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# Improvement of Thermal Insulation by Environmental Means

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## 1. Introduction

Insulation is a vital part of all contemporary buildings; it performs many functions, all of which influence the cost of the building and its operating cost. This component is essential to be positioned not only in the floors, walls, and ceilings of the buildings, but also using of other key technique to improve the insulating process (John F. Malloy 1969). There are many other ways, although one of the most vital way is using of vegetate buildings concept.

Building and garden usually do not arise together and seldom at the same time. Mostly a building is build first and the garden made around it, but if there was a garden first, little of it remains undisturbed by the time the building is build. The layout of the building requires a planner, that of the garden also. Often the representatives of these two entwined disciplines do not meet, or come together to late, when they can but tolerate each other. It would be better if they met to discuss and decide every detail before the first sod was broken. Best of all, the planning of building in its garden should be a mutual undertaking. (Jan Birksted 1999). No Architectural concept is complete without natural areas. Exclusive of soil such growth media to grow plants or vegetations, without water to encourage them, and without the wildlife attracted by the sustenance thus offered, an architectural element has not the fully rounded totality of a factual architecture. The most important class of environment means in reading of this chapter is green areas inside and outside the architectural elements, which requires be to implicit more in terms of ecology as an interface between us and the natural world. Therefore, a green building comes into sight such global human requirement. Today the requirement is to oriented building components towards natural resources to be included in building concept. The green areas is the most significant environmental means, where the green covering concept can be changed to the concept of biophilia.

Biophilic habitat combines the interests of sustainability, environmental consciousness, green areas of the large nature, and organic approaches to evolve design solutions from these requirements and from the characteristics of the site, its neighborhood context, and the local microclimate. The concept of biophilic architecture is a part of a new concept in architecture, that labor rigorous with human health, ecology and sustainability principles, such a integrate part of architectural configuration, which must be in optimal proportion with other buildings area. At what time an architectural element is viewed as an ecosystem, it is obvious that biophilic architecture can play a vital role in creating a healthy indoor environment.(David Pearson, 2004). The biophilic architectural concept deals with the interaction and interrelations of communities of human and plants with under architectural spaces upon local microclimate. A green areas concept can improve the building functions by increasing the efficiency of energy resource, and reducing the building impacts on human health and the environment during the building's lifecycle, through better sitting, design, construction, operation, maintenance, and removal. (Frej, Anne B. 2005).

Energy is fundamental to all life. Even early man knew his life depended upon energy from food, fire, and from the sun, and he conserved it to the best of his ability. He stored food, built a shelter around his fire, and wrapped himself in skins. The shelter around the fire to contain its heat, and the skins wrapped around his body to retard the flow of heat from his skin to the surrounding air were two types of thermal insulation. Therefore, thermal insulation was one of man's first inventions. This illustrates that the need for energy conservation is as old as man himself (John F. Malloy 1969). The new orientation of actually researches on biophilic habitat aims to move the human actions under an architectural roof towards the green of the large nature; this movement intends to create:

- Natural and physical frameworks become more than friendly.
- The Energy consummate by our buildings is most well organized.
- The human development by effectively managing of natural resources is effective.
- The negative effects of climate change become more reduced.

## 2. Energy consumption and macro-environment metropolitan

### 2.1 The negative effects of global climate change

Throughout mainly of the geological record, the Earth had been bathed in uniform warmth such was the fixed opinion of geologists. The glacial epoch it seemed to have been a relatively stable condition that lasted millions of years. During the last 2 billion years, the Earth's climate has exchanged between a frigid "Ice House", like today's world, and a sweltering "Hot House", like the world of the dinosaurs. Global climate change is reasoned by the accumulation of greenhouse gases in the lower atmosphere. The global concentration of these gases is increasing, mostly unpaid to human activities, such as the combustion of fossil fuels (which release carbon dioxide) and deforestation (because forests remove carbon from the atmosphere), cities extending and wrong consumption of our natural resources. Extreme weather events such as droughts, floods, cyclones and frosts may affect areas previously unaffected or strike with increased frequency. The sun influences Earth's climate (Amjad Almusaed 2010). What is new is that the changes predictable to occur as quickly that nature will have more than tricky to keep up. When the climate revolves out to be warmer, we have to remain for that some species will get it too hot for us, but could flourish further north (McMichael, A. J., and Haines, A. (1997)).

Human beings are exposed to climate change through changing weather patterns (temperature, precipitation, sea-level rise and more frequent extreme events) and indirectly through changes in water, air and food quality and changes in ecosystems, agriculture, industry and settlements and the economy.

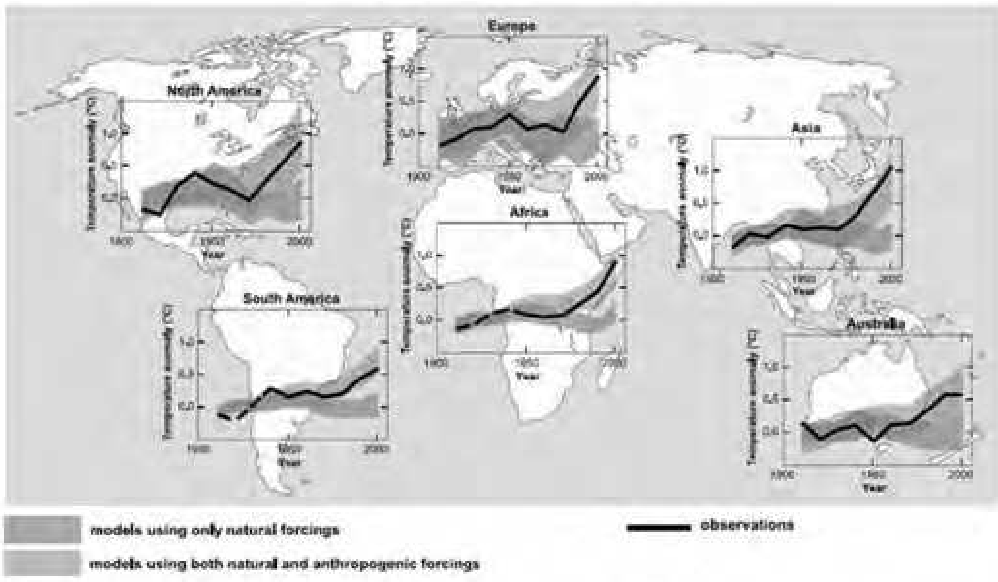



Fig. 1. The global and continental temperature change (Source: IPCC 2007)

### 2.2 Negative effects of urban head island phenomenon

One of the most important issues facing Biophilic cities of the future is the urban heat island effect, which will be greatly make worsted by rising global warming. The major reason of the urban heat island is change of the land surface by urban progress; waste heat creates by energy usage is a secondary contributor. As inhabitants centers grow they are inclined to adjust a greater and greater area of land and include an equivalent amplify in average temperature. Partially as a result of the urban heat island effect, monthly rainfall is about 28% greater between 30-60 kilometers downwind of cities, compared with upwind. Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality (Amjad Almusaed 2010). They can be developed on urban or rural areas. As it would be predictable, there is a minor fact regarding non-urban heat islands, since they typically do not correspond to a risk for the human being or the environment. In the meantime, urban heat

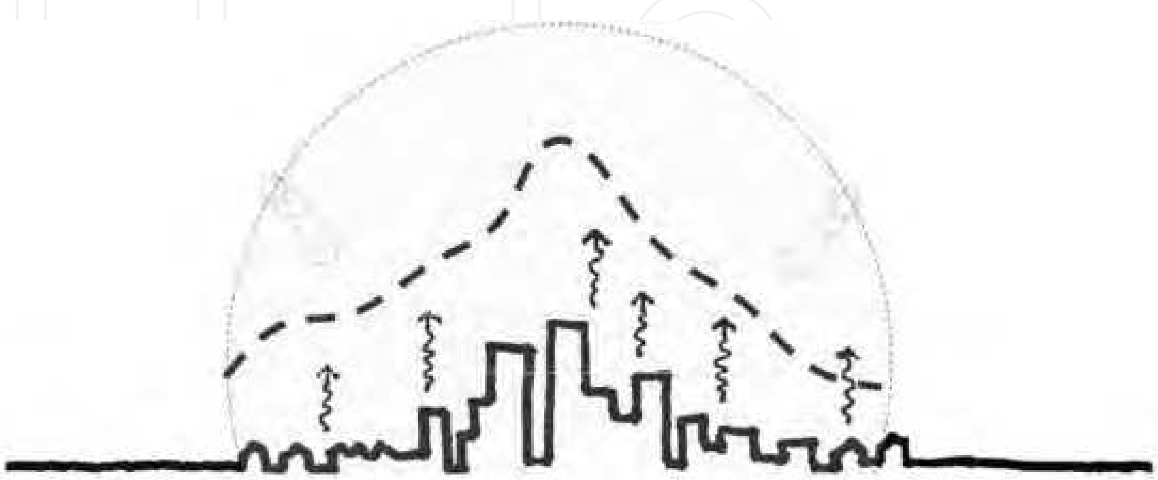


Fig. 2. Urban heat island dealings ( sources: Amjad Almusaed 2010)

islands have been abundantly addressed throughout decades in urban areas with an extensive variety of climates and landscapes (Amjad Al-musaed 2007).

### 2.3 Improvement of energetic macro environment

Plants, vegetations upon building surfaces and are a method not only to decrease city temperatures but also to diminish the heating load and energy require of individual buildings. A long-term strategy of planting shade trees and creating of reflective buildings materials for roofs walls, and pavements can mitigate the urban heat island effect and help to diminish associated economic, environmental, and health-related costs. (H.Y. Lee 1993). Green areas supply always the important environmental and human health benefits which cover a large area of advantages and benefits that can be for example in ameliorate the urban island effect in special for hot climates and relieving the damage on the ecology of the city. Principally concerning microclimate, rainwater retention and filtering of airborne pollutant lowering energy expenditures, purifying the air, reducing storm-water runoff, longer durability of the building skin, due to lower surface temperatures and better protection against UV-radiation, creation of recreation areas in parts of the city, aesthetical improvements in denaturalized urban centers and many others. Numerous reimbursements can result from the adoption of green areas over the buildings and using the new concept of biophilic city. Vegetative building exterior skin can also play a vital function in addressing UHI in global cities, as they have been well-documented to decrease building surface temperatures and building heat gain (Liu & Baskaran 2003, Del Barrio 1998) and are rising in status due to their thermal and ecological characteristics.

One introduces additional green areas into the built environment, and the other engages choosing correct building materials that reflect the sun's rays. Both strategies diminish the urban heat island effect - the temperature in center cities is at 2-10 degrees higher than in nearby rural areas. With using of a light-colored building surfaces and materials or reflective coatings lowers surrounding temperatures. These measures may limit the frequency, duration and strength over periods of hot weather. Strategies to reduce overheating, such as the use of cold skin building and clean sidewalks, and planting trees providing shade, have many advantages.

## 3. Energy consumption and thermal buildings micro-environments

### 3.1 Reducing of energy consumption upon micro-environment by using green areas

Communities can take a many steps to save energy consumption upon micro-environment. These strategies include: By means of greater, the concept of biophilic urban and architecture, vegetated buildings extern surfaces, by living green walls and planting trees and vegetation employ the evapotranspiration and evaporative-cooling procedures of vegetation on construction surfaces and integrate open green spaces. In addition, trees, shrubs, and other plants help reduce ambient air temperatures during a process known as "evapotranspiration." This happens when water absorbed by vegetation evaporates off of the leaves and surrounding soil to naturally cool the surrounding air. Trees also insert oxygen to the atmosphere, break down a quantity of pollutants and diminish dust (Amjad Al-musaed 2007). It has been predictable that 300 trees can counterbalance the quantity of aerial pollution that a human being generates in a life span. 1 $m^2$ of green areas can remove up to 2 kg of airborne particulates from the air every year, depending on foliage type.

Reducing the level of heat-absorbing surfaces such as paved, asphalt or concrete surfaces and amplify their permeability, where the certain that the individual built form's configuration (size, clustering and form) does not give confidence heat-island effects (Myer, W. B., 1991).

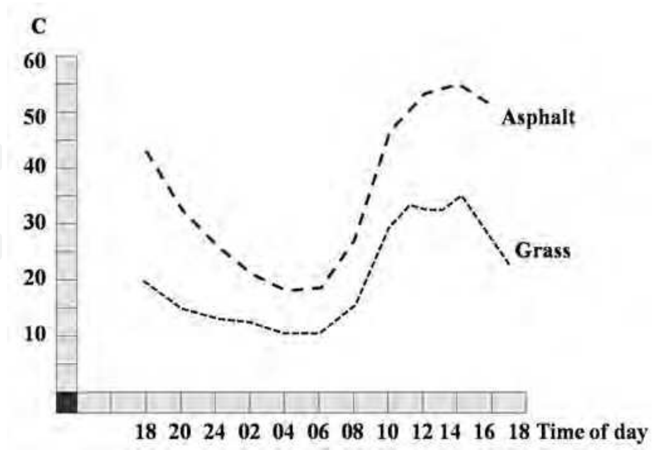



Fig. 3. Earth Surface temperature through 24 hour ( Source : Amjad Almusaed 2010)

The current surfaces (roofs, infrastructure, pavements, etc) with vegetated surfaces such as green roofs or green gardens and open - network road surface or specify cool materials to decrease the heat absorption.

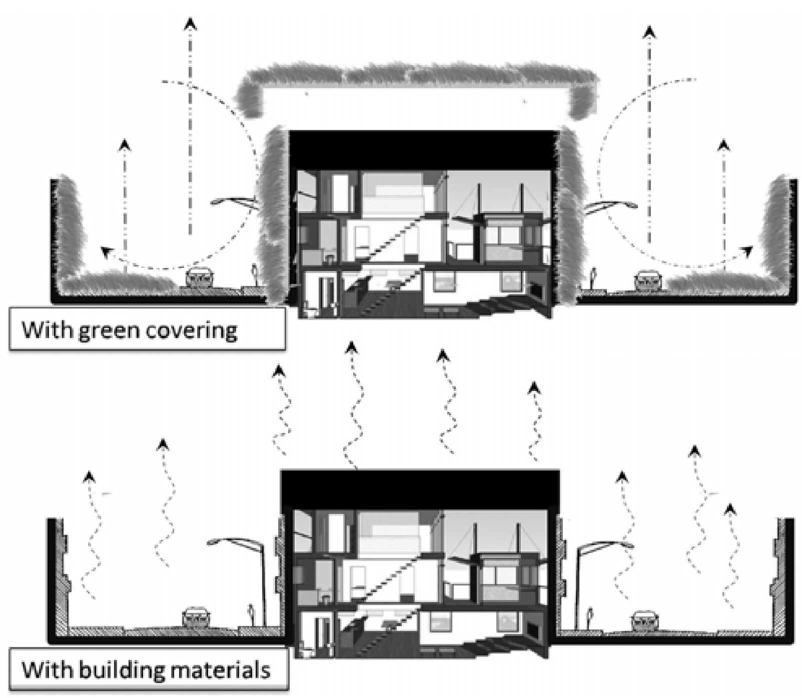



Fig. 4. The comportment of different surfaces (green covering – non green covering)

The replacement of vegetation by streets, buildings and asphalt, frequently guide to a greater absorption of sunlight throughout the day and a slow release of heat throughout the nighttimes. Selection of building material is a key in overturning the heat island effect, for it is the dense dark-colored structures that draw sunlight and keep it for periods. Green walls or roofs, with their landscaping and incorporation of natural materials, are ideal in their resistance to heat absorption. A study by Singapore researchers found that such gardens reduce roof ambient temperature by 4 °C and that heat transfer into the rooms below is lower.

A study in Tokyo shows that if the temperature in Tokyo goes down by 0.8 °C because of rooftop gardens, electric-bill savings equivalent to approximately $ 1.6 million per day could be achieved (Wong Nyuk Hien 2008). The urban heat island mitigation strategies, can support to diminish direct energy utilize in buildings, and if applied on a community-wide basis, can decrease generally ambient air temperature in a specified region (Gallo, K.P.; Tarpley, J.D. 1996).

### 3.2 Reducing of energy consumption by using of soft cool material buildings

Using soft cool building materials and controlled to cool paving materials. Adjust current and new urban city block layouts and configurations with explain patterns, materials and surfaces that absorb a smaller amount of solar energy.

### 3.3 Increasing of the shading effects

That can take place by assemblage of physical volumes, or planting trees. Planting shade trees reduces the amount of heat absorbed by buildings by directly shielding them from the sun's rays. A local microclimate can be different from its surroundings by receiving supplementary energy, consequently it is a modest warmer than its surroundings. On the other hand, if it is shaded it could be cooler on average, because it does not acquire the direct heating of the sun. Its humidity may vary; water may have accumulated there production things damper, or there may be a smaller amount water so that it is drier.

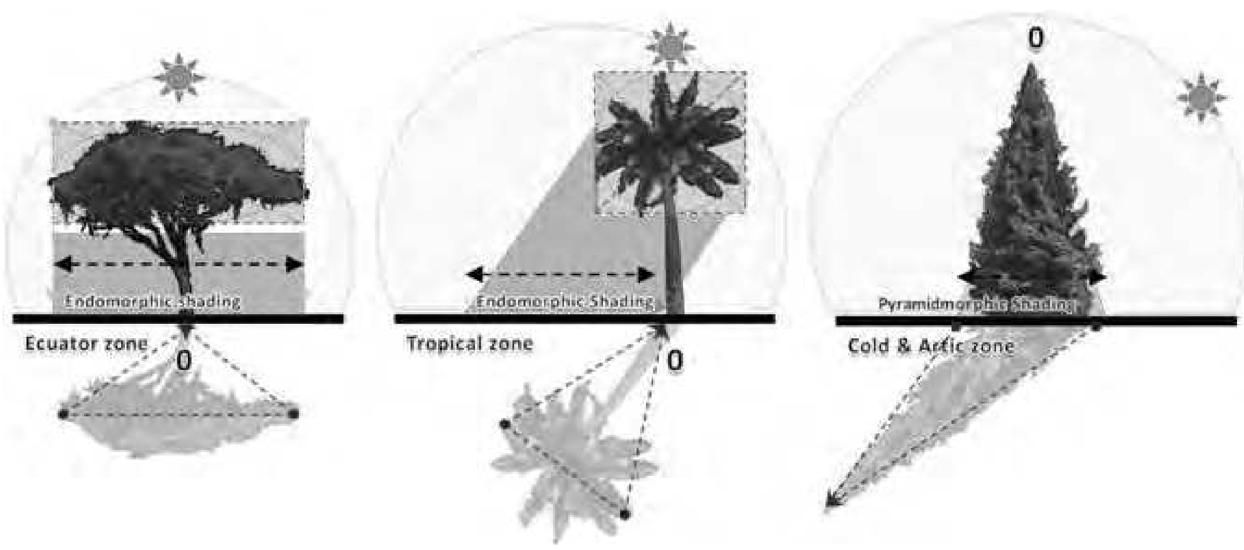



Fig. 5. Trees shade morphologic in correspondence to world climate specific (Archcrea institute)

### 3.4 Saving energy by using a well reflecting and high building materials

For generate a competent result, of reducing energy consumed by building function, we need to utilize a well reflective and high emissivity building materials for the climatic skin building surfaces or install green areas for the extern roof and facade. Therefore, we require to increasing the reflectivity of buildings surfaces such as rooftops and using frequently of light colors. Creation highly reflective building surfaces will keep buildings cooler and warmer and reduce energy bills. Research conducted in Florida and California indicates that buildings with highly reflective surfaces require up to 40 percent less energy for cooling than buildings covered with darker, less reflective roofs. Opt for roof, surface and building colors so as to decrease effects (evade black or dark colors but utilize white and light colors).

### 3.5 A well design of circulation arteries

Design the roads and street canyons width, height ratios and their orientations to control the warming up and cooling processes, the thermal and visual comfort conditions, and assist in air-pollution dispersal (Ken Yeang 2006). Design the built form with the topography of the locality, to ensure that the heat-island effect does not affect the climate of the larger region surrounding the designed system and to reduce the wider impacts on people and on the surrounding natural and built environment (Ken Yeang 2006).

### 3.6 Slow thermal reactions leading to formation of ozone pollution

As a result we require to control the traffic-systems reduction, distraction and rerouting to reduce the production of air pollution, and heat discharges. For parking the optimal solution is in building vehicular parking spaces underground or as covered structured parking. Use an open-grid pavement system (with impervious surfacing such as porous concrete) for the parking-lot areas (Ken Yeang 2006).

### 3.7 Reducing of the energy consumption

In the past, green areas on the roofs have been used to insulate edifices. The major and vital role of green areas on biophilic architecture is that to conserve, insulate and hold back a change of energy flux, between outside and inside. The green areas amplified the thermal performance of the green covering system and constantly lowered the heat transfer between the construction and its environment all over. Green areas insulate buildings by preventing heat from moving throughout the climatic skin areas.

### 3.8 Increase of the physical comfort and the quality of the life

The economic price of the success strategies is outweighed not merely by the cooling energy reserves, but in addition by the decrease in greenhouse gas releases, esthetic value of urban forestry, and the increased quality of human health (Hinkel, Kenneth M. (March 2003). These can be defined as win strategies. Mitigation of the urban heat island impact by increasing the employ of surfaces covered in vegetation and building materials with higher than usual reflectivity; in mixture with a strengthening of emissions decreases programs has the potential. Using top roof such climatic skin roof can help our mitigation strategy for reducing of urban heat island effect.

### 3.9 Reducing of the buildings height

Using of a very high buildings in the centre of the cities increase temperature few degrees. The high buildings surrounded by many urban areas give a multiple surfaces for reflection and absorption of sunlight, increasing the efficiency with which urban areas are heated. This is called the" canyon effect"

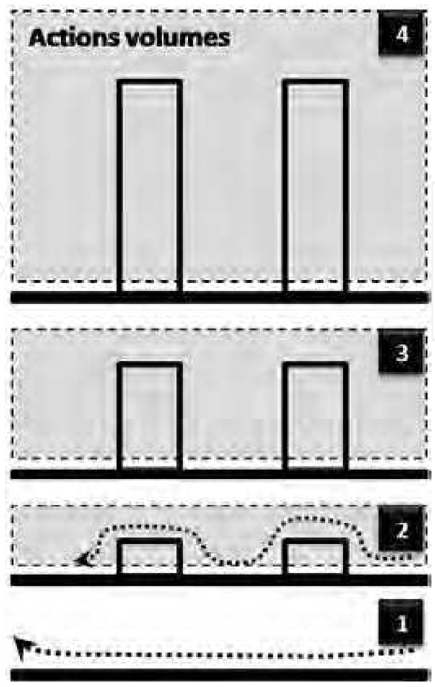



Fig. 6. The effects of high building on city climate

## 4. Thermal performance of green covering

Green areas are the most important visual associations between land, buildings and the sky; the most prominent of all plant life, and without their presence, our townscapes would be naked. A sense of continuity is given by old green area and they remain well-known marker when unneeded buildings, hedgerows and path make way for new developments. The green areas amplified the thermal performance of the green covering system and constantly lowered the heat transfer between the construction and its environment all over. It insulates building by preventing heat from moving throughout the climatic skin areas. For cold and temperate climate the energy flux occurs from hot inside spaces to cold outside environment and contrary meant for hot climate. Thermal insulating green area build up with official property values are permitted to be supplementary to the conventional thermal insulation.

Due to this special build-up, the building owner saves approx. 2 litters / m² fuel oil per year. The green areas on building surfaces reduced the daily energy demand due to heat flow through the building surfaces by 83-85 % in the spring/summer and 40-44 % in the fall/winter, with an overall annual reduction of 66 %. Green areas insulate buildings by preventing heat from moving through the climatic skin areas. Their insulation properties can be maximized by using an increasing medium with a low soil density and high moisture comfortable and by selecting plants with a high leaf area directory. In the winter, the additional insulation supplied by the growing medium (substrate) helps to diminish the amount of energy necessary to heat the building. The amount of the energy rate savings impact is a function of (Amjad Almusaed 2008):

- The size of the building

- The building location
- The depth of the growing medium
- The type of plants and other variables

Since the 1980s investigate has been conducted on topics such as the insulating effects of greens on façades. Green areas over building surfaces have been shown to significantly reduce building surfaces temperatures and building surfaces heat gains. Karen Liu's field experiments in Ottawa, Canada confirmed that an extensive green area reduced heat gains by 95 percent and reduced heat losses by 26 percent as compared to a standard reference area (Liu & Baskaran 2003). In experiments at Pennsylvania State University (PSU), roof surface temperatures were below ambient air temperatures in greened roof areas at the same times that temperatures on traditional roof surfaces reached 40 degrees Celsius above air temperature. PSU studies also indicated significant (5 – 10 degree C) differences in indoor air temperature in rooms below greened and non-greened roof areas (Gaffin et al 2005).

The vegetative skin building was modeled as three divide layers – the building material layer, the soil surface layer, and the canopy layer. Each is represented by its own energy balance, as seen in the figure below. The associated equations can be linked together by the flux through each connecting boundary. This makes it possible to solve for surface temperature taken at the soil surface, as it is most easily measured in a green roof. Heat flux into the building can also be solved for using these energy balances, as well as water lost through evapotranspiration.

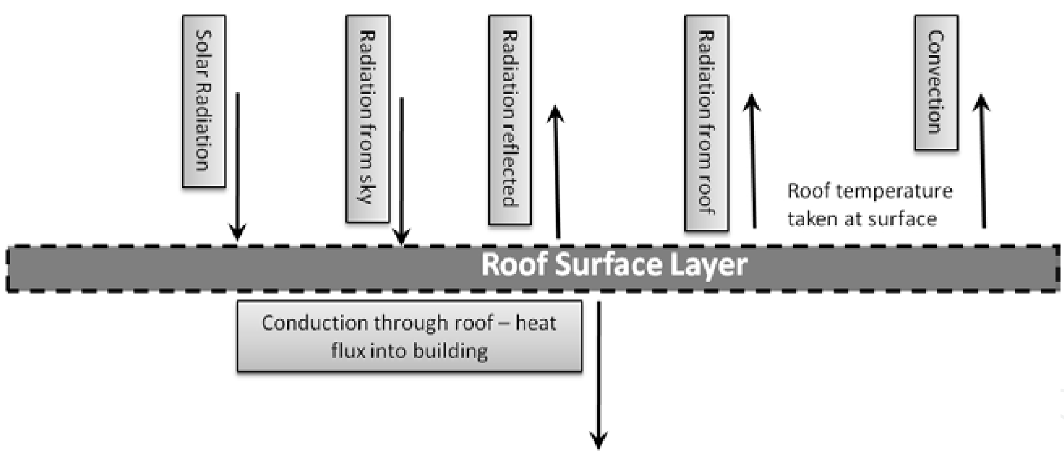



Fig. 7. Energy balance on roof surface layer for typical, reflective, and elastomeric roofing (Source : Caroline H. 2008)

Temperatures of classical building surfaces exceeded ambient temperatures by up to 45 °C and had ranges of skin building temperature also exceeded 45 °C. Vegetative skin buildings maintained temperatures under the ambient during the day in the majority cases, and had average temperature levels that were at or under the ambient environmental temperature (Caroline H. 2008).

The average range in temperature for a green skin building was 10 °C, while the average range in classical skin building was 42 °C. These vast roof temperature ranges can create stress in the structural roofing materials themselves, which is one skin building of the reasons that green skin buildings are able to extend the life of building materials. Vegetative skin building temperatures and fluxes were the lowest category of skinning building condition during the midday hours in the greater part of cases, declining midday temperatures and fluxes would be mainly significant in office buildings that not only have highest solar heating loads at that time, but also highest heat loads from high habitation and equipment operation.

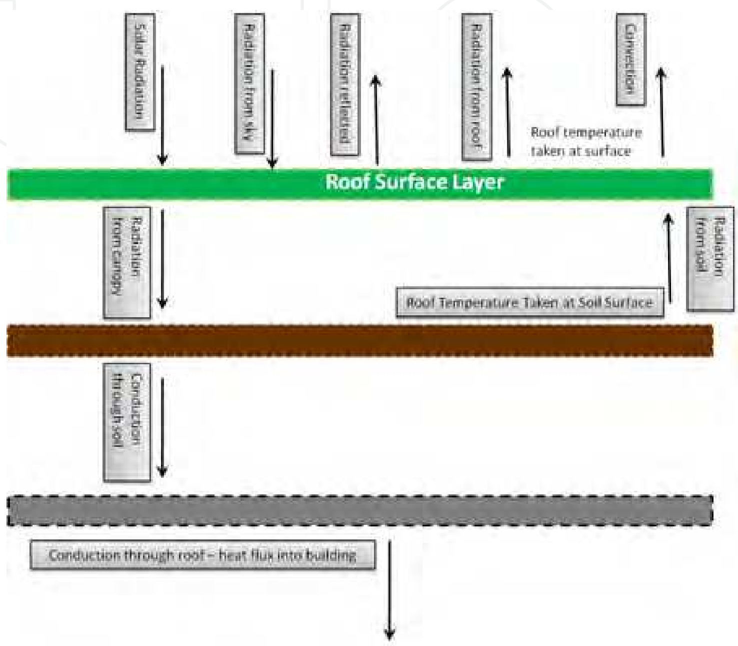



Fig. 8. Energy balance on vegetative skin building layers (Source : Caroline H. 2008)

Additionally, the temperature of green skin building surfaces and the heat flux through the green skin buildings had a lower range of values than any other kind of skin building. While the average values of temperature and flux were often inferior for elastomeric skin buildings, the range of values was much lower for vegetative skin buildings. The elastomeric building kin surfaces much more regularly had negative values of flux (heat loss) mainly in the morning and evening hours. These negative flux values of elastomeric skin buildings were in several cases as large as or larger than the maximum positive flux. The fact that green skin building temperatures and flux values were most stable throughout the day, representing the lowest range from morning to midday, is also considerable for building operators to note. This means that cooling and heating loads will be consistent throughout the day. While any kind of alternative skin building was confirmed to greatly decrease the flux into the building, it should also be an objective to maintain flux and temperature so as to decrease the pressure put on heating and cooling systems to adjust for changing heat fluxes. In particular, the negative heat fluxes that often were demonstrated by elastomeric skin buildings in the model results would indicate that buildings might need heating in the mornings to maintain room temperature due to this heat loss(Caroline H. 2008).

### 4.1 Greenly areas placement

The green areas can take a differ places in relation to the non- greenly areas where the green area appearance aim to be synchronized by means of other area in concordance with architectural perception upon biophilic habitat. The stabilizer forms resulting from the accumulation of separate elements, which can be characterized by their capability to develop and combine with other forms. For recognize preservative groupings as integrated compositions of shapes as figures in the visual field, the combining elements have to be connected to one another nr a rational method. Good biophilic habitats plan their planting to avoid unfavorable local microclimates avoiding frost pockets for sensitive crops, and allowing for the effect of aspect on temperature or water balance. They can also try to make new microclimates, which will favor the plants they are growing. Shelterbelts of planted trees or bushes create a drag that slows down the drying or cooling winds that blow across architectural volume. The effect of a shelter belt of trees on wind speed can extend across the field as far as 20 to 30 times the height of the plants (Jonathan Adams 2007). By means of the green areas form and position over architectural concept, it can be measured by three criteria:

- Performance.
- Identity.
- Economy of means.

Everyone has a subconscious or usual means to be familiar with the architectural elements that are used every day symbols of comfort, familiar functions and occasionally, visual excitement (Amjad Almusaed 2010).

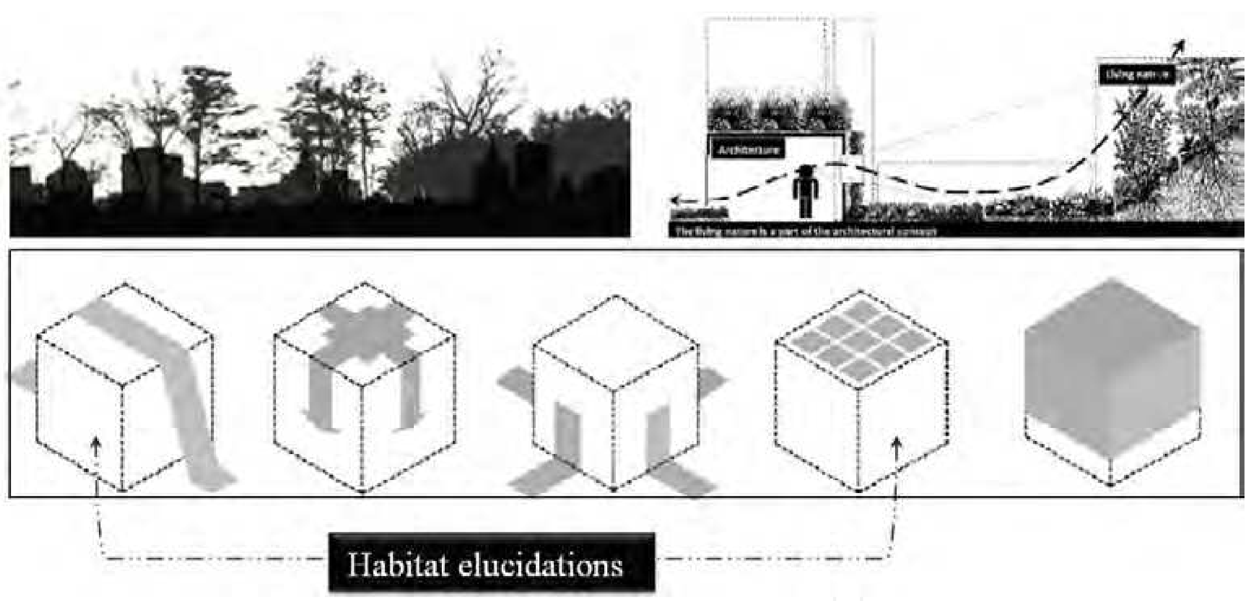



Fig. 9. Architecture and green covering forms and placements upon biophilic habitat ( Amjad Almusaed 2010)

### 4.2 Greenly effects on the environment

The carbon is incorporated into the tree's growth. Because of transpiration and shading, the air surrounding a tree can be around 5 °C cooler than its environment. Tree-shaded neighborhoods can be up to 3.5 °C cooler than those without trees. The competence of plants to produce oxygen varies quite a bit. It is also potential to build an artificial process involving photosynthesis that would successfully do the same thing but it would not be a beautiful to walk through (Ken Yeang 2006). An average of human requires are; 2600 grams of food, 686 grams of oxygen (O2) and 400 grams of water.

#### 4.2.1 Vertical green

A plant leaf produces about 0.005 litter's oxygen per hour. Therefore a mature human need about 50/0.005 = 10000 leaves which would be provided by about 500 small plants for one person.

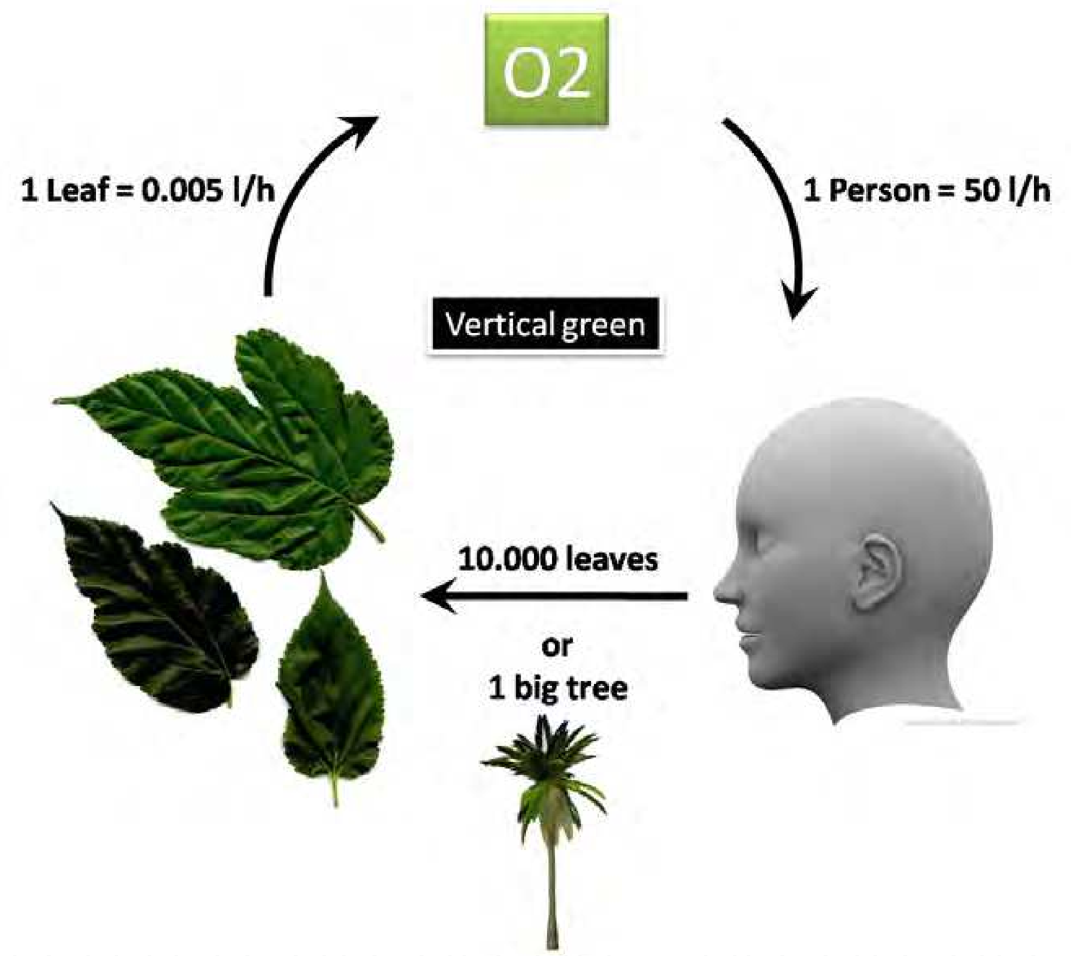



Fig. 10. Human and plant interaction on vertical green

If the average of shrub or other medium size plant has 30 leaves per plant, then that would be 5 ml / leaf x 30 leaves = 150 plants (Wizkid 2008). An average of 18 $cm^2$, leaf area can release atmosphere of 0.005 litters' oxygen per hour. An average of person who consumes 50 litters oxygen per hour. Consequently, an average of 18 $m^2$ of vertical green area is sufficient for one person. In addition, an average of 5 $m^2$ of vertical green areas is satisfactory. There are many assumptions, average leaf, and average plant.

#### 4.2.2 Horizontal green

In a 1.5 $m^2$ of uncut grass, produces enough oxygen per year to supply one person with their yearly oxygen intake requirement (Brian Burton 2009).

In addition it will necessitate to take into evidence oxygen production reduces as carbon dioxide concentration increases, assuming this hypothetical person is in a limited space with all these plants, the CO2 concentration will increase suitable to the person's expiration. This will slow down the plant's photosynthetic rate (Jonathan Adams 2007).

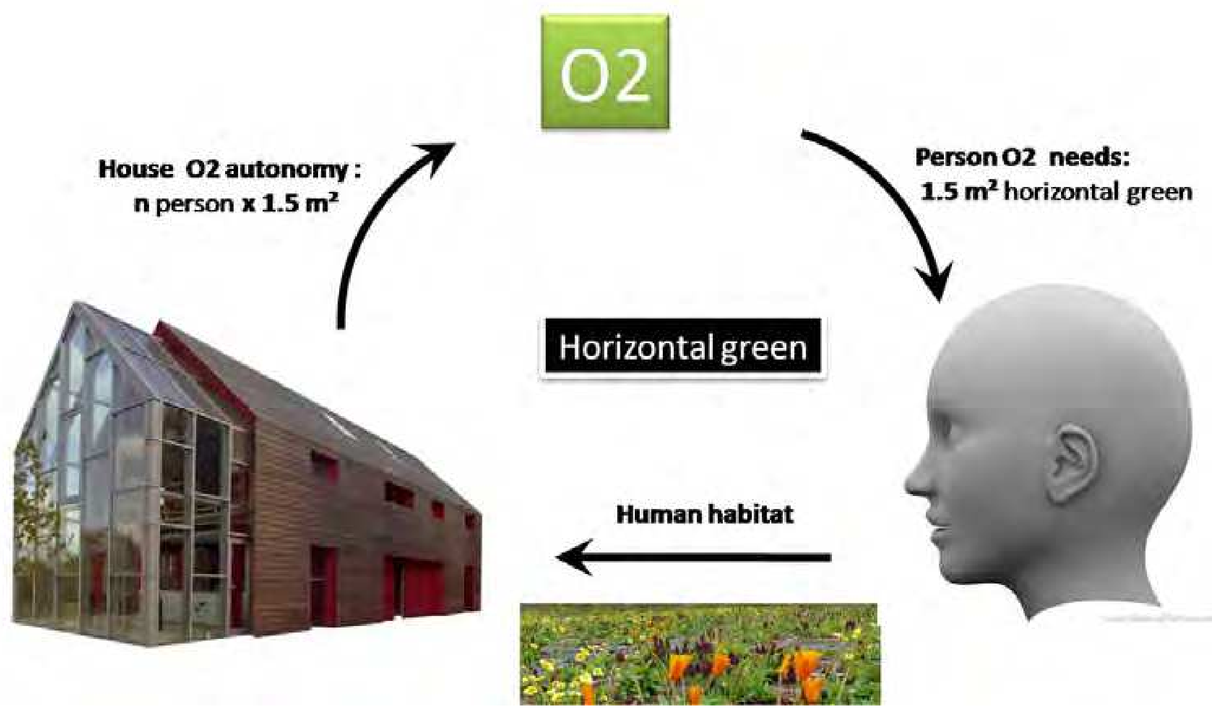



Fig. 11. Human and plant interaction on horizontal green

Hospitals and health facilities utilize the therapeutic benefits of green areas. These facilities sometimes use gardening as a tool to enhance the healing process for patients. In addition, the person can enjoy the comfort, fresh air, and landscape while restoring their health (Ismail Said (Jun 2003)). The query is how we can obtain the oxygen and air quality from the plants. biophilic structure on the earth is a valued and appreciated part of life, where areas and human carrier green is not only an excellent synthesis of both qualitative and quantitative research that documents the bond between people and plants, it is a synthesis of the life's work and thinking of one of the most important figures in people-plant relationships.

Using of a good managed green covering. According to the NASA study, the heat island effect in urban areas can be most effectively reduced with more green space (vegetation offers moisture to cool the air). In adding, light-colored surfaces can reflect sunlight, and should be used on rooftops (J. Hansen, R. et al (2001). Excessive using of solid elements with less thermal properties such as some of building materials in the front of a less using of soft materials with high thermal proprieties such plants amplify the phenomenon radically (Henry J, Glynn, Heinke G 1989).

When green areas are replaced by asphalt and concrete upon roads, buildings, and other structures, it becomes essential to provide accommodation-growing populations. These surfaces absorb - rather than reflect - the sun's heat, causing surface temperatures and overall ambient temperatures to increase see table 1.

The climate performance of the biophilic architecture be able to be considerably affected by green walls, as well the visible changes concerning temperature, the solar gain by direct solar radiation and long-wave heat as well as convection. In addition the, changes in the humidity levels are also supposed. It is essential to image what an exterior living wall will look like during the winter. Green roofs have extended term experimental in value, variety, conception (Velazquez L, Kiers H 2007). All elements can be given differently into all numbers of permutations combinations of solid and almost transparent membranes (Amjad Almusaed 2004).

Green areas are the most important visual associations between land, buildings and the sky, the most prominent of all plant life, and without their presence our townscapes would be naked. Our modern lives seem to be dominated by conflicts of one kind or another, and on the particular subject of trees it is the pressure on land and the rise of consumer power that is placing the professional adviser and his love of green areas in some difficulty. Today modern architecture may fairly be said to have won its first battles all over the world, but in very few of them has it had any assistance from landscape architecture.

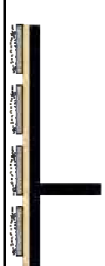
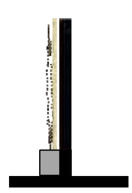
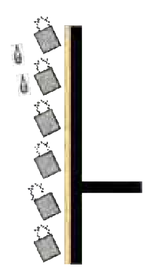
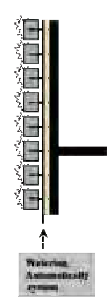
| **Criterions** | **Extensive green walls** | | **Intensive green walls** | | **Green roof** |
|---|---|---|---|---|---|
| | *Spots green suspended walls* | *Compact green suspended walls* | *Living walls* | *Energetic biophilic walls* | |
| |  |  |  |  | |
| Thermal insulation | Low, very diminutive | Low, diminutive | Middle, can be efficient | High, more efficient | High, excellent |
| Environment friendly | Low, is more decorative | Middle, need relationship between building and green areas | Middle, need relationship between building and green areas | High, green is a part of buildings model | High, green is a part of buildings model |
| Urban heat effects reduction | Low, employment | Middle, employment | Middle, employment | High, effective in combating the phenomenon act | High, effective in combating the phenomenon act |

Table 1. The different categories of green walls and roof (Archcrea institute)

One of the best qualities of the modern movement is its increasing awareness of the connection between the space within building and the space around them, and of the interdependence of building and green areas.

## 5. Other environmental mains of thermal insulating

### 5.1 Double skin façade (the energetic role of double skin façade)

Walls must give building spaces protection against hot, cold, wind, external noise, and enhance security. A well insulate heavy construction is needed. But also a sustainable external element is necessary. For an efficient bioclimatic building architect can oriented to a curtain wall such as sustainable exterior elements. Curtain wall is synonyms: double skin façade double-leaf façade, double façade, double envelope, wall filter façade, and ventilated façade ( Amjad Almusaed 2010).

The curtain wall on façade is principally a couple skins separated by an "air corridor". The main layer of skins is usually insulating. The air space between the skins layer is as insulation against temperature extremes, winds, and the sound. If there are two skins of glass, or other thermal opaque materials so for shading interior space that the sun-shading devices are often located between the

The double skin façade consists of two layers of materials, with air space between the two layers preserved, the principal's roles of curtain walls are controlling of solar gain, access to fresh air, embodied energy, esthetics. see figure 12.

Of course, there is a certain level of energy consumption, but this is significantly reduced as internal temperatures, are already lower than outside temperatures. Double –skin facades offer a protected from the exterior environmental conditions; these shading devices are less expensive than system mounted on the exterior.

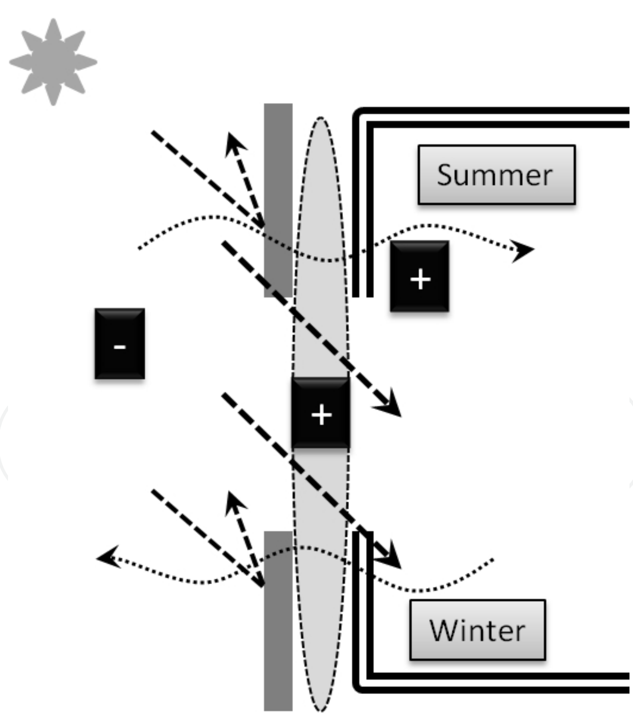



Fig. 12. The thermal role of curtain wall

The principal benefit of double-skin façades over traditional architecture is that they permit the application of blinds even for the buildings with substantial wind. The special materials are mainly used for architectural purposes due to their performance in reducing solar heat.

- Energy saving is an essential factor to reduce the emission of carbon dioxide which is a cause of global warming, and ventilation is only unique method to control the indoor air quality and also regarded as an effective method to sweep out the indoor.
- In one recently experiment, achieved by department of civil engineering and architecture in University of the Ryukus in Japan, by a group of engineers and architects, about the ventilation of living spaces. That was by using two types of passive cooling ( one is a conventional building with cross-ventilation through open windows, and the other is a nuilding which has double skin walls and the gaps of these skins are ventilated .The ventilation airflow comes from the gaps between the double skins and is discharged from an exhaust tower on the roof top. It called ventilation model. The latter is an ordinary hours. The outer walls are made from reinforced concrete and the inner walls are made from heat insulation boards, whose material is foamed polystyrene, and plywood. The difference between two experiment models is only the gap between the outer and the inner skins. The resulted of this experiments shows that the indoor air temperature in the ventilation model is lower than the conventional model by 2 degrees in summer and 1 degree in winter except 5 hours in the morning (Oesterle, Lieb, Lutz, Heusler 1999).

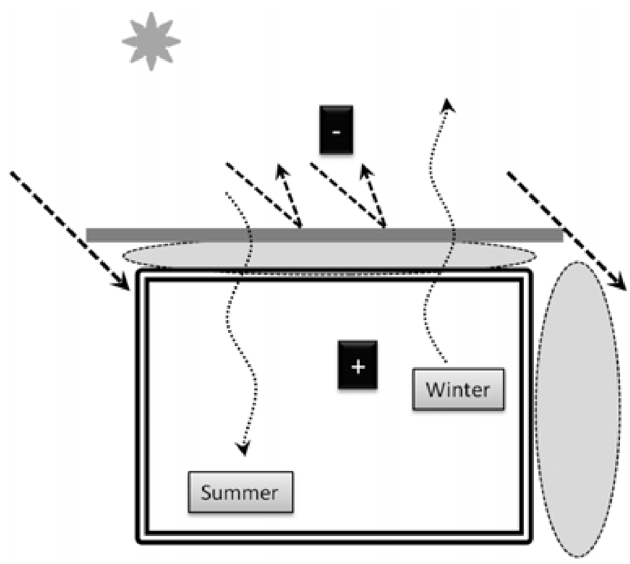



Fig. 13. The double skin roof positive effect

It is clear that the double skin walls of the ventilation model have effects on indoor thermal environment, which means that the double skin walls can keep the indoor space a little cooler all the year round. Several hours in the morning, this relation reverses, because the outdoor air temperature rises quickly and the ventilation model is directly influenced by the outdoor air. It is vital to make clear that the double skin wall can only cool the air inside the structure by several degrees lower than the actual external temperature (Amjad Almusaed 2004). It would be utopian to expect that these systems could provide the same cooling action as air conditioners. On the other hand, integration this construction form into a big intelligent bioclimatic system can give us a better resultant, which we will see that in other parts of research.

The roof on the hot climate houses receives the highest proportion of solar radiation and is also the surface barest to the clear cold night sky. To limit the heat gain, the most effective method is to shade or construct a second roof over the first see figure.

The outer roof will reach a high temperature and it is therefore imperative to separate it from the inner roof, to provide for the dispersion of heat from the space between the tow and to use a reflective surface on them both. The surface of the lower roof should reflect the low temperature heat and for the outer roof a white surface is best.

### 5.2 Heat break transfer concept

We all depend on energy to get better our lives. But using energy means nothing on its own; it just a way to achieve something else. And we are becoming more aware of some of the problems that come from wasting energy. The significant way of a wasting energy is energy losses by exchange of energy through external elements. Energy losses in a building mainly occur by conduction through external surfaces radiation, and convection. Conduction takes place when a temperature gradient exists in a solid medium, such external wall, windows, roofs, floors. Energy is transferred from the more energetic to the less energetic molecules when neighboring molecules in collide. Conductive heat flow must occur in the direction of decreasing temperature because higher temperatures are associated with higher molecular energies. Heat transfer through radiation takes place in the form of electromagnetic waves, mainly in the infrared region. The radiation is emitted by some body as a consequence of the thermal agitation of its composing molecules. In a first approach the radiation is described for the case that emitting body is a so called black body. Heat energy transferred between a surface and a moving fluid at different temperatures is known as convection. Condensation on the windows may be a sign of heat loss.

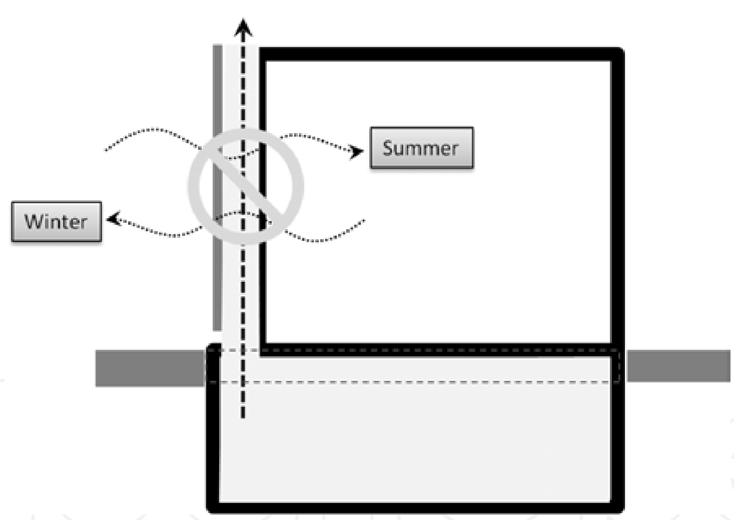



Fig. 14. The constructive effect of the optimistic underground temperature

A damp area around the window from the exterior is another sign of heat loss. During the winter, a typical window loses up to 10 times more heat than an equivalent area of an outside wall or roof. Windows can account for up to 30 % of the heat loss from a conventional house, adding significantly to heat cost. Drafts, window condensation and mould can also affect our comfort and indoor air quality. Sustainability is a wise approach to the way we live. And using energy in a more sustainable way is a part of this approach (Amjad Almusaed 2004, p187). We can save money, reduce imports, protect the environment, and move society forward in an intelligent manner. If we start doing this now we win as individuals and we will win as a society. The concept of intelligent energy losses break consists of a using of some thermal effects to wipe out or stopping the immigration of energy between exterior spaces and interior through external element. This concept can be useful using in architecture on the extreme climate regions. By a deep study of specialists about the optimal thermal effect that can help in realization this concept, consequently we must seek for a suitable source of energy, which must be permanent and easy to get. Creation of this system subsequent to the passive and zero energy concept need a well integrates of the energy in the house's components (Amjad Almusaed 2004).

## 6. Conclusion

A green building is a confusing expression of biophilic architecture. Green building is a construction, which can be shaped by mains of renovation process. While, a biophilic architecture strugglers the negative effects of urban heat island in local microclimate scale, and improves the human physical comfort to create a healthy human life. Therefore, one of the major problems facing us is how to establish and maintain environments that support human health and at the same time are ecologically sustainable. Green areas seems too important to people. Most people today believe that the green world is beautiful.

In fact, green areas by now contribute, some extent, to a better microclimate through evaporation, filtering of dust from the air and reduce in temperatures at the buildings surface. Besides improving the microclimate and the indoor climate, the retention of rainwater is another important advantage. Aesthetic form require, escalating the value of the possessions and the marketability of the building as a complete, mainly for accessible green areas.

On arid climates when the sun rises up, buildings roofs and asphalt road surface temperatures can rise up to 30–45 °C hotter than the air, while shaded or moist surfaces frequently in more rural environs remain close to air temperatures. City surfaces with plants offer high moisture levels that cool the air when the moisture evaporates from soil and plants (Parker, David E. 2004). The influence of plants must employment eventually to keep up with the increased require in energy. Improving energy efficiency can decrease the global warming effects of carbon in the atmosphere, improving air and water quality, and encouraging sustainable development in the cities. The physical frameworks of the city extends unprompted; consequently, it turns out to be a major area of the city centre. The green areas diminutive and take a negligible part of the city typically marginal. Many fixed edifices (civil and industrial buildings) and mobile elements such as cars, public transport and another feature contributing to the warm cities that will increase the phenomenon dramatically.

One of the most significant subjects for our study is to show how we can discover the best possible manner to realize our earth greener, sustainable, and our buildings agreeable and saves more energy, to help the human to live in healthy and economically framework.

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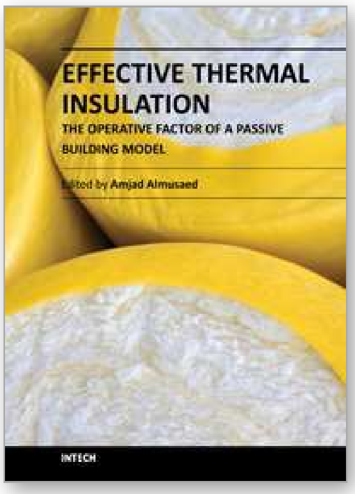


**Effective Thermal Insulation - The Operative Factor of a Passive Building Model**
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This book has been written to present elementary practical and efficient applications in saving energy concept, as well as propose a solitary action for this category of topics. The book aims to illustrate various methods in treatment the concept of thermal insulation such as processes and the attempt to build an efficient passive building model.

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