

apresentação Lisboa E-nova, 2007 **ARQUITECTURA SUSTENTÁVEL**



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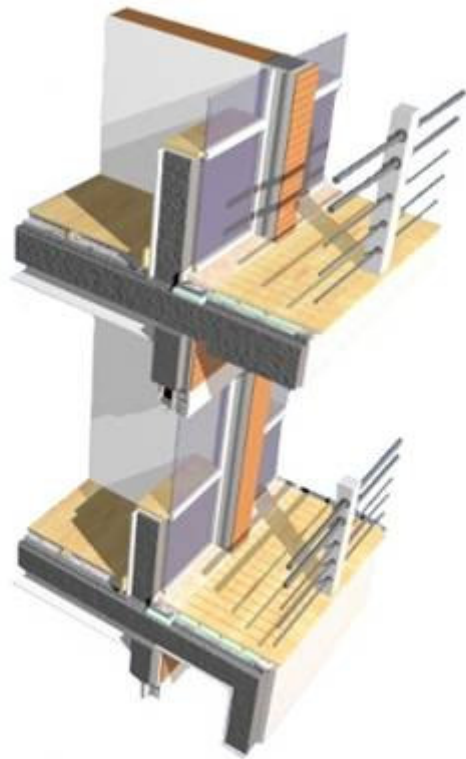




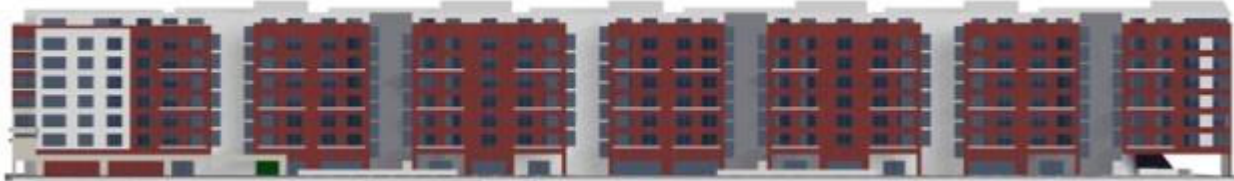
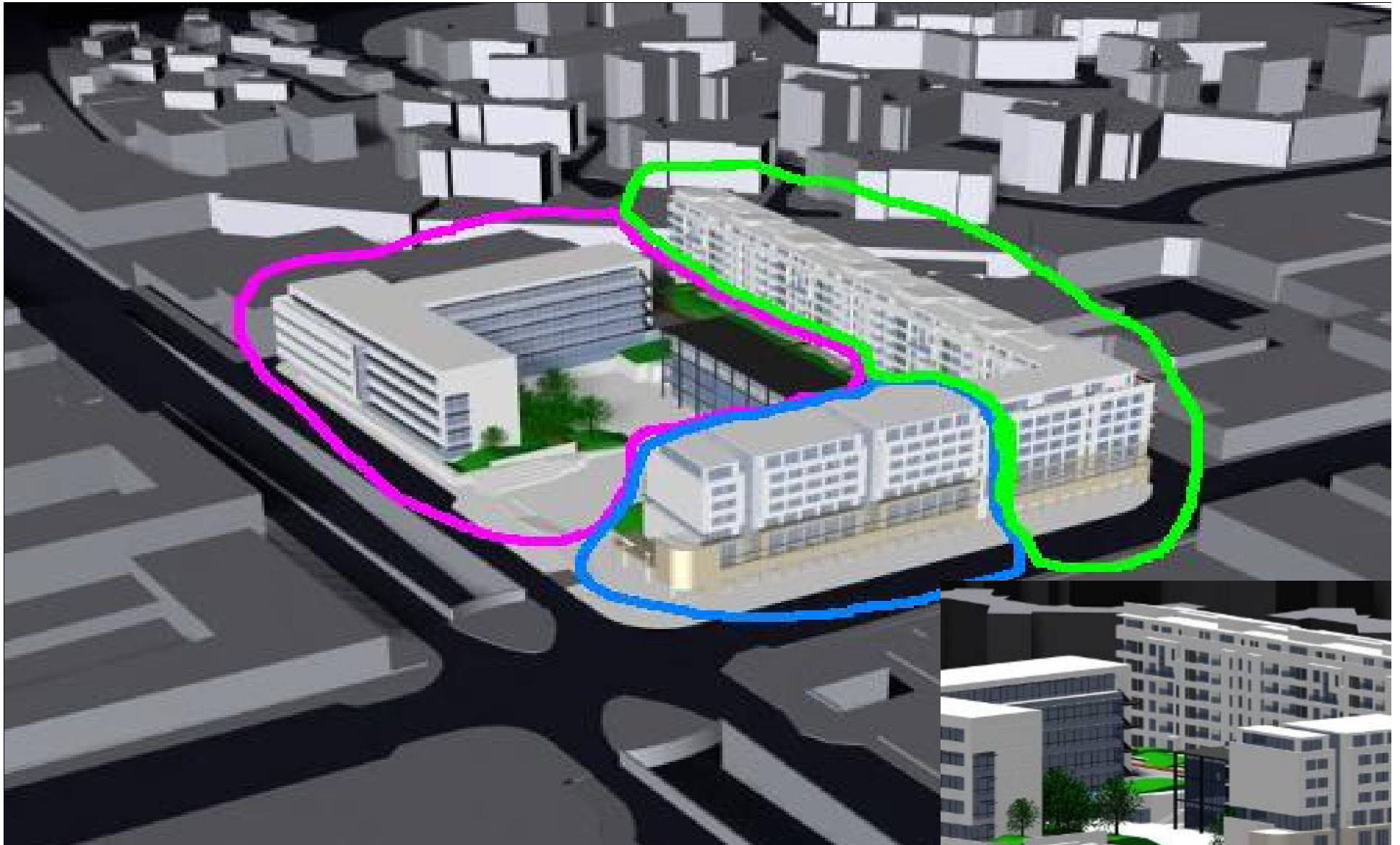




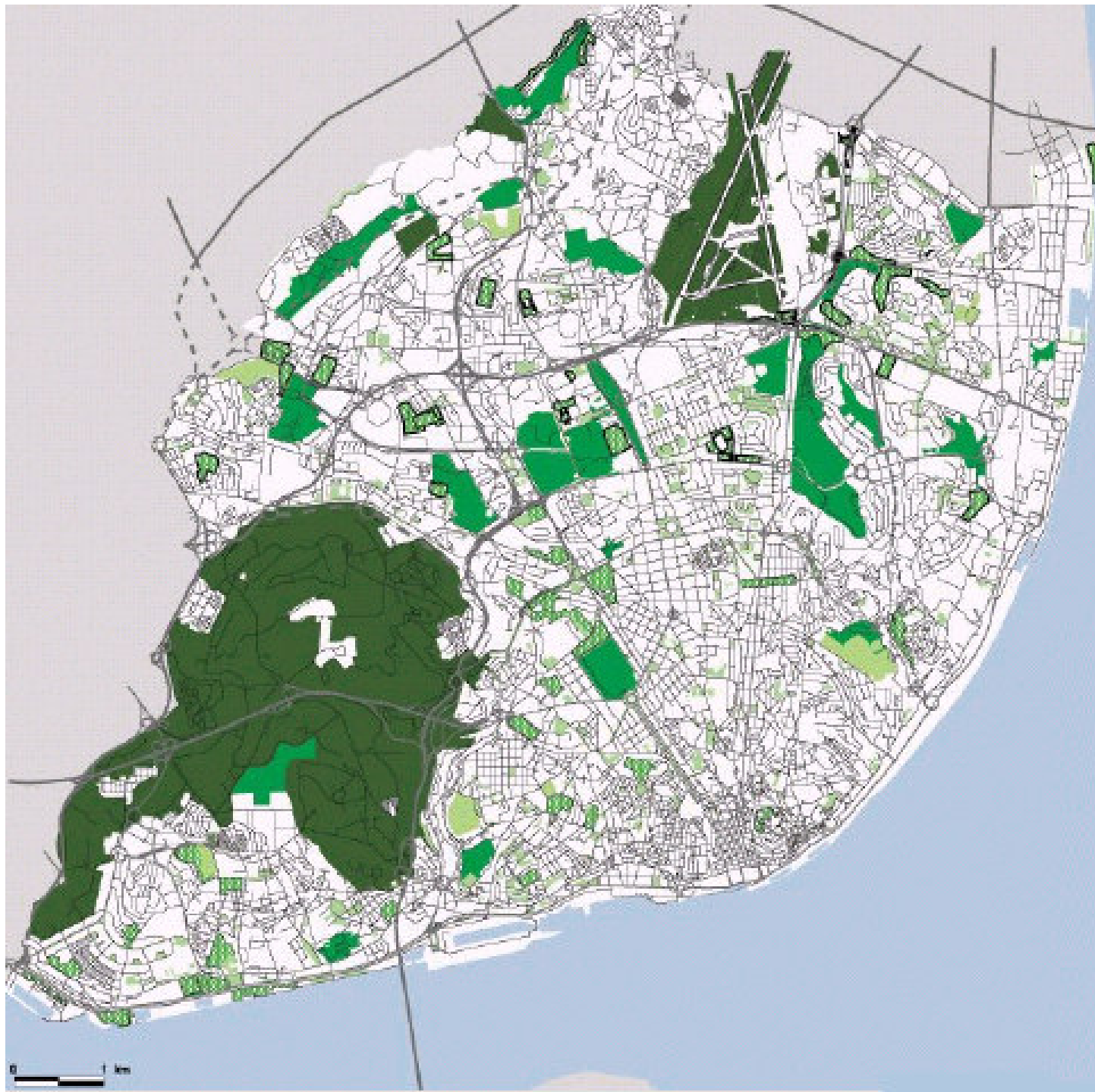
Torre Verde, Livia Tirone



Torre Verde, Livia Tirone



Parque Oriente, Livia Tirone



**Espaços
Verdes
Da
Cidade:**

**“CARTA
VERDE”**









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SOLAR XXI building

An Energy Efficient Building in Lisbon

Campus of INETI, Lumiar

INETI, Lisboa

Colectores solares



Painéis
fotovoltaicos

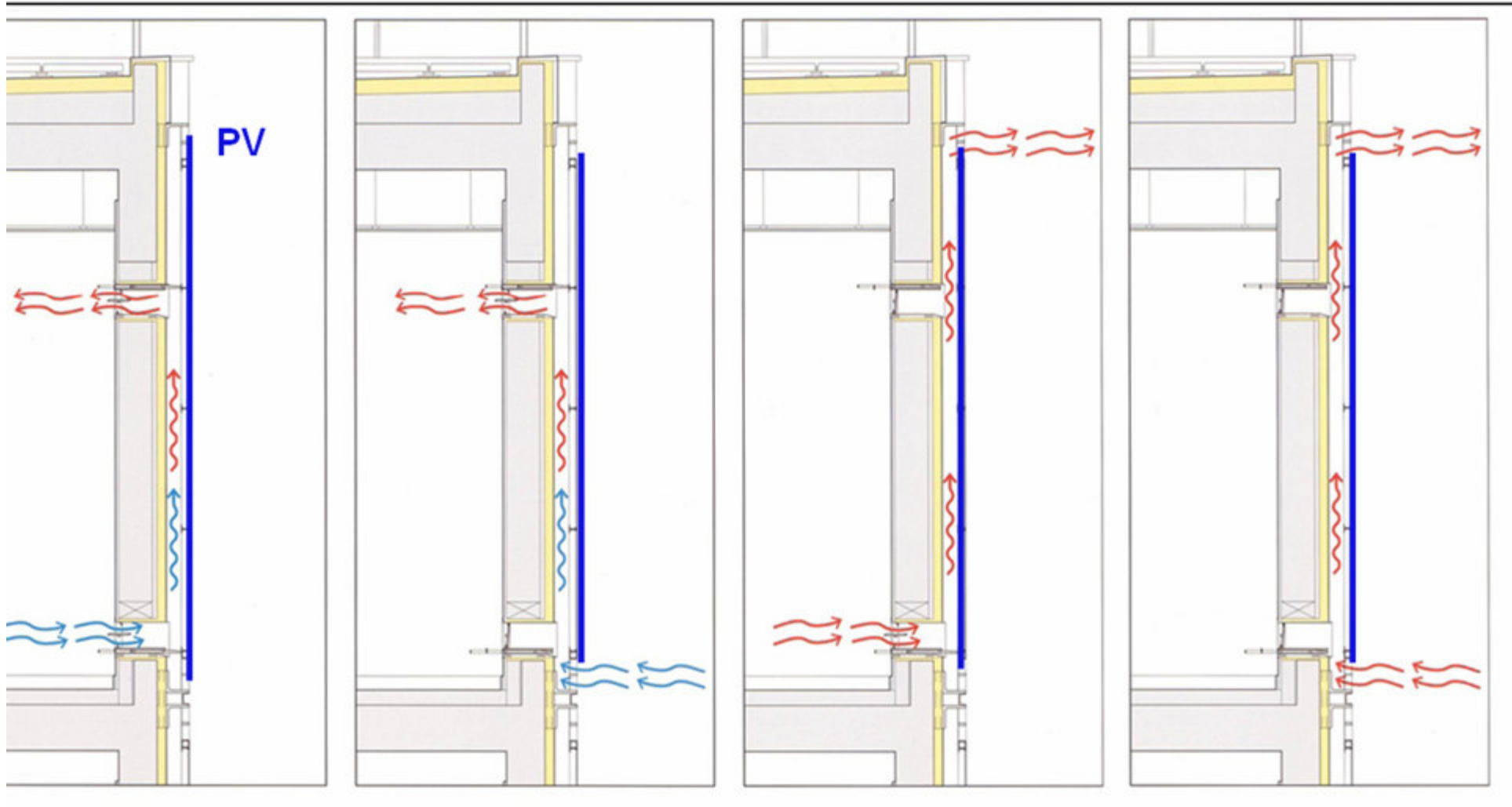




Nascente e Norte



Aproveitamento Térmico do PV



Inverno

Primavera/Outono

Verão

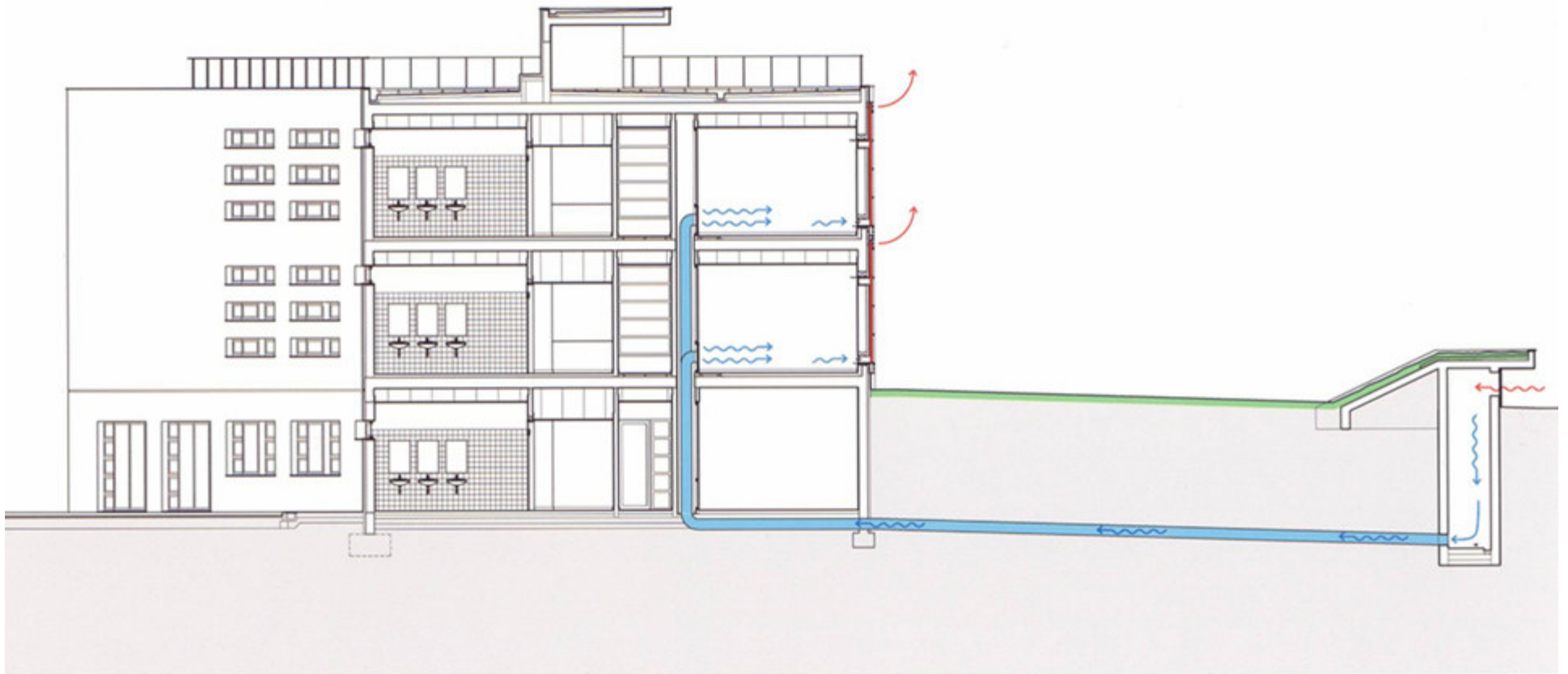


Aquecimento por convecção natural: o ar interior da sala aquece ao circular em contacto com a superfície interior dos painéis fotovoltaicos, reentrando aquecido na sala.



Arrefecimento Passivo

Tubos no solo





External air inlet for the buried pipes

ARQUITECTURA SUSTENTÁVEL



Vista interior,

sistema de ventilação fechado

sistema de ventilação aberto

Claraboia de ventilação e iluminação natural



Colectores solares térmicos (CPC)
Apoio ao sistema auxiliar de aquecimento





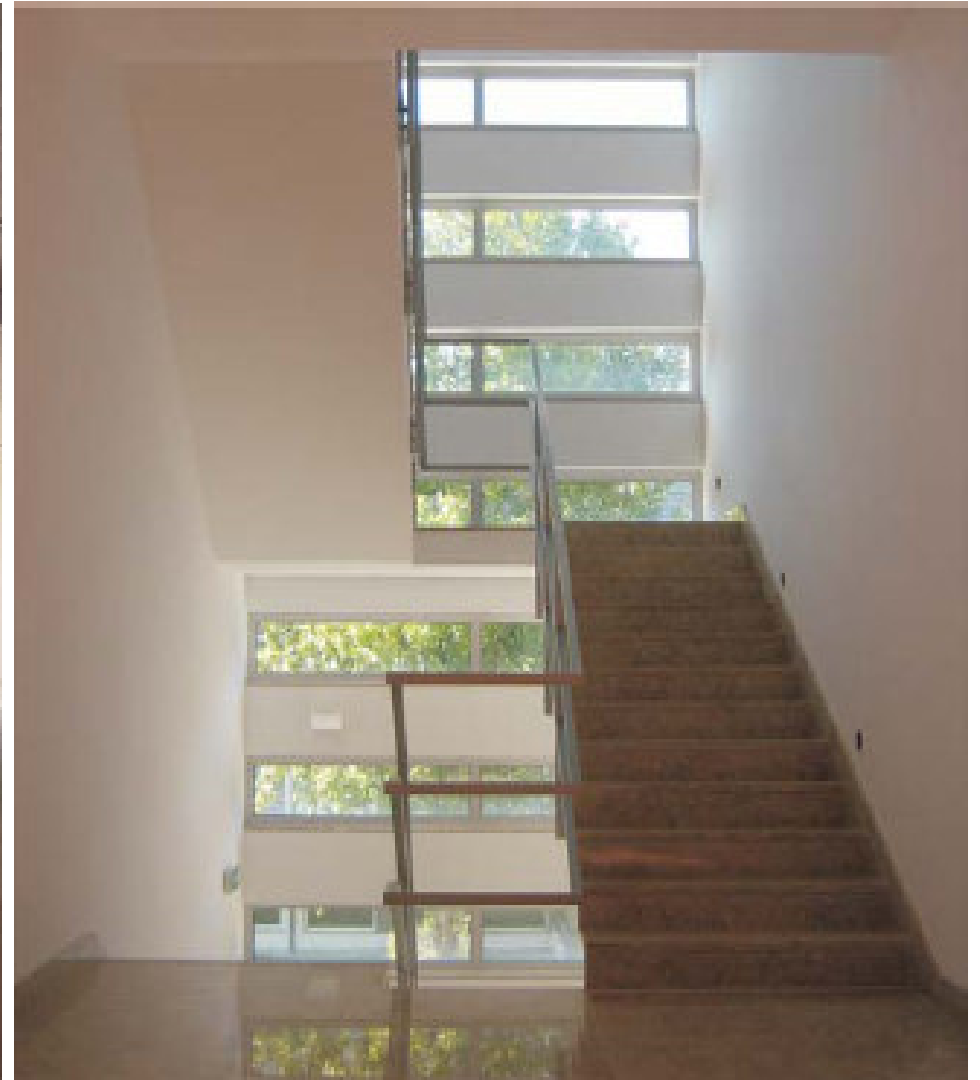
Atrium for Lighting and Ventilation



Adjustable glazed venetian blinds for ventilation



Natural Lighting of the basement floor



Natural Lighting in the stairs' area



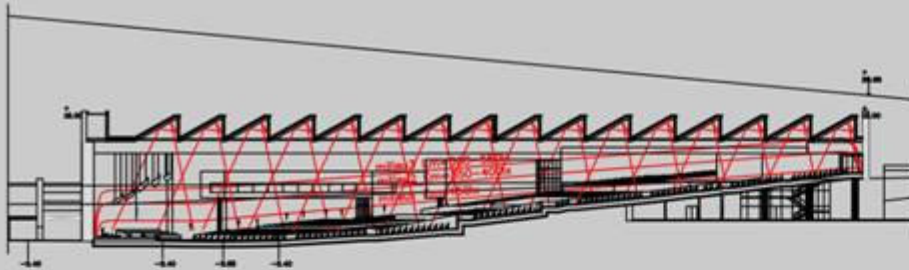
Edifício e parque de estacionamento com central solar fotovoltaica de 6 kWp



3ª semana de arquitectura m a i o

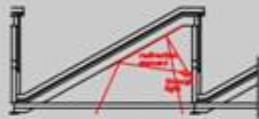


NATURAL AND ARTIFICIAL LIGHTING - CONCEPTUAL DESIGN

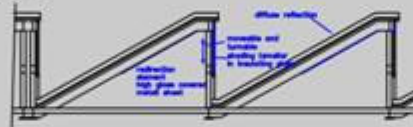


longitudinal section artificial light

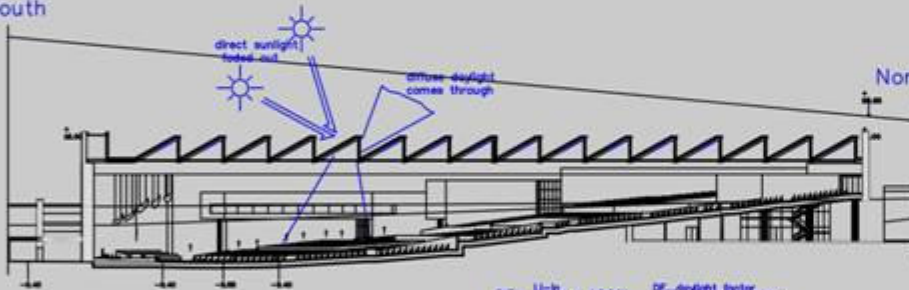
detail artificial light



detail daylight



South

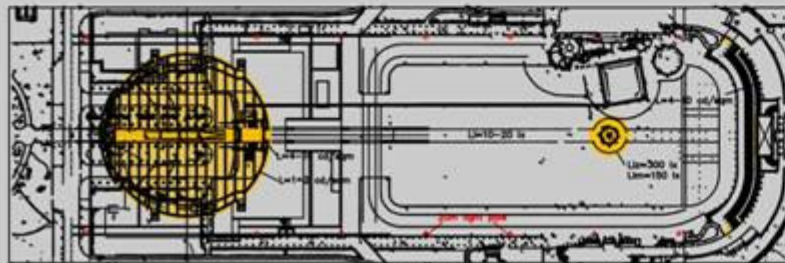


North

longitudinal section daylight

$$DF = \frac{U_{in}}{U_{out}} \times 100\%$$

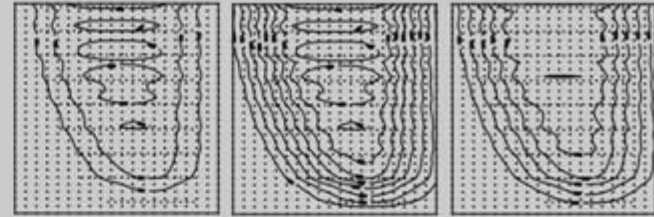
DF...daylight factor
 U_{in} ...indoor illumination
 U_{out} ...outdoor illumination



outdoor lighting

U_{in} ...light intensity (lx)
 U_{in} ...middle light intensity (lx)
 U_{in} ...total light intensity (lx)
 L ...luminaire (lx/deg)

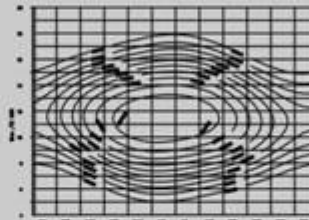
artificial light levels



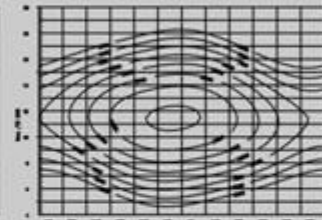
illumination level - ceremony $U = 100-150$ lx
 illumination level - concert $U = 300-400$ lx
 illumination level - conference $U = 500-600$ lx

outdoor illumination in relation to daytime and month

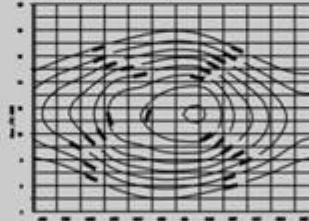
standard clear sky (DIE)



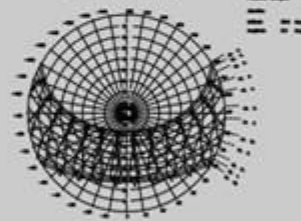
standard overcast sky (DIE)



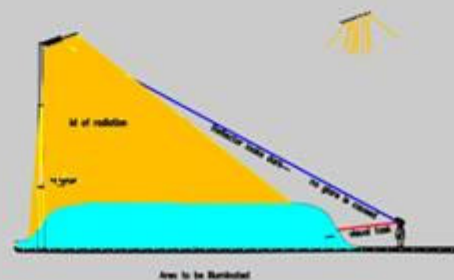
average sunshine (Krochman)



solar altitude chart



Secondary system with asymmetrical reflectors



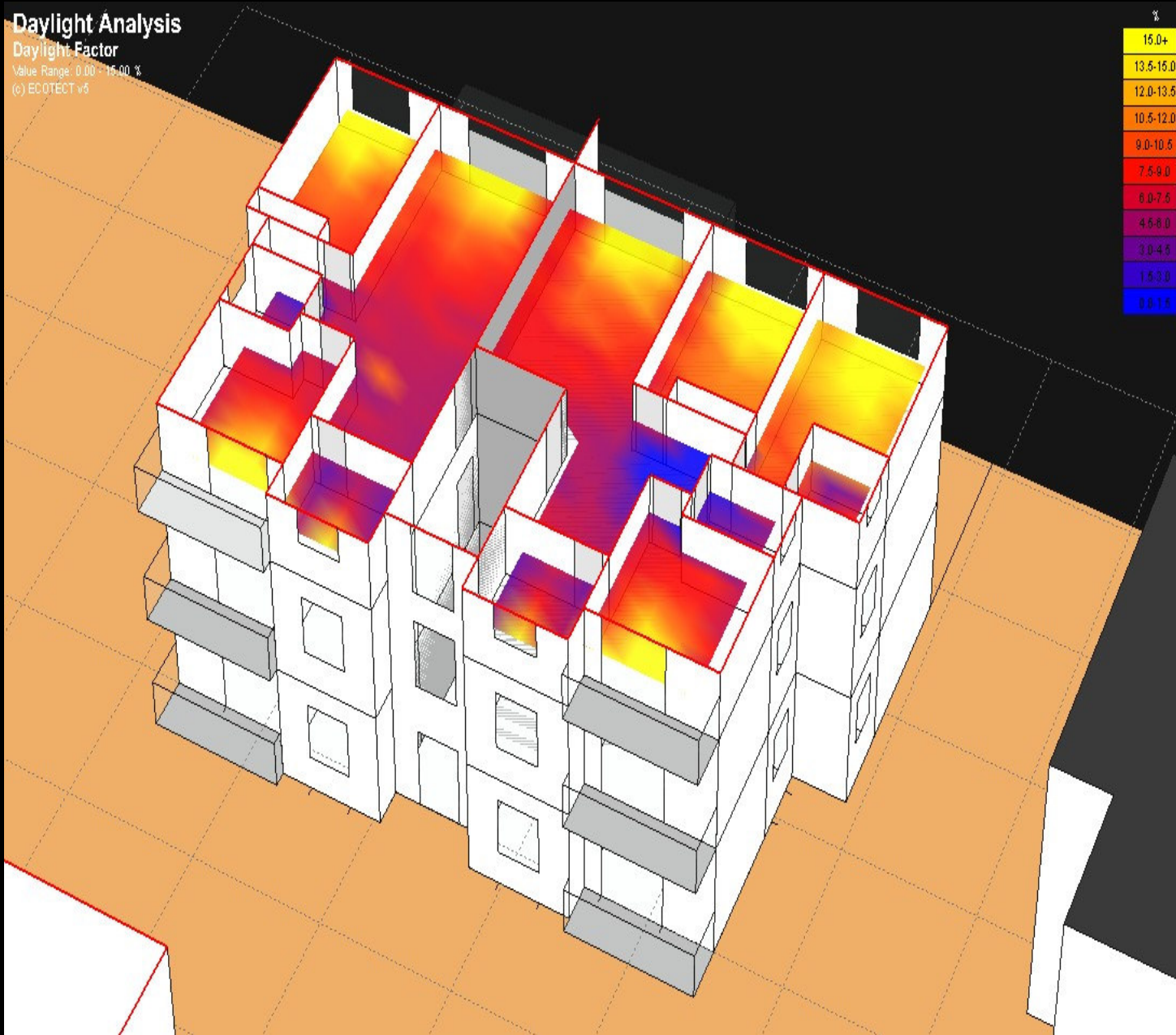
- Direct glare**
 Less glare in field of radiation by:
 * avoidance of direct view of the lamp
 * light point decomposition - many small light points
 Less glare outside field of radiation by:
 * perfect glare cut-off precise radiation and reflector principle (PTP)
 * use scattered light thanks to double mirror technology
- Reflected glare**
 * avoid reflection on wet surface due to large luminous surfaces
- Degree of shadow**
 * avoid shadow due to large light-emitting area
- Uniformity**
 * high uniformity regardless of the number of spots
 * low light point height/reflector height
- Visibility**
 * good visibility due to perfect illumination
 * good colour perception thanks to lamp with high colour rendition
- Maintenance**
 * lamps are replaced from a low height (platform)
 * maintenance is possible with the system in operation
 * no mechanically movable components
- Energy-illumination**
 * system efficiency 30-40%
- Energy-visibility**
 * glare cut-off ensures better visibility even at low lighting levels

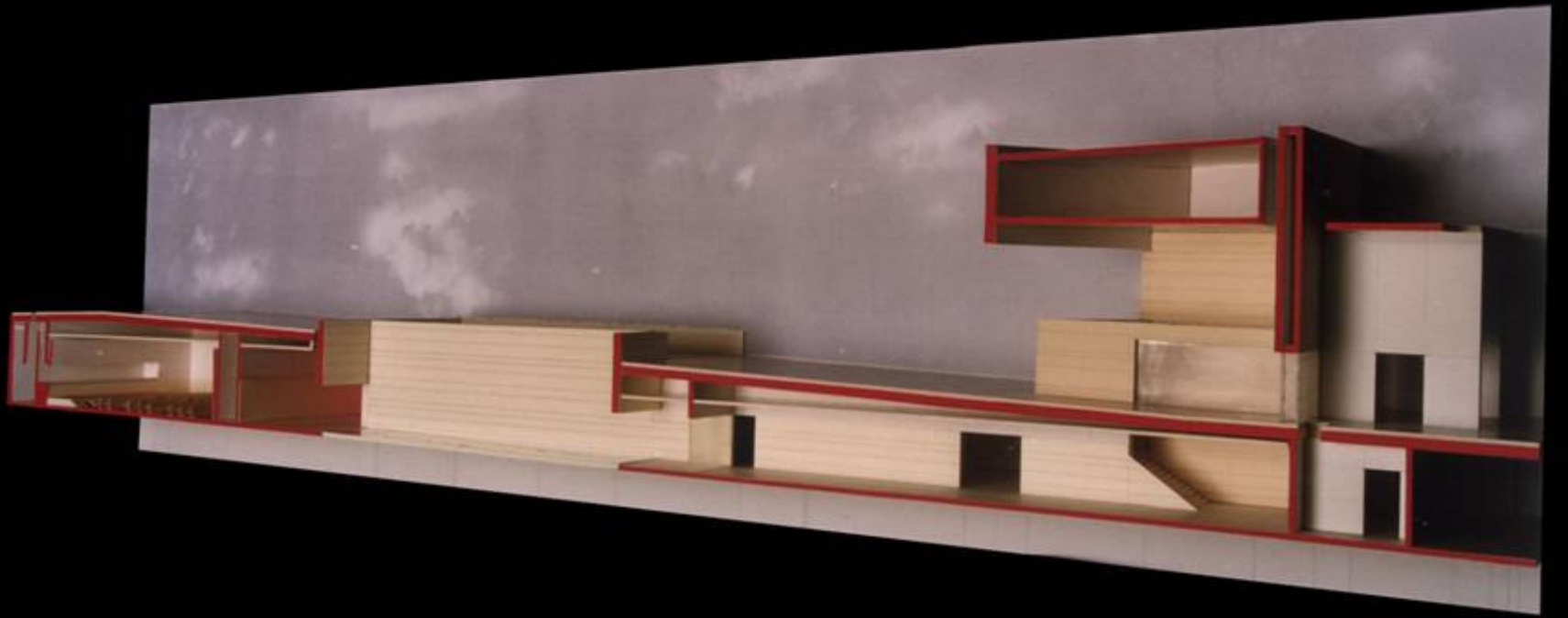
Daylight Analysis

Daylight Factor

Value Range: 0.00 - 16.00 %

(c) ECOTECT v5







1ª mostra de trabalhos





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Ghery

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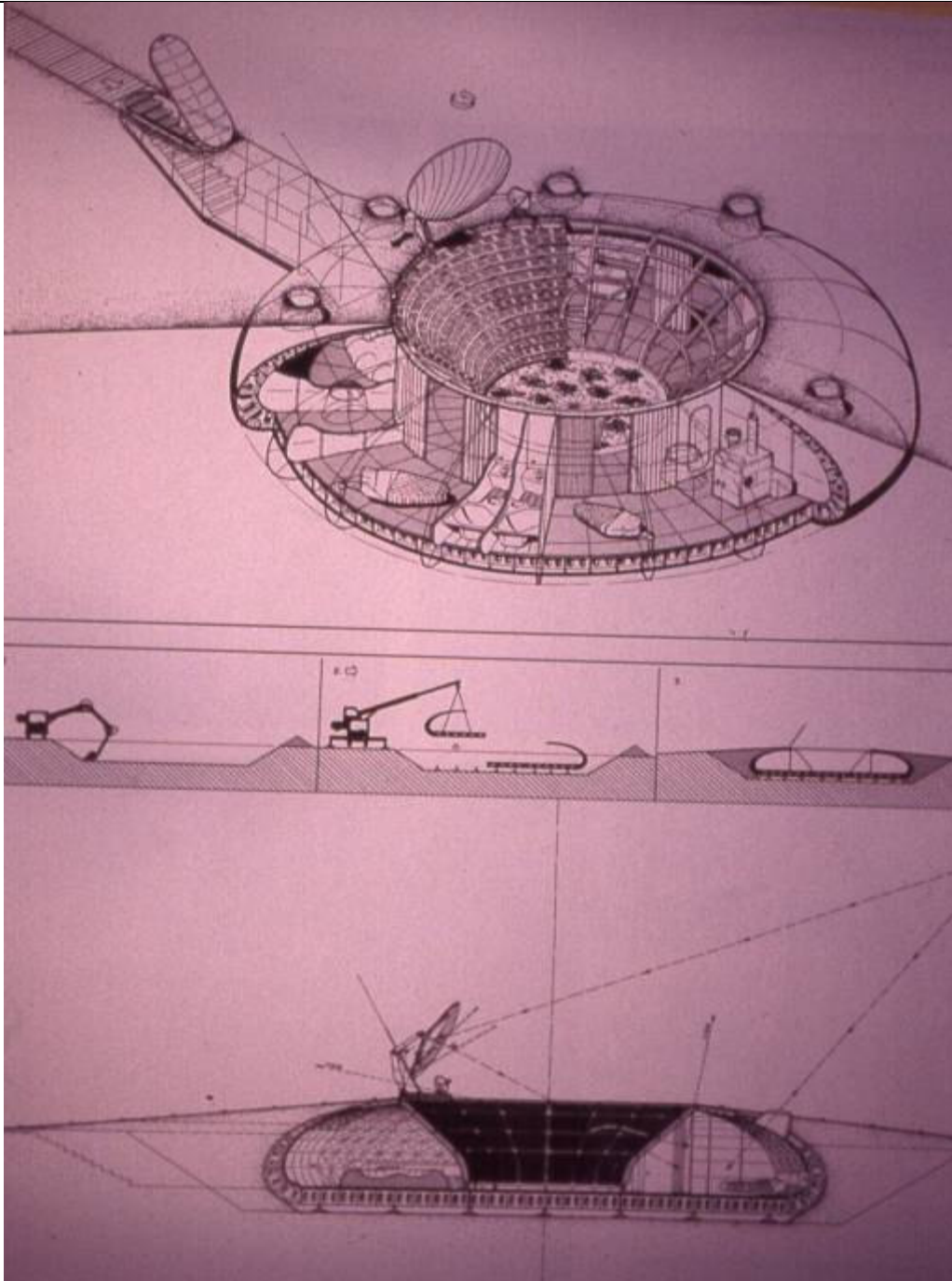
1960's

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1960's

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Future Systems, Doughnut House
casa auto-suficiente. 1967. US



Sea Ranch, California

IST



Thank you!



Prof. Manuel Correia Guedes

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2007