



The Abdus Salam
International Centre for Theoretical Physics


United Nations
Educational, Scientific
and Cultural Organization


International Atomic
Energy Agency



**Workshop on "Physics for Renewable Energy"
October 17 - 29, 2005**

301/1679-24

**"Buildings for Sustainable Development:
Climate, Social & Comfort"**

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Chairperson, World Renewable Energy Congress
Director-General, WREN
Brighton, United Kingdom**

**BUILDINGS FOR
SUSTAINABLE
DEVELOPMENT**

Climate, Social & Comfort

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FACTS & CONCEPTS

- We Build to keep for Generation
- We Build to Have Privacy
- We Build To Have Comfort
- We Build To Show Our Status
- We Build To Accommodate
Our, Daily, Seasonal & Future
Family Expansion Needs

Zero Energy Building



Building with Stones





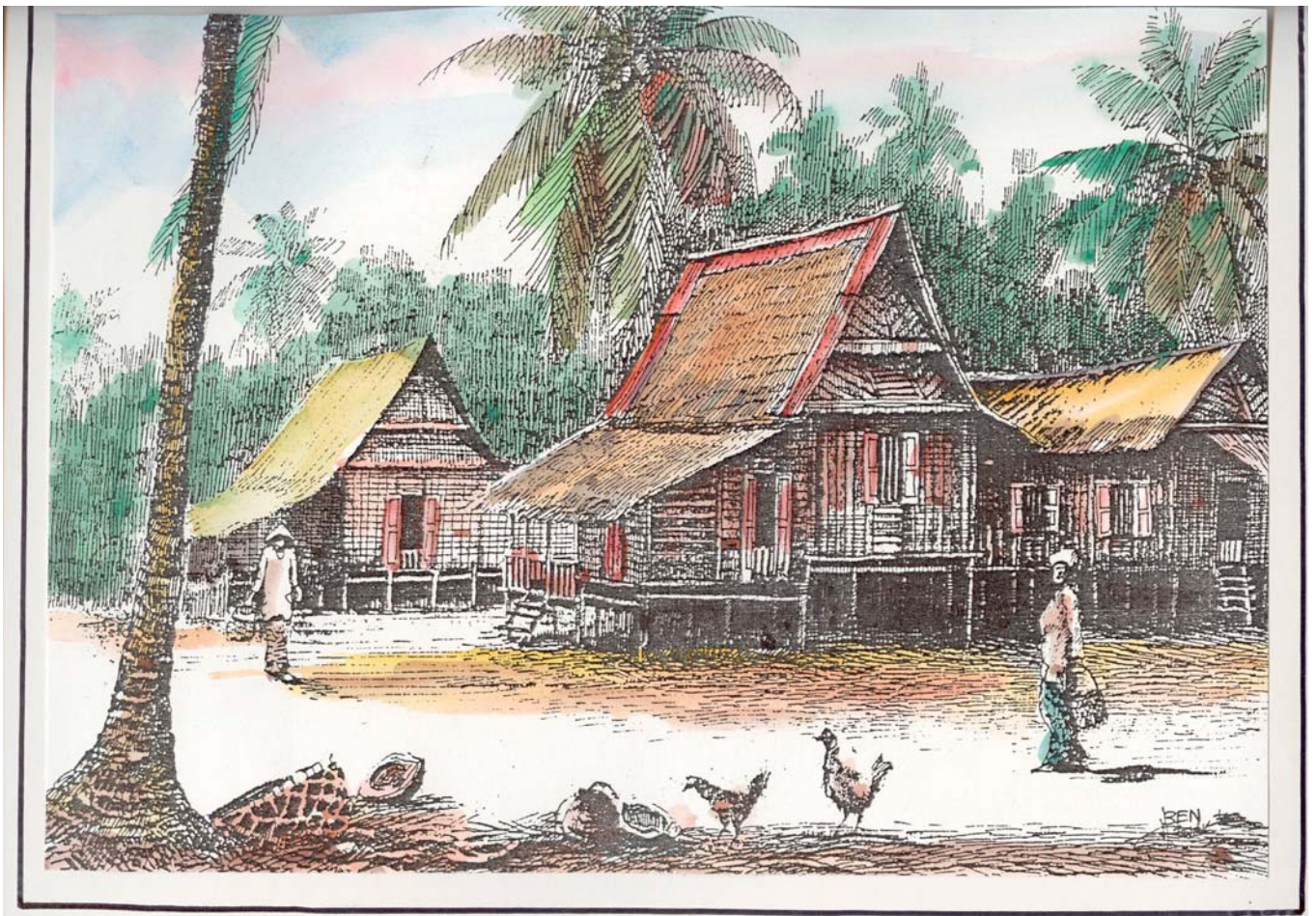
South American Community



Marsh Arab – IRAQ



Malaysian Traditional Buildings

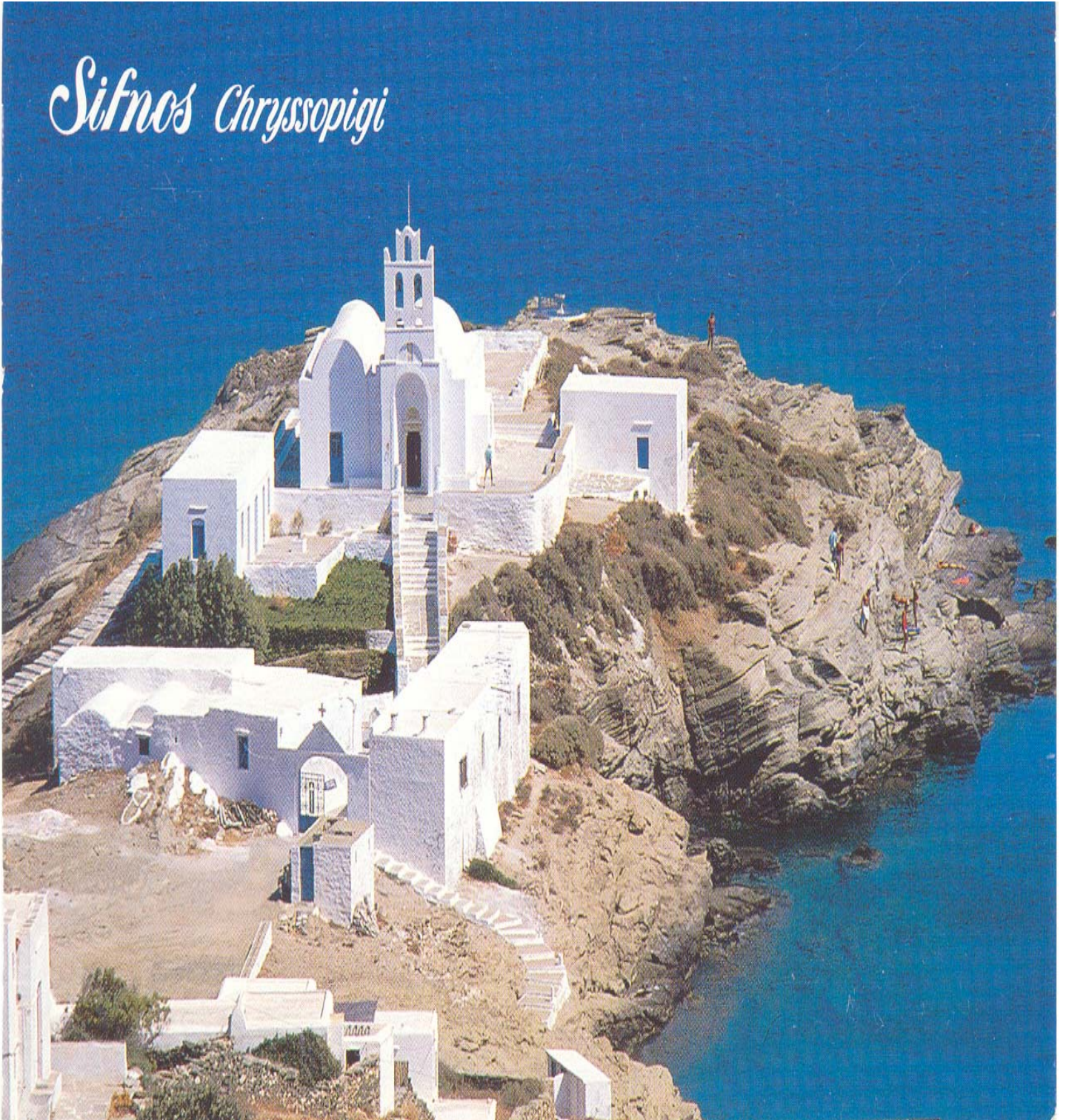


Desert Agriculture Laboratory – Egypt



Sifnos – Greece

Sifnos Chrysopigi



Aerial View – Oxford



Brighton Pavilion



Morocco – Typical House



Modern Tudor House in Cambridge



When A Building is Sustainable

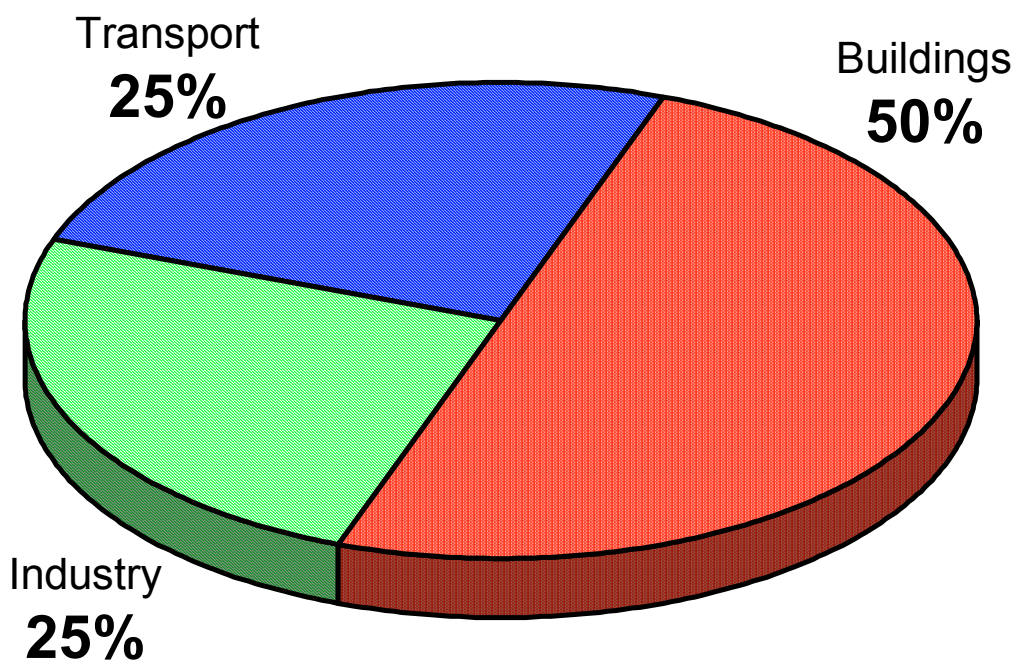
Area	Sustainable	Unsustainable
Energy consumption	Low	High
Embedded energy	Low	High
Comfort	High	Low
Environmental impact (materials)	Low	High
Lifetime	Long	Short
Cost	Low	High
Maintenance	Low	High

Electricity Consumption in Buildings

NAME	Energy Consumption	Consumption Per Capita Wh/yr	Area of Use
Developing Countries	75-95	250-1000	Lighting, Fans, Small Appliances
Emerging Countries	60-75	4000-6000	Lighting, Fans, Refrigeration, Heating Small Appliances
Industrial Countries	45-60	7000-18000	Lighting, Fans, Heating, Cooking and Cooling, All Appliances

Oil Usage in Developed Countries

Proportions of Fossil Fuel Use in Developed Countries

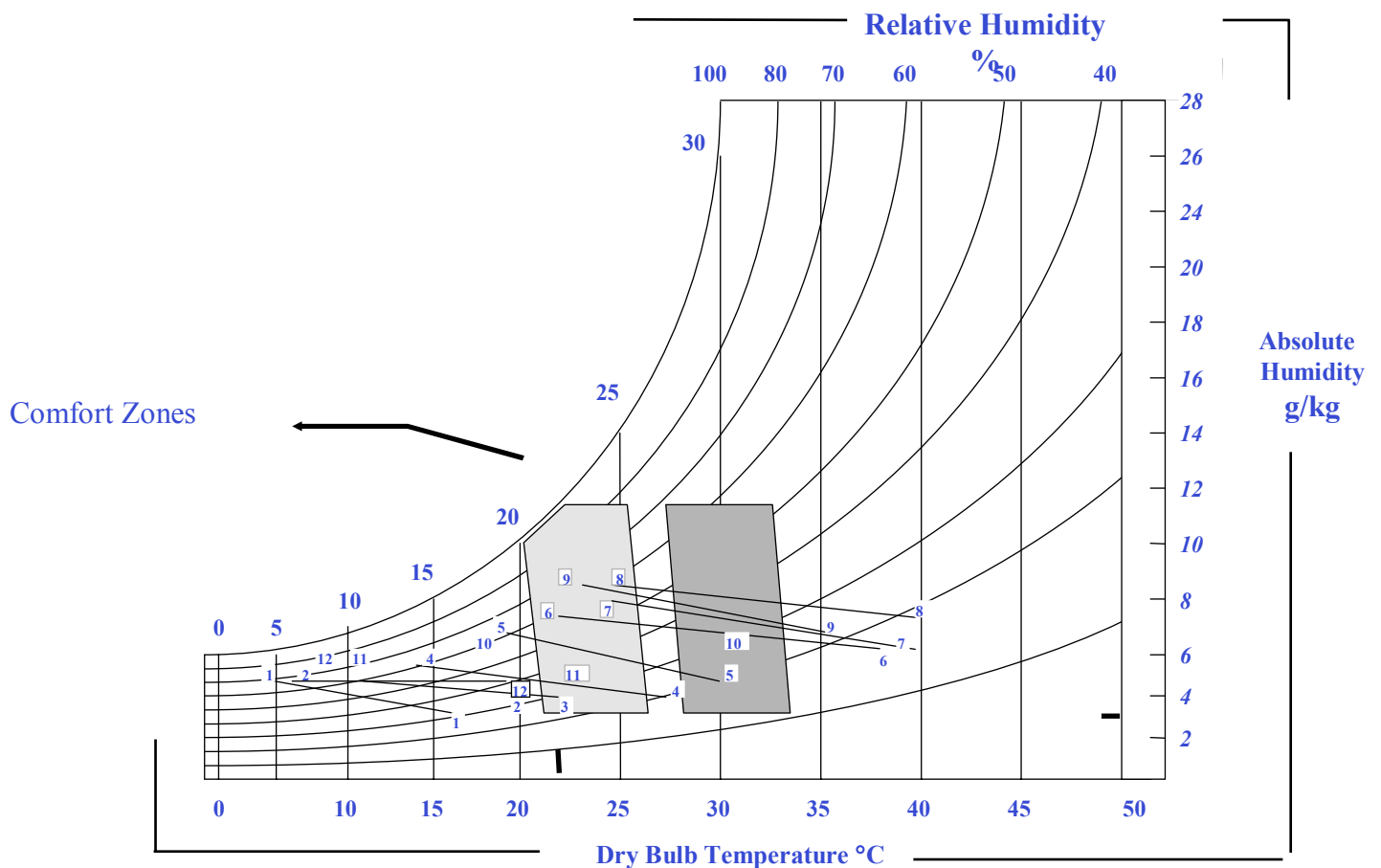


MAX FORDHAM

Where Do We Start

- Climate
- Building Materials
- Shading & Orientation
- Ventilation
- Daylighting
- Micro-climate

The bioclimatic chart for El-Oued, ALGERIA

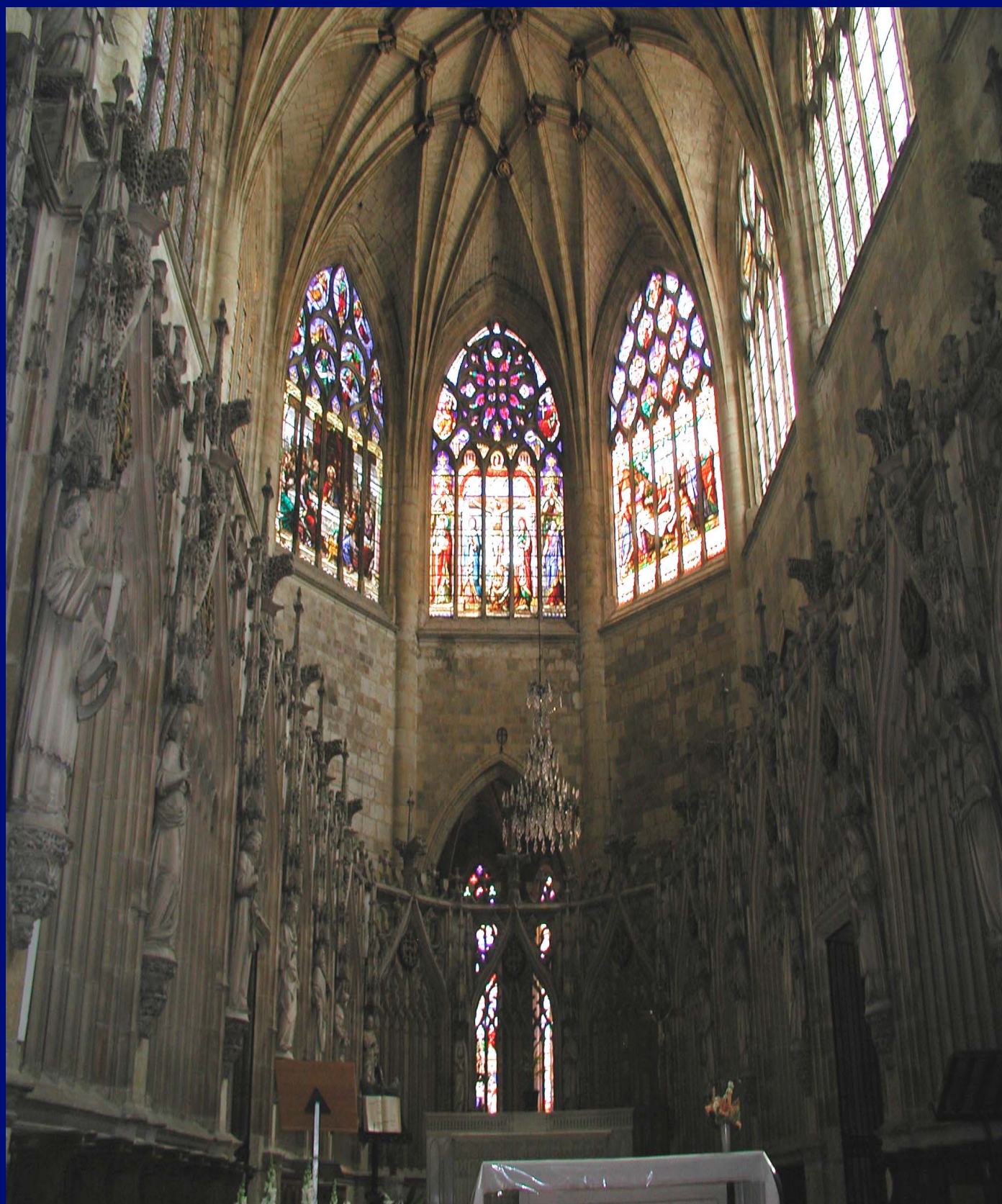




Italian Church in London



Stain glass windows



GLASS ARCHITECTURE

Glass Architecture ... will let the sunlight and the light of the moon and stars shine into the room, not through a couple of windows but, as nearly as possible through whole walls, of coloured glass

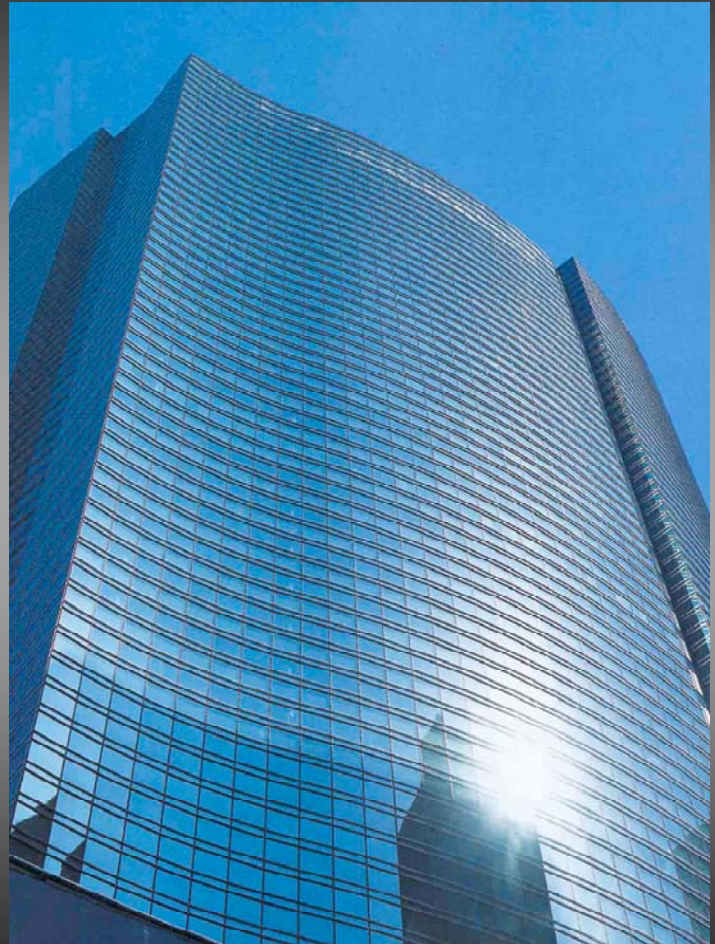
Paul Scheerbart (1914)

Qatar Building



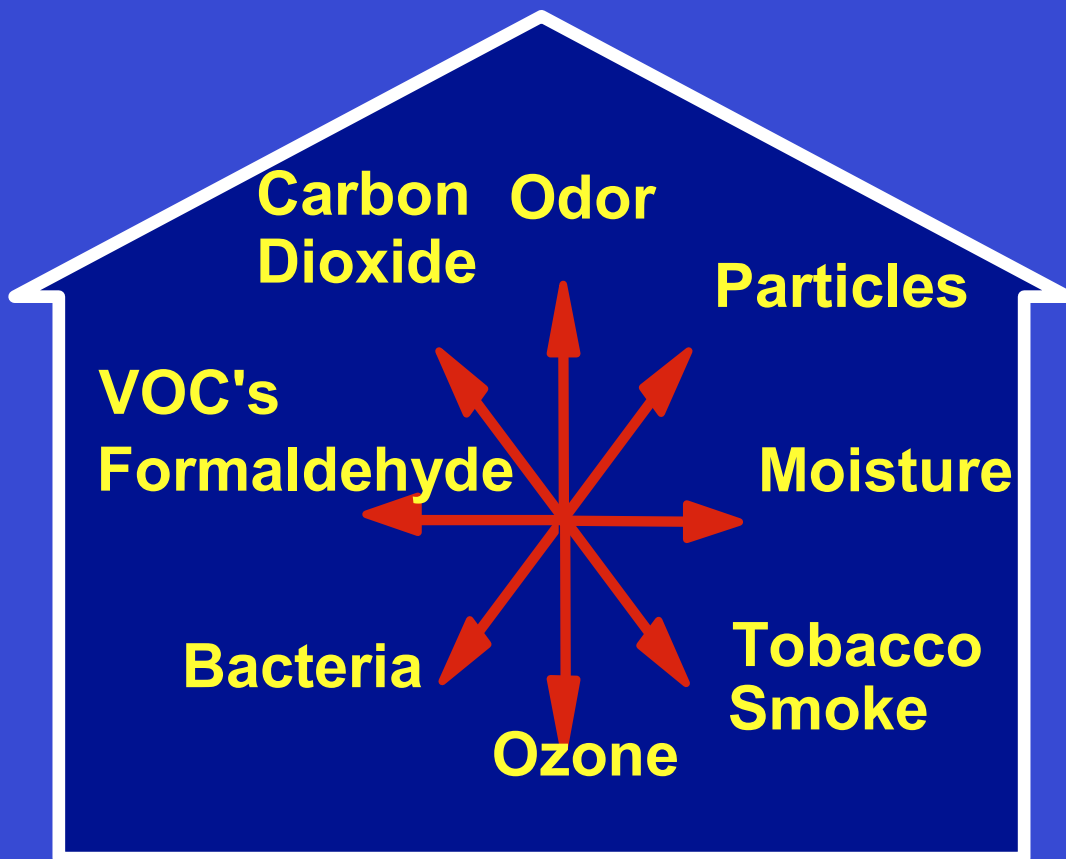


Use of Selective Glass

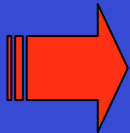


Indoor Air Quality

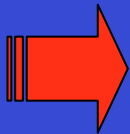
Some Common Indoor Pollutants



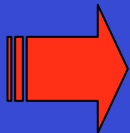
Ventilation Methods



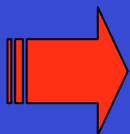
Natural
Ventilation



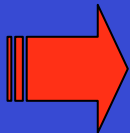
Mechanical
Ventilation



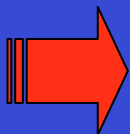
Mixed Mode
Ventilation



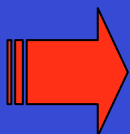
Mixing/Dilution



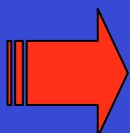
Displacement



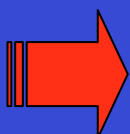
Re-circulation



Single Pass



Ventilation Heat
Recovery



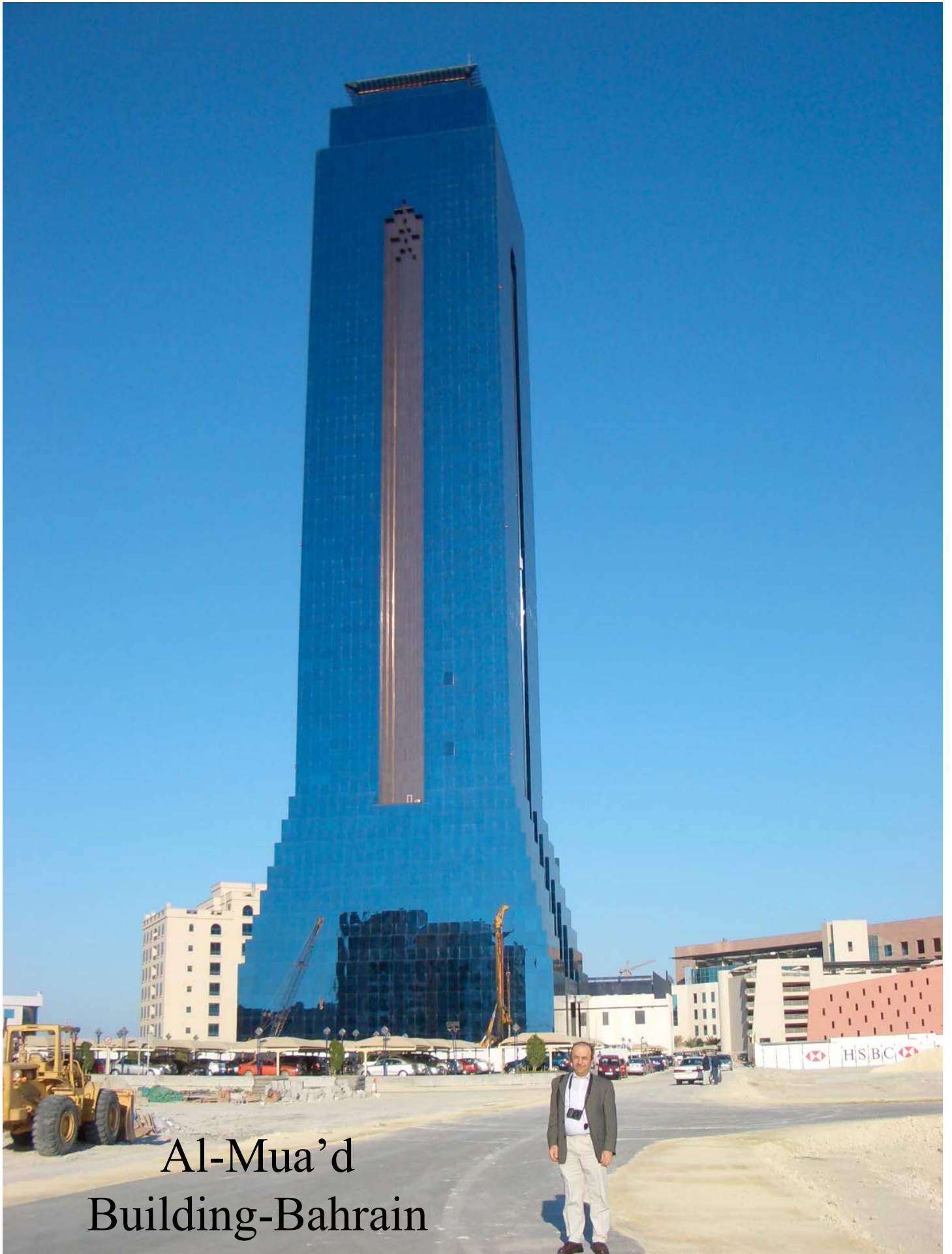
Demand Controlled
Ventilation

Natural Ventilation



Atrium – Bahrain University





Al-Mua'd
Building-Bahrain







Sarah's
www.sarahs.be

MAES

STELLA ARTOIS Dupiler

Loburg
LE MONT DES ARTS

The Little One

LE MONT DES ARTS

Atrium









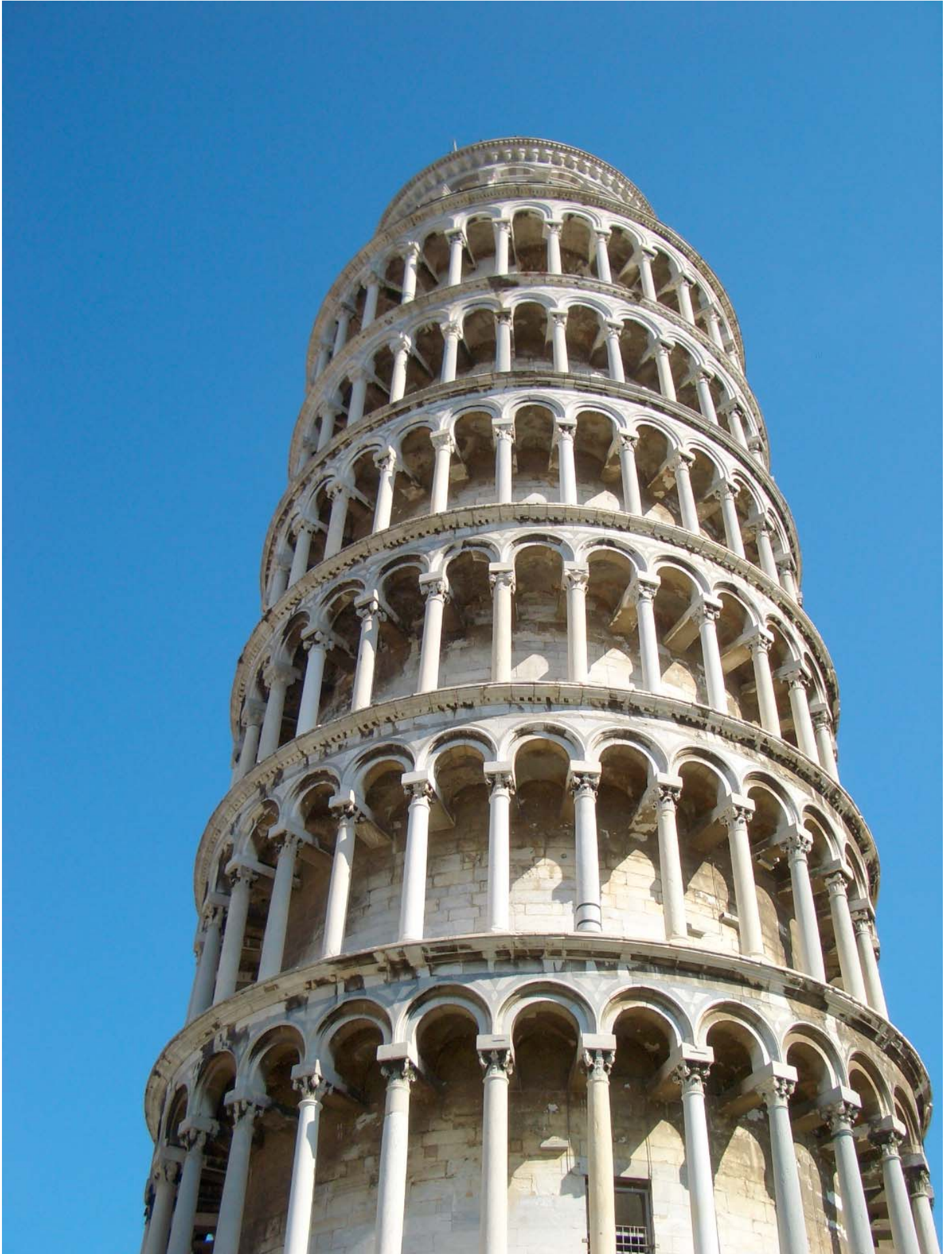


PISA



Tower & Church



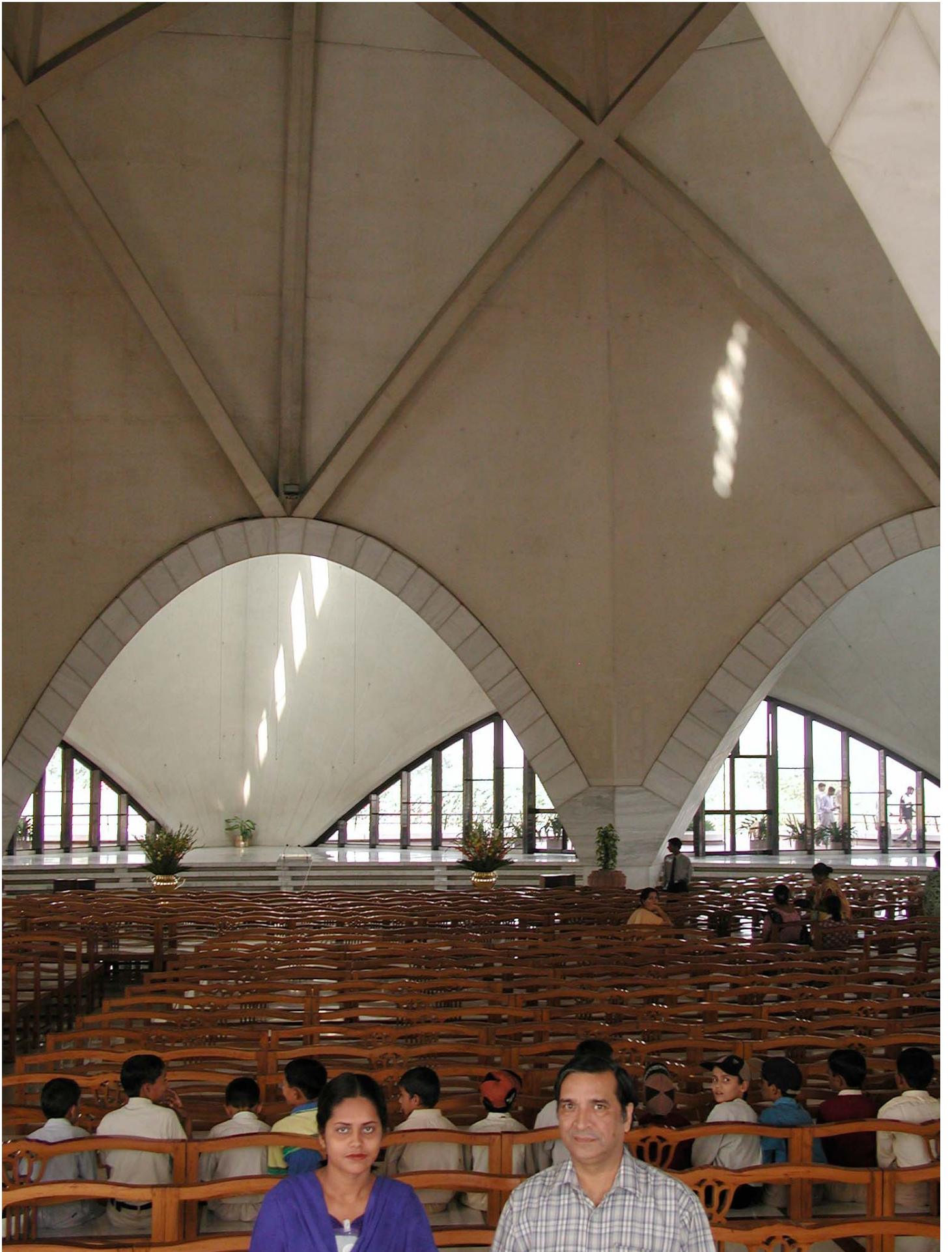




Bahai Centre – India









Sharjah Scene









Malaysia Congress Centre



Cambridge University Hall – sixties architectural movement



Daylighting – The entrance



The Façade and Court Yard



The Dome



Gaudi Architecture

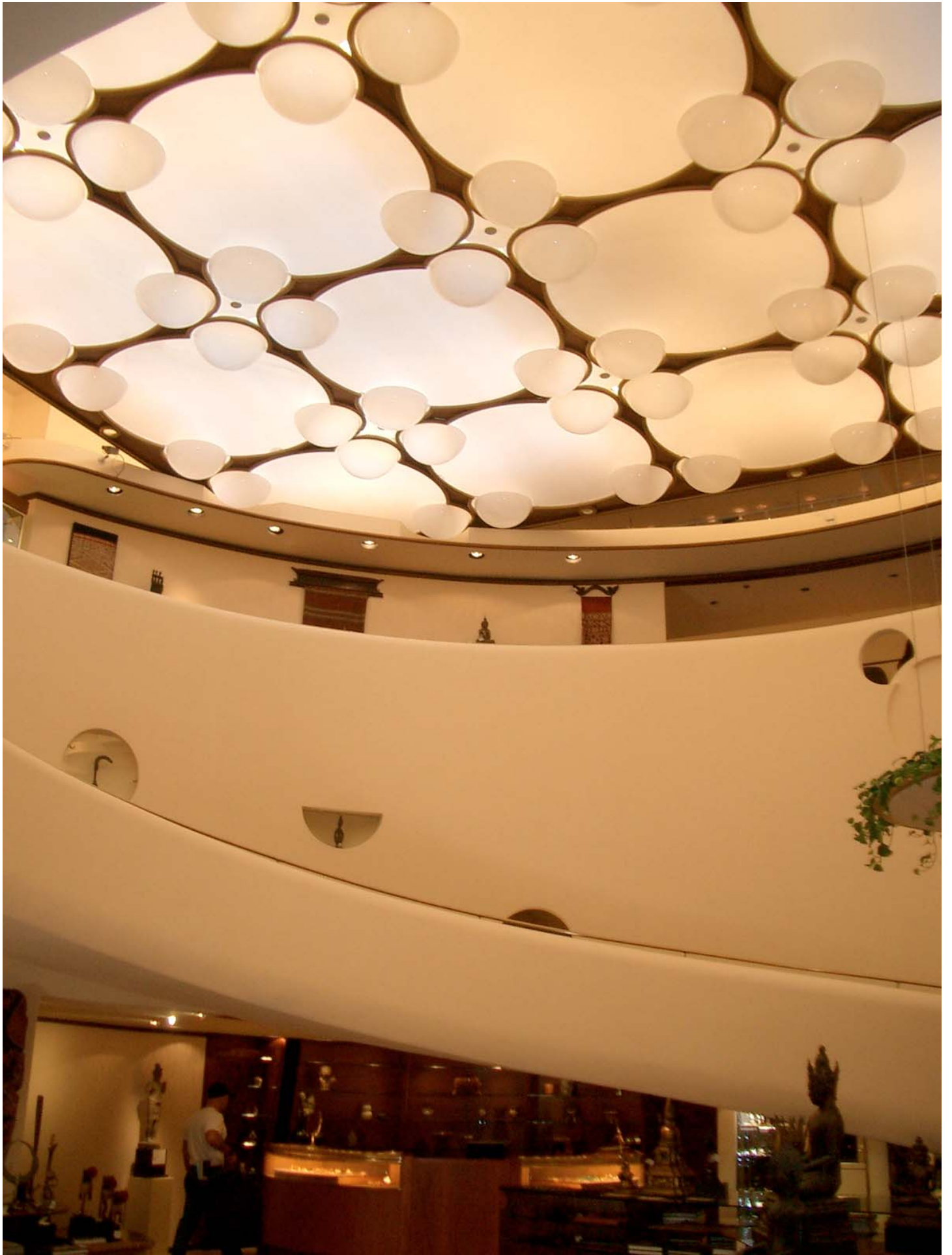


Nothing Straight



Frank Lloyd Wright Building in San Francisco





The Swiss-Rey Building-London







Abu Dhabi

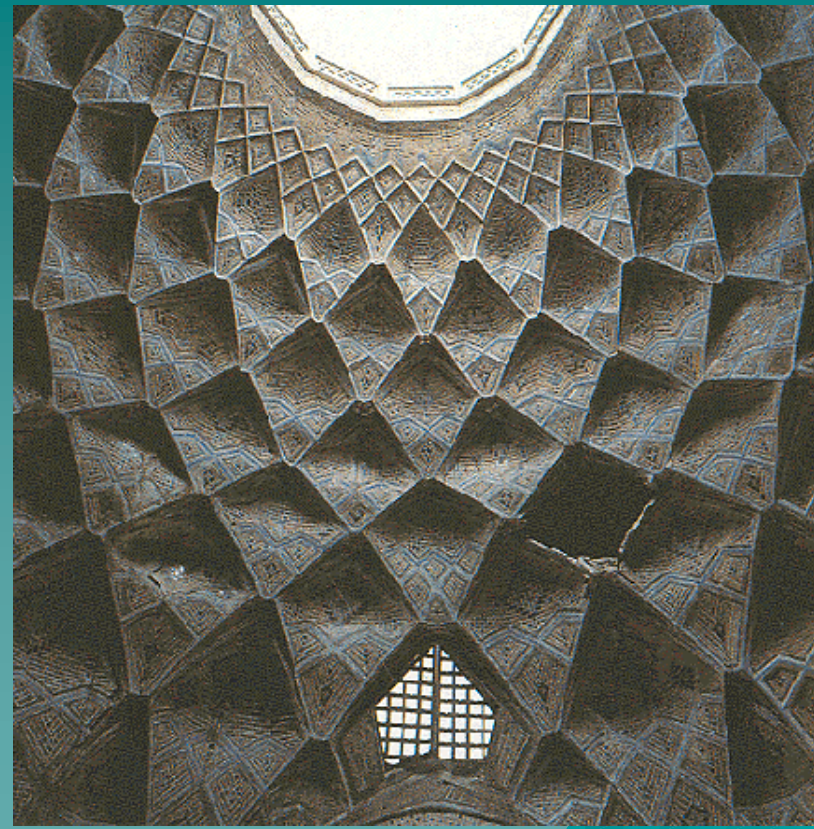








TWO LAYERS DOME



LIGHTING CONTROL

◆ ORIENTATION

