Urban Heat Islands: Green Roofs as a Potential Way to Attenuate Temperatures in Cities

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- INGLÉS II
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INTRODUCTION

PRIVATE GARDENS

PARKS

URBAN GREENERY

STREET TREES

SQUARES

INTRODUCTION

BENEFITS OF URBAN GREENERY

AIR SANITATION PROMOTION

TEMPERATURE COOLING

PRECIPITATION RETENTION

NOISE ATTENUATION

INTRODUCTION

CONSTRUCTION OF BUILDINGS → SATISFACTION OF THE CITIZENS' NEEDS

URBAN GREENERY → REDUCTION AND DISPLACEMENT

INTRODUCTION

INTRODUCTION

PURPOSE OF THIS WORK

To develop a sustainable city model, reincorporating the green spaces that have been displaced, aiming to mitigate the effects of global warming

MAP OF THE PRESENTATION

- DESCRIPTION OF THE PROBLEM: **URBAN HEAT ISLANDS**
- CAUSES AND CONSEQUENCES
- PROBLEM APPROACH: **GREEN ROOFS**
- POSITIVE AND NEGATIVE ASPECTS

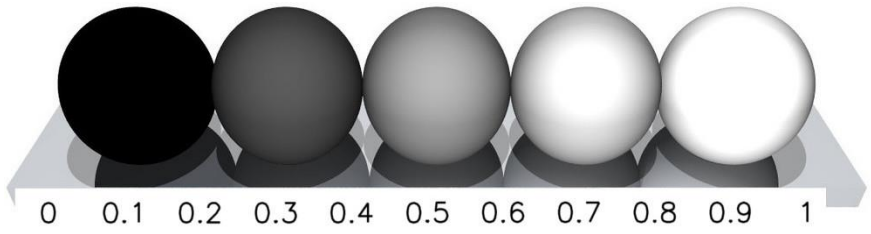
EXPECTED WORK IMPACT

To propose a **solution** and also raise **awareness** of the importance of urban greenery.

URBAN HEAT ISLANDS

LOW ALBEDO MATERIALS

Albedo is the relative amount (ratio) of light that a surface reflects compared to the total incoming sunlight. A surface with a high albedo will reflect more sunlight than a surface with low albedo.



URBAN HEAT ISLANDS

A **UHI** is a metropolitan area that is a lot warmer than the rural areas surrounding it.

URBAN HEAT ISLANDS

CONSEQUENCES OF UHI

- INCREASE IN THE ELECTRICITY CONSUMPTION
- REINFORCEMENT OF CLIMATE CHANGE
- IMPACT ON WATER QUALITY
- DETERIORATION OF HUMAN HEALTH

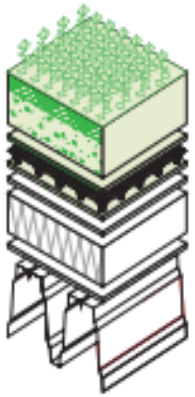
GREEN ROOFS

THE INCORPORATION OF URBAN GREENERY IS PROVEN TO MITIGATE THE UHI EFFECTS

GREEN ROOF

- Building system with a plant finish on a bed of soil or substrate that is specially designed for obtaining environmental benefits.
- Building technologies for improving the habitat or saving energy consumption.

TYPES OF GREEN ROOFS



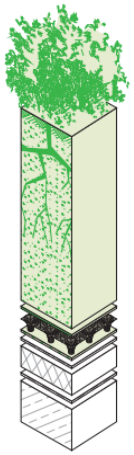
EXTENSIVE GREEN ROOF

- Recommended application for limited load-bearing building structures and low-usage areas
- Low maintenance meadow effect benefit

SEMI INTENSIVE GREEN ROOF

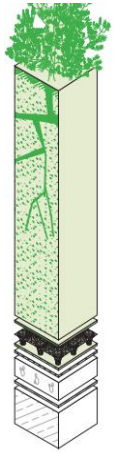
- Possibility of creating a pleasant environment for people working or living at the location
- Suitability for outdoor living spaces
- Use of basic plant types which require more maintenance than those on the extensive roof

TYPES OF GREEN ROOFS



INTENSIVE GREEN ROOF

- Designed landscaped roof garden which may include an irrigation system
- Normal ground-level gardening possibilities
- Suitability for strong board bearing structures



GROUND LEVEL GREEN ROOF

- Use of substantial planting during construction with heavy mechanical plant and equipment
- Suitability for ground level structures such as underground car parks

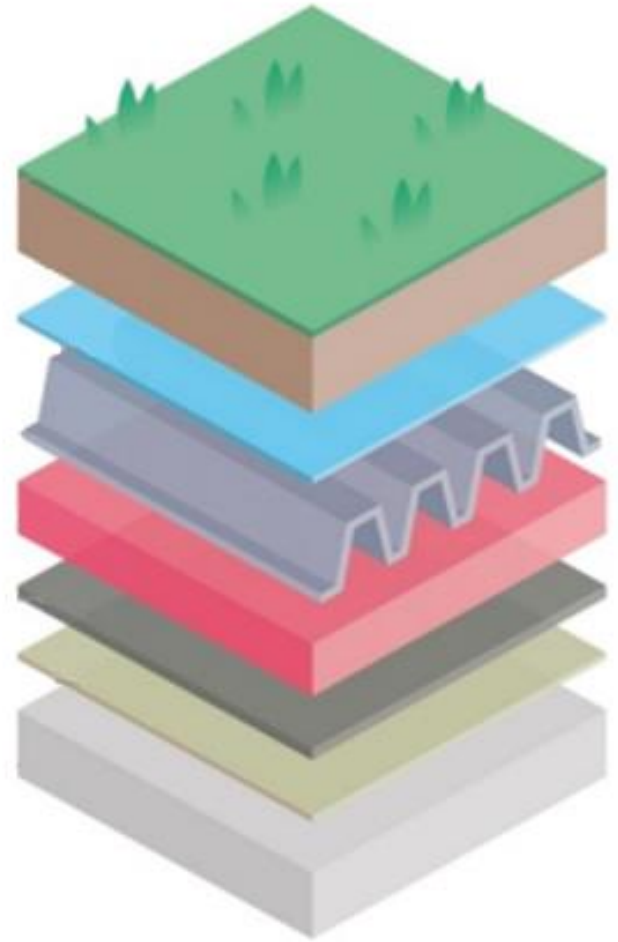
LAYERS OF A GREEN ROOF

PLANT COVER*:* It depends on type of roof chosen.

ROOT-PERMEABLE FILTER FABRIC: It prevents the soil from migrating into the drainage layer and clogging it.

PROTECTION LAYER: It retains moisture and allows roots to grow through, thus enhancing cohesion of the layers above.

WATERPROOFING LAYER: It prevents water damage through the deck layer.



SUBSTRATE*:* It depends on the types of plants used. Soil depth can start from 40 mm upwards.

DRAINAGE LAYER AND DRAINAGE SYSTEM: It removes excess water from the vegetation root zone.

ROOT BARRIER: It protects the waterproofing membrane or insulation layer from root penetration.

DECK LAYER*:* It represents the foundation of a green roof.

GREEN ROOFS IN EXISTING BUILDINGS

Existing buildings require the roof design to be **studied** so it meets the requisite load conditions.

WIDE RANGE OF ROOFS

SHADED AREAS

LOW LOAD-BEARING CAPACITY

HIGH-RISE BUILDINGS

LIMITED ACCESS

SLOPING ROOFS

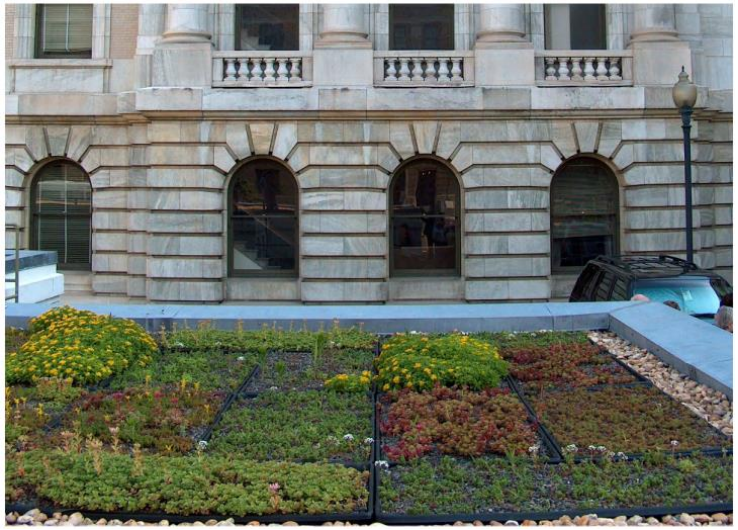
With a maximum slope of 45 degrees

Green roofs must be **MAINTAINED**.

POSITIVE ASPECTS OF GREEN ROOFS

ENVIRONMENTAL AND HEALTH BENEFITS

REDUCTION OF THE UHI EFFECT



STORAGE TANK FOR RAINWATER

Permeable pavements (left) and biofiltration (right)

OPTIMIZATION OF AIR QUALITY

POSITIVE ASPECTS OF GREEN ROOFS

BUILDING BENEFITS

HYDRAULIC INSULATION

ACOUSTIC INSULATION

THERMAL INSULATION

Temperature differences between a green roof and a conventional roof

ROOF LONGETIVITY

SOME DISADVANTAGES...

- ASSURANCE THAT THE BUILDING CAN SUPPORT A GREEN ROOF
- QUALITY INSTALLATION AND LEAK PREVENTION
- MAINTENANCE REQUIREMENTS
- POTENTIAL PLANT LOSS

> “To have any meaningful impact on the city you must have a lot of roof terraces, but we have seen an evolution of the **MENTALITY** around this issue. A few years ago, people weren’t interested in climate change, now they’ve realized it’s urgent.” [9]

CONCLUSION

Critical view of the **constructive develpment of cities** and the negative effects this has on the environment.

11 SUSTAINABLE CITIES AND COMMUNITIES

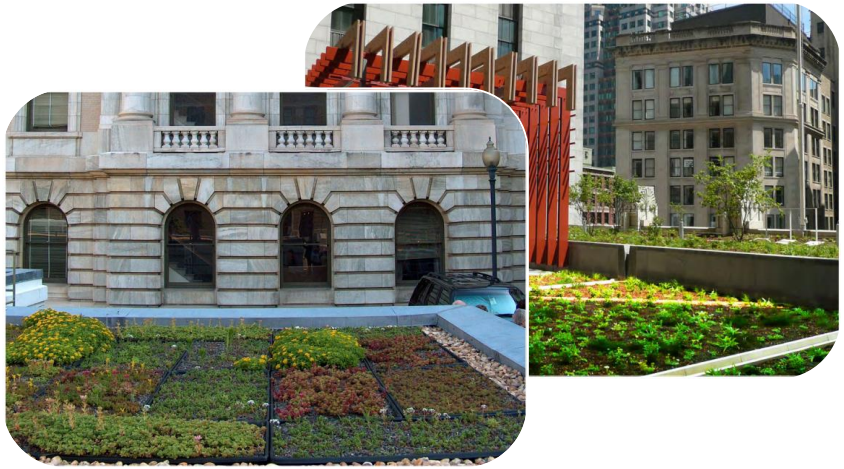
GREEN ROOFS

Important **innovation** in the construction world

Tool to combat climate change and its consequences

Aesthetic and functional benefits

13 CLIMATE ACTION



SUSTAINABLE URBAN DEVELOPMENT

THANKS FOR YOUR ATTENTION

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