

# Foster + Partners



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# Sustainable Architecture (with architects) The Building Envelope



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FAÇADE CONSULTANTS

# Agenda

- Estudio Marshall Introduction
- Overall Scenario
- The building envelope





Image NASA  
© 2008 Europa Technologies  
© 2008 Tele Atlas  
© 2008 DMapas

34°00'00.00" S 64°00'00.00" O

©2008 Google™

Alt. ojo 11001.00 km

# Estudio Marshall & Associates

- Consulting architectural organisation.
- Founded in October 1998
- Building envelope Consultants
- Profile: Reliable, independant and highly skilled reference
- International activities
- Offices in Buenos Aires + Madrid



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# Projects with:

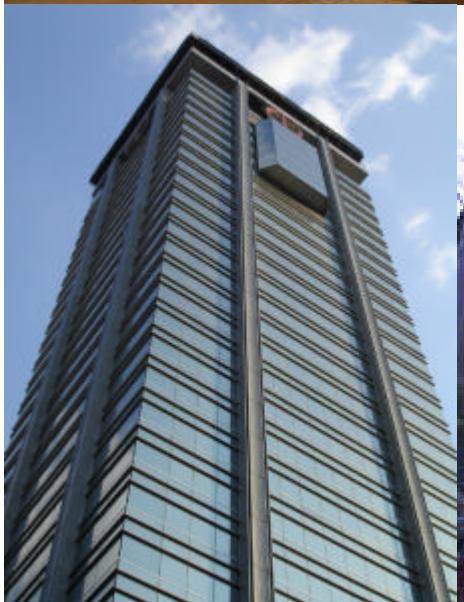
- Foster + Partners
- Rafael De La-Hoz
- Toyo Ito
- Cesar Pelli & Associates
- B720 arquitectura
- David Chipperfield
- Architektonika
- Rafael Viñoly Architects
- Javier Salinas
- Mario Roberto Alvarez
- Manteola, Sanchez Gomez, Santos, Solsona
- Cristian Boza
- Ayesa
- Hyder Consulting
- Arup Facades
- Estudio Lamela – Richard Rogers
- Chapman Taylor
- SOM
- Mangado y Asociados
- Gonzalo Byrne



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America - Europe

# Activities

- Design
- Quality control
- Pathologies
- Education and research



# Projects

- Airport terminals
- Hospitals
- Hotels
- Housing towers
- Museums
- Office towers
- Public buildings
- Religious buildings
- Shopping malls
- Sports facilities
- Theatres



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# Overall Scenario



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# Driving forces

- Social changes
- Increase of world population
- Climate changes
- Fossil fuels depletion



# Social changes

- It has been said that human beings, now spend over 90 per cent of their lives indoors: approximately 22 hours per day at work, home or in shops.
- Different requirements, activity levels and personal preferences



# Increase of world population



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# World Population



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Year	Population
1950	2 529 346
1955	2 763 453
1960	3 023 358
1965	3 331 670
1970	3 685 777
1975	4 061 317
1980	4 437 609
1985	4 846 247
1990	5 290 452
1995	5 713 073
2000	6 115 367
2005	6 512 276
2010	6 908 689
2015	7 369 003
2020	7 850 649
2025	8 324 226
2030	8 762 174
2035	9 181 935
2040	9 606 206
2045	10 037 286
2050	10 461 086

United Nations Secretariat, *World Population Prospects: The 2008 Revision*

# World Population



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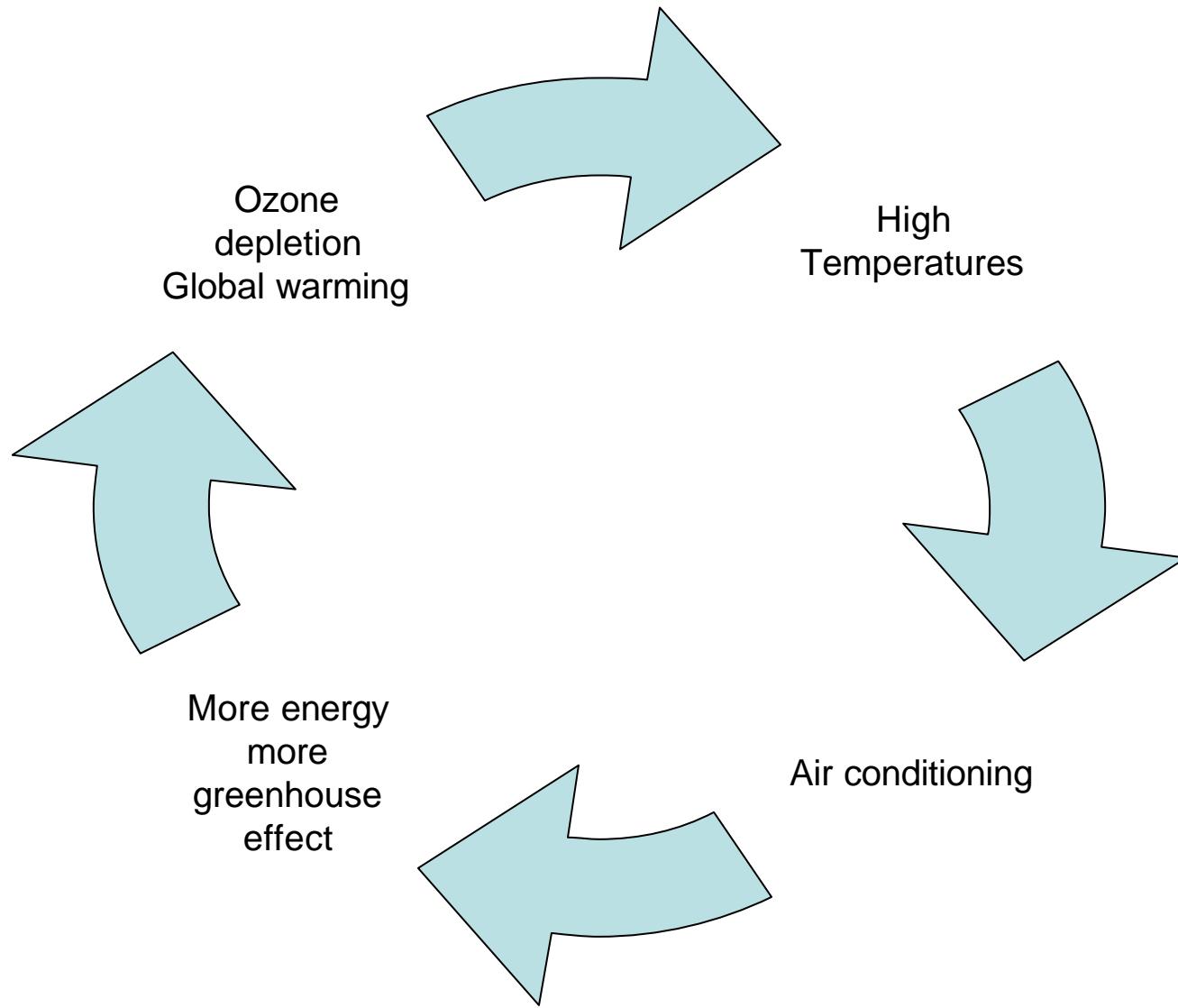


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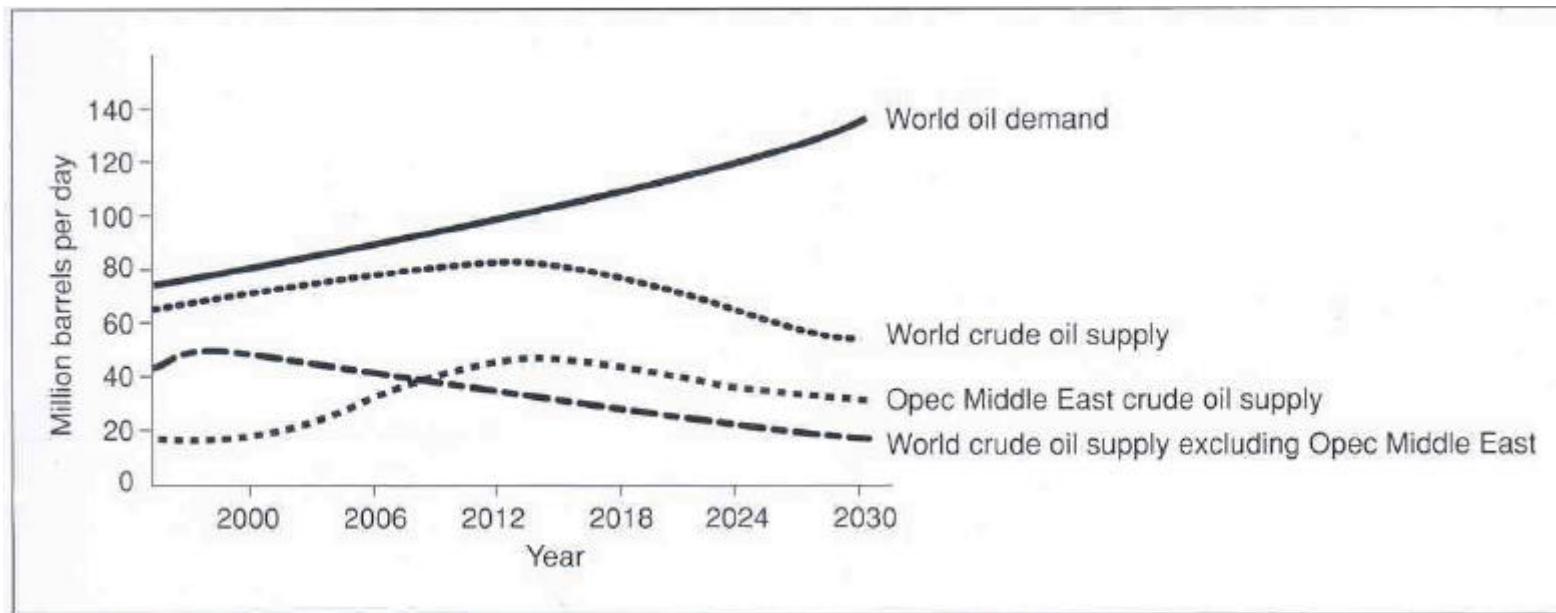
# Climate changes

- Rise in global average temperatures
- Dieback of tropical forests and grasslands
- Rainfall decreases
- Increase in sealevels
- Increase in atmospheric activity





# Fossil fuel depletion



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# Architecture

- Buildings are the single most damaging polluters of the earth.
- Buildings consume more than half of all the energy consumed in Developing countries
- Buildings produce over half of all climate-change gases (CO<sub>2</sub>)



# Sustainable architecture

- Green architecture
- Passive solar architecture
- Vernacular architecture



# Sustainable architecture

- Green design began in 1970s  
(Save energy + use renewable resources)
- Climate change in 1980s  
(Greenhouse effect – CO2 emissions )



# Sustainable ...

- **adjective** 1 able to be sustained. 2 (of industry, development, or agriculture) avoiding depletion of natural resources. (Oxford English Dictionary)
- Related concepts: energy – conservation resources – Action – development.
- Meeting the needs of the present generation without compromising the ability of the future generations to meet their own needs. (Foster + Partners)



# Sustainable architecture

- Term widely abused
- Policies are in place (in some places)
- UK : all new buildings ZERO CARBON by 2016



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# Sustainable architecture addresses:

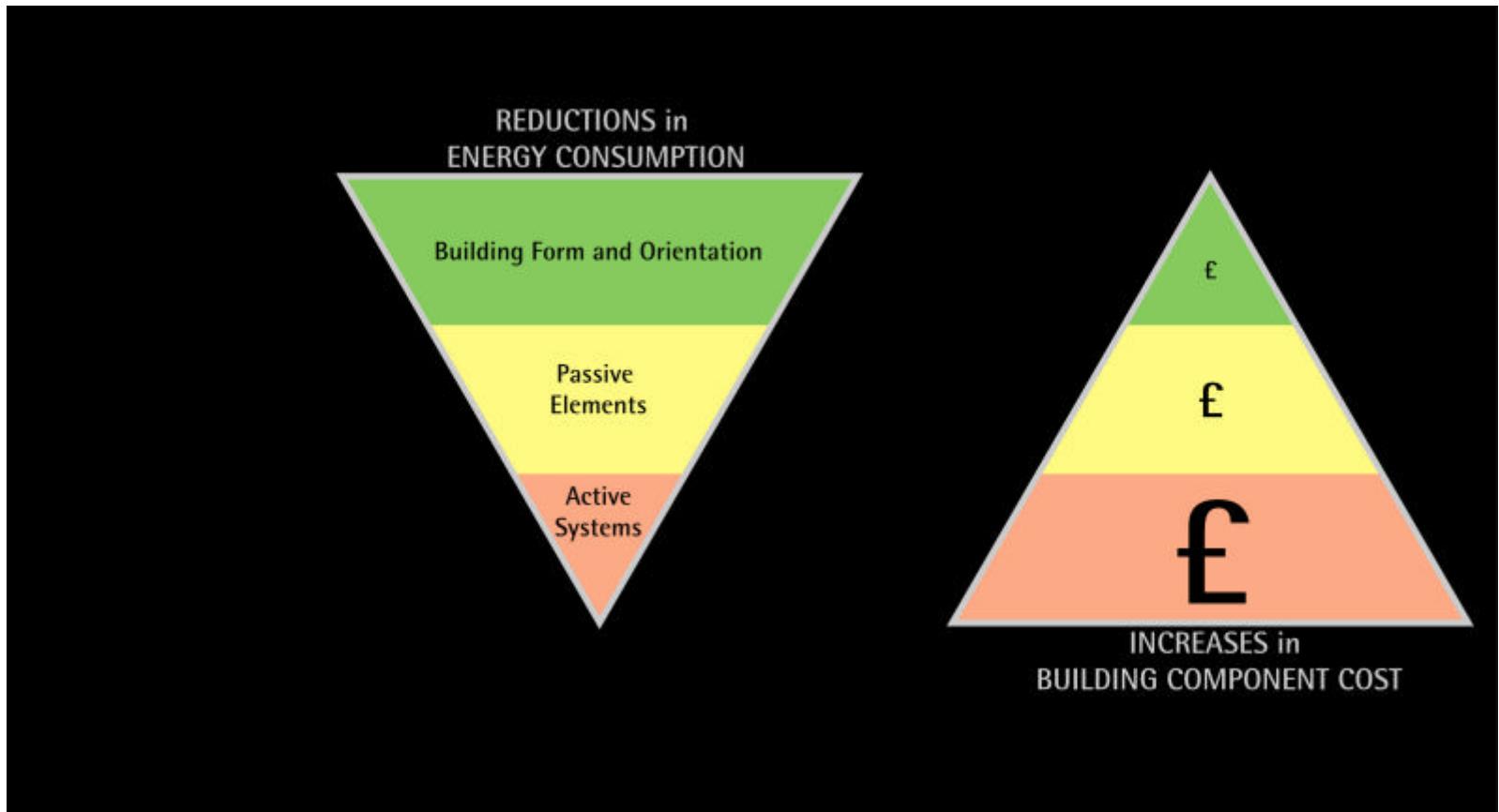
- Energy and CO<sub>2</sub>
- Water
- Materials
- Surface water run-off
- Waste
- Pollution
- Health and well-being
- Management
- Ecology



# Sustainable architecture

- Orientation
- Orientation
- Orientation





F+P



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# Vernacular architecture

Methods of construction which use locally available resources to address local needs.

Vernacular architecture tends to evolve over time to reflect the environmental, cultural and historical context in which it exists.





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Igloo



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House in Cameroun



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Timber house un Ukraine



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Black house in Scotland



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Cave houses – Matera - Italy



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17/10/2009

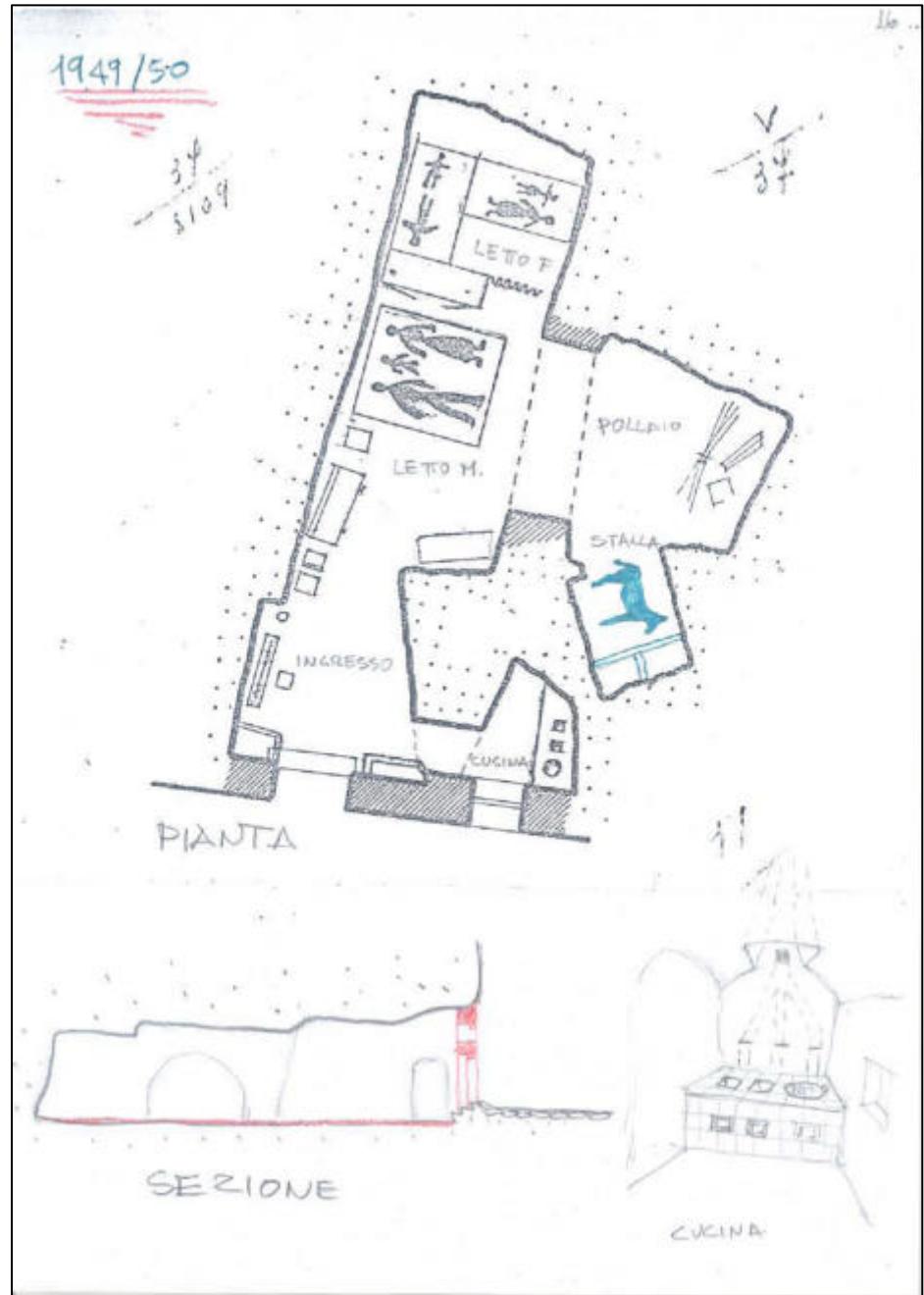
Cave houses – Matera - Italy



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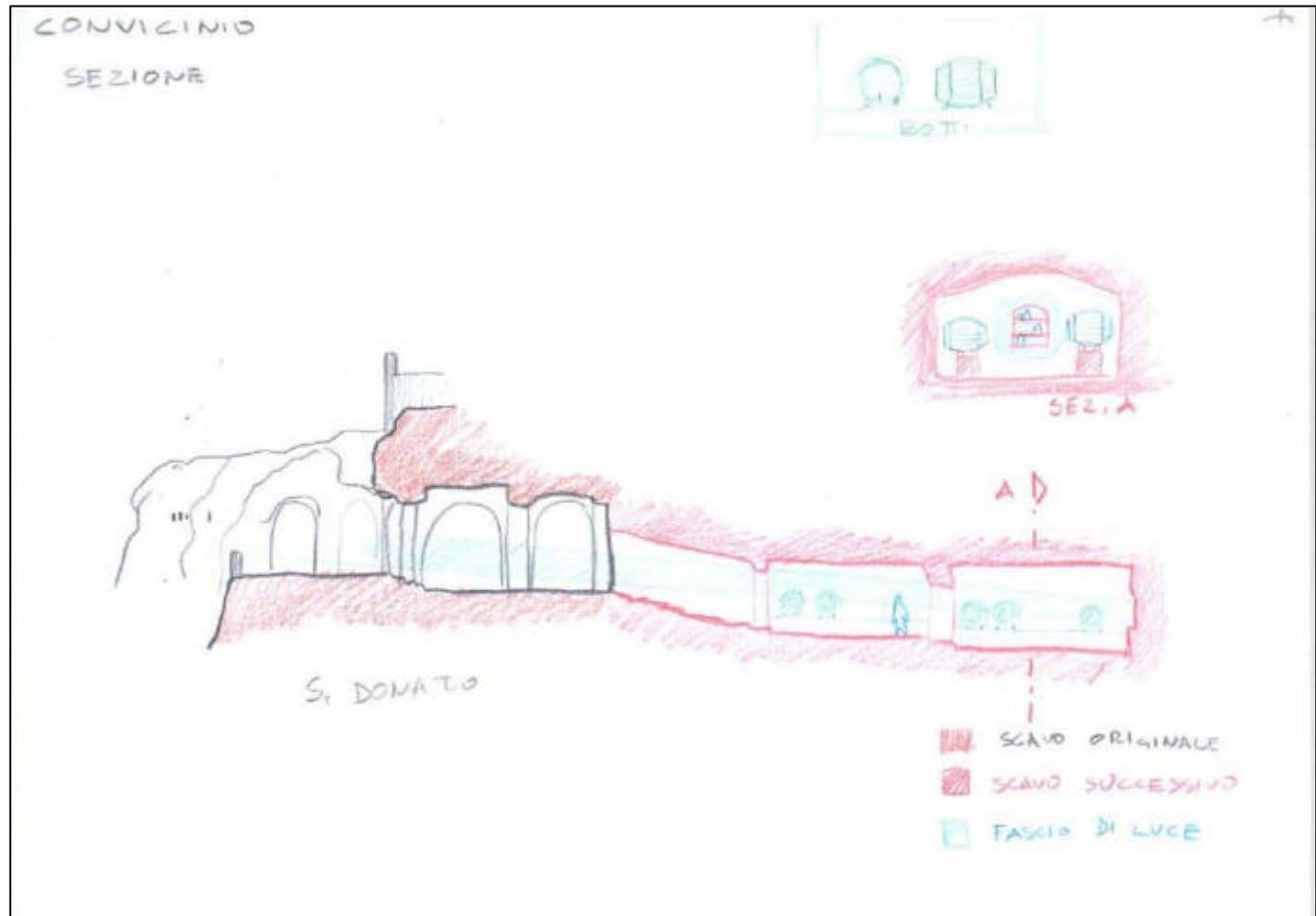
Cave house – Matera - Italy





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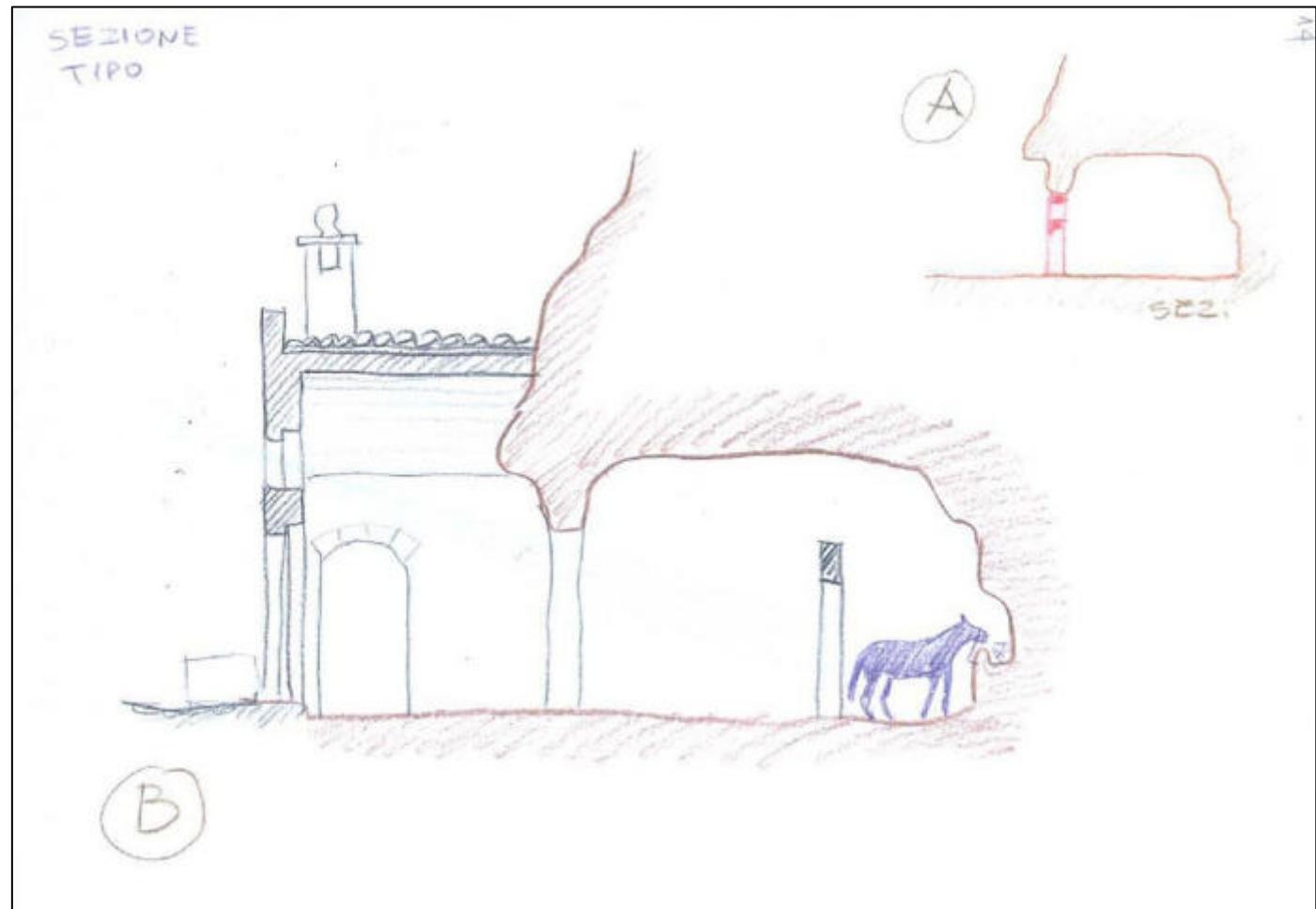
Cave houses – Matera - Italy



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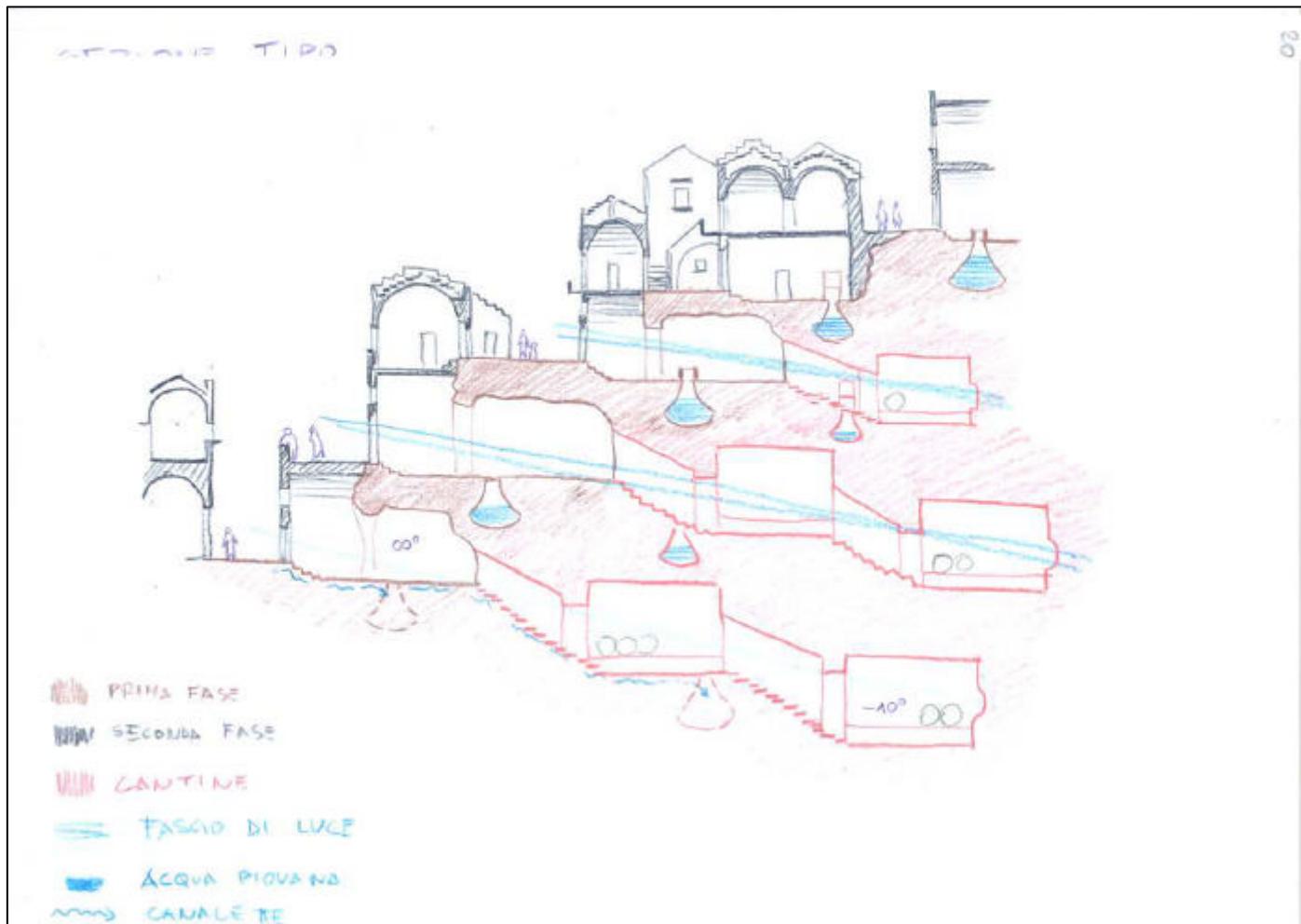
Cave houses – Matera - Italy



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## Cave houses – Matera - Italy



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Adobe house with thatched roof



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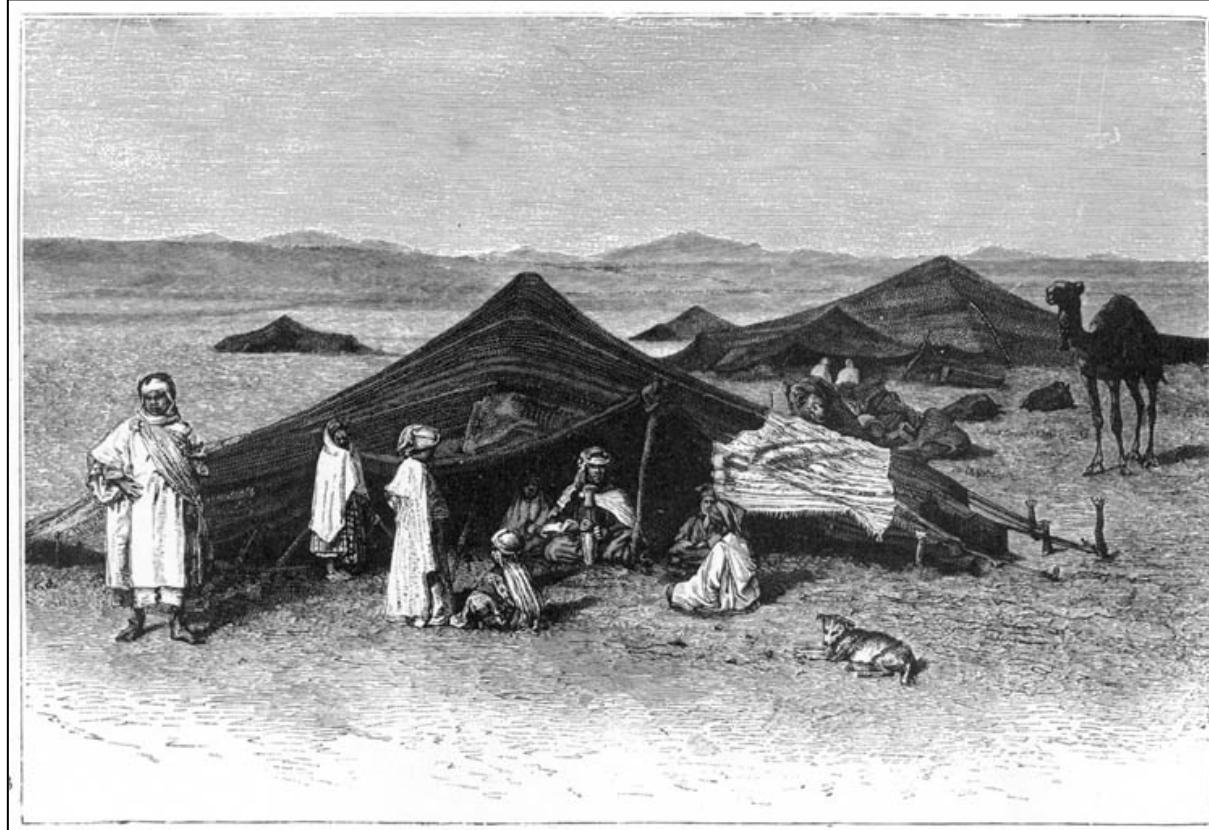
Tipee - Spokane, WA ca 1900



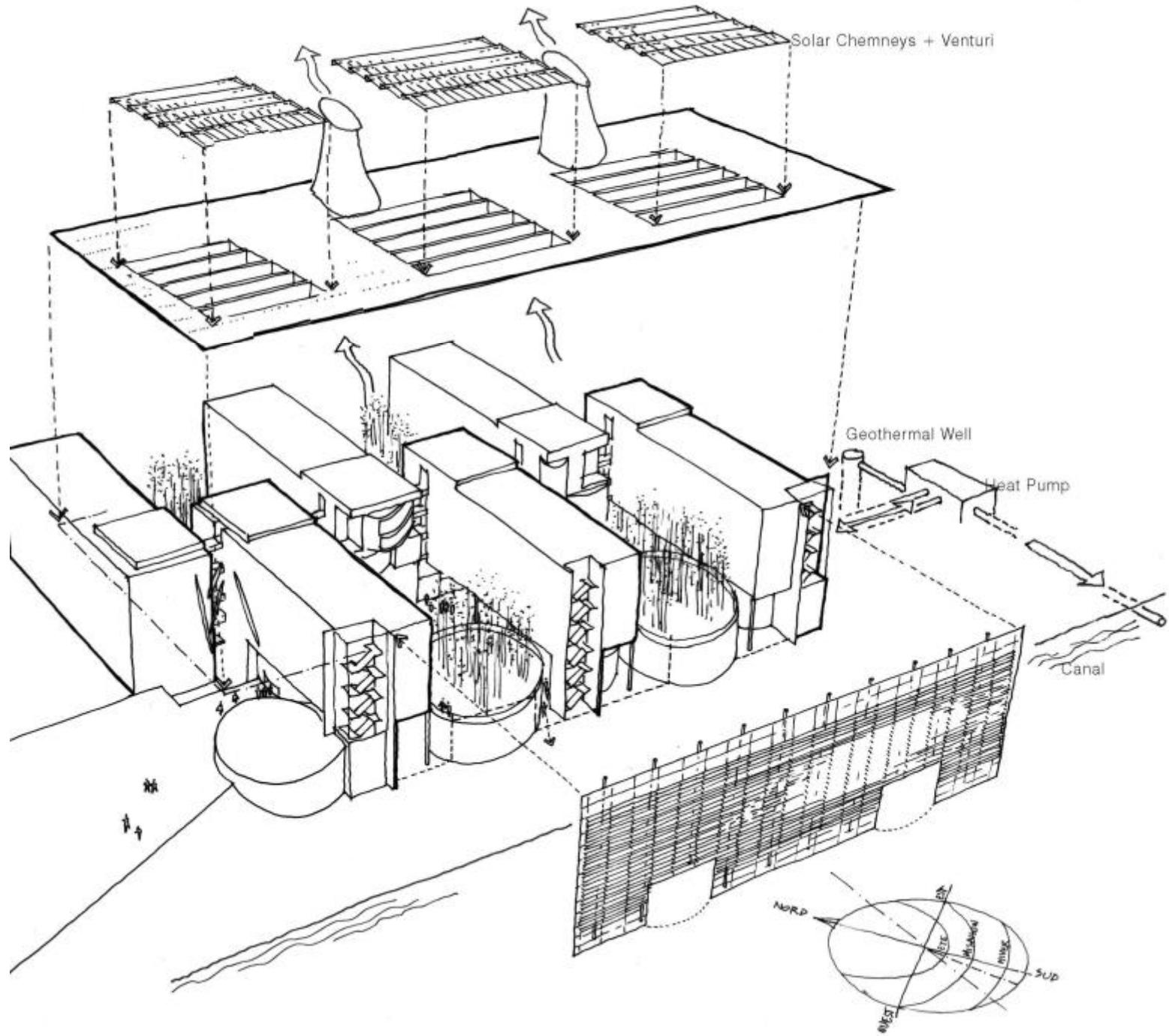
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Arab Tent · Middle Eastern Deserts





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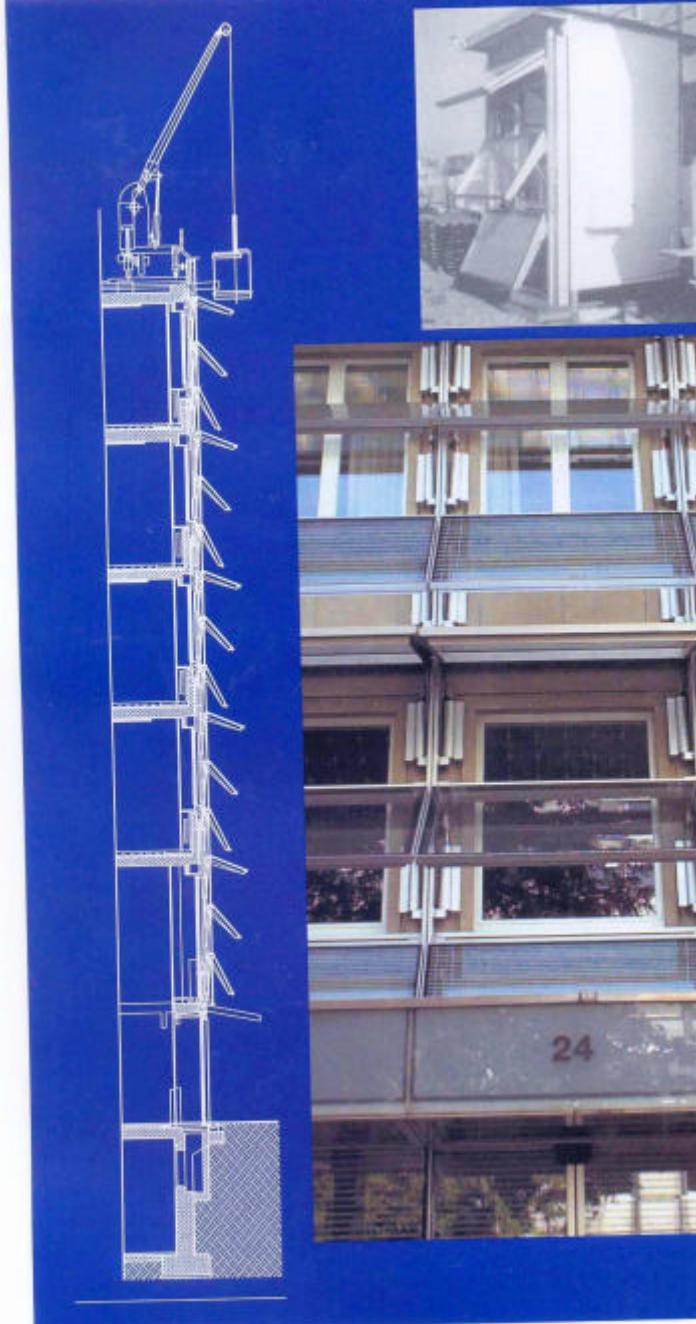




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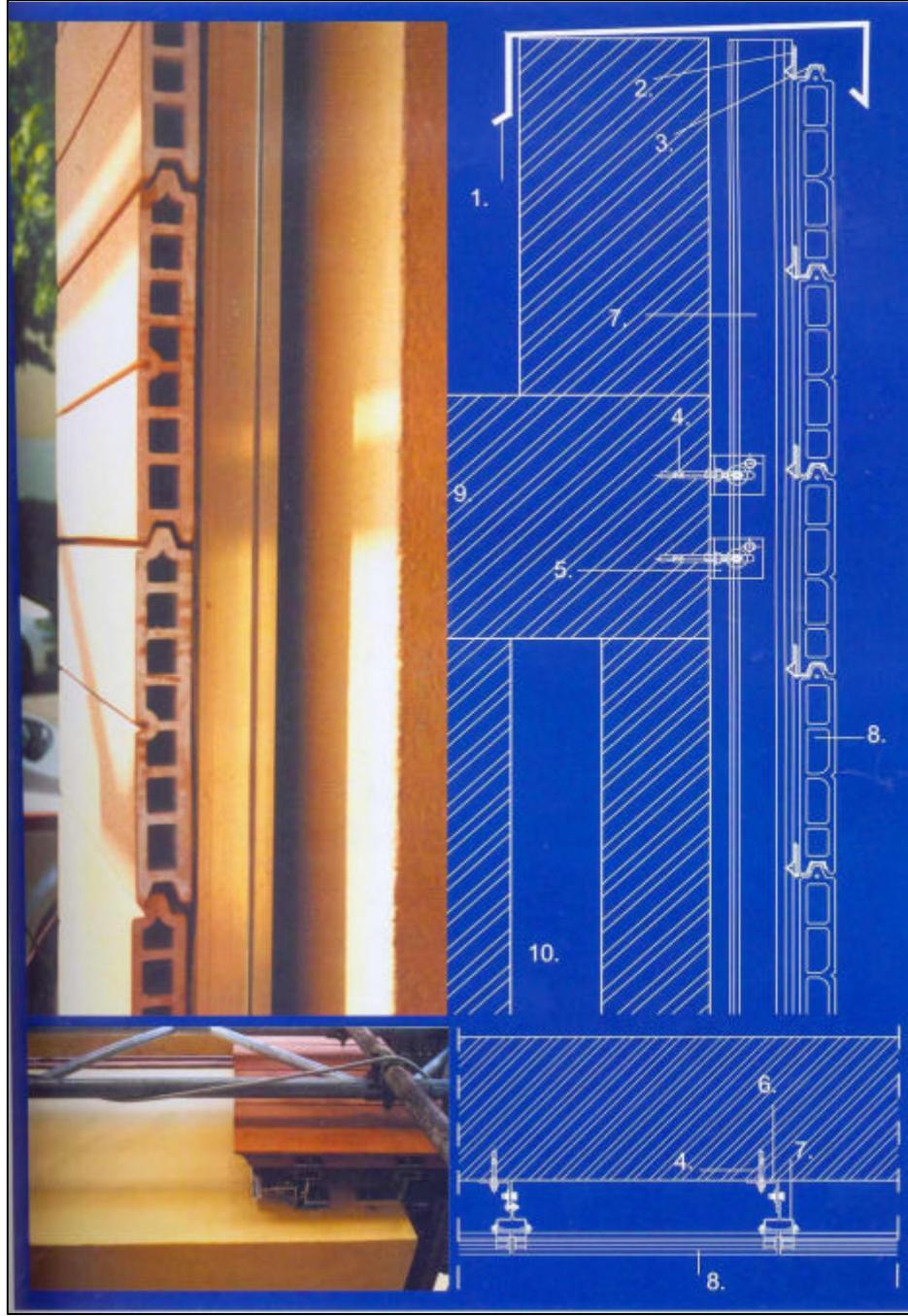




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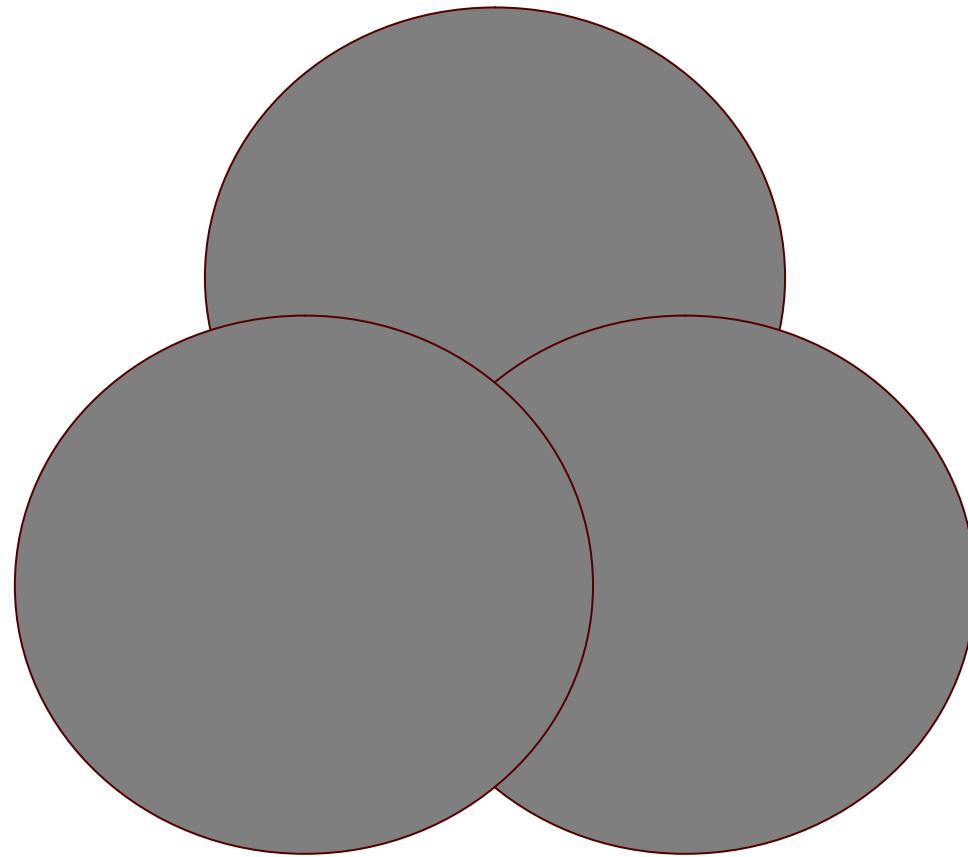
# Sustainable building envelopes



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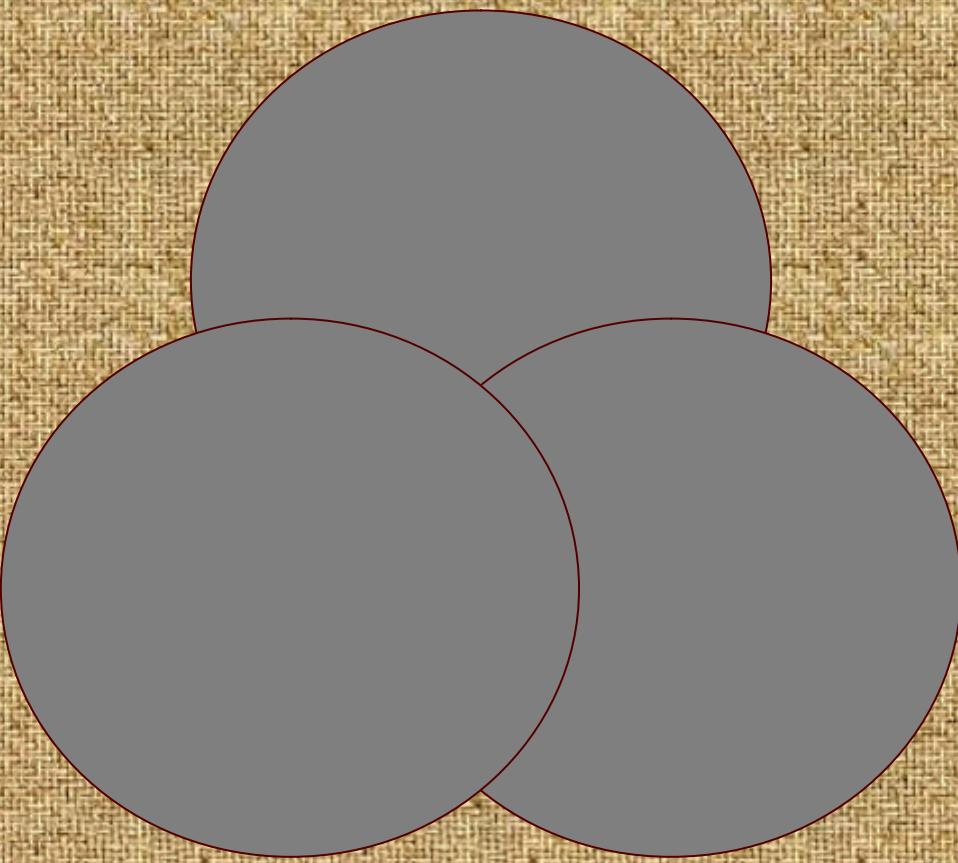
Dermis



Clothing

Building

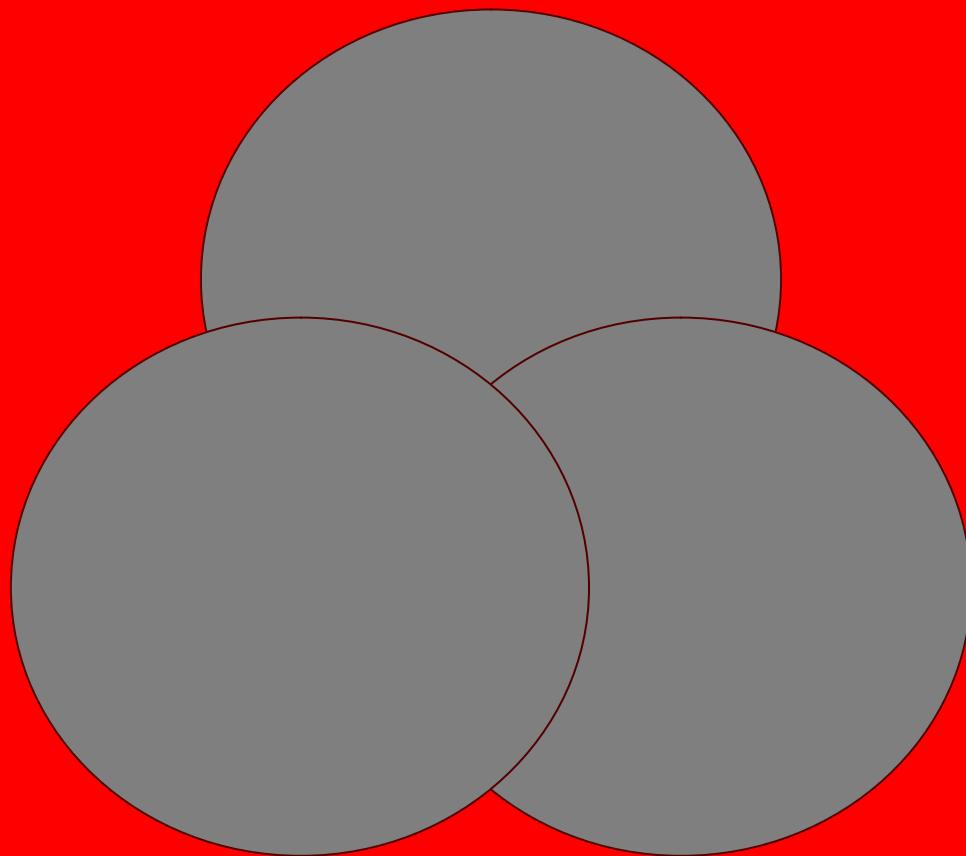
Dermis



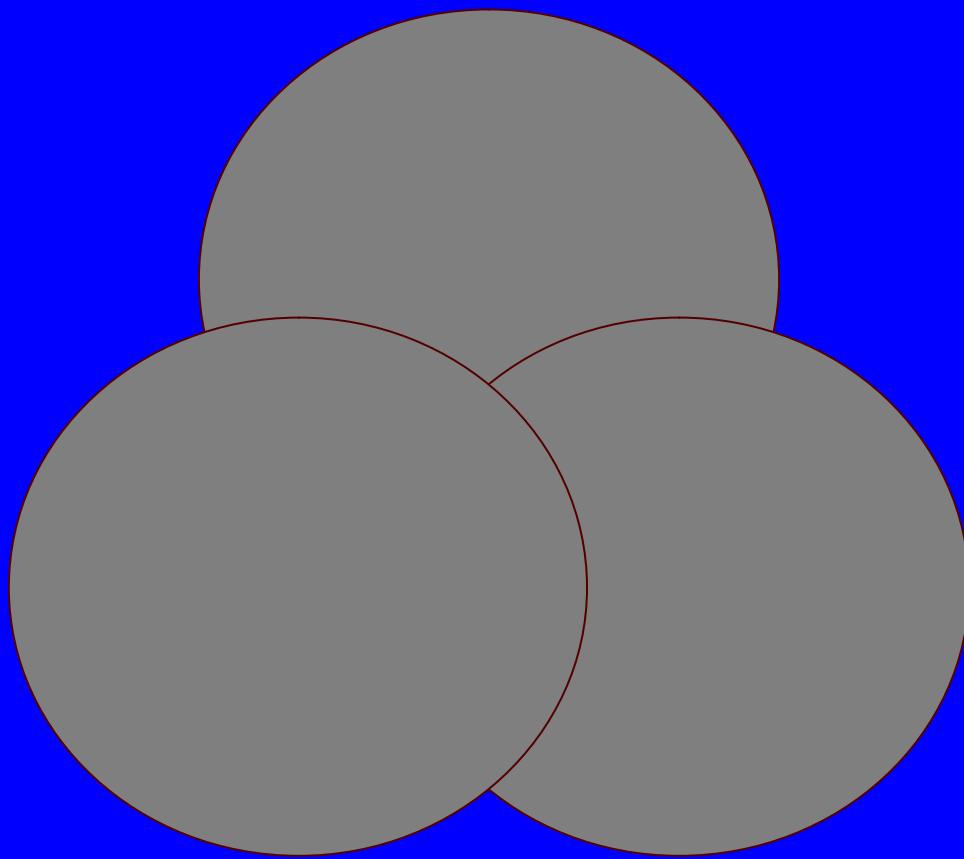
Clothing

Building

Dermis



Dermis



Clothing

Building



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Human skin

# Sustainable building envelopes

- Low embodied energy

**Amount of energy used to produce an object**

- Whole life performance

**Long term impacts considered**

- Enhance natural ventilation

**Less heating and cooling**

- Enhance thermal energy conservation

**Reduce supply of external energy**

- Enhance daylighting

**Manage natural light to fulfill needs**

- Avoid thermal bridging

**Mold, maintenance**

- Facilitate renovation

**Existing buildings**

- Green facades

**Gray water irrigation, orientation**

- Recycling

- Final disposition



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# Sustainable building envelopes

1. Low embodied energy
2. Whole life performance (long term impacts considered)
3. Enhance natural ventilation
4. Enhance thermal energy conservation
5. Enhance daylighting
6. Avoid thermal bridging
7. Facilitate renovation
8. Green facades where possible)
9. Recycling
10. Final disposition



# Sustainable building envelopes evolution

1. Largely glazed
2. Mostly closed
3. Active and Interactive
4. Green roofs and facades
5. Passive?
6. ????



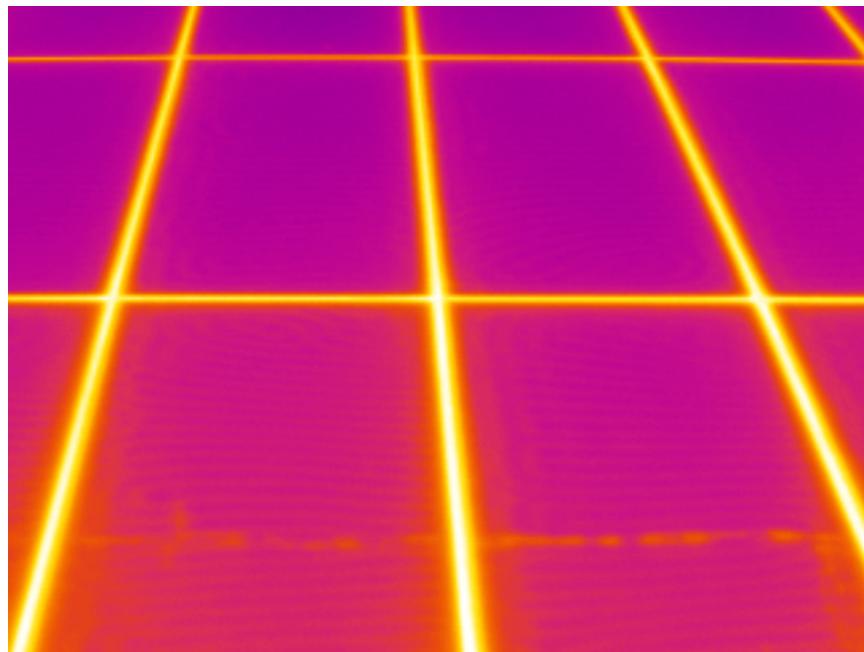
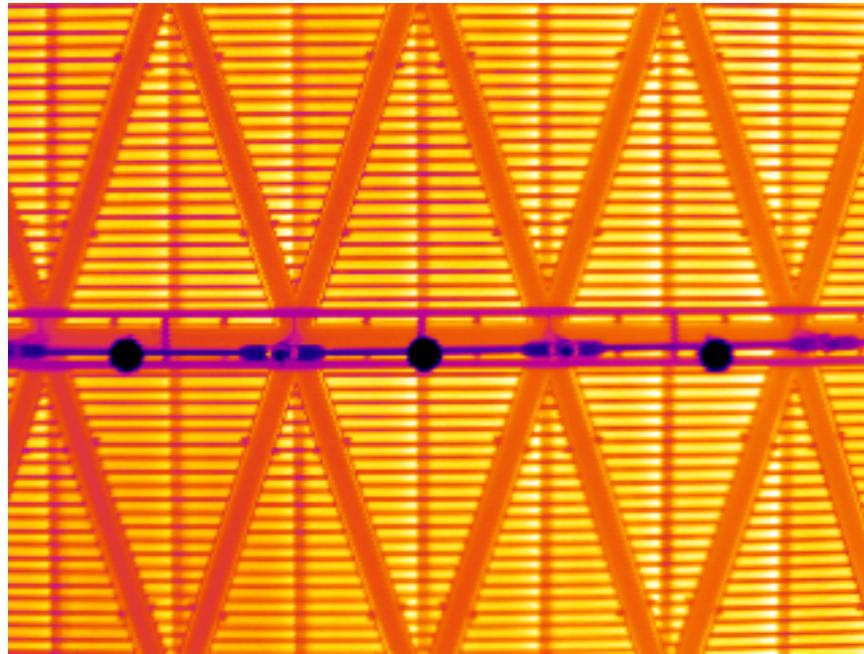


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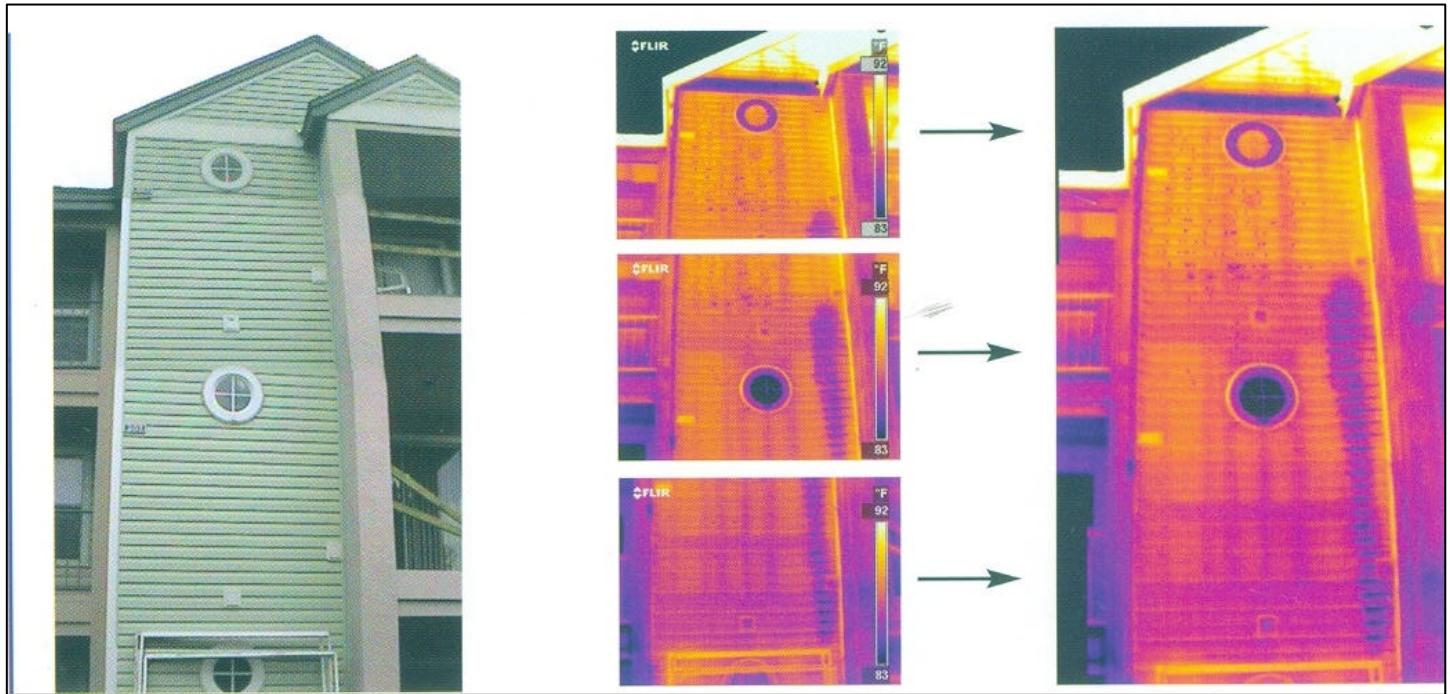
# Infrared eye



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opportunity!

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