Smart Solutions for Urban Cities

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***Abstract*—This paper investigates on analysing the methods and techniques of constructing new modern buildings by utilizing ultra-low energy. This study involves types of solutions which can be implemented by a well-organized way. It emphasizes mainly on climate change & various other efforts to reduce construction hazards. One of the main tasks of the construction industry is to increase the strength and reliability of structures while reducing construction costs & ill-effects caused by it. In these techniques the energy use of constructing structures is being reduced to a very far extent. The paper enlightens on topics such as passive house, porous concrete & a well-organized drainage system (SUDS). Hence, there is feasibility to adopt these advanced construction techniques.**

Keywords— Passive house, Porous concrete, Sustainable drainage system (SUDS).

I. INTRODUCTION

This project shows the ways / solution for lowering the usage of electricity, minimizing the construction hazard, minimizing the CO2 emission. Seeing to the present situation of the rising issue of Climate change we have put spotlight on revolutionary solution and cease the use of crummy method. Better standard for living. Better drainage system for a well- planned town. Plan for an ideal building and town plans. Due to the aftermath of these crumbling methods it becomes obligatory for us to use the smart and advanced ways so that the human will live in ease. Healing up the environment has been of utmost significant in these days that are why we must look into this matter. So this project is been more or less associated with environment friendly situation because nature is our best source and nothing is bigger than nature. Drainage system which employs new roads (Porous Road) for systematic storage of rain water and storm water for lowering the water's waste, pollution etc. and utilizing that water for other chore work. This will also reduce the effect of flood inthe region.

II. EASE OF USE

New structure or method of construction (Passive Building) for easy way of construction, with new and better materials, for lowering the cost of electricity consumption and using the natural source on behalf of artificial source. Rain water harvesting is nowadays increasing, so implementing this at huge extent will decrease the water demand. The energy consumption is being increasing day by day so to cater that the use of smart solutions make it mandatory for us for living a life in harmony, ease and without any harm.

III. PASSIVE HOUSE

A building standard that is truly energy efficient, comfortable, affordable and ecological at the same time. Passive House is not a brand name, but a construction concept that can be applied by anyone and that has stood the test of practice. Yet, a Passive House is more than just a low- energy building. Passive Houses allow for heating and cooling related energy savings of up to 90% compared with typical building stock and over 75% compared with average new builds. In terms of heating oil, Passive Houses use less than 1.5 liters per square meter of living space per year – far less than typical low-energy buildings. Similar energy savings have been demonstrated in warm climates where buildings require more energy for cooling than for heating. Passive Houses are also praised for their high level of comfort. They use energy sources inside the building such as the body heat from the residents or solar heat entering the building – making heating a lot easier. Appropriate windows with good insulation and a building shell consisting of good insulated exterior walls, roof and floor slab keep the heat during winterin the house – and keep it out during summer.

Design of passive house:-

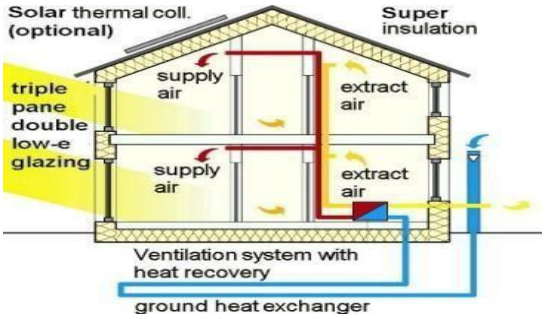
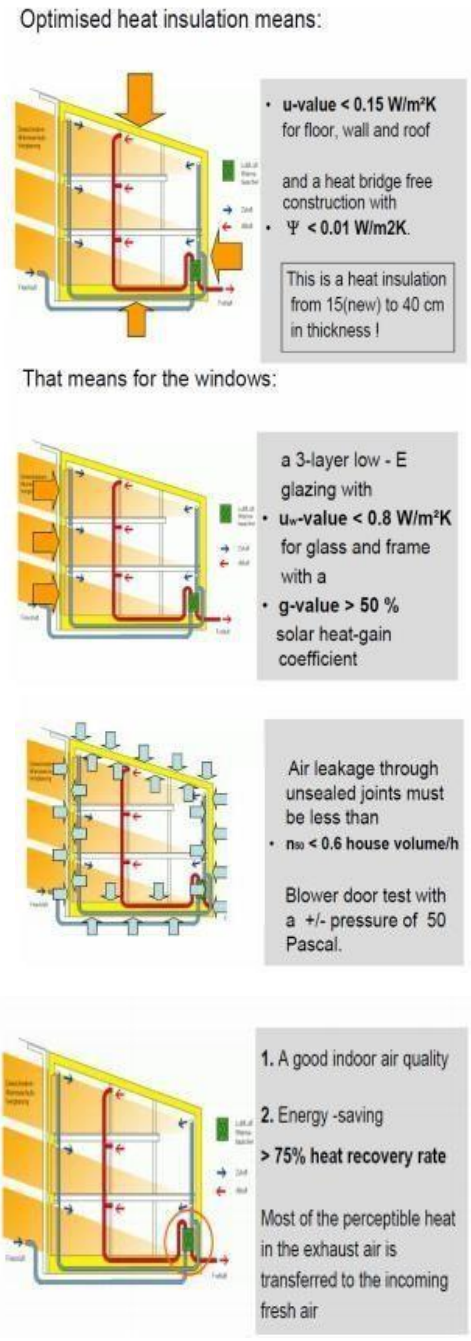
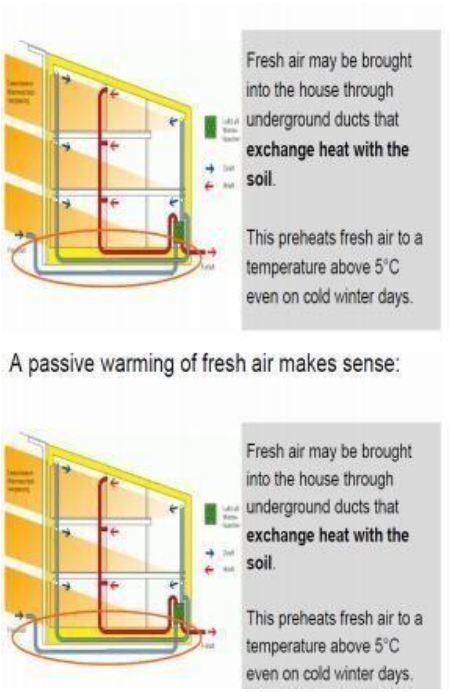


Figure 1. Functional scheme of a ventilation system with heat recirculation

Components of passive house:-

1. Passive solar design and landscape
2. Super insulation
3. Advanced window technology
4. Air tightness
5. Ventilation
6. Space heating
7. Lighting and electrical appliances





IV. DRAINAGE SYSTEM

A sustainable drainage system (SuDs/SuDS/SUDS) is designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges. The term sustainable urban drainage system is not the accepted name, the 'Urban' reference having been removed so as to accommodate rural sustainable water management practices.

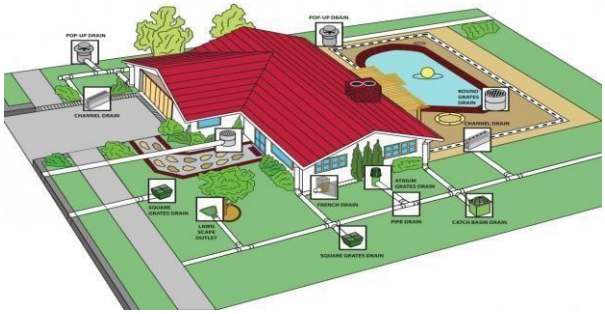


Figure 2. Functional scheme of SuDS (Sustainable Drainage System)

SuDS use the following techniques:

- Source control
- Permeable paving such as pervious concrete
- Storm water detention
- Storm water infiltration
- Evapo-transportation (e.g. from a green roof)

V. POROUS CONCRETE

Porous concrete are special type of concrete which allows water to percolate through it so that the water can be used in other different purposes. It has been increasingly in demand because they offer site planners and public works officials the opportunity to manage storm water in an environmentally friendly way. Impervious surfaces such as

roofs and pavements create runoff, so that dirt and debris are washed into streams and waterways. At the same time, water has often been regarded as the "enemy" of concrete. Great efforts are taken to assure that water does not enter the roadway material, especially in areas with numerous freeze/thaw cycles. Ironically enough, porous concrete offers the opportunity to address both of these problems in many parking lot and paved area applications. With the proper design and installation, porous concrete parking areas can provide cost-effective, attractive parking lots with a life span of twenty years or more, and at the same time, provide storm water management systems that promote infiltration, improve water quality, and eliminate the need for a detention basin.

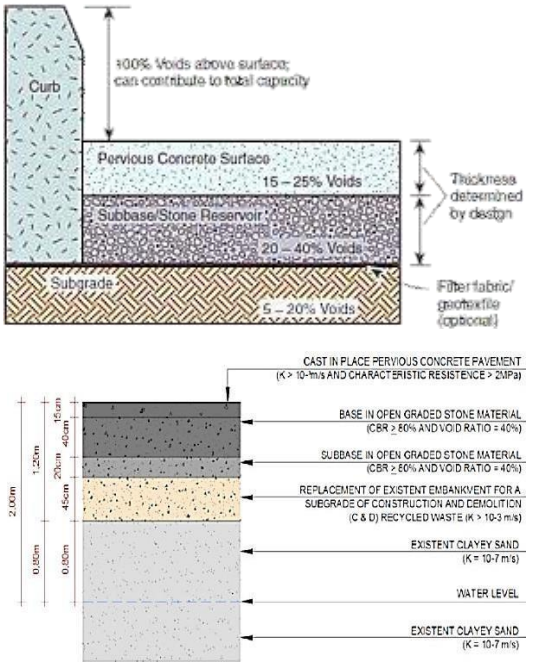


Figure 3. Functional scheme of Porous Concrete Pavement

VI. RAINWATER HARVESTING

Rainwater harvesting (RWH) is a process of collecting and storing rainwater that falls on a catchment surface (typically a roof, although almost any external surface could be suitable) for use, independent from, or supplemental to the mains water supply.

There are three main types of rainwater harvesting system:

1. Water collected in storage tank(s) and pumped directly topoints of use.
2. Water collected in storage tank(s) and fed by gravity topoints of use.
3. Water collected in storage tank(s), pumped to an elevatedcistern and then fed by gravity to the points of use

A. Abbreviations and Acronyms

- CO – Carbon Di-oxide
- SuDS – Sustainable Drainage System
- RWH - Rainwater harvesting

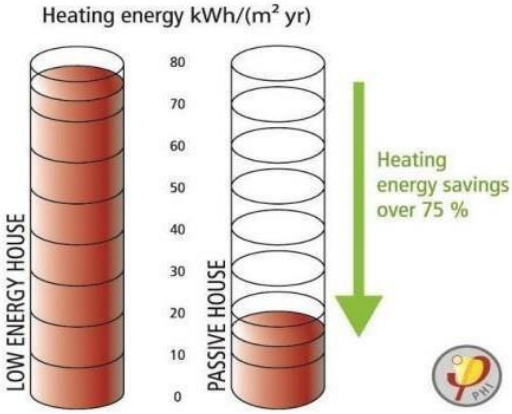


Figure 4. Energy efficiency of a passive house

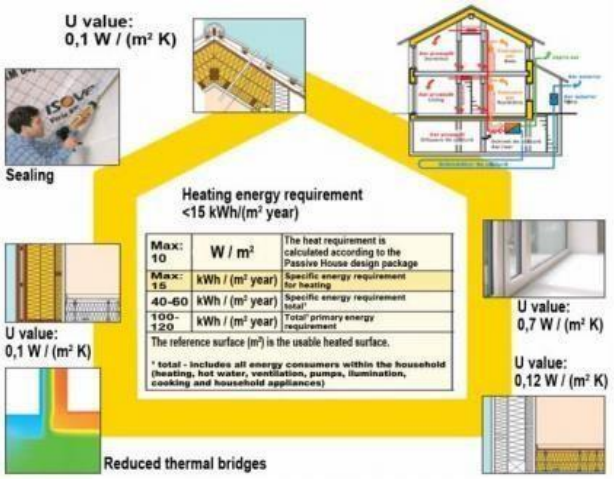


Figure 5. Principle scheme, by which an energy requirement can be obtained for heating purposes, under 15 kWh/m²·year

VII. CONCLUSION

The above mentioned techniques offer great technical & ecological advantages in comparison to other forms of construction. The first priority before construction of any structures should be environment so keeping this mind this paper emphasizes mostly on reducing environmental hazardsof conventional techniques.

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