

# W5

## BIOCLIMATIC & ECOLOGICAL INTERVENTION OF THE COURTYARD OF THE 5<sup>th</sup> ELEMENTARY SCHOOL IN AGIOS NIKOLAOS, CRETE



### WORKSHOP GROUP

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## CURRENT SITUATION

Containers are used for classrooms in the 5<sup>th</sup> Elementary School in Agios Nikolaos , which surround a concrete and extremely hot courtyard in the summer. The classrooms are hot even with air-conditioning.



## PARENT'S & CHILDREN'S WISHES

Non concrete, softer ground surface in the courtyard.

Shaded places for games, trees, flowers and nature.

Use of the outer municipality space adjacent to school for sport activities and events.

Removal of polycarbonate cover of the existing metallic shelter as it is very hot in the summer.

Shaded thresholds, waiting areas, a solution for avoiding floods.



## PROPOSAL CONCEPT

A more human environment embracing pupils with nature, which will give stimuli for their senses and brain, concentration in their learning process, as well as an active environmental education. Happiness and joy of life is the goal.



Ecological, low cost, low embodied energy materials and bioclimatic design are applied.



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The natural environment enhances the learning process, being a space of adventure, the respect to each other and themselves, the team spirit and group activities.

The municipality's space outside the existing school courtyard will be surrounded with a green wall fence.

Pupils will enjoy their courtyard even after school activities and feel more like home.



Long sliding doors which will be closed during school operation time and open in the evening. This way the schools courtyard will extent outside and use the sport courts and the space for events.

The municipality's space outside the existing school courtyard will be surrounded with a green wall fence.

Pupils will enjoy their courtyard even after school activities and feel more like home.



# 1 PUPILS MOVEMENT



empty concrete courtyard

aggression

individual game

tension

disorientation

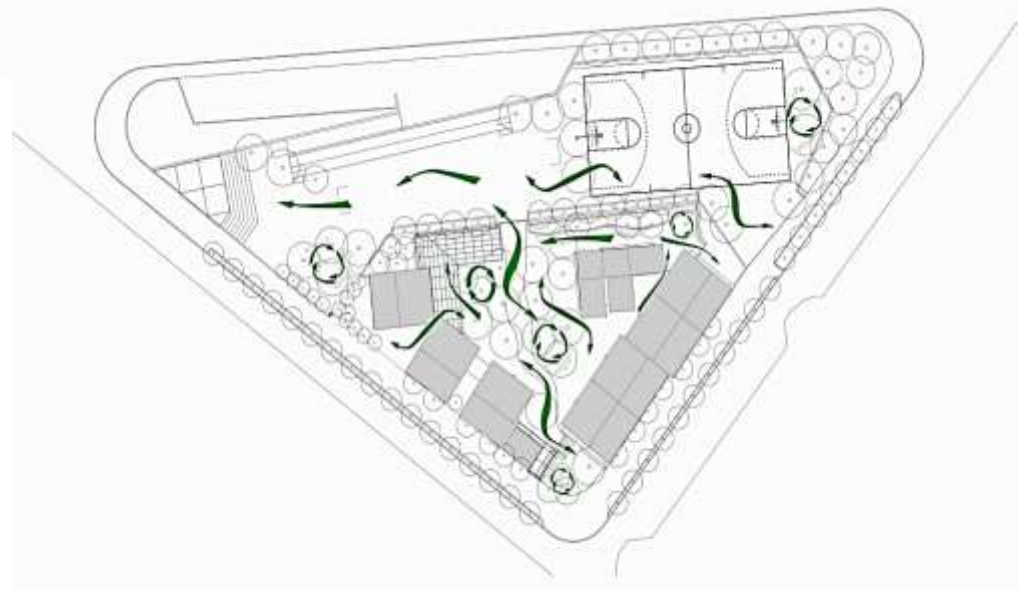
natural courtyard environment

social gathering

team game

calmness

concentration



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## 2 HARD SURFACE ≠ SOFT GROUND



Hard concrete prevents water cycle – breakage, removal and recycling of concrete



Replacement with earth and wild indigenous grass (agriada), allowing water cycle



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# 3a PLANTING

Vegetation absorbs heat

Boasts immune system - calms

# 3b PLANTING – TREES

For shade , stimuli, temperature decreasing

## DECIDUOUS



Morus alba



Robiniax  
Margarettae



Melia  
azedarach

## EVERGREEN



Ceratonia – siliqua  
(Carub tree)



Cypripedium

## BUSHES



Nerium  
oleander

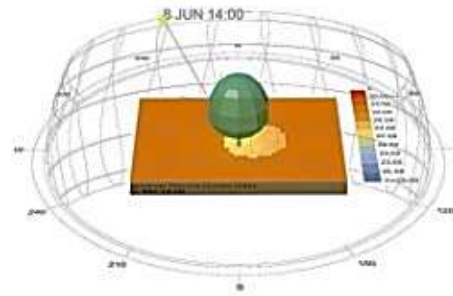
## CLIMBING PLANTS FOR VERTICAL GREENING



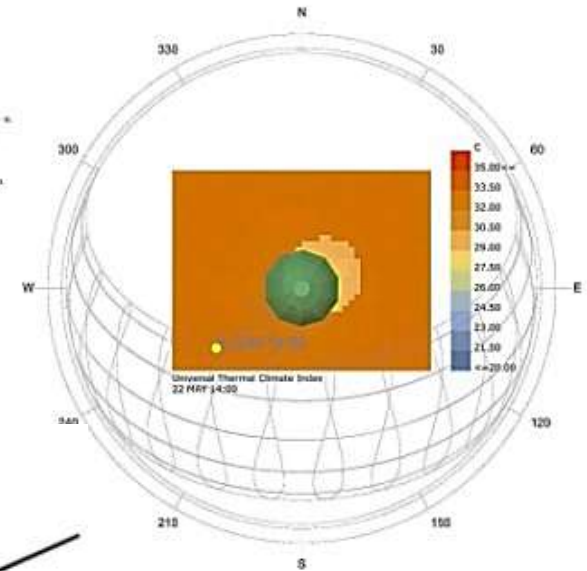
Hedera – Helix for  
hiding fences



Star jasmine for  
6 facades

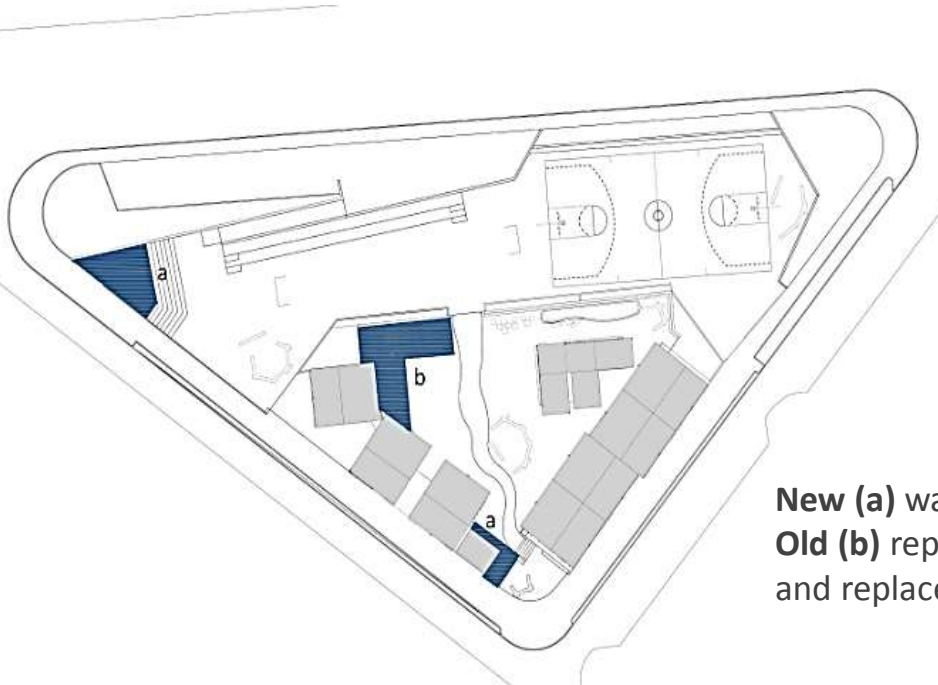


Sun-Path Diagram - Latitude: 40.52  
8 JUN 14:00, ALT = 63.71, AZM = 234.96





# 4 SHADING WITH TIMBER TRELLISES



**New (a)** water fountains, WC area, eastern entrance

**Old (b)** repair existing metal construction, remove polycarbonate and replace it with timber trellis



Existing toxic buffers



Replacing with organic rope



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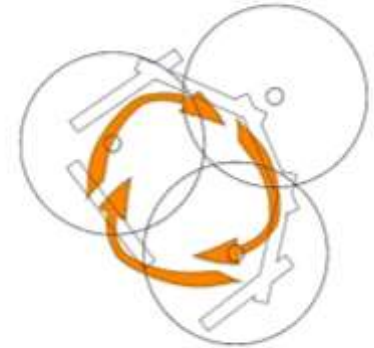


# 5 SOCIALISING

Defining space with gathering and sitting possibilities



Shaded  
circular arrangements



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# 6 BRAIN STIMULI = EXPLORATION OF THE PHYSICAL ENVIROMENT

Learning through natural materials. Trunks are used as fences, sitting spaces and games for pupils. Most materials will be used from the municipality, from the cutting and maintenance of existing trees.



All material surfaces will be smooth and friendly to the children, with round edges for safety reasons.



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# 7 FLOOR COVERING



- Wooden paths made of trunks
- wild indigenous grass
- rammed earth floor for the basketball court



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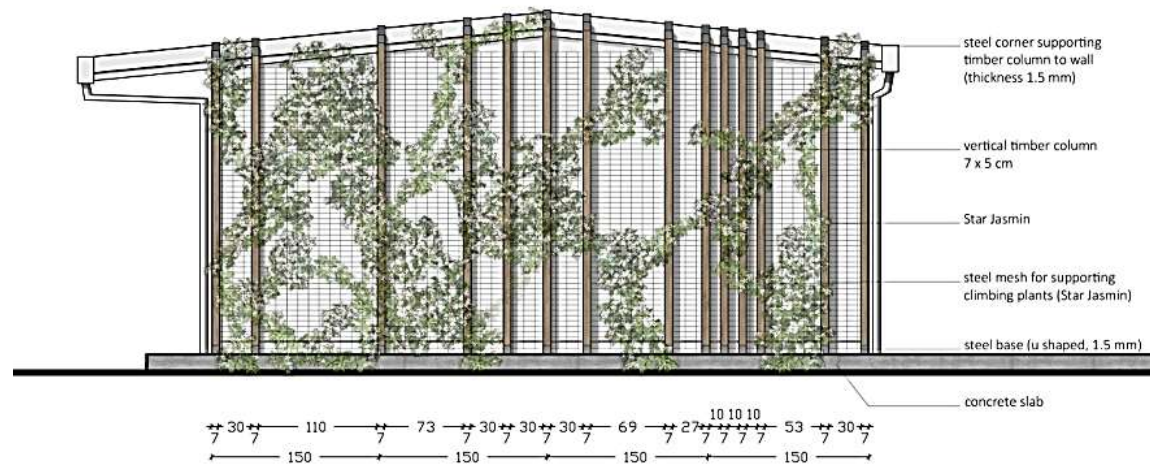
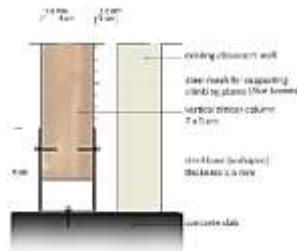
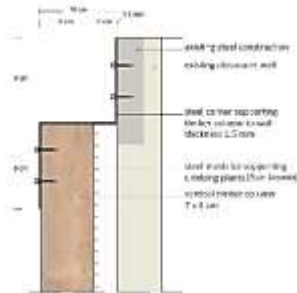
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# 8 VERTICAL GREENING ≠ METAL FACADES + METAL FENCES



Covering of existing metal fences and facades with climbing plants

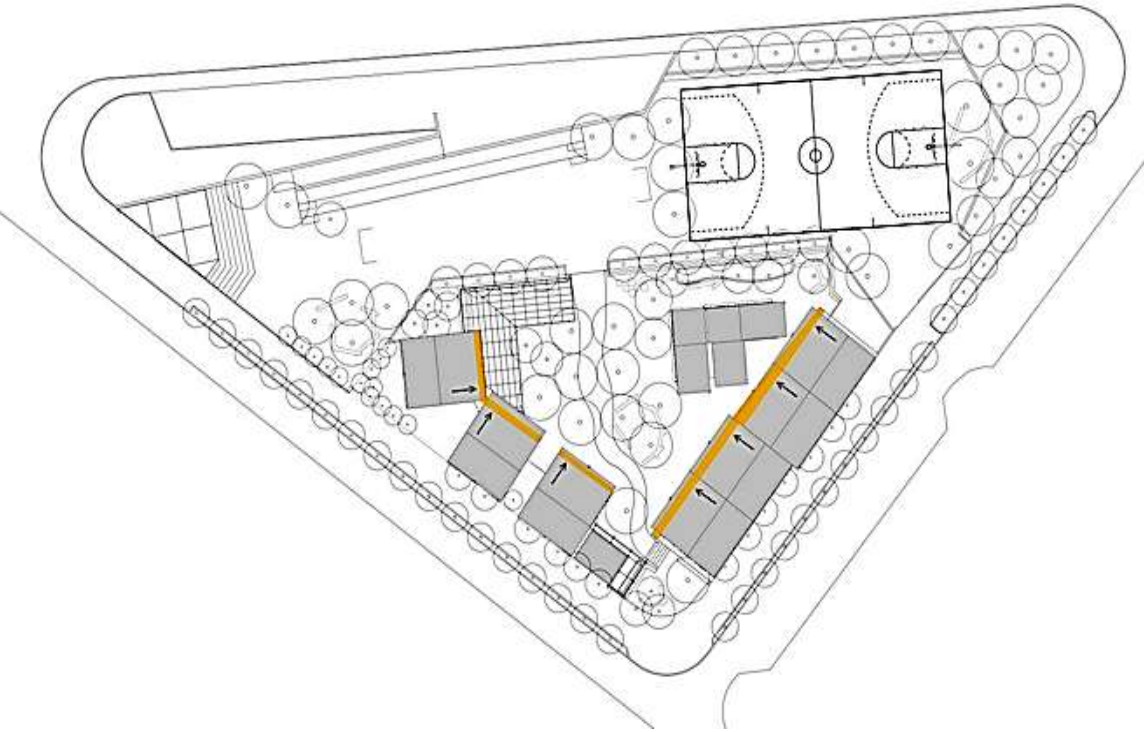


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# 9 THRESHOLD SAFETY



Proposal of a smooth transition with wider landings made of deck.



Existing classroom thresholds are dangerous.



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# 10 RAINWATER from roof gutters floods the whole concrete courtyard \_ solution

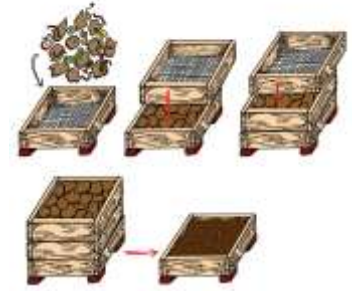
Rain water collection in tanks as demo for the pupils.

Rain water directed to the municipality drainage



# 11 ENVIROMENTAL EDUCATION : VEGETABLE GARDEN + GARDEN WITH HERBS + COMPOST BIN

The contact with nature enhances good mood, makes pupils smarter and increases the levels of serotonin. Children learn to cultivate and observe nature.



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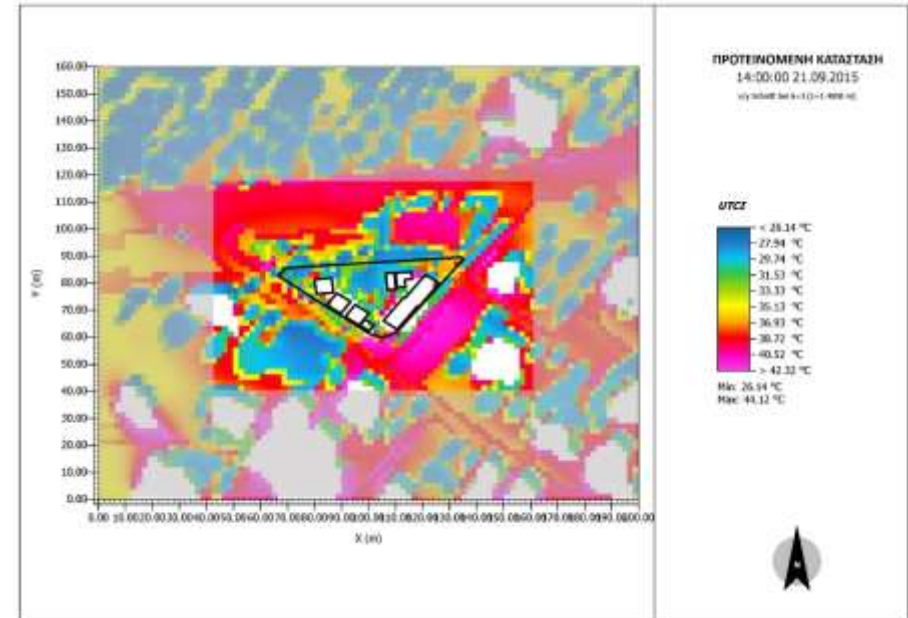
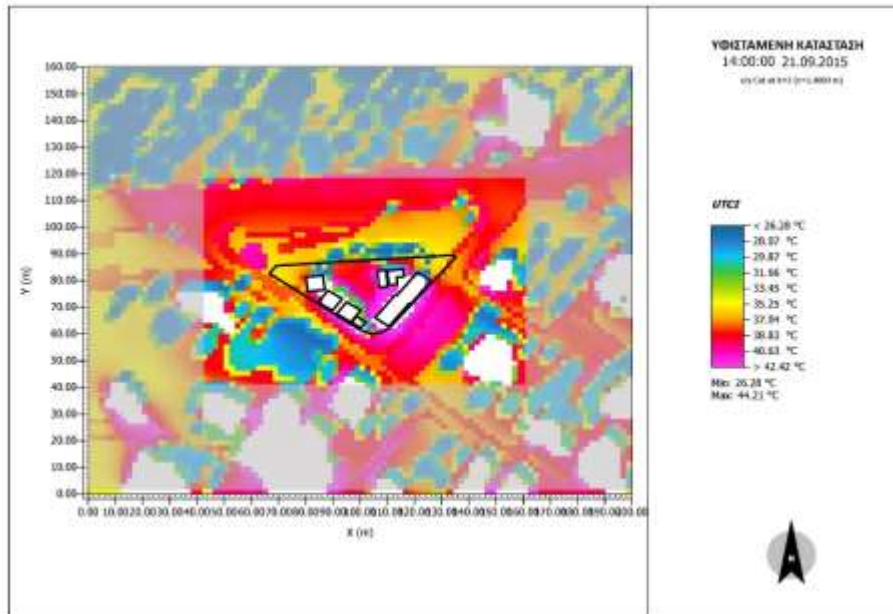


# 13a MICROCLIMATE SIMULATIONS

- Air temperature reduction up to  $0,7^{\circ}\text{C}$
- Surface temperatures decreased up to  $13^{\circ}\text{C}$



Improvement of thermal comfort  
up to  $12^{\circ}\text{C}$



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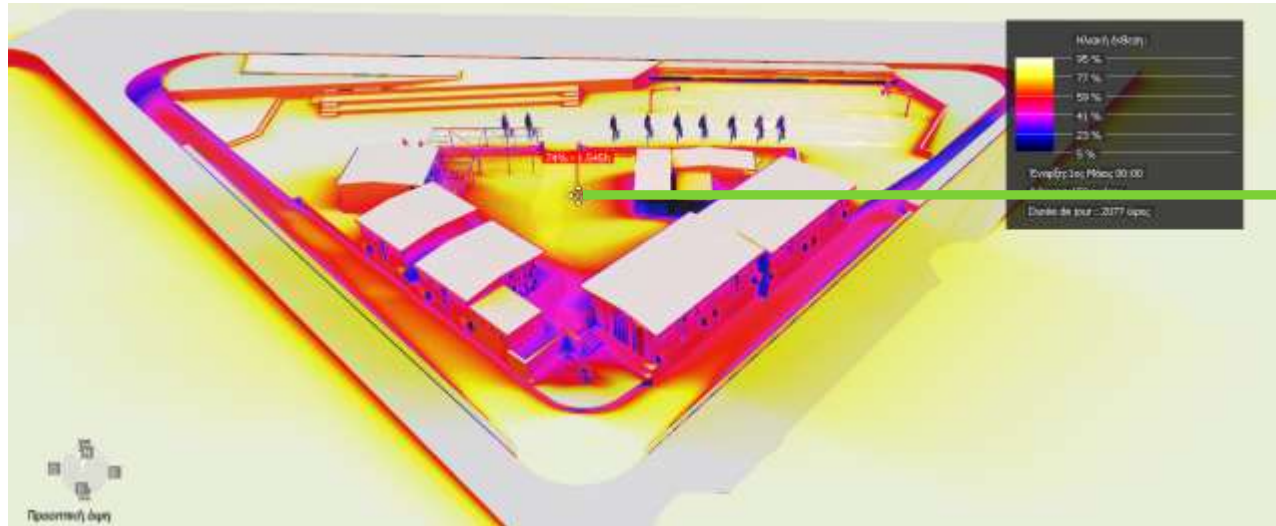


MINISTRY OF HEALTH

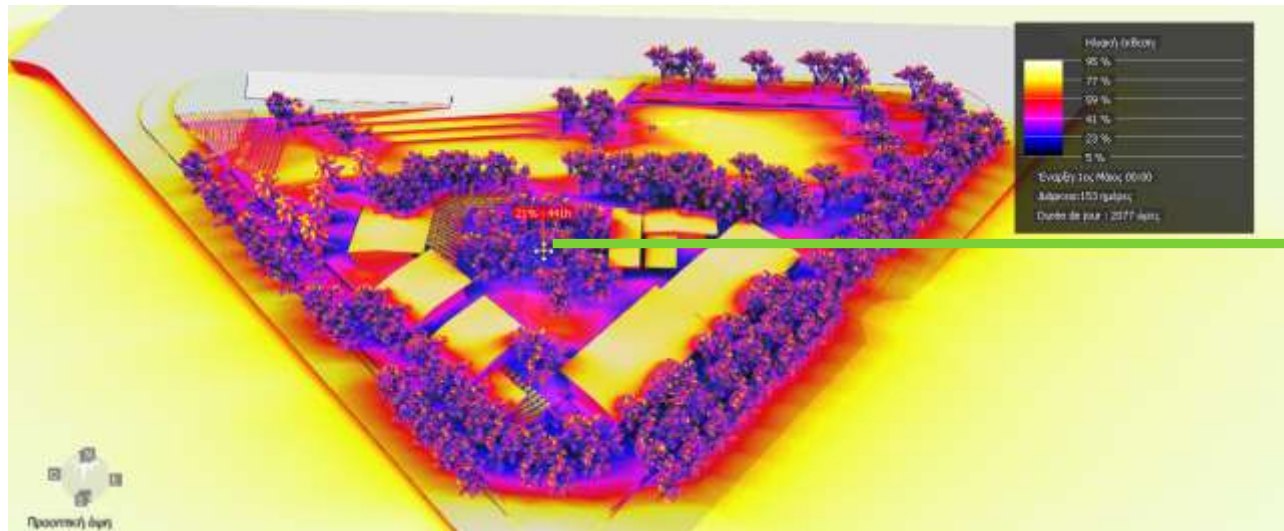


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# 13b SHADOW AND INSOLATION SIMULATIONS



75%



20%



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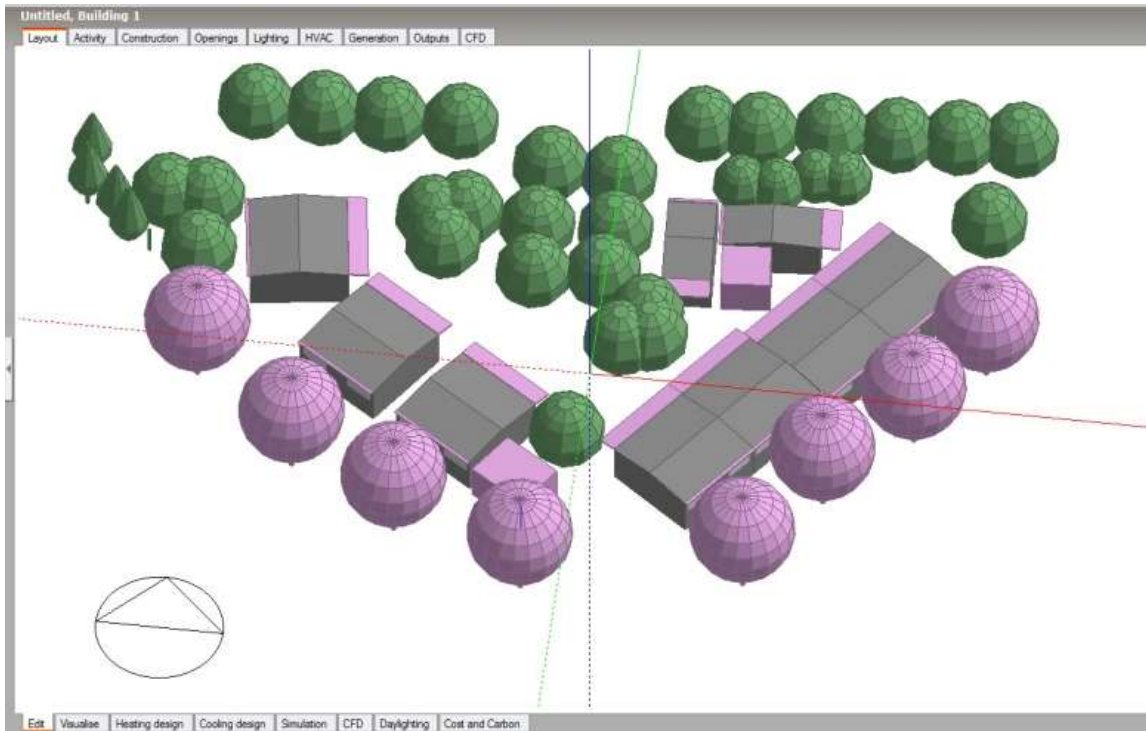
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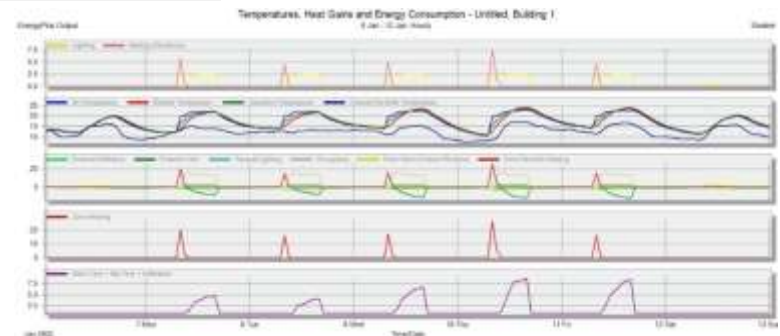




# 13c THERMAL SIMULATIONS



**Decrease** of energy needs by **7%**  
just by planting trees and providing shading.



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Thank You!



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