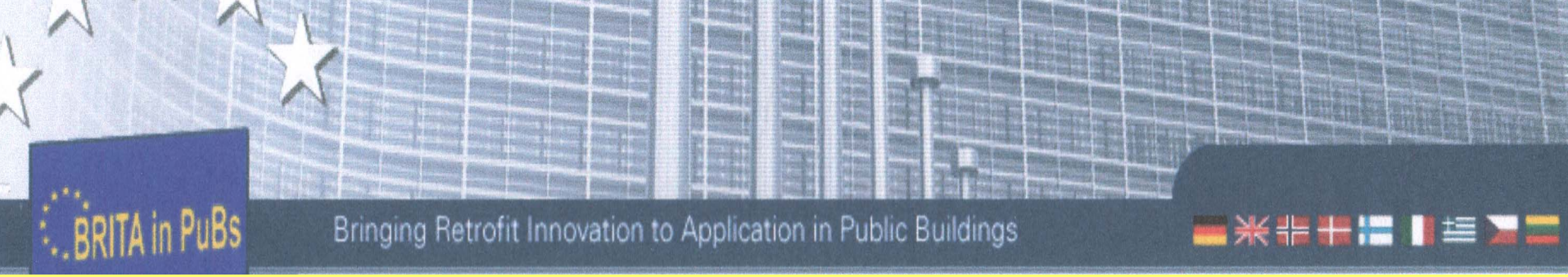

SOLAR ENERGY AND ARCHITECTURAL INTEGRATION

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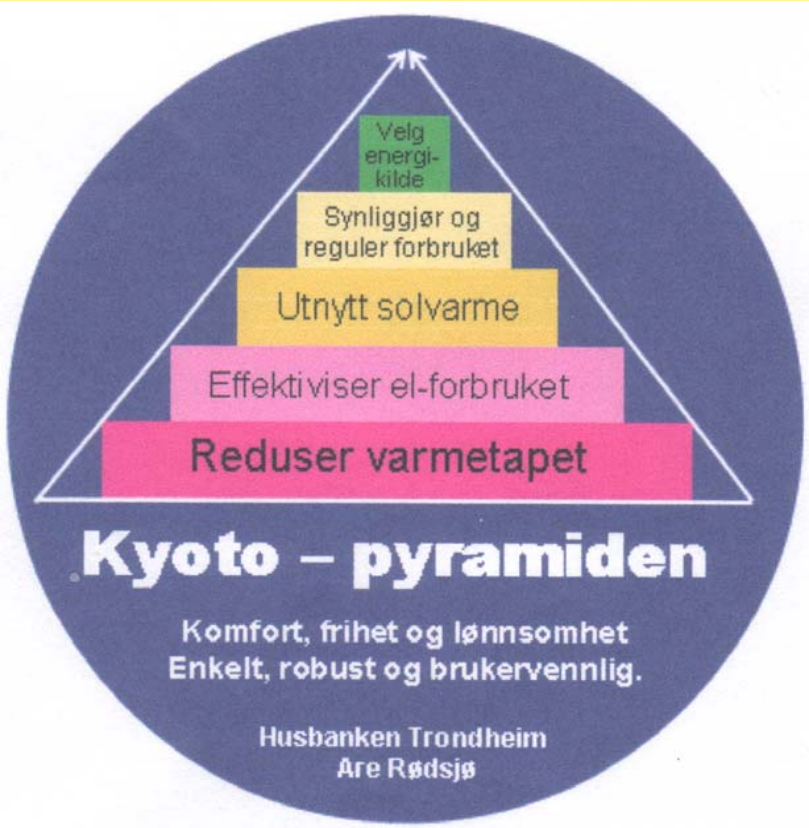
First of ALL : Reduce energy need
Finally : Select energy source(s)

Finally (top) :

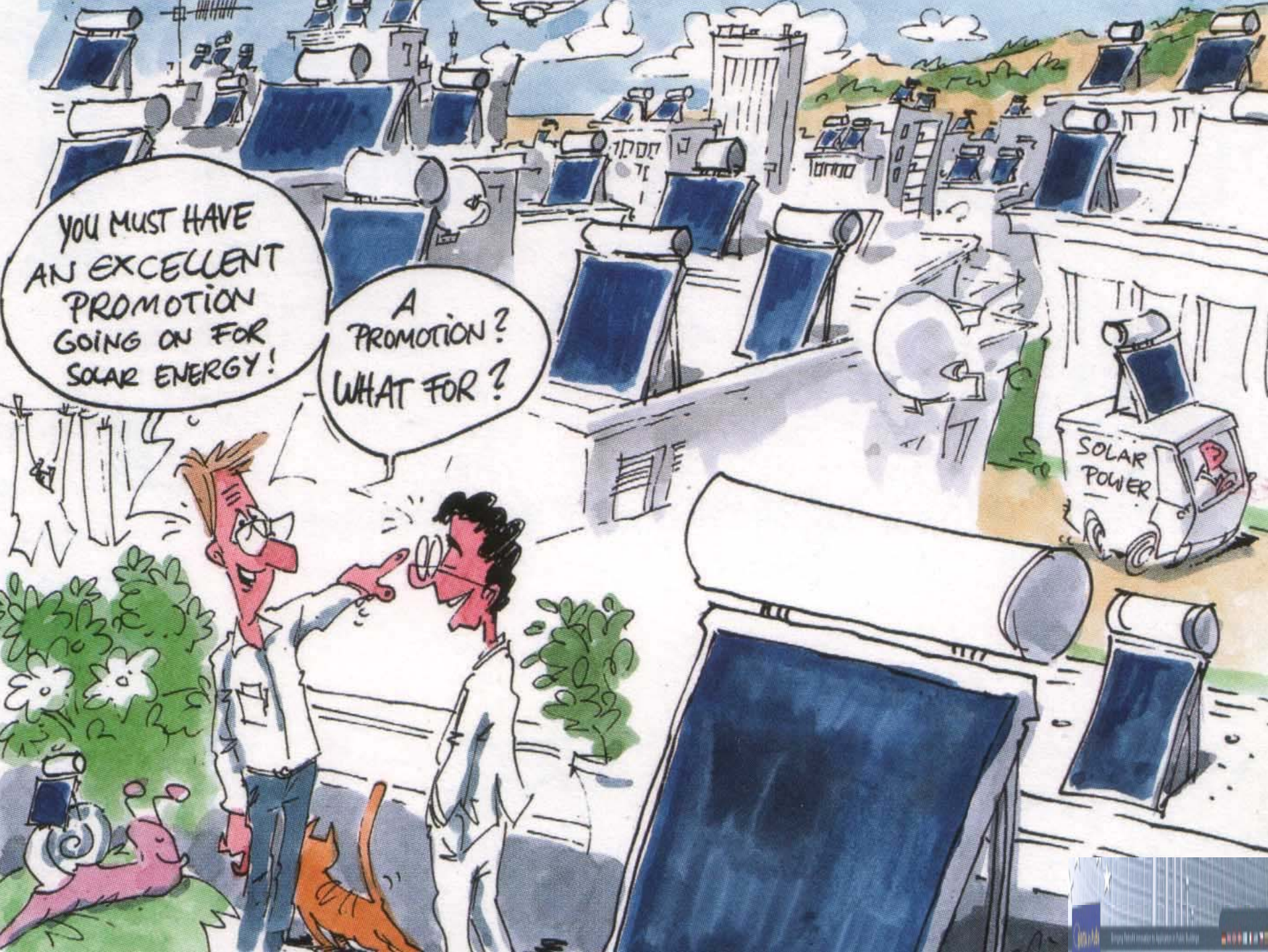
Select energy supply

First (base)

Passive Solar,,
Control,
Insulation



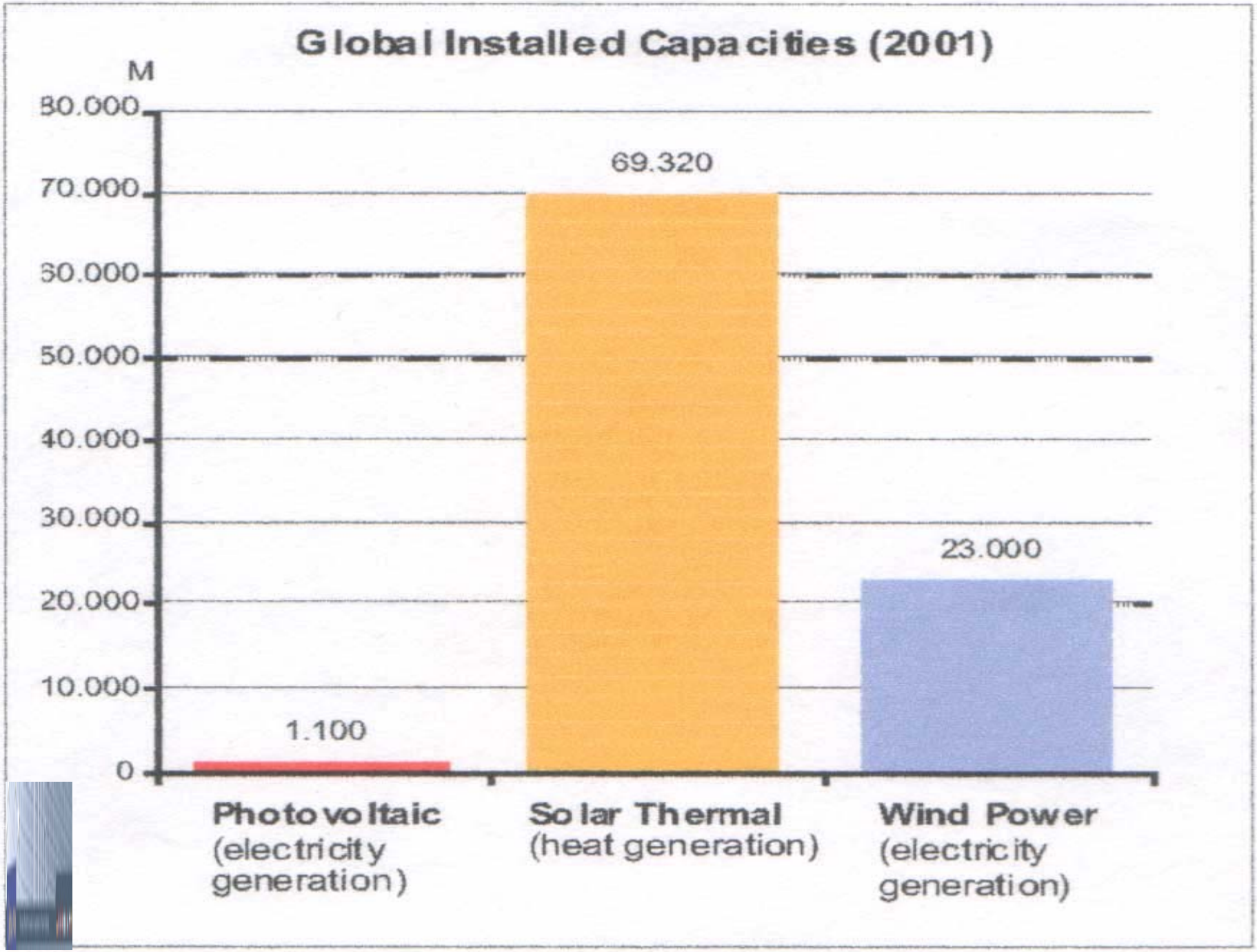
- Select Energy Source.
- Visualize and Regulate the Energy need.
- Make use of passive Solar.
- Energy Efficiency.
- Reduce heat loss through the Building Envelope.


YOU MUST HAVE AN EXCELLENT PROMOTION GOING ON FOR SOLAR ENERGY!
A PROMOTION? WHAT FOR?
SOLAR POWER

Solar Roof Chaos

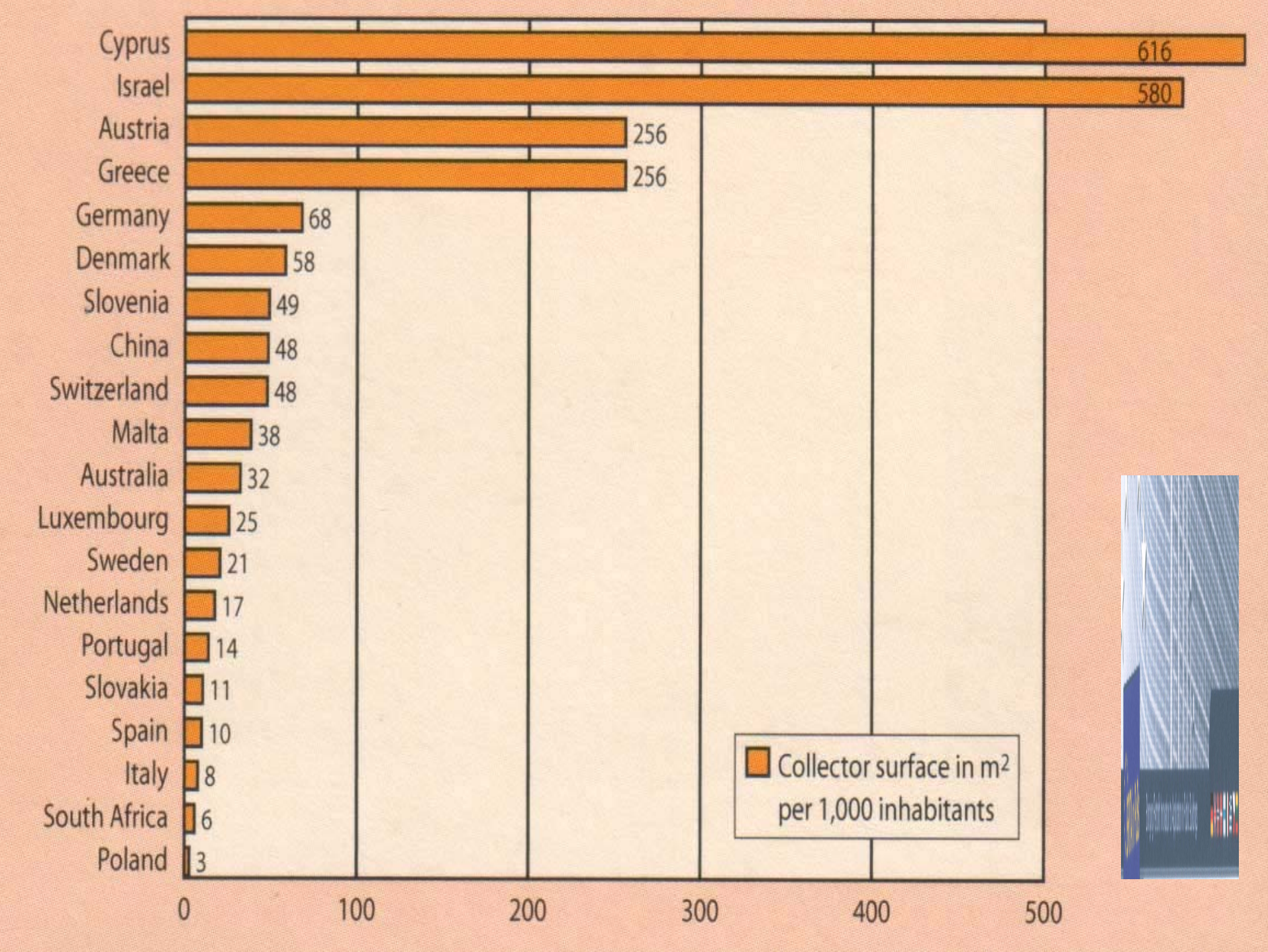
BRITA in PuBs

Bringing Retrofit Innovation to Application in Public Buildings


Global Installed Capacities (2001)
M
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0
69.320
23.000
1.100
Photovoltaic
(electricity
generation)
Solar Thermal
(heat generation)
Wind Power
(electricity
generation)

Solar Thermal or Solar Electric (PV)

- Heating constitutes a larger part of the energy bill than Electricity – in most countries.
- Solar ***Electric*** systems best tech. can generally speaking only supply approximately 100 Watt /m2 wall surface of usable energy. (Thin film tech. only half that at 50 Watt/m2 wall surface.)
- Solar ***Thermal*** systems can supply 300 – 400 W/m2 wall surface, which is three times higher than solar PV.
- SolarThermal system costs are only a fraction of solar Electric per installed Watt. That is one of the major reasons of the widespread use in so many countries.


Cyprus
Israel
Austria
Greece
Germany
Denmark
Slovenia
China
Switzerland
Malta
Australia
Luxembourg
Sweden
Netherlands
Portugal
Slovakia
Spain
Italy
South Africa
Poland
616
580
256
256
68
58
49
48
48
38
32
25
21
17
14
11
10
8
6
3
0
100
200
300
400
500
Collector surface in m² per 1,000 inhabitants

The Friendly Wall

- Vertical
- Solar Air System
- Spaceheating and DHW

Colourful Solar Systems = No Problem - If Absorbers are Dark

- Colour in Buildings
- Colour in Nature

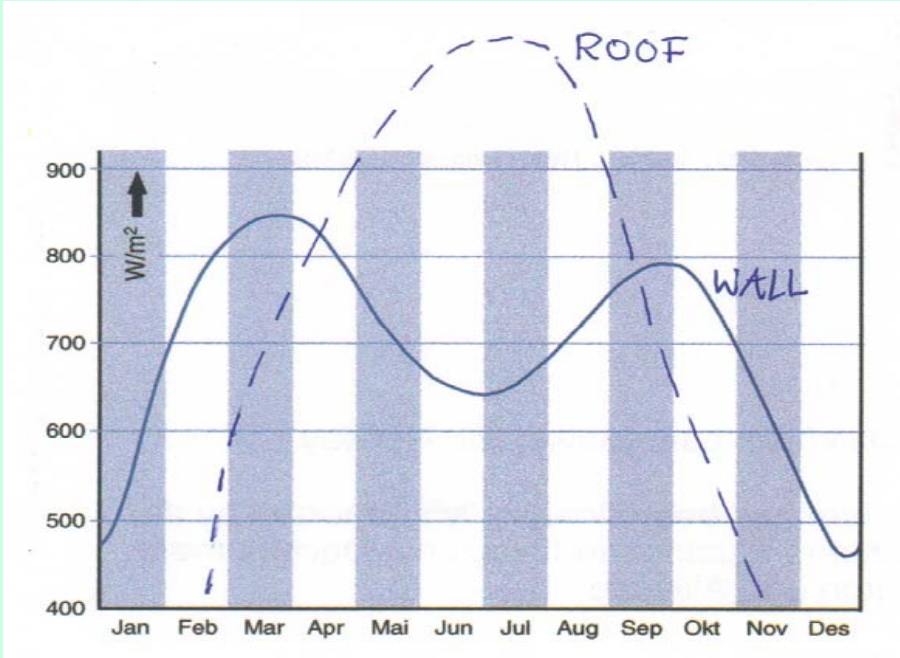
Solar Air Heating Systems

- Air has a lower mass than water.
  This can lead to more bulky constructions to move heated air as opposed to moving hot water, but air has other advantages :

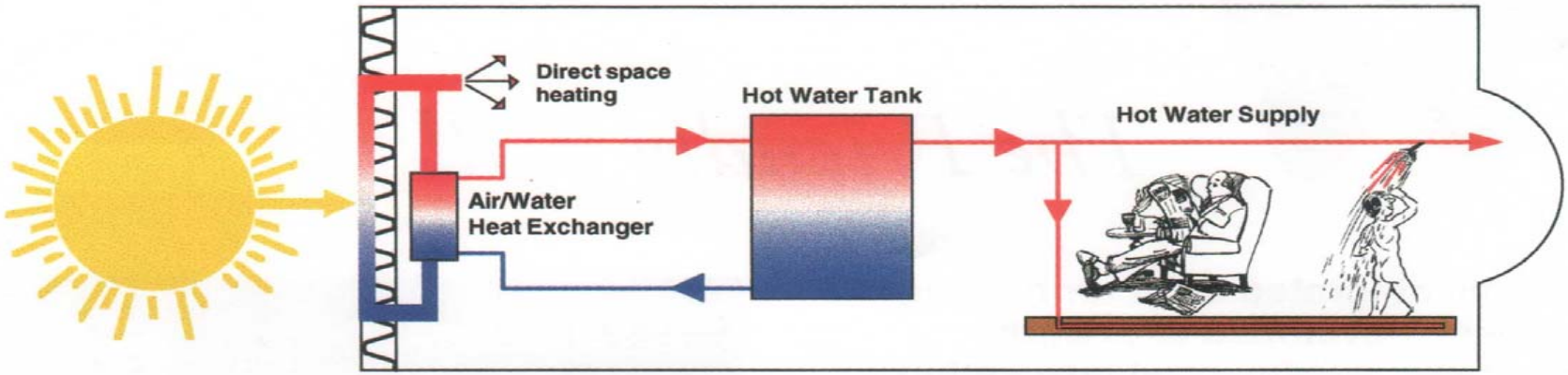
- **Air based solar systems do not <u>freeze</u>**
- **Air systems do not <u>leak</u> and cause damage like a water system**
- **Air systems do therefore not need to use <u>defrost</u> liquids like Glycol.**

- Bulkiness caused by deep air ducts in larger systems can be overcome if the air speed can be reduced. This reduces the efficiency (transfer of heat from absorber to point of energy need) but acceptable compromises can easily be struck.

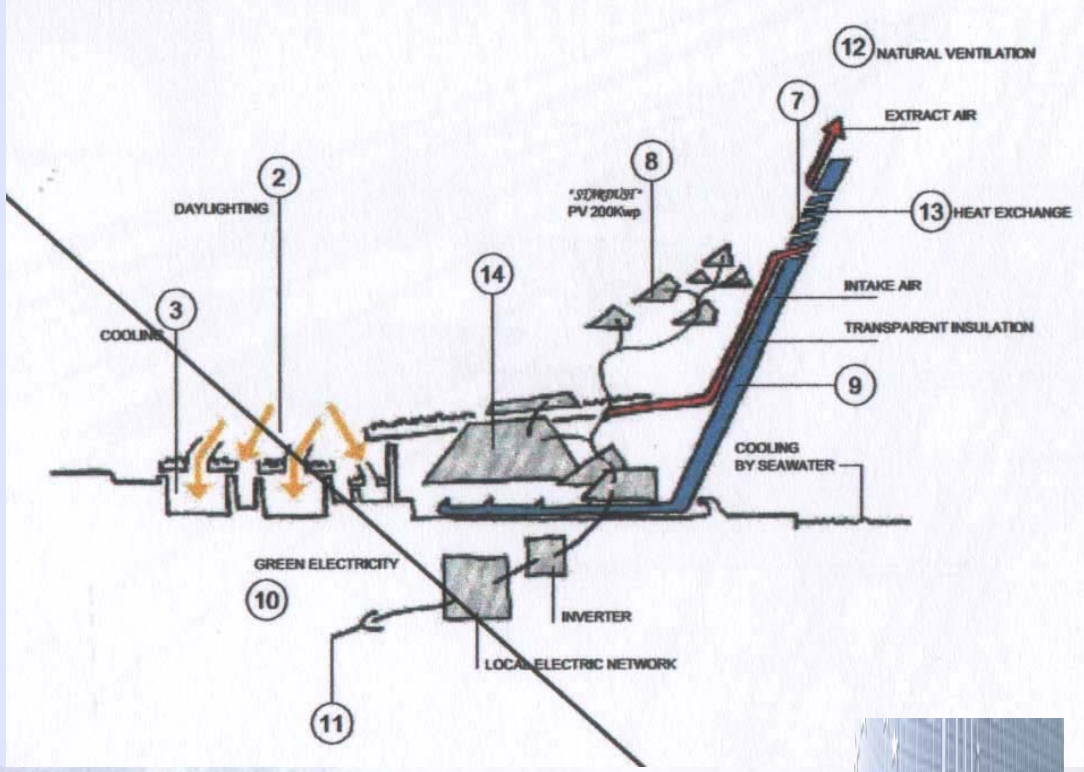
Vertical in Northern European Climate

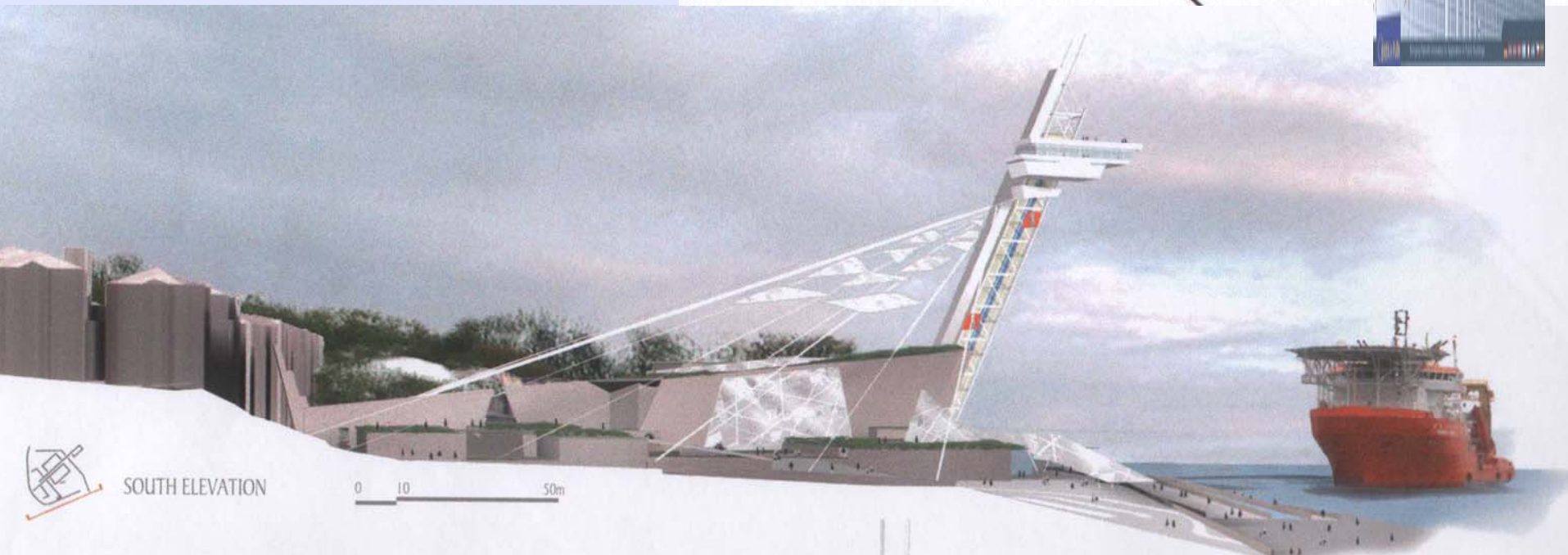


The system to convert sunshine on a wall into hot air and water



Concert House Stavanger, Norway





Wall Positioned Absorber

Huge Overhanging Solar Roofs - Triple Functions :

To catch Water

To create Shade

To produce Energy

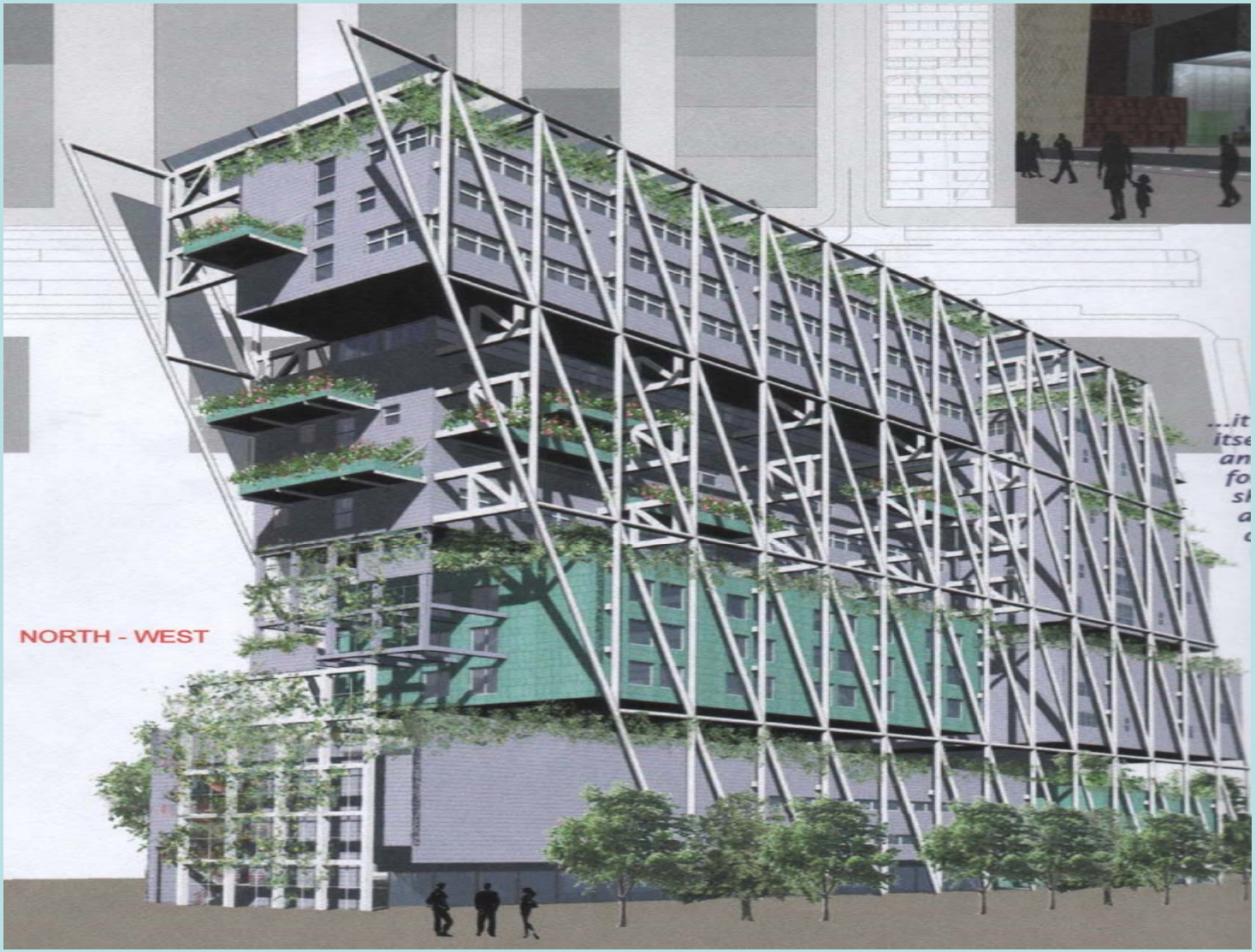

BRITA in PuBs


BRITA in PuBs
Bringing Retrofit Innovation to Application in Public Buildings

OSLO, NORWAY 2005

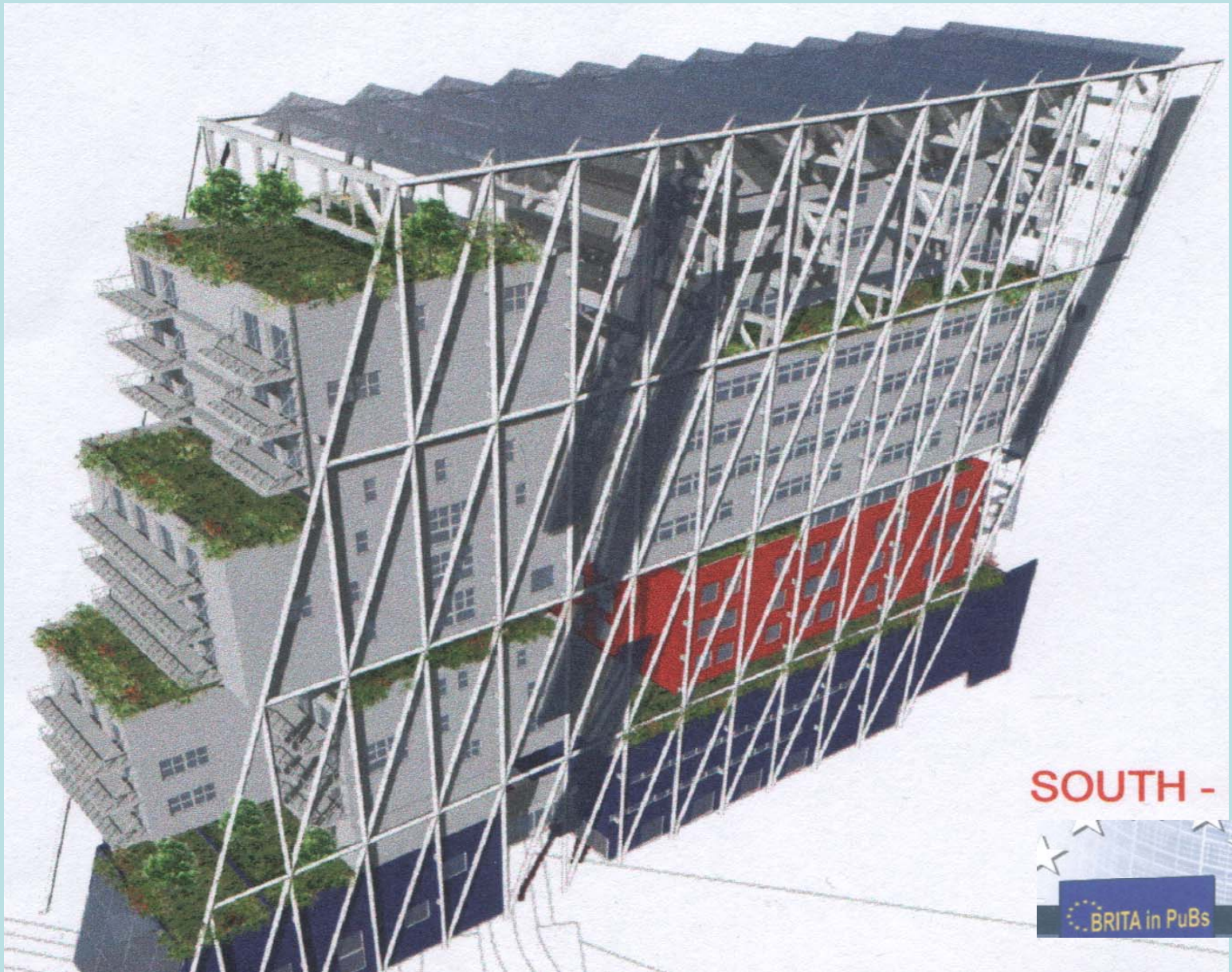
International Architectural Competition

Europe´s most energy efficient office building - 20.000 m2

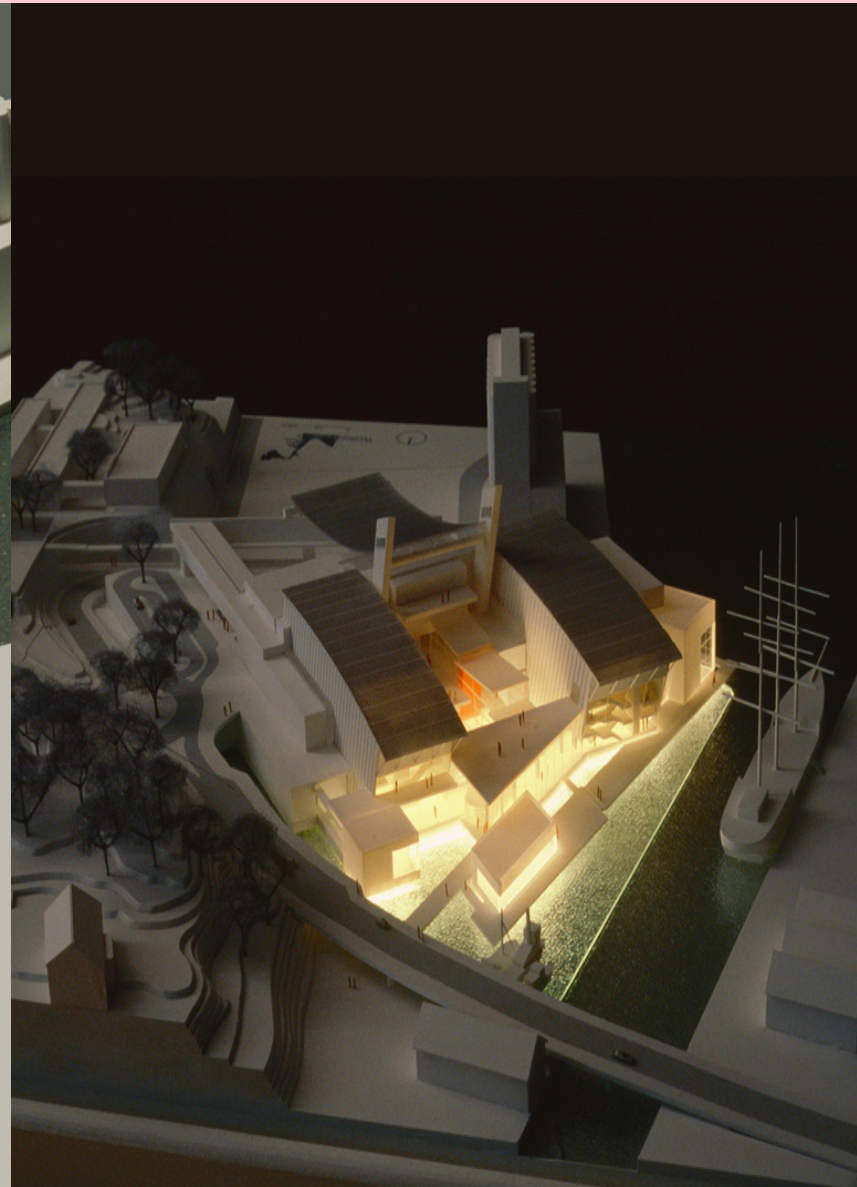


- Sivilarkitekt Røstvik AS + Alexandros Tombazis, Meletitiki

Net energy need : 36 kWh/m2/year -
minus solar PV (7) and Thermal (8)
= Delivered energy need <u>21 kWh/m2/year (Benchmark 230)</u>



Consert House, Kristiansand, Norway



Hol Church - Norway

Built 1924

Hol Church - Brief reminder of the project content

East

South West

OVERALL CHALLENGE of cultural heritage listed buildings

- ***What do you do when you are hardly allowed to do anything ?***

- **Not allowed** :

- No new external features on building skin.
- No visible internal features.
- All changes to be approved by Riksaktikvaren.

- **Allowed** :

- Features at external distance or hidden internally.

VERTICAL SOLAR ABSORBER

GOAL :
SUPPLY ENERGY
CREATE DEBATE

TRADITION
Must Fit

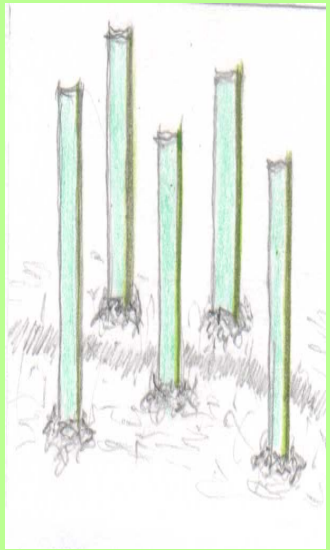
AESTETICS
Design

TECHNICAL
Must Work

TRADITION

Object :
Stone Group
Motive

as
Vertical
Solar
Absorbers
?



ABSORBER in LANDSCAPE

ABSORBER in LANDSCAPE

ABSORBER ALTERNATIVES

Thank you

-

for your Attention !