



## AUTOMATED HIGH PERFORMANCE BUILDING TECHNOLOGY-A WAY TOWARDS QUALITY LIVING

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### Abstract

Automated high performance building is new and innovative technology in terms of automation and environmental impact by nominal construction. High performance buildings focus on minimizing impacts to the environment through reductions in energy usage, water usage, and minimizing environmental disturbances from the building site. Climate change, caused by the release of greenhouse gases (mainly carbon dioxide) into the atmosphere, has been recognized as one of the greatest threats of the 21st century. Share of energy consumption in India and China has also been on the rise due to sharp urbanization, population explosion, and intensive growth of IT and related business. Buildings are the dominant energy consumers in modern cities account up to 40% energy consumption. Energy demand of whole world including India is increasing day by day. For meeting that energy demands every country is expanding their power plant capacity and optimizing the various options to increase the energy capacity while the energy generation from the fossil fuel is directly affected to the environment. The objective of our review was to examine the state of evidence on automated high performance building design as it specifically relates to indoor environmental quality and human health and quality life standard.

*Keywords : automization, high performance building technology.*

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### 1 INTRODUCTION

High performance building is the practice of promoting optimum utilization of resources like water, energy & material by the way of which, reducing building impacts on human health and the environment during the building's lifecycle, through better design, construction, operation, and maintenance which includes: Global warming and climate changes have become a major concern for mankind today. In order to ensure that, development and environment conservation go hand in hand, major corporations around the world are empowering projects to slow down depletion of natural resources. We spend 90% of our lives in buildings that protect us from the extremes of the nature like heat, cold, rain, wind, snow etc. However, our buildings use enormous amount of energy, water, and material throughout their life cycle. They also create a large amount of waste and have a profound effect on ecosystem. The economic, health and environmental impact of our homes is apparent in our society. To meet the challenges of our built environment, a new way of designing & construction has evolved. High performance building, this system follows design and construction practices that significantly reduce or eliminate the negative impact of the building on the environment and the occupants. In this practice the building not only use

zero energy but also standard of living and safety are perform by automization.

### 2. FEATURES OF HIGH PERFORMANCE BUILDING

**1. High performance building material:** The material used are the environmental friendly

**2. Automization in building:** It involve the sensor provided in the building that are burglar alarm, ambient lightening system, fire alarm, CCTV surveillance, motion controller system.

**3. Reduction in energy use:** The use of external energy is too small as its generate its own electricity.

**4. Waste management:** The kitchen waste, garden waste and gray water is reuse by certain mechanism.

### 3. CONSTRUCTION MATERIAL

**1. AAC:** Autoclaved aerated concrete is a lightweight, precast, foam concrete building material. It improved the thermal efficiency reduces the heating and cooling loads in building and easy to work so that quick assembly possible.

**2. Green paints:** There are serious health and environmental concern surrounding paints. Using paints that are free of Volatile Organic Compounds (VOCs) such as benzene and toluene, free of heavy metals such as lead or cadmium. VOCs is a solvent which released into the air as a paint dries. VOCs can cause acute symptoms, including headaches and dizziness. VOCs are

numerous, varied, and ubiquitous. They include both human-made and naturally occurring chemical compounds. VOCs play an important role in communication between plants and messages from plants to animals. Some VOCs are dangerous to human health or cause harm to the environment. Anthropogenic VOCs are regulated by law, especially indoors, where concentrations are the highest. Harmful VOCs typically are not acutely toxic, but have compounding long-term health effects. Because the concentrations are usually low and the symptoms slow to develop, research into VOCs and their effects is difficult.

**3. Eco wood:** Eco wood is the wood produces and processed by the man himself by recycling. Also the wood manufactured from baggage of sugarcane can be classified into this category this type of wood can again be recycled and reused. Thus it helps to keeps to environment healthy.



**4. Insulated wall:** In a typical home, space conditioning and comfort bills can account for up to one-half of a home's energy bills with the remaining portion due primarily to water heating, lighting, and appliances. Installation of the cost-effective level of insulation is extremely important. Home owners can affect their energy usage, save money, and help the environment all at the same time. Investing in energy-efficient options, such as insulation, will provide a continued payback to the home owner and a more enjoyable and comfortable living environment for many years, as well as a reduction in emission of greenhouse gases.

**Types of insulated wall:**

1. Air gap insulation
2. Cotton insulation
3. Mineral wool insulation
4. Plastic Fibre insulation

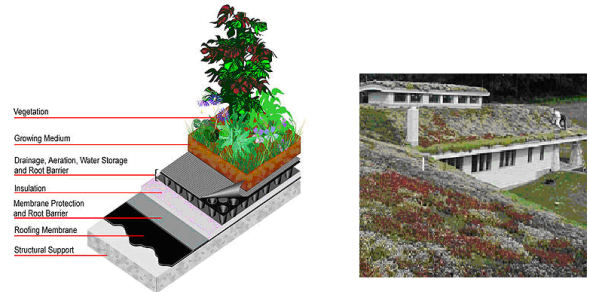
**5. Transparent roof / sustainable day lighting**

The transparent roofing system is manufactured base on the technologies and European standard PVC resin formulation. Lighting accounts for around 15% of the energy bill in most homes, and around 25% in commercial buildings. The most sustainable lighting is natural daylight. It is not only a free renewable resource but it also has well-documented health benefits. Careful architectural design is required to maximize natural light in a building while maintaining indoor temperature

regulation and reducing direct light glare. The strategic placement of windows, skylights, light shafts, atriums and translucent panels in harmony with other building components, such that light is reflected evenly throughout internal spaces, is known as day lighting design.

**Advantages of transparent roofing system:**

1. Competitively priced
2. Highly corrosion resistance
3. Fire resistance and water proofing
4. Easy for installation due to light weight
5. Light transmitting and multiple color option
6. High strength



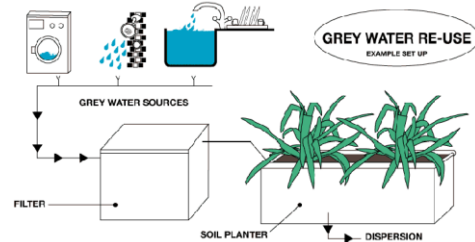
**4. TECHNIQUES**

**1. Solar lightning:** The system is provided with battery storage backup sufficient to operate the light for 10-11 hours daily. The system is provided with automatic ON/OFF time switch for dusk to down operation and overcharge / deep discharge prevention cut-off with LED indicators. Other Green Techniques in Electrical Field includes Energy Conservation in the appliances like Refrigerator, Oven, Air Conditioners etc.



Fig. Solar Street Light Dimensions and Labels

**2. Grey water management**



Grey water is a type of water having any domestic waste water produce, excluding sewage. Sewage has much larger organic loading than grey water. with proper

treatment grey water can be put to be good use. the nutrients in grey water (nitrogen and phosphorus) provide an excellent food source for the plants

### 3. Afforestation

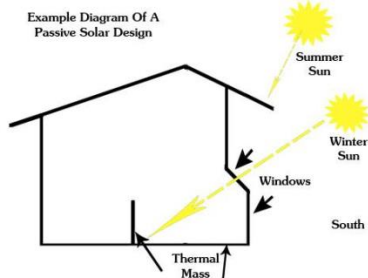
Afforestation is the establishment of a forest or stand of trees in an area where there was no previous tree cover. This trees have special property that they shade there leaves in the winter and allow the sun's heat to enter inside the house. While during summer, it has maximum leaves so that the building gets natural cooling.

### 4. Rain water harvesting

When water supply becomes limited, practical solutions can fill the gap. Rainwater harvesting systems provide distributed storm water runoff containment while simultaneously storing water which can be used for irrigation, flushing toilets, washing clothes, washing cars, pressure washing, or it can be purified for use as everyday drinking water. You can really take this as far as you want. But it all comes down to various filtration and processing systems. Rain water harvesting is a process of collecting the rain water that falls on terraces and roof tops during the monsoons and storing it in tanks, pits, trenches, bore wells, unused wells etc. or directing it so that it percolates into the ground water. Rain water harvesting includes:-

1. Collecting rain water.
2. Purifying it to an extent.
3. Directing it to subsoil spaces below the plot where it can be stored, by gravity or mechanical means.

### 4. Passive solar heating and cooling



Passive solar buildings range from those heated almost entirely by the sun to those with south-facing windows that provide some fraction of the heating load. The difference between a passive solar home and a conventional home is design. The key is designing a passive solar building to best take advantage of your local climate. Your building's windows, walls, and floors can be designed to collect, store, and distribute solar energy in the form of heat in the winter and reject solar heat in the summer. This is called passive solar design or climatic design. Unlike active solar heating systems, passive solar design doesn't involve the use of mechanical and electrical devices, such as pumps, fans, or electrical controls to move the you can apply passive solar design techniques most easily when designing a new commercial building or home. However, existing

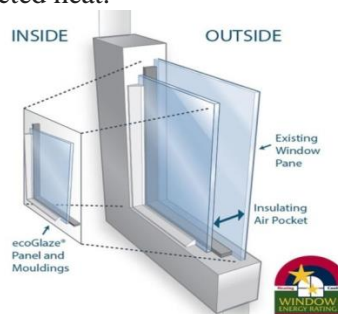
buildings can be adapted or "retrofitted" to passively collect and store solar heat.

### 5. Solid waste management

Solid-waste management, the collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful. It consist kitchen waste, garbage, plastics, metals, papers, glasses, etc.

### 6. Window Glazing

Glazing, which derives from the Middle English for 'glass', is a part of a wall or window, made of glass. Glazing also describes the work done by a professional "glazier". Glazing is also (less commonly) used to describe the insertion of ophthalmic lenses into an eyeglass frame. Glazing is commonly used in low temperature solar thermal collectors because it helps retain the collected heat.



### Need of automation and green concept

1. Its lower the cost.
2. Reduced scope for human error.
3. High quality building maintenance.
4. Responsive building management.
5. Ability to meet tenant needs.
6. Easy and centralizes management operation.
7. Simplicity and future expandability.
8. Utilization of non conventional energy sources.
9. Air conditioning for cooling.

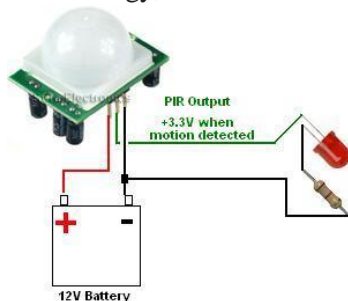
### SENSOR TO BE USE

**1. Ambient lighting system:** The have a wide range of performance allowing accurate ALS measurements in lighting environments ranging from low-light to bright sunlight up to 220K lux. This family of devices is particularly useful for display management dimming or brightness control with the purpose of reducing power consumption, extending battery life, and providing the optimum viewing in diverse lighting conditions.

**2. Fire alarm:** A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame.



**3. Motion lighting system:** The key to motion-activated lighting is the motion sensors which trigger activation of the light source. Here are two popular types of passive motion sensors. These are mostly found in residential homes. Passive infrared motion detectors (PIR) detect emitted infrared energy – given off by humans and animals in the form of heat. When there is a sudden increase in infrared energy, an alarm is sound.



**4. CCTV surveillance:** is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. It differs from broadcast television in that the signal is not openly transmitted, though it may employ point to point (P2P), point to multipoint (P2MP), or mesh wired or wireless links. Though almost all video cameras fit this definition, the term is most often applied to those used for surveillance in areas that may need monitoring such as bars, banks, casinos, schools, hotels, airports, hospitals, restaurants, military installations, convenience stores and other areas where security is needed. Though Videotelephony is seldom called "CCTV" one exception is the use of video in distance education, where it is an important tool.

### CHARACTERISTICS OF HIGH PERFORMANCE BUILDING

Cost effectiveness. Lifecycle costs, cost/benefit analysis and ROI over expected lifespan

- Safety and security. Safety and security of occupants and impact of building failure on the community
- Sustainability. Integrated design, energy performance, water conservation, indoor environmental quality and reduced impact of materials
- Accessibility. Recognizing and addressing different accessibility needs
- Functionality. Ensuring that the building fulfils its intended purpose and meets occupants' needs

- Productivity. Enabling occupants to do their best work and contribute to achieving the organization's goals

### CONCLUSION

- High performance building is synonymous for green building.
- It is both smart and green to create facility i.e. safe, healthy and comfortable .green technique reduces the side effects on environment such as greenhouse gas emission, soil pollution, health hazards, ozon depletion etc.
- Automation provided in building provide safe and comfort to the personal living in the building. It includes the sensors which overcome the waste of energy.
- Kitchen and garbage waste use for producing energy and fertilizer which contribute to reduction in co2 emission which evolve after decomposition.
- The endless energy source such as sun energy is utilized to generate its own energy.
- This green and smart concept is better for better tomorrow and healthy life of coming generation.

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