or solar farm. These systems will be required to meet the demand for generating zero carbon emissions by 2020.

How do we use invention – the human capacity to explore new ways of doing things – to the benefit of future generations?

By pushing the boundaries of what is possible now – through design –
we can make a difference to how societies develop in the future.


Collaboration with overseas architects
90%
10%
% Involvement
Collaborator
Foster + Partners
Scheme Design
Detailed Design
Handover
Construction Documents
Construction Administration

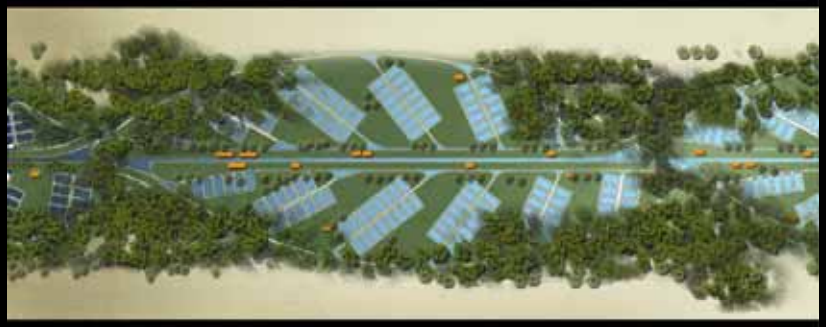
The Catastrophe

2000

Extent of shoreline in 1973

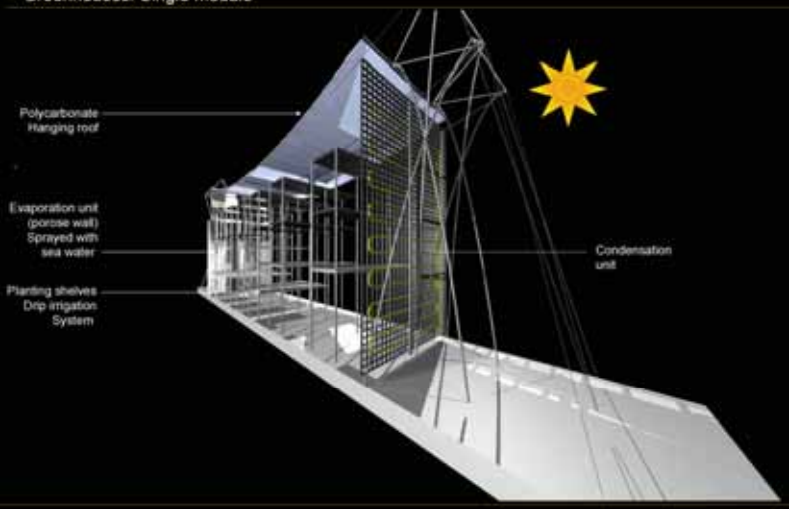
2007 © Foster + Partners

Fish & Shrimp Farms and Mangrove Plantations



2007 © Foster + Partners

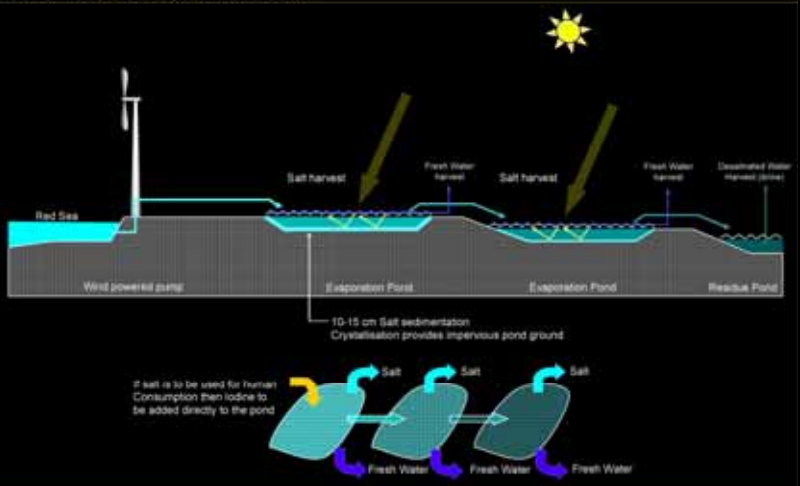
Greenhouses: Single module



Red to Dead
Opportunity Presentation
Foster + Partners

2007 © Foster + Partners

Salt production and water evaporation

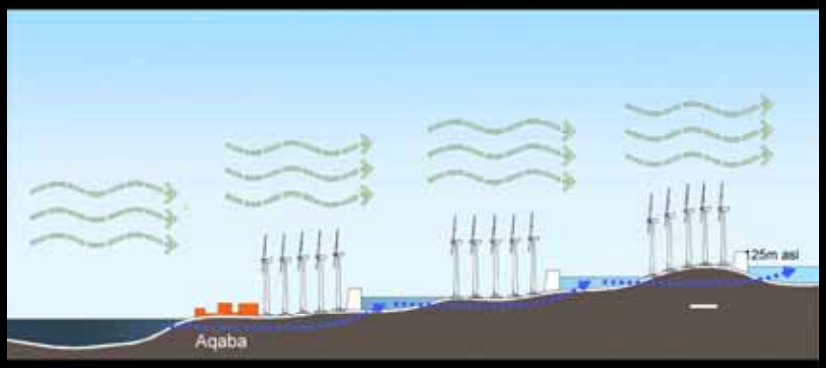


Red to Dead
Opportunity Presentation
Foster + Partners

2007 © Foster + Partners

Wadi Arabah Zone1

Use windpower in order pump Red Sea water from Aqaba over 50km up tp canal level (125 m asl)



Red to Dead
Opportunity Presentation
Foster + Partners

2007 © Foster + Partners

Storm Water Management
About 90% of yearly precipitation in Dharavi is concentrated in the Monsoon season and this causes regular flooding. Other than the problems related to transportation, a number of health issues arise because of this, worsening the poor hygiene conditions of the site and escaping the spread of water related diseases.

Electricity

Waste
Waste has a two-fold aspect within Dharavi. On one side the total lack of centralised collection, cleaning and maintenance systems worsen the health conditions of many inhabitants. On the other, Dharavi is an exemplary recycling community. Recycling is one of the main industrial activities and the city recycles waste not just generated within Dharavi, but also a significant percentage of Mumbai's waste.

The ten One Planet Living principles behind New Dharavi

Health and Happiness
The strategies identified in the masterplan will improve the health, income, knowledge and environment of Dharavi. Through Neptune's sensitive approach to redevelopment, the socio-cultural aspects of the site will be retained and improved.

Equity and Fair Trade
Neptune are approaching the project sensitively - involving the community, protecting livelihoods and creating income-generating activities within the redeveloped project.

Culture and Heritage
We will build on and incorporate the key elements of the local culture and heritage.

Natural Habitats and Wildlife
Dharavi's redevelopment will protect the existing Mahim Nature Park. We will develop a landscape strategy based around the ecological services required on site.

Sustainable Water
The provision of clean water and sanitation for all residents of Dharavi is key to our promise. Through efficient appliances and facilities, domestic water use will be reduced. Flood risk will also be minimised through raised building thresholds and improved flood defences.

Local Food
Sustainable Materials
Sustainable Transport
Zero Waste
Zero Carbon
Sustainable Food
Local and Sustainable Materials
Sustainable Transport
Zero Waste
Zero Carbon