

ECOWEEK

2010 ... habits change ... climate change

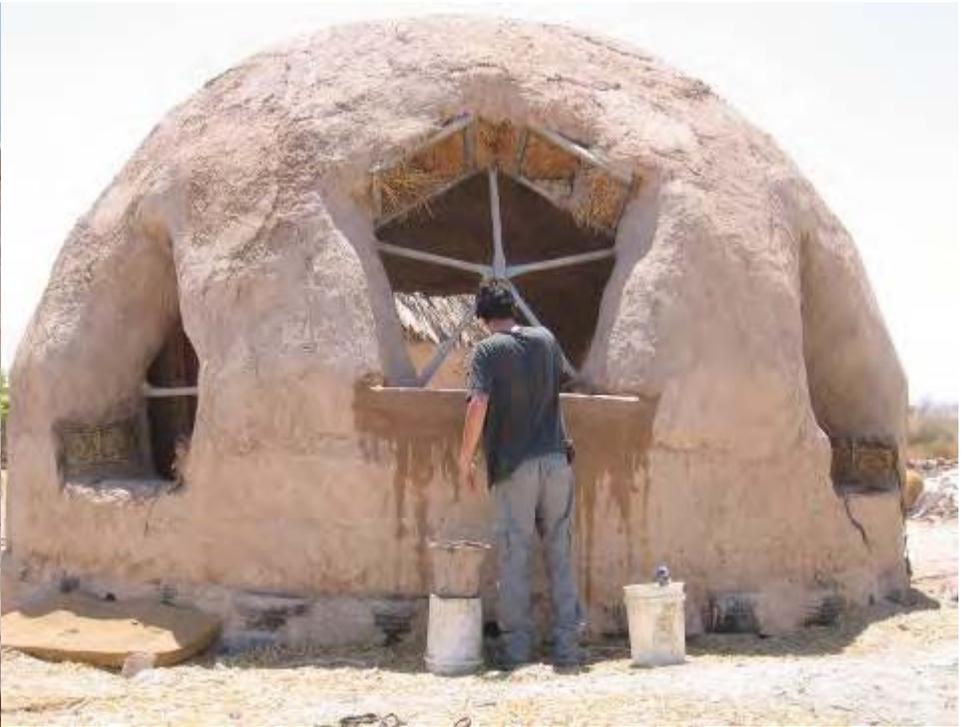
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**Architect Dr. Elias Messinas  
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**Do buildings contribute to  
Climate Change?**

**Yes!**

**green buildings**



you hear:  
“eco-buildings  
cost more”

do they?

design

# passive solar design

**orientation**  
**shading**  
**climate**



vernacular solutions  
energy-free  
for comfort in buildings

**Private Residence *Aegina, Greece* completed 2008**



**solutions: orientation, shading**



**solutions: orientation, shading**



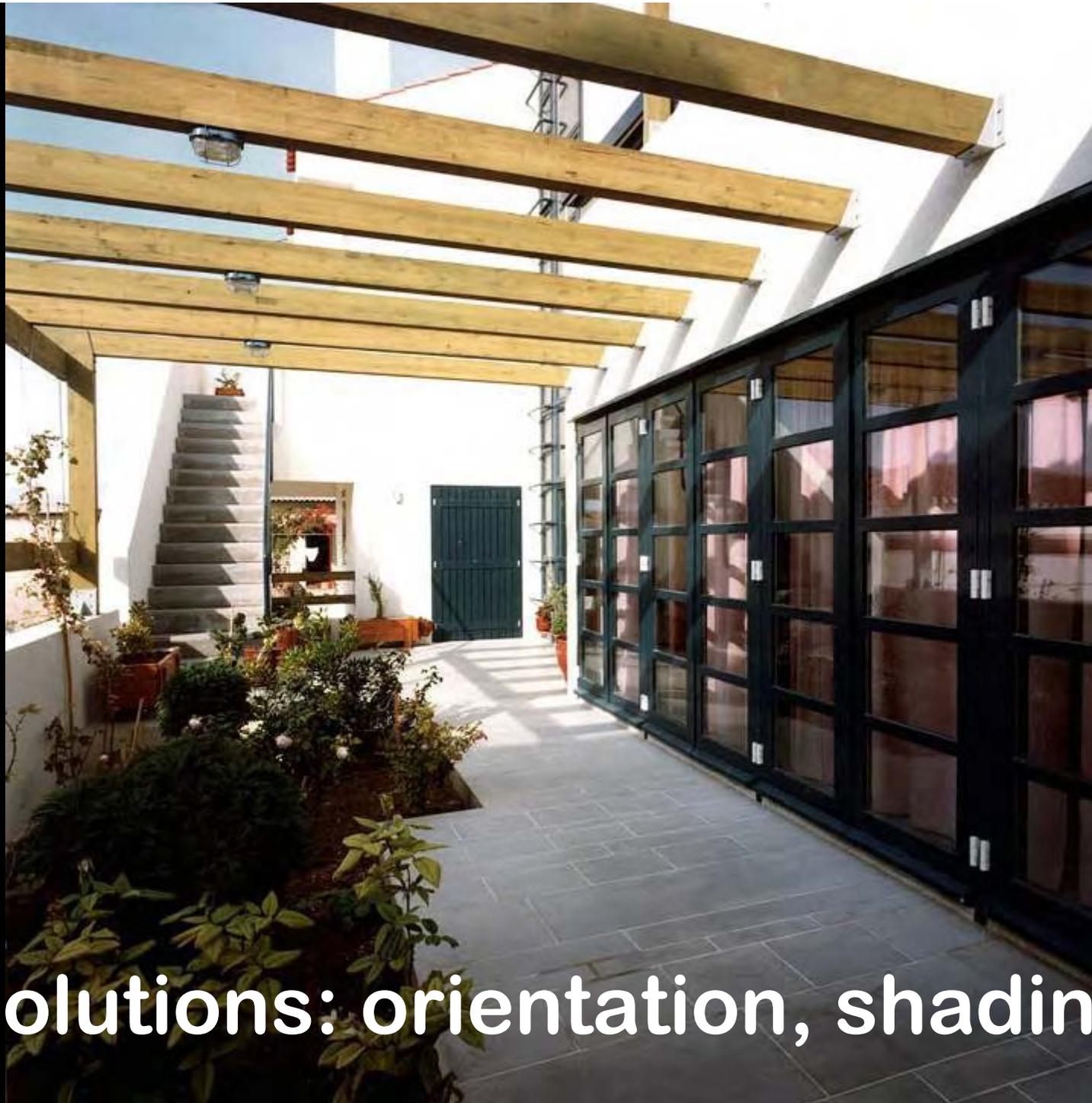
solutions: orientation, shading



**solutions: orientation, shading**



solutions: orientation, shading



**solutions: orientation, shading**



**solutions: orientation, shading**

*Courtesy: Elias Messinas*

Does it cost more?

**No!**

**Savings**

**10-20 %**

insulation



**Is it insulated;**



**No!**



Yes!

**Savings**  
**30-40%**

Does it cost more?

**No!**

# Must calculate the Building lifetime cost



Total bldg cost

# Building lifetime cost

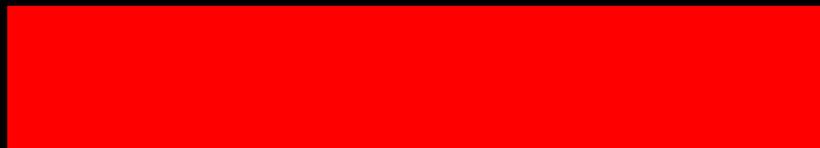


**25% building cost**

# Building lifetime cost



**25% building costs**

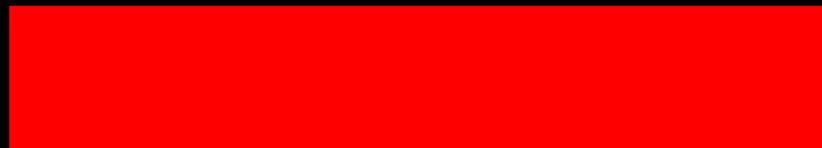


**75% running cost**

# Building lifetime cost



25% building cost **+10%** = 2.5%



75% running cost

# Building lifetime cost



25% building cost **+10%** = 2.5%



75% running cost  
**-40%** = 30%

# Building lifetime **savings**

cost vs. savings:

**+2.5%** < **-30%** !!

Does it cost more?

No!

Buildings are also  
**responsible** for:

## Depleting:

- 40% of produced energy
- 40% of virgin minerals
- 25% of virgin wood
- 16% of water withdrawals



**Buildings are also responsible**  
**for producing:**  
**construction waste**

# Waste can be recycled!



*Courtesy: Julie Bargmann*

# Waste can be recycled!



*Courtesy: Julie Bargmann*

# Waste can be recycled!



*Courtesy: Julie Bargmann*

# Waste can be recycled!



*Courtesy: Elias Messinas*



# Stone excavated and recycled



*Courtesy: Elias Messinas*

Waste can be recycled!



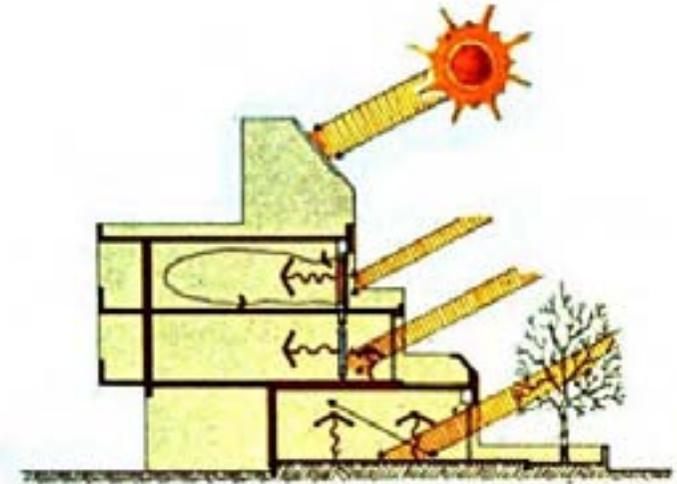
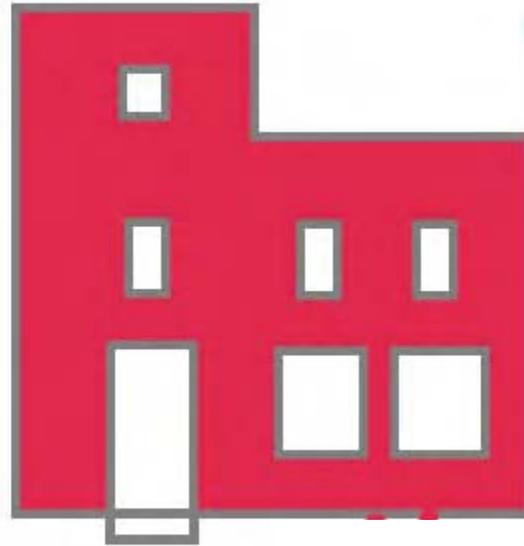
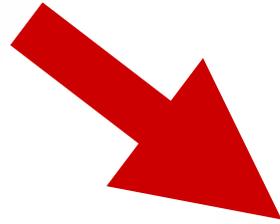
*Courtesy: Elias Messinas*

**green** building  
systems

lighting  
cooling  
heating



Let the sun shine in!



**passive heating**



South exposure!



glasshouse



**South exposure!**



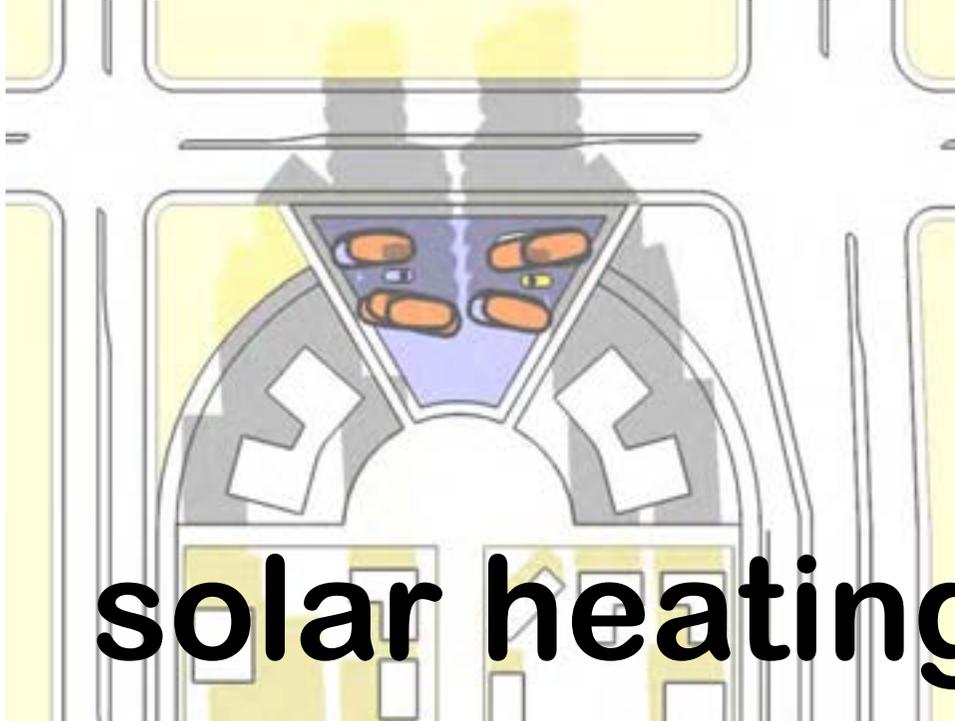
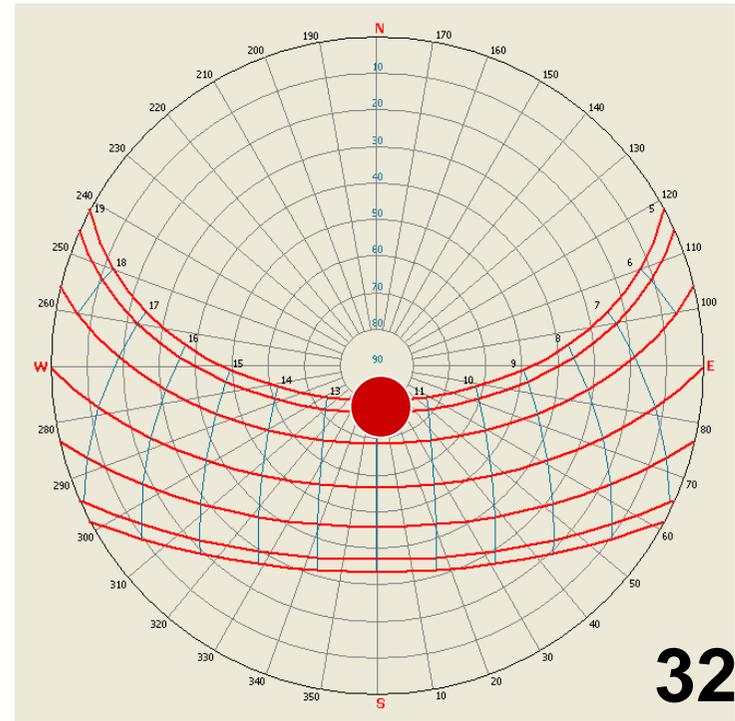
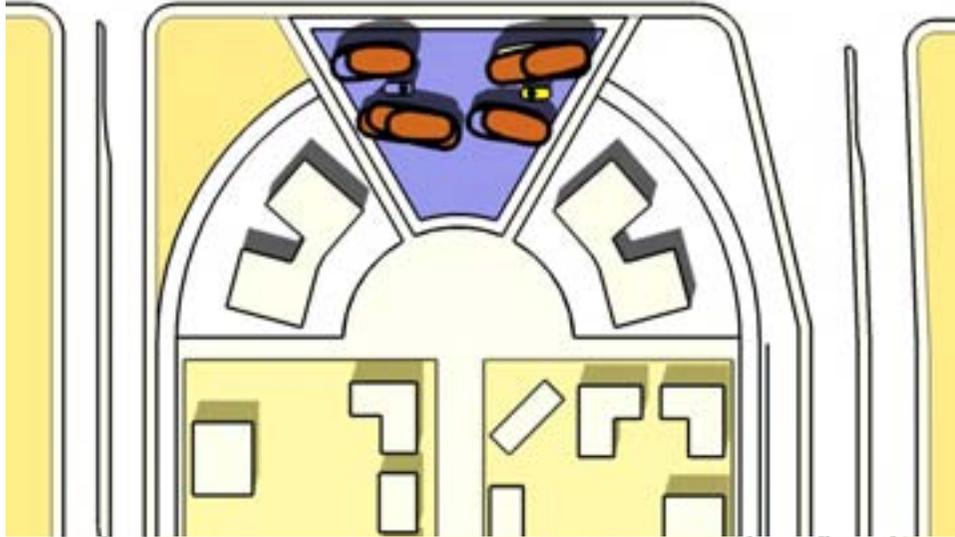


glasshouse

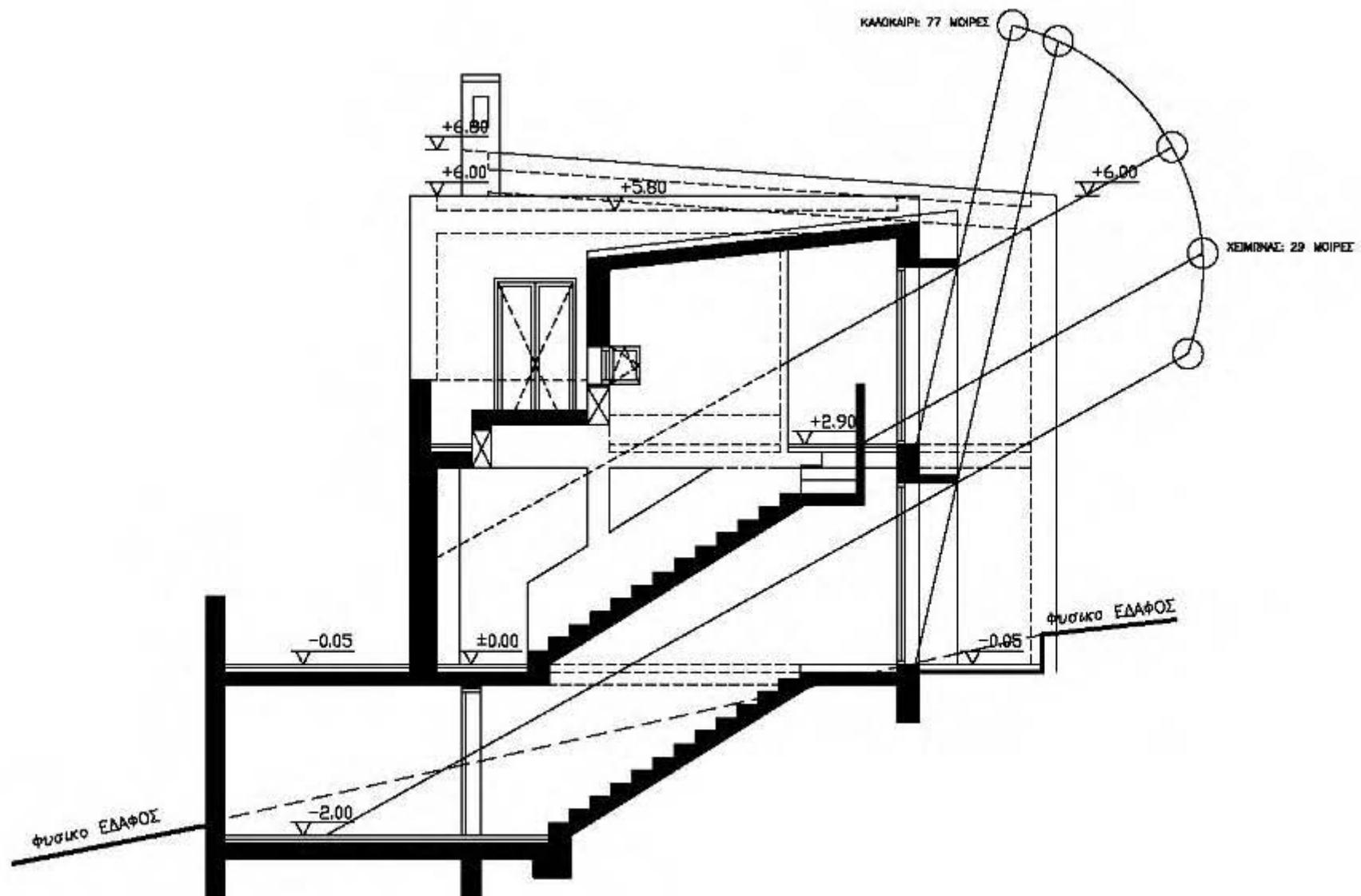
rainwater collection

*Courtesy: Elias Messinas*

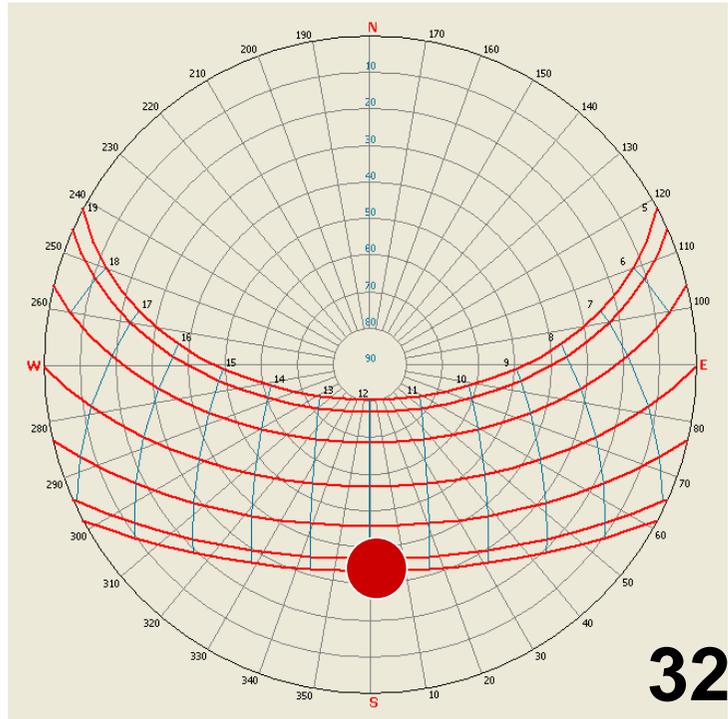
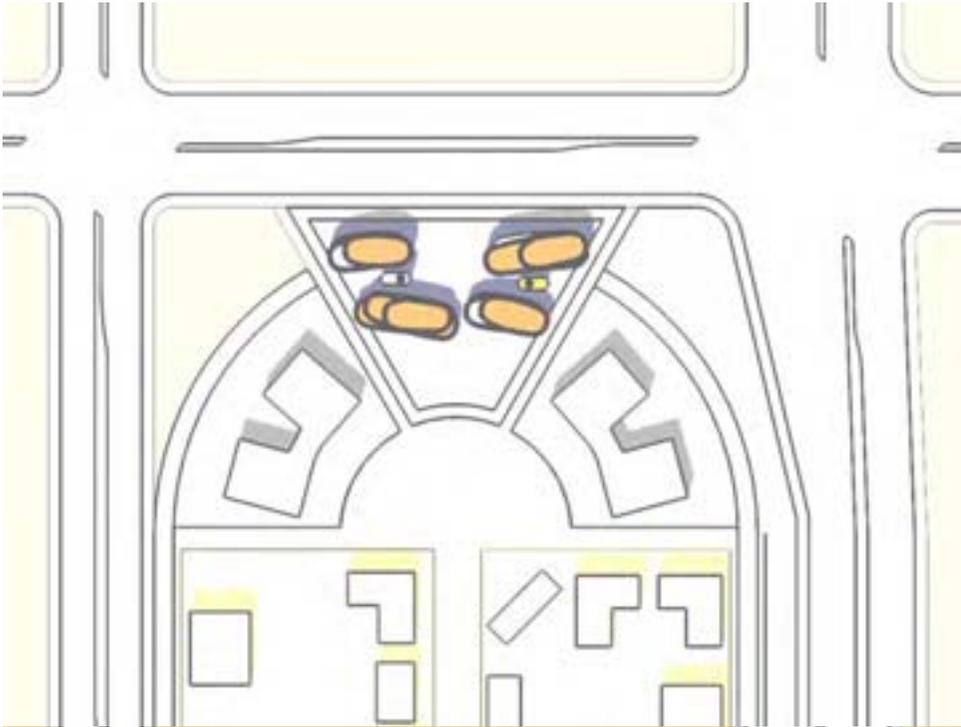
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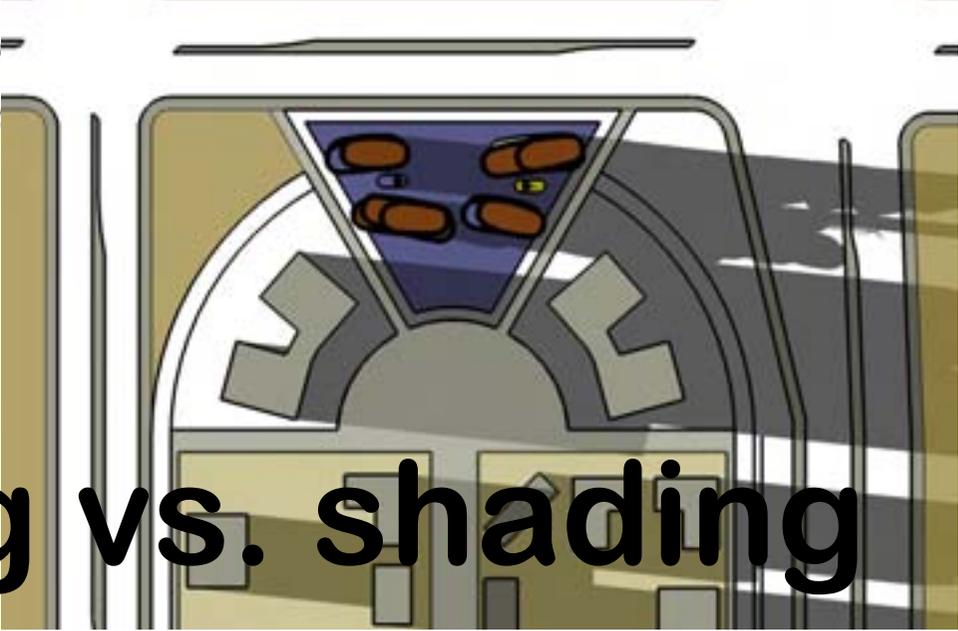
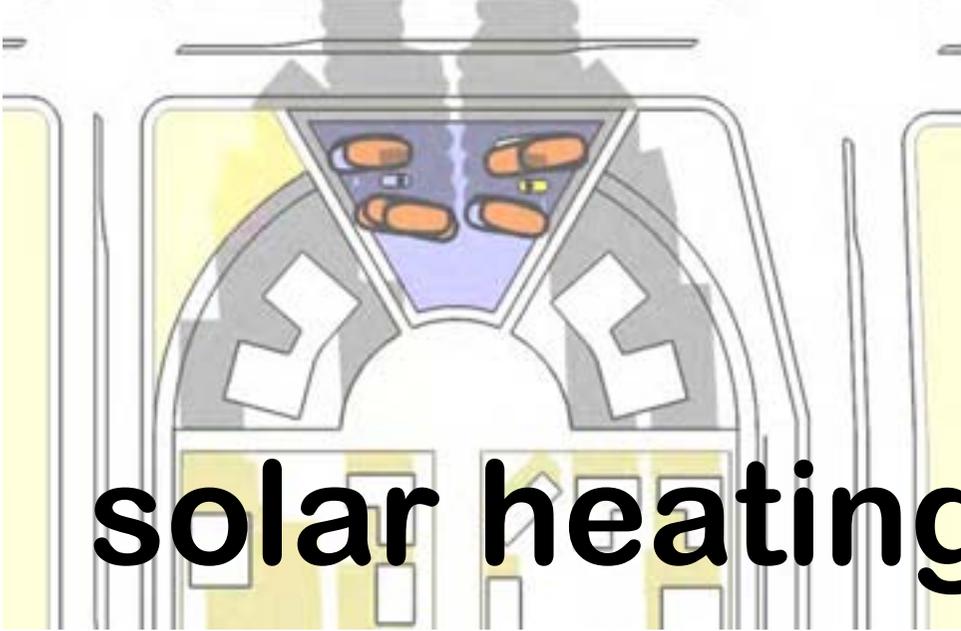
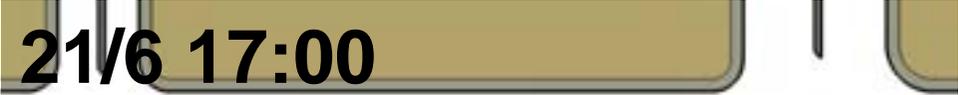
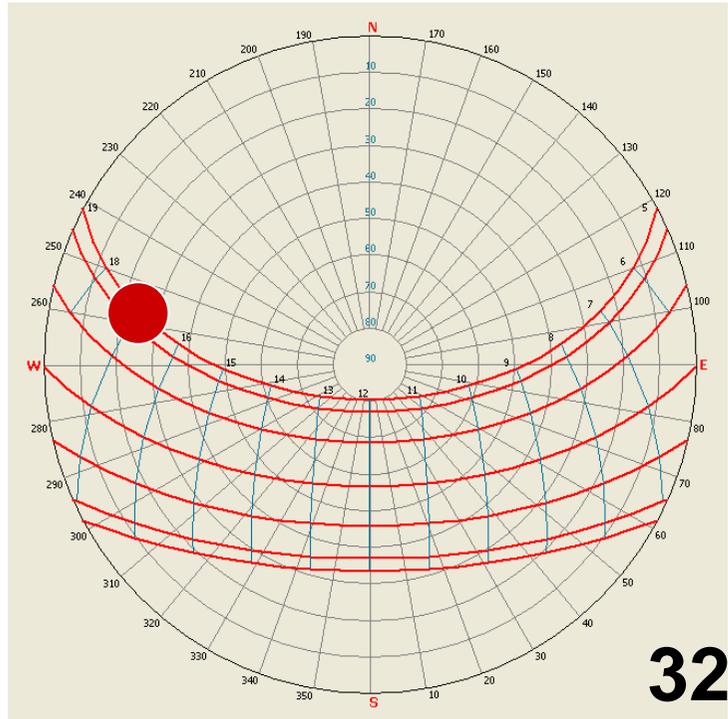
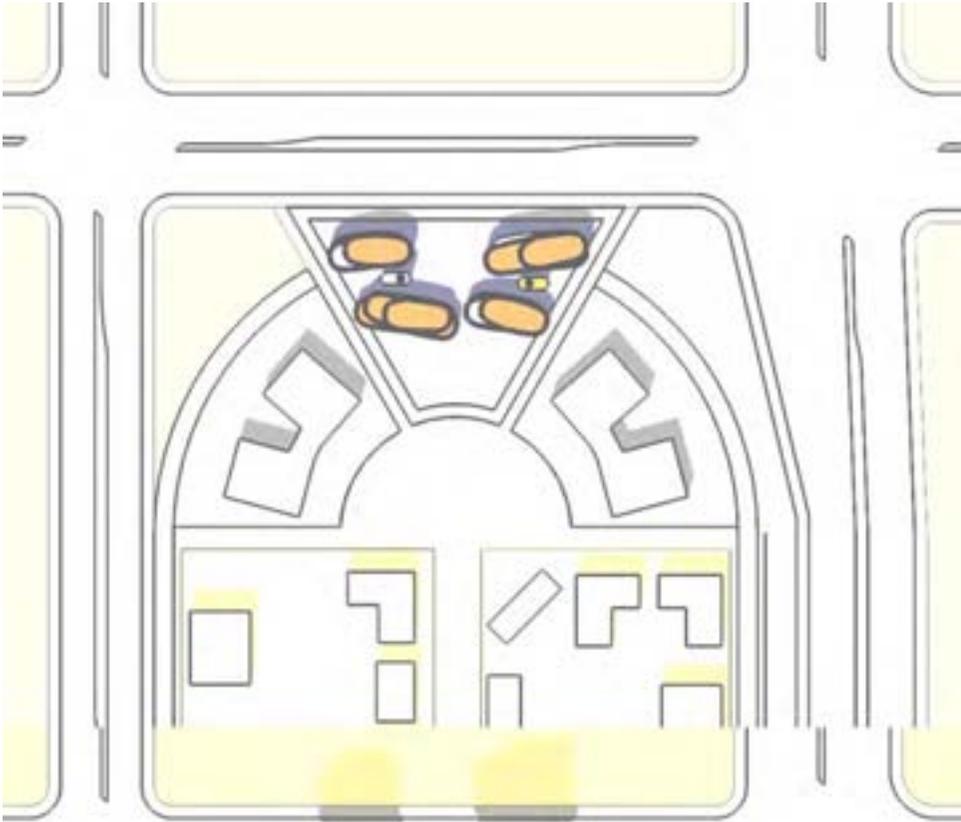
solar heating vs. shading



ΤΟΜΗ Α-Α



**solar heating vs. shading**



**solar heating vs. shading**



solutions: shading

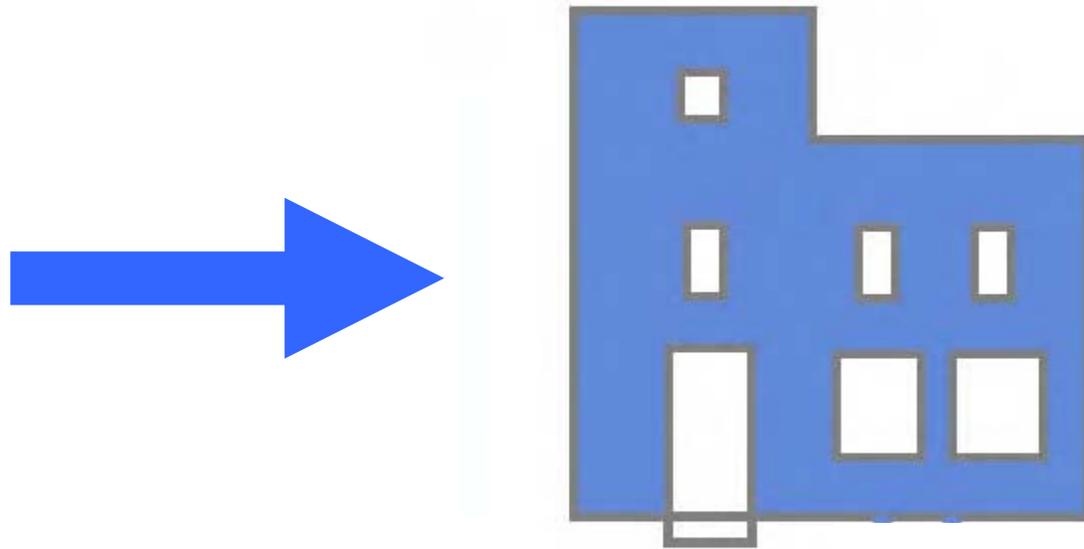


solutions: shading

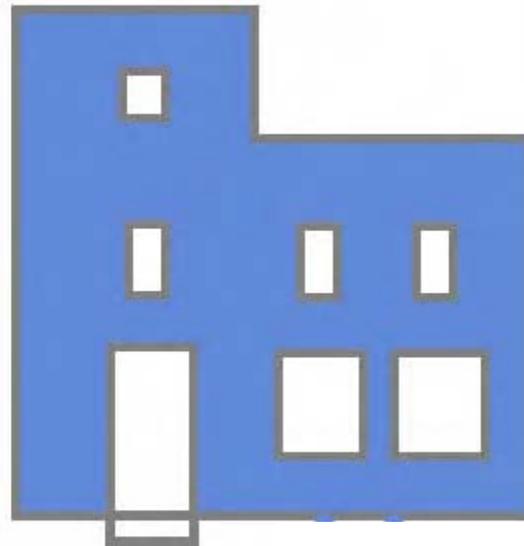
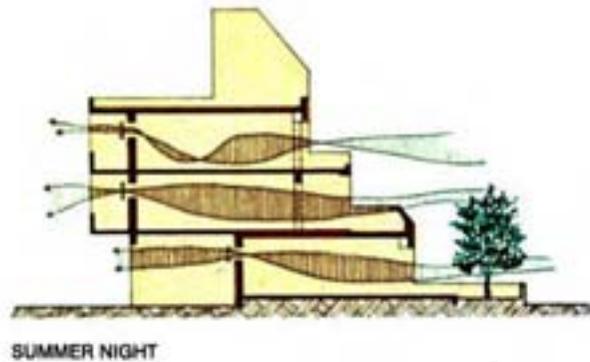
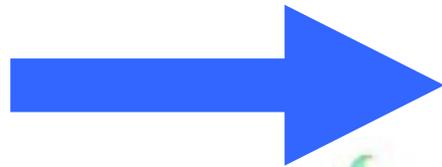
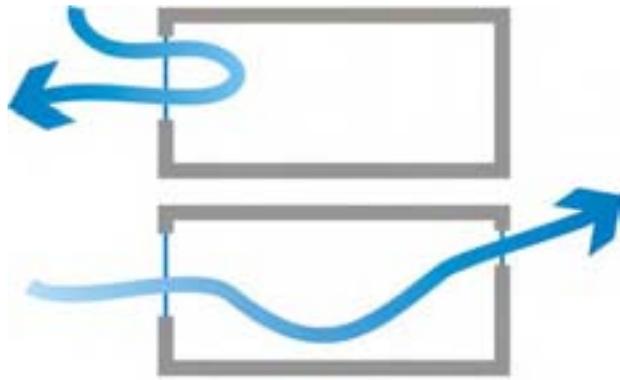


**solutions: shading**

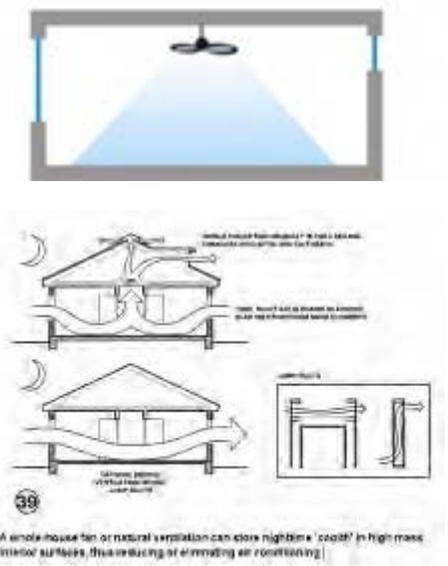
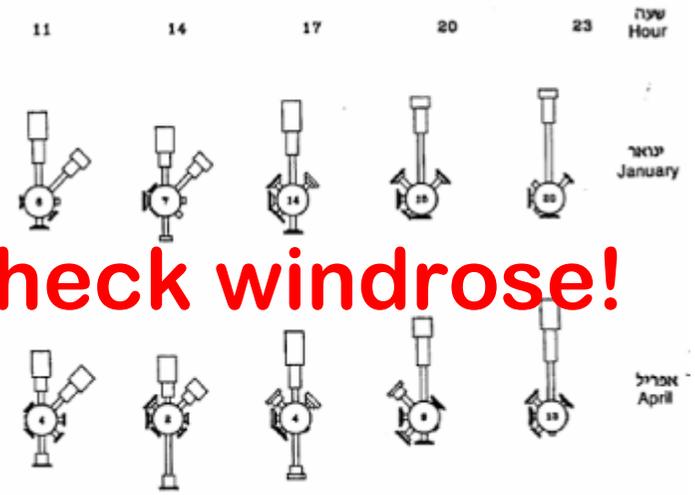
*Courtesy: Elias Messinas*



**passive ventilation**



check windrose!



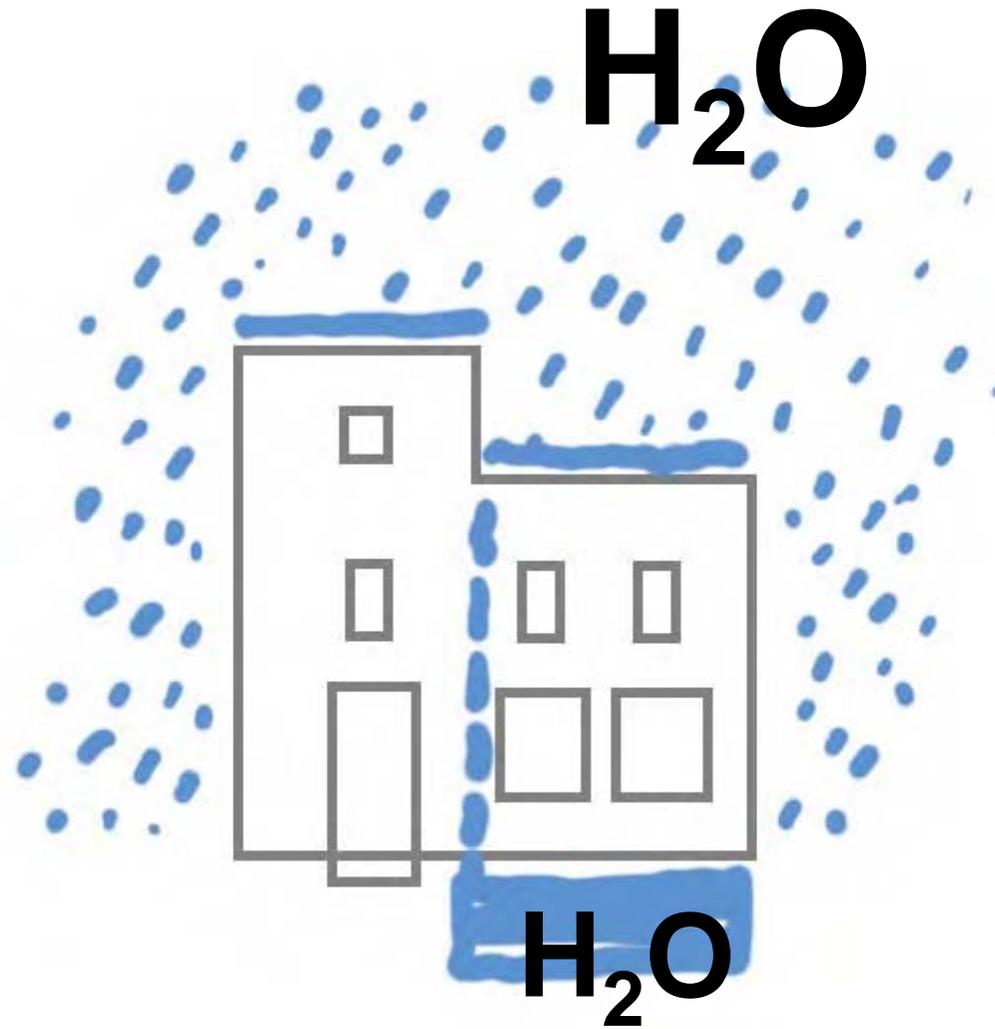
# passive ventilation

Windows high in space  
to release hot air





**Wind tower to release hot air –  
remember: you can also use your  
stairwell in the same way!**



**collect water**



Recycle sink grey water



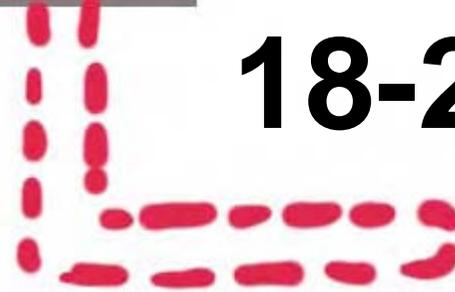
Collect rainwater



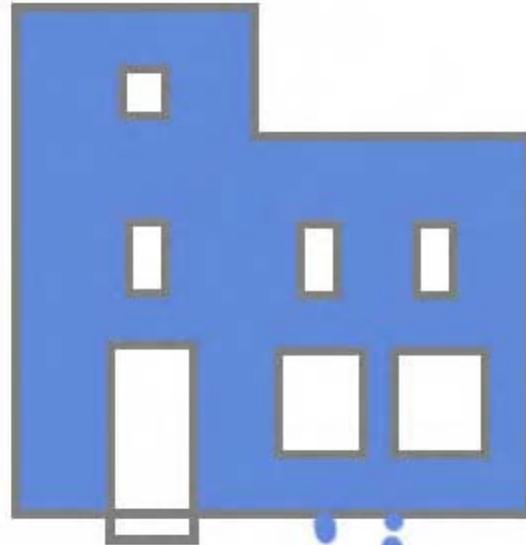
Collect in underground cistern



**18-20°C**

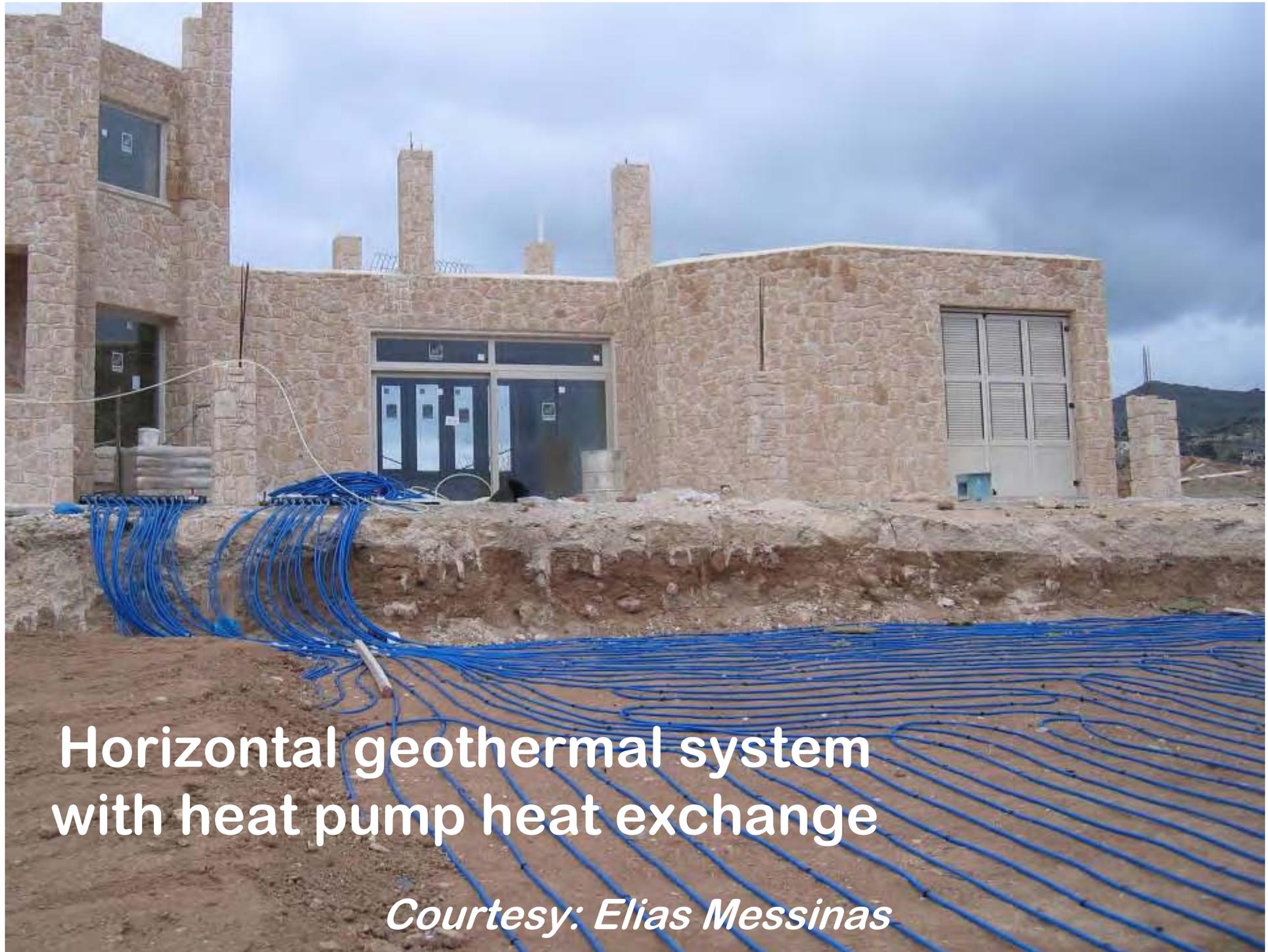


**geothermal heating**



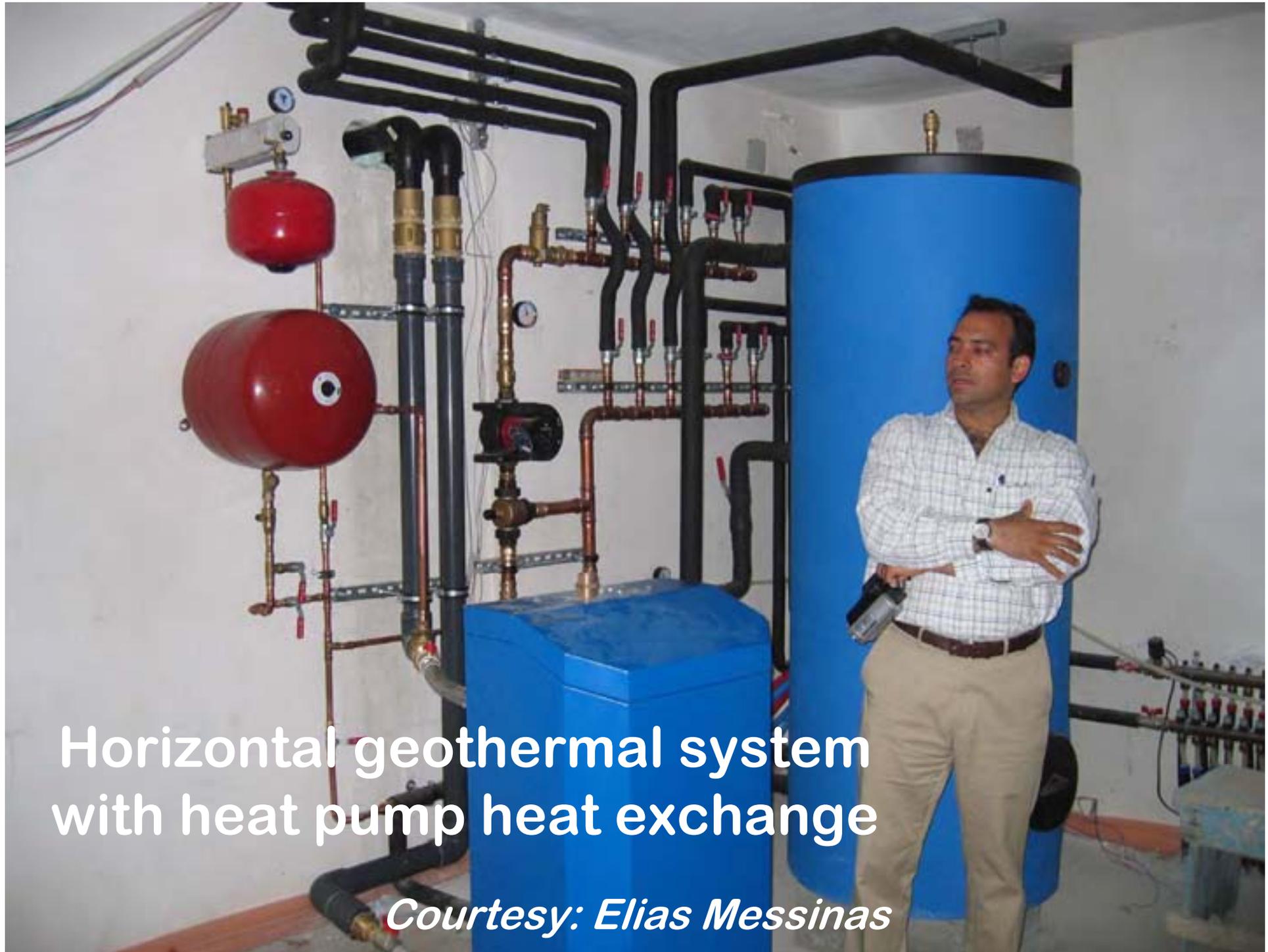
**18-20°C**

**geothermal cooling**



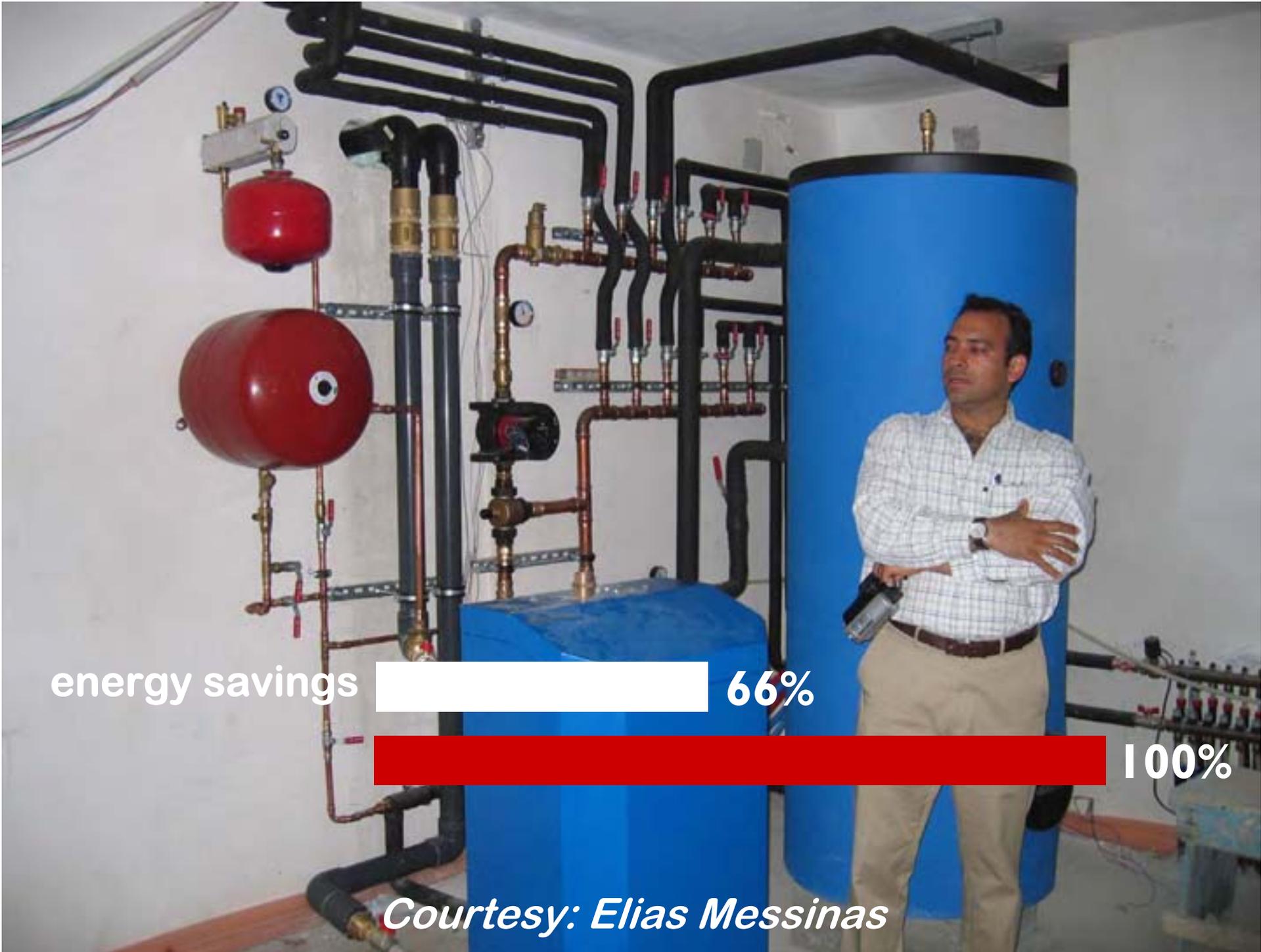
Horizontal geothermal system  
with heat pump heat exchange

*Courtesy: Elias Messinas*



Horizontal geothermal system  
with heat pump heat exchange

*Courtesy: Elias Messinas*



energy savings

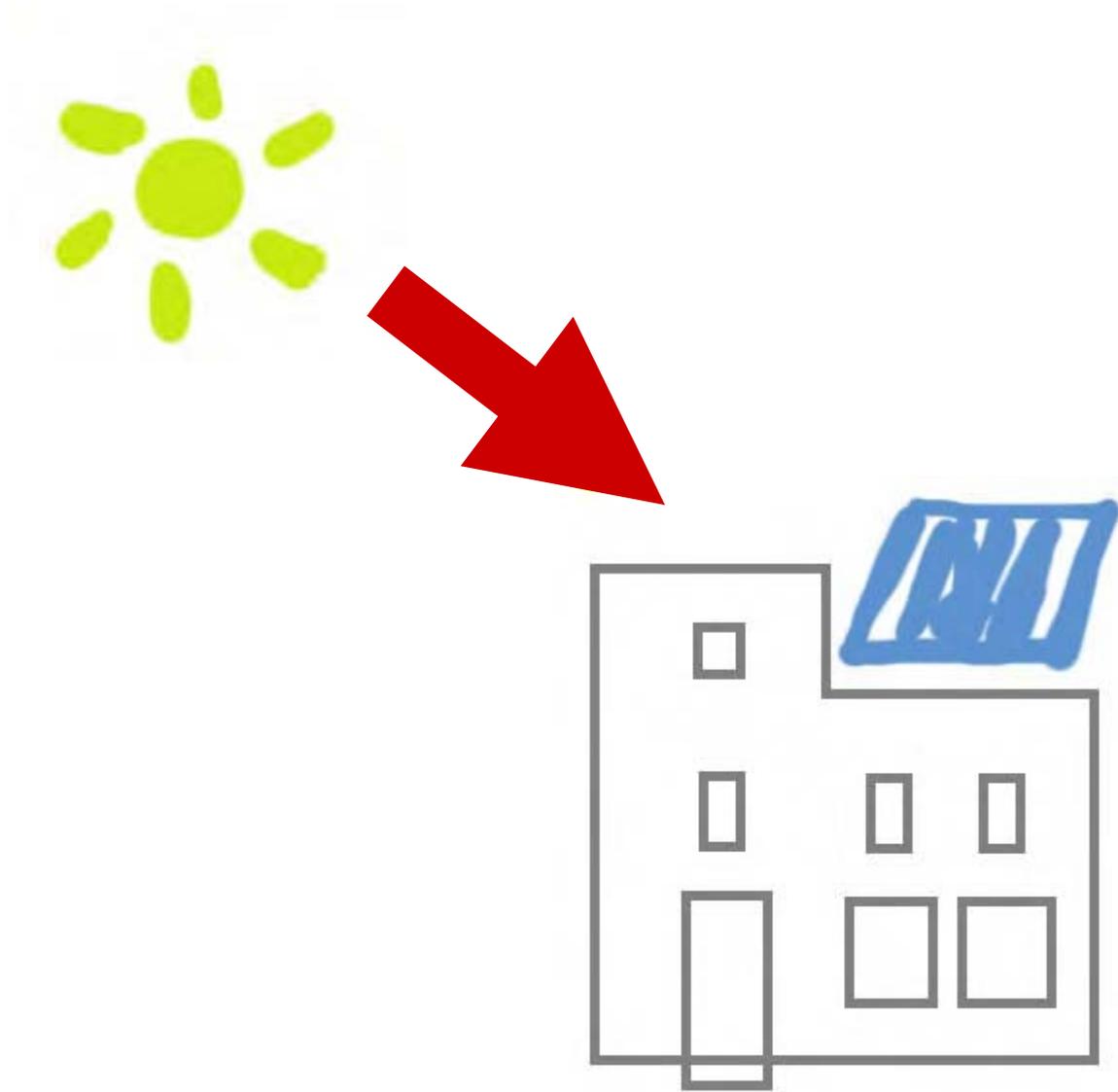


66%



100%

*Courtesy: Elias Messinas*



**solar panel**







energy savings 80%

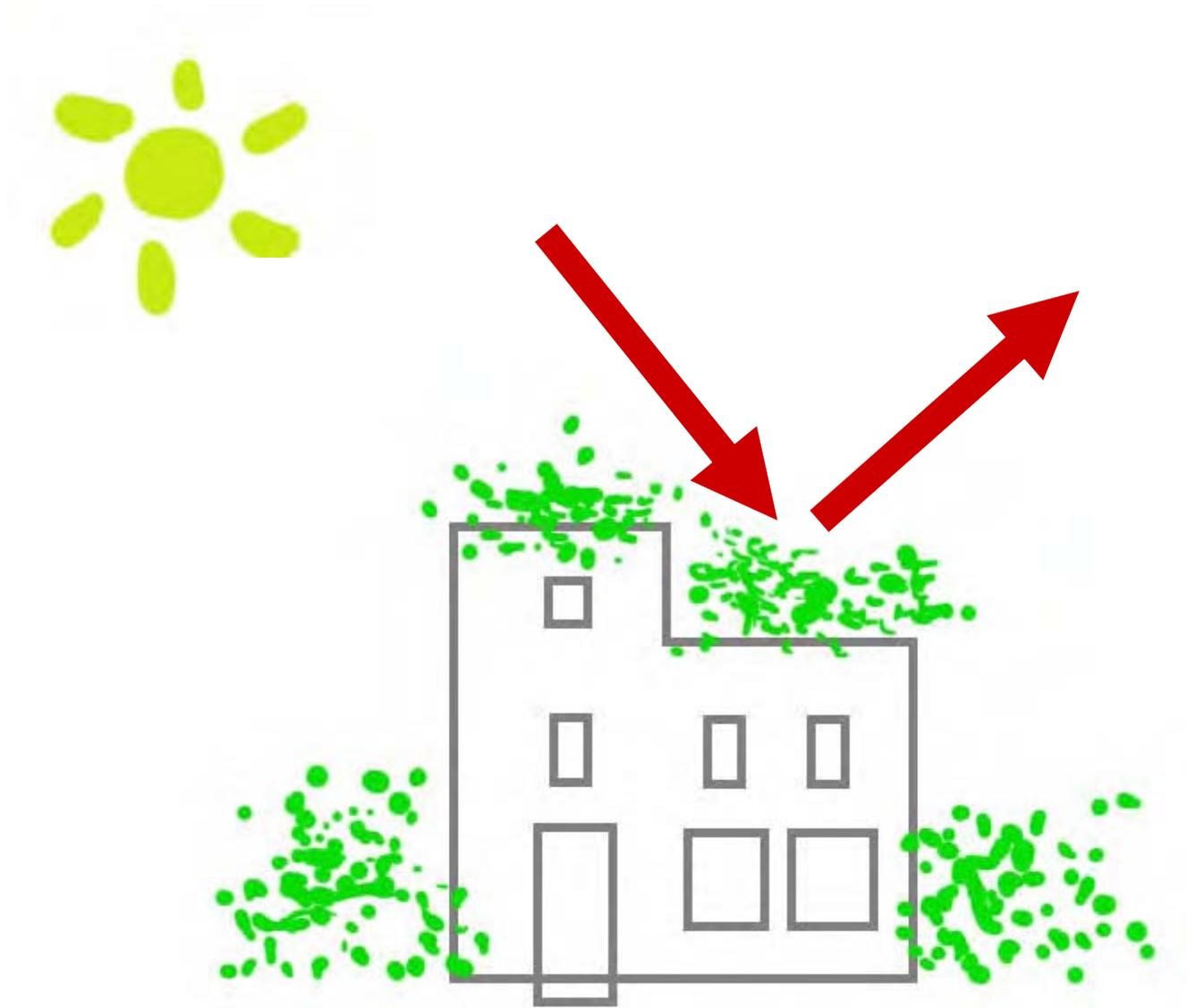
100%



solar energy



**solar heating-cooling**



**green roof**



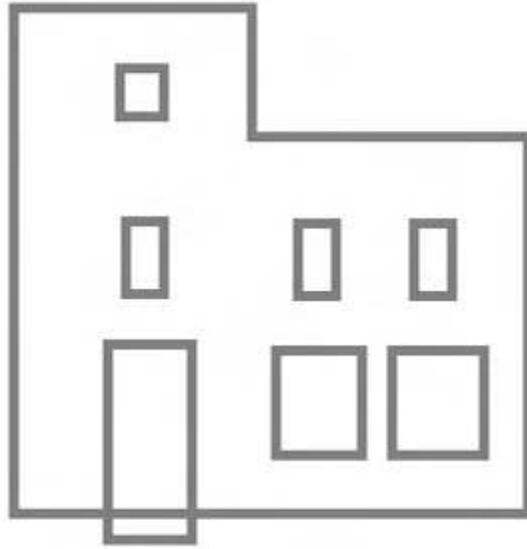
Reduce heat island effect

**+75°**

**green roof: 30°**

**green roof / wall**





**materials**



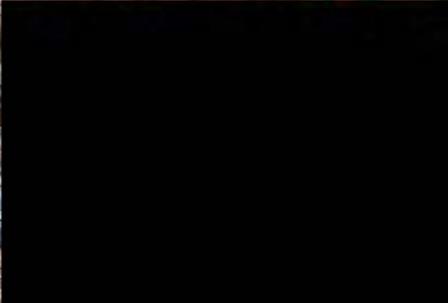
natural materials



adobe



mud



Mud, tires, strawbale



wood recycling



**Water source for passive cooling**



**Recycled crashed concrete**



**Recycled grey water**

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