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## Providing a framework for sustainable green design to reduce global warming

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### **Abstract**

Attention to nature is one of the methods that is important to help environmental issues. Pilgrimage, while preserving valuable resources, creates healthier environmental conditions. Today, the appropriateness of architectural quantities and qualities has become the first concern of architects. In the environmental approach, topics such as sustainable architecture and green architecture are examined. The use of green roof in Iran is a solution to define and analyze sustainability in the form of policies and components of sustainable development. There is no doubt that one of the most important challenges and controversial issues of this century around the world is the issue of energy. In general, there are various methods for conserving energy resources. The most common method is saving, which is possible through culture building. The newest idea for conserving energy is the use of new equipment and systems that have been designed for this purpose. Building energy management systems include: Intelligent building is a building that (includes a dynamic and cost-effective environment by integrating the four main elements of systems, structure, services and management and the relationship between them). A smart building benefits from these Provides through intelligent control systems. In this article, while introducing energy management systems in buildings, we examine its types, implementation methods, applications, as well as its impact on energy consumption management and optimization.

**Keywords:** Sustainable architecture, conservation of valuable resources, green architecture, environmental approach, components of sustainable development.

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## **Introduction**

Due to the increasing use of irreversible natural resources and excessive waste of energy, green buildings in the evening are a good solution to preserve irreversible or late return of the earth. One of the main problems that all developed and developing countries Building development is facing them, the problem is their energy supply, because commercial centers are used for a long time during the day, it is necessary to consider certain criteria to reduce energy consumption [1]. Therefore, how to build buildings in order to reduce energy consumption in the building, should be done in such a way that both in terms of designs prepared and in terms of materials used, the necessary measures and forecasts are made. A green building is a type of building in which environmental energy is used appropriately according to the structures in which the building is constructed [2]. The Green Movement, which originated mainly in the United Kingdom, has led to a new approach to sustainable development that has influenced not only the conservation of the planet's backyard energy, but also the psychological and economic factors and attitudes of sustainable employers and other stakeholders. One of the current problems of Third World countries is the lack of attention to principled constructions with the approach of environmental protection and the incompatibility of these constructions with the goals of sustainable development [3]. As a developing country with rich renewable energy resources and increasing use of non-renewable energy sources, Iran is in dire need of extensive energy optimization and micro and macro planning in this area. One of the solutions to optimize energy consumption is to design buildings with an eco-technological approach. An approach whose results have been proven in achieving the goals of sustainable development [4]. Sustainable architecture is a trend in architecture that seeks to minimize the negative environmental effects of buildings by increasing

productivity and moderation in the use of materials, energy, construction space and the ecosystem in general on a large scale. Sustainable architecture uses a conscious approach to energy and environmental protection in the design of the built environment. The purpose of sustainability, or ecological design, is to ensure that the resources available to us today are used in a way that does not harm the overall health of humans or make resources unavailable for other uses in the long run. In this paper we provided a framework for sustainable green design to reduce global warming.

### **Importance of Issue:**

Energy efficiency throughout the life cycle of a building is the most important goal of sustainable architecture [5]. Architects use a variety of passive and active techniques to reduce the energy required by buildings and increase their ability to absorb or produce energy. Sustainable architecture prioritizes passive systems to minimize costs and complexity, and seeks to meet the building's energy needs by positioning the building and incorporating architectural elements into it, using renewable energy sources and then fossil fuel sources only in Used as needed and as a supplement [6]. To make the best use of environmental resources, building area analysis can be used to exploit sources such as sunlight and wind for heating and ventilation. Good insulation is one of the most important and cost-effective elements of any efficient heating, cooling and air conditioning system in buildings. A more efficient building will require less heat generation or waste heat, but may require more ventilation capacity to allow polluted air to escape into the home. Sustainable architecture is one of the new trends and approaches in architecture that has been considered by many contemporary designers and architects in recent years [7]. This architecture, which arises from the concepts of sustainable development, seeks to adapt and harmonize with the environment is one of the basic human needs in today's

world. The purpose of creating green buildings is to improve the climate, prevent the loss of energy used for cooling and heating, and prevent the negative effects of construction on the environment. Before anything else, a green building needs a creator like anything else. This means that creating a green building will help and support the health of the person who lives in and around it, and will lead to their satisfaction and usefulness. This requires the careful application of certified strategies in architecture [8].

The use of sustainable nature and a sufficient source of material and reliance on the sun for heat, electricity, and daylight use, and the reuse of waste, produce a subtle alliance and subtle structural integration of these strategies. Of course, it should be noted that the transformation of human culture into a foundation and change the basic structure of the human soul and nature depends. We must rediscover our union and interdependence with something much larger than ourselves [9]. The world of nature is a spiritual realm that excels in everything. This is Bolozhev's idea, first in the person and then in society. He believes that we must force both groups to agree on the facts of life in the world. In the West, it is believed that the advantage in environmental design and design will improve and it will be successful if the assembly and its design team are really just a group of designers. Significant amounts of energy are released from the building by streams of water, air and compost. On-site energy recycling technologies can effectively recover energy from hot water and stale air and transfer that energy to fresh cold water or fresh incoming air. Recovering energy from compost leaving buildings for non-horticultural uses requires central anaerobic digestion. Green building is often interpreted as a building that has little negative impact on its surroundings [10]. The purpose of creating green buildings based on the above principles is to improve the climate and prevent the negative effects of construction on the environment. Saving and optimizing energy consumption and the use of sustainable energy currently have no role in

the country's tourism culture. In addition, in the construction of the private sector, and especially in the housing of the affluent classes, relatively important figures are spent at the expense of other essential items in the building, which are spent on extreme decorations, which are mainly known as tool making [11]. The motive for spending these unbalanced sums is to adorn the splendor and glory and ultimately the prosperity and success of the business, especially in the profession of making and selling. This has unfortunately become a fashion in society, which is worrying. But the solution to the problem of discovering new aesthetic approaches is necessary to bring about change and transformation in the public mind and to replace biological patterns based on saving balance and optimizing consumption and respect for the natural and social environment instead of the current degenerate patterns. This requires architects to try to direct public taste in constructive and socially beneficial ways, instead of pursuing popular and market-oriented tastes. Architects can convince people that climatic and environmental designs are no less beautiful than the usual current decorations [12]. Through architecture, society can be informed about the desirability and great economic and environmental value of energies that are known as harmless, calm and . Energies that from the point of view of artists and architects can be called beautiful instead of anything else. The future of the world lies in beautiful beauties. Let's discover the beauty of pure and life-giving energies. This type of design follows certain principles that must be observed: management of energy resources, design with the ability to return to the life cycle, design for humans [13].

### **Sustainable design and principles of sustainability thinking:**

Green architecture or sustainable architecture is one of the new trends and approaches of architecture that has been considered by many contemporary designers and architects in recent years. This architecture seeks to minimize the

negative environmental impacts of the building and the optimal use of materials, energy and development space and ecosystem [14]. As can be deduced from the definition of sustainable architecture, the purpose of building design according to the principles of sustainability and ecology is to reduce energy waste and environmental pollution. Sustainable architecture is a subset of sustainable design and one of the most important developments in contemporary architecture and a humanitarian response to the crises of the industrial age. Sustainable architecture uses a conscious approach to energy and environmental protection in the design of environmentally friendly structures [15]. The purpose of creating green buildings is to improve the climate, prevent the loss of energy used for cooling and heating, and prevent the negative effects of construction on the environment. The idea of sustainability, or environmental design, is to ensure that our actions and decisions today do not destroy the opportunities of the next generation [16]. Energy efficiency is the most important goal of sustainable architecture throughout the life cycle of a building. Green design is a practical way to solve problems in which natural resources are minimally damaged before and after the production and manufacturing process. In addition, in the process, materials must be useful, have a long useful life and can be returned to the natural cycle. Long-lasting things are both useful and the biggest barrier against extravagance and waste, and this is better than reusing or recycling them [17].

In this type of architecture, the building not only adapts to the climatic conditions of its area, but also interacts with it. What is referred to today as sustainable development is a reformist revision of modernism and tradition. Sustainable development is development that meets the needs of the present in a way that does not diminish the ability of future generations to meet the needs [18]. To this end, it is necessary to reduce the use of nature and natural resources as much as possible and to manage environmental pollutants and construction

waste in such a way that the life cycle is not disrupted. The point to be made is that sustainable or ecological architecture should not be confused with indigenous architecture. By definition, indigenous architecture is a branch of architecture that bases its work on regional needs and building materials that reflect regional traditions. And has evolved over time and based on environmental, cultural, technological and historical background [19].

### **The need for sustainable architecture:**

At the beginning of the industrial revolution in the eighteenth century, the concentration of atmospheric carbon dioxide was 270 parts per million, and now it has reached 377 parts per million. This amount is unprecedented not only in the last 740,000 years, but also from 55 million years ago. 55 million years ago, the planet was a tropical planet with no north or south poles, and sea levels were 80 meters higher than today [20]. These conditions were not suitable for human life, and by eliminating these conditions, man was able to continue his yard on this planet. But now man is consciously reshaping these conditions with his own hands [21]. If the current trend continues, side effects such as on ecology and ecology management, impact on human health, changes in infrastructure through floods and movement of land layers, flooding of rivers and rising sea water, drying within continents and wetting of coasts, burning cities Forests include the depletion of the ozone layer, reducing the temperature difference between night and day, acidifying the oceans, and changing the distribution of water on Earth. The conservation of energy and the sustainable use of it [22]. Enormous advances in oil extraction technology and other underground reserves have enabled the greater use of these non-renewable resources, so buildings must be designed to minimize fossil fuel consumption. It is also important to consider where the resources used in development systems are used and how to maintain them sustainably and use resources that can be replaced more quickly.

For example, wood from trees that grow faster and can be replaced should be used.

**Principles of sustainable architecture:**

Paying attention to human life and preserving it now and in the future, using materials that cause the least damage to their environment, whether during production or during use or destruction; Minimal use of fuel energy and efforts to use natural energy, reduce environmental degradation, improve the physical and mental living conditions of humans and other living organisms can be called the primary goals of sustainable architecture.

**Energy conservation principle:** Every building should be designed and built in such a way that the need for fossil fuels is minimized. The necessity of accepting this principle in the past ages is undoubtedly undeniable considering the way of construction, and perhaps only due to the great variety of new materials and technologies in the contemporary era, such a principle has been forgotten in buildings [23]. The use of different materials or with different combinations of them, buildings, change the environment according to the needs of users. It is also worth mentioning the theory of the biological complex, which originates from providing shelter to survive the cold or creating a cool space for people to live, for this reason, as well as the presence of other factors, people build their buildings for many mutual benefits. They were building together. Buildings built in response to the local climate and in an effort to reduce dependence on fossil fuels carry more unique experiences than ordinary apartments today, and are therefore considered semi-finished efforts to create green architecture. Many of these experiences were also the result of individual work and effort; And so it is clear that it is not considered as a sustainable principle in the designs and constructions of today's society [24].



**Principle of working with climate:** Buildings should be designed to be able to use local climate and energy sources. The shape and location of the building and the location of its interior spaces can be such that it improves the level of comfort inside the building and at the same time, through proper insulation of the structure, reduces fossil fuel consumption. These two processes inevitably have many overlaps and commonalities. Before the widespread use of fossil fuels, wood was the main source of energy, which still provides about 15% of today's energy. When wood became scarce, it was natural for many people to use the sun's heat to generate heat in order to reduce the need for wood. Greek cities such as the Pyrenees changed the location of the city to prevent flooding, and built rectangular grids with east-west streets that allowed buildings to face south and use favorable sunlight [7]. The Romans also continued to follow the principles of solar design by learning from the experiences of Greece; But they also used transparent windows, invented in the first century AD, to increase the heat generated. With the increasing scarcity of wood as fuel, the use of south-facing facades in the construction of wealthy homes as well as public baths became common. The design tradition was not limited to heating laws due to the climate to create comfort inside the building, but in many climates, architects were required to design a cool space to create the desired conditions inside the building. The usual solution in the present age, the use of air conditioning systems, is only an inefficient process in the face of the climate and at the same time is associated with high energy consumption, which even when energy is cheap and abundant due to pollution. It counts as a mistake [11].

**Principle of reducing the use of new resources:** Each building should be designed to minimize the use of new resources and at the end of its useful life, create a source for other structures. Although this principle, like other principles mentioned, is oriented towards new buildings, it should be noted that most of the existing resources in the world are used in the current artificial environment, and

repairing and upgrading existing buildings to reduce environmental impact is important. Equals the creation of new structures [25]. It should also be noted that there are not enough resources to create artificial environments in the world that can be used for the reconstruction of each generation of buildings, a new amount of them. This reuse can be formed through the use of recycled materials or recycled spaces, the recycling of buildings and the elements inside them is part of the history of architecture. The monastery of Santa Albas, rebuilt in 1077 and 1115, used the ruined bricks of a nearby Roman building [2]. The wooden frames used in the Middle Ages were pieces of wood that were cut and joined together in a carpentry workshop and coded, then disassembled and transported to buildings. The use of this method meant that parts of the medieval building could be relocated if necessary; Even today, they can be moved to another location. Sometimes the whole structure of the building was moved to build a new building. For example, when the Victoria and Albert Museum was built in London, the previous building on the site was no longer needed, and in 1865 a proposal was made to hand over the metal building to local authorities in north, east and south London with the aim of setting up a local museum in a new location [14]. Officials in East London accepted the offer, and the building of this local museum was completed in 1872, which has now been turned into a children's museum. In most cases where access to new resources is minimized, methods are discovered by which buildings built for one purpose can be used for other purposes, however some necessary changes can change the original shape of the structure or building [26]. This is a disaster for those interested in the permanent protection and maintenance of buildings, and the question arises as to whether a building should always remain unchanged because it once had a valuable use, or whether it should be maintained to maintain efficiency. And the efficiency made the necessary changes in it? A green process in examining this issue may find judgment possible only on the basis of available resources. If the

resources needed to change a building are less than the resources needed to demolish and rebuild it, these changes should be welcomed. However, this does not mean that the historical significance of the structure is not respected and celebrated. In addition, these structures may have other values that need to be considered [15]. These problems become more apparent in changing existing buildings in order to prepare them to adapt to new needs, especially in improving the condition of the building in terms of performance and efficiency that may lead to changes in its appearance. Changes in some older buildings for new applications can have certain costs and problems. However, the benefits of reusing these large buildings side by side and within an urban environment can overcome these problems and costs. Renovation of existing buildings in cities and towns can also protect the resources used to demolish and rebuild the building and thus prevent the demolition of the community [27].

**Principle of respect for users:** Green architecture respects all people who use the building. This principle seems to have little to do with pollution caused by global climate change and ozone depletion. But the green process of architecture, which includes respect for all the common resources in building a complete building, does not exclude man from this complex. All buildings are built by humans, but in some structures the truth of human presence is respected, while in others there is an attempt to reject the human dimension in the construction process [12]. In Japan, a number of robots have taken on the role of humans in creating and designing buildings, but for a robot, effective project performance involves performing a specific task that can be repeated many times. But on a different scale, a human being as an architect can still rely on his skill to do many unrelated tasks. More respect for human needs and the workforce can be experienced in two separate ways [4]. For a professional builder, it is important to note that the safety and health of building materials and processes are as important to the entire human community as they are to

workers or users. Architects have gradually become aware of the presence of various toxins on construction sites, and the use of CFC-type insulation materials or the use of other hazardous materials in buildings has recently been banned. Another form of human participation that needs attention is the positive involvement and involvement of users in the design and construction process, which, if not used effectively, is a waste of efficient and useful resources. Many buildings have used this energy and the results have resulted in satisfaction in creating large buildings [28].

**The principle of respect for the site:** Every building should touch the ground gently and lightly. Australian architect Glenn Murcott makes the strange statement: The building should touch the ground calmly and lightly. This statement has a feature of the interaction between the building and its site, which is essential for the green process, and of course has wider features. A building that greedily consumes energy produces pollution and is alien to its consumers and users, so it never touches the ground gently and lightly. A more explicit interpretation of this statement is that it is not possible to remove every building from the site built on it and restore the conditions before the building was rebuilt on the site. This type of site connection is found in traditional Bedouin Arab settlements; The lightness and serenity among them in touching the earth lay not only in the movement of their house, but also in the materials they used and the possessions they carried with them [13]. The black tent of the Bedouin Arabs was made of the wool of goats, sheep, and camels. Tents with long ropes were kept in place and very few wooden beams were used because wood was a very scarce resource in the desert. While in urban communities, indigenous and traditional life has been abandoned for monogamy and architects have entered the field of design, there is still a constant need for temporary structures to create various exhibitions and other cultural activities. Such structures often take the form of Bedouin tents [19]. Designed by Dutch architects for the 86th Festival in

Sonsbek, the structure was designed to protect fragile sculptures outside the building, and the wind was designed to be invisible. In this structure, four types of materials were used, namely prefabricated concrete for foundations, transparent glass for walls and steel roofs for trusses and fittings, and silicone resin for connecting glass plates to each other. The glass fins were also attached to the glass walls to create more rigidity and also to provide a space for the connection of light metal trusses carrying the glass roof. The floor of the building was normal and was covered only with wood to prevent flowering [23]. At the end of the festival, the building was separated again and then removed from the site and the soil removed; Thus, the site returned to its pre-festival status without any changes. This building can be used for any other exhibition or festival or its members can be used in any other structure [26].

**The principle of totalitarianism:** All green principles require participation in a holistic process to build an artificial environment. Finding buildings that have all the principles of green architecture is not an easy task. Because green architecture is not yet fully understood. A green architecture should include more than one single building of its own and should include a sustainable form of urban environment. The city is a creature beyond the complex of buildings; In fact, it can be seen as a set of interacting systems - systems for living and recreation - that are embodied in the form of structures, and it is by looking closely at these systems that we can draw the face of the city of the future [27].

To achieve such goals, some principles must be observed:

1. Reuse existing buildings and preserve the environment, place bush and greenhouse and green plants as much as possible
2. Prevent water loss and collect and recycle water and use rainwater
3. Increase energy efficiency in various ways, including building a building that makes the most of sunlight and seasonal changes. Do not use devices that are not approved in terms of energy consumption, thermal and sound insulation

4. Use native, recyclable materials and those that require the least amount of energy to prepare. Such products, in addition to being durable, also contain the least amount of harmful chemicals.

5. Enjoy natural and clean energy such as solar and wind energy

Knowing and studying these measures will lead the architect to a better understanding of the environment he has to design.

### **Sustainable architecture design steps:**

These steps are as follows:

**Economy of Resources stage:** This principle, on the one hand, deals with the proper use of non-renewable resources and energies, such as fossil fuels, in order to reduce consumption, and on the other hand, controls and uses natural resources as renewable reserves. And Mandegar is paying serious attention. For example, one of the most immortal sources of energy is sunlight, which is now used by photovoltaic technology to provide water and electricity to the building. To control resources, three types of strategies can be considered, including energy conservation, water conservation and material conservation. As can be seen, the focus on these three sources is due to their importance in the construction and management of the building [5].

**Life Cycle Design Stage:** The second principle of sustainable architecture is based on the idea or theory that matter transforms from a usable form into another form without compromising its usefulness. On the other hand, due to this principle, one of the tasks of the designer is to prevent environmental pollution. To achieve this, the theory examines the building in three stages. These stages are: the pre-construction stage, the construction stage and the post-construction stage, respectively. It should be noted that these steps are interrelated and there is no clear boundary between them. For example, recycled materials in the post-

construction phase of one building can be used as raw materials in the construction phase of another building [28].

**Humane Design Stage:** The principle of human design is the last and perhaps most important principle of sustainable architecture. This principle is rooted in the needs that are necessary to maintain the chain elements of the ecosystem, which in turn ensure human survival. This principle has three strategies of conservation of natural resources, urban design-site design and human comfort, which focus on increasing the coexistence between the building and the environment outside it and between the building and the people who use them. In fact, it can be said that in order to achieve sustainable architecture, the designer must combine and balance these steps and principles that define a basic framework for a sustainable design in his design [29].

### **Advantages of sustainable architecture and use of green buildings:**

The advantages of sustainable architecture and the use of green buildings are:

- Use of natural energies in daily consumption
- Stability of the indoor environment
- Use of waste and effluent in water production required for irrigation of green space
- Apply appropriate methods to reduce or control wasted energy and optimize energy consumption
- Attention to the climatic properties of the region
- Use of non-chemical recyclable materials and materials that do not endanger human health.
- Design with materials close to nature
- Use natural plants as live design inspiration
- Avoid damaging the condition of the land for more profit

- Achieving the highest quality of life in the shadow of relying on the environment
- How to use the land?
- Pay attention to the ecological character of the area [1, 6, 13, 29, 30].

**Environmental concerns for sustainable development:**

Dana Goodman, an architect with postmodern American ideas, has spent more than a decade of her life on the idea of a floating city. The floating city is a direct response to the population explosion that could occur in the near future for parts of the globe. He studied architecture at Columbia University and is interested in marine living environments and the possibility of living in such environments. Examples of activities in this field are the construction of 60 artificial islands in Japan due to the reduction of space and population density. However, Goodman's idea is different from building purely artificial islands, and in a way involves creating a floating anchor bed that can accommodate a small town. Although this type of city may seem unrealistic at the moment, it is in fact a reflection of the current movement in art and design to create stability in growth and development. The idea of reliability is to wish for future generations a better and more favorable planet than what is seen today. However, it must be acknowledged that human behavior guarantees biosphere stability only if it does not destroy existing natural resources.

Today, in a way, all of our human behavior requires the use of energy from sources that, like fossil fuels, are non-renewable and cannot be reproduced. Of course, it must be said that our activities are not limited to this issue and include serious air pollution and critical environmental conditions, which can create difficult and unbearable conditions for future generations. Are these factors that should affect the future architecture in relation to other issues such as functionality and optimality of the home space? Other markets show an increase



in people's interest in health and environmental issues, which can be said to be a step towards sustainable development in general. For example, we can mention the new tendency that has been created for the preparation and use of organic materials in society, which indicates the use of more natural materials and free of chemicals. Architecture is a special field in this field because the use of energy as well as materials in it is relatively high. We routinely protect buildings that have historical value against the urge to demolish them and build newer homes. The two main ideas in the development and construction market are currently prevailing: one is the idea of needs that seeks to meet the standards of modern life for all human beings and the other is the idea of limitation that focuses on limiting biological resources to meet current and future needs.

After World War II and the pursuit of modernity in the 1950s, the focus of architecture was on over-utilizing land and trying to create as many tall, block-like concrete buildings as possible. This approach is seen today as a gross architectural mistake because, although the problems were met in terms of needs, the limitations were seriously added. Although the concentration of population in an inner city seems to be more stable due to environmental issues, it was not considered sustainable from a social point of view in order to reduce the need for the movement of people and goods from a social point of view. Excessive population density in a confined space leads to increased stress, lack of peace of mind, and increased crime rates. Building blocks emerged as obsolete parts of cities in the future, and in fact many did so until they were demolished or rebuilt and developed. Ideas of needs and limitations are the basic principles of sustainable architecture and its connection to aesthetic, environmental, social, political, economic and moral values. Among the architectural groups that are most active in the field of advanced research, we can mention LOG ID company. The members of this group are architects, engineers, doctors, botanists, physicists and communication technology

specialists who have made every effort to use green and solar energy. Although the company in question is a knowledge-based company, its technologies are used directly in the discussion of sustainable architecture, which can lead to responsiveness in the ways of using solar energy in homes and thus reduce the consumption of fossil fuels. In this way, facing the issue of sustainable development, the main focus is on materials that cause the least damage to the environment in homes, both when consumed and when they are out of use, and this means focusing on technological advances to achieve It is reliable, while the other view on the subject is to pay attention to the basics and principles and simplify the architecture and reduce all aspects involved in construction.

One of the ideas of returning to the basics and principles can be inspired by nature, learning from the environment, preserving the visual beauty of the land by assimilating the architecture with the environmental landscape. Emilio Ambasz is an architect who aspires to inspire a sense of home and connection to the environment through his designs. His work, which means being involved with the environment at all stages of life, plays a central role in the green architecture movement. His idea is based on principles such as reducing or reducing energy use, reducing pollution and damage to the environment and polluting natural resources, and ultimately providing better conditions for healthy living. His project was designed for Schlumberger Research Laboratories in the United States on a beautiful hillside. While normally this design should have suddenly disturbed the beautiful landscape of the place, but its design is almost completely done underground and the gentle lines of the hills of the area with a beautiful and homogeneous charm to the sides of the building that is in harmony with the surrounding landscape. Is connected. The idea that architecture seeks to interact with the environment owes much to Frank Lloyd Wright in the first decade of the twentieth century. Wright is well aware that architecture can be constructed in harmony with the natural environment

and, of course, with sociological aspects in mind, as if they were part of nature. He considered this style of architecture to be organic architecture, which has many aspects in common with green architecture, but its focus is also more on the construction process and location.

Another approach that can be taken to assimilate buildings with the surrounding environment is to inspire the architectural design of buildings from nature. This method also pays good attention to and conforms to the landscape and aspects of organic architecture. Jersey Doyle Snail House has taken advantage of this thinking. It is located near the Forket River, surrounded by forest, and a number of wooden buildings are located nearby. In terms of shape, it seems that it has established more harmony with the surrounding nature, and of course, it should be said that in addition to shape, it has also paid attention to environmental issues, such as the use of solar panels, which has helped reduce electricity consumption. Of course, it should be noted that in order for a building to be sustainable, it does not need to be mixed and colored in the surrounding environment. The two green buildings, Thorn Crown Chapel and Cooper Chapel, located in a wooded area of the United States, are architecturally different from ordinary green buildings. In order for a church to stand out and better express its symbolic role, it needs to stand out in some way in comparison to its surroundings rather than being hidden. In the face of such an approach, an attempt has been made to construct the buildings in question for materials, life cycle, symbolism, and sustainable function. Phi Jones, the architect of these buildings, therefore focused a lot on the beauty of this building for the viewer. From inside the building, you will encounter a very attractive and at the same time ceremonial space for design, with very large windows that allow you to have a great view of the beautiful surrounding scenery. In the construction of these churches, while paying attention to the details of the forms in the

traditional and rooted form, a great deal of focus has been placed on design and sustainable materials.

The architect has tried to emphasize the spirit of the building in a formal context and also to connect God with the natural world. According to Jones, an important aspect of a sustainable building is having a very long period of life and long-term use. However, it should be noted that some architects do not agree with this idea and believe that if the design is in the right direction of reliability, there is no need for such a show. Although only a handful of reliability laws have been passed, it must be acknowledged that politicians and governments have acknowledged the importance of reliability at a relatively slow pace. However, all of this indicates that steps have been taken to make changes to common building materials and designs today. Studying the environment like a beacon above the human head has made it possible for us to better understand the effects of our behaviors on nature and its unregulated exploitation, which ultimately lead to unfortunate natural events such as rising biosphere temperatures or floods and fires. Fortunately, human beings today show more concern for the future and destiny of future generations, and this awareness and effort to preserve the environment or to strive for a life in which the organic aspects are more fully respected is itself promising to open the way to a future. That architecture should also approach this goal. Human awareness and long-term visibility can well justify the low cost of more sustainable and environmentally friendly constructions compared to conventional buildings today. Humans are at the center of sustainable development issues and concerns. They strive to live a healthy and fertile life in harmony with nature. In order to achieve sustainable development, environmental protection is an integral part of the development process and should not be seen as a separate identity outside of development.

## **9 examples of the best sustainable architecture in the world:**

**1. Angel Square, Manchester, England:** Angel Square Manchester is the headquarters of the co-op group. With 3,000 employees, the group won the Best Group Award from the Building Environmental Assessment Research Institute (BREEAM). The building was designed by 3D Reid Architects in 2009 under the direction of Mike Hitchcumoff. The construction process of Fereshteh Square started in 2010 and ended in 2013. According to the co-op group: "This building's energy comes from the Combined Heat and Power (CHP) system. It also uses rapeseed oil, which is grown on the group's farmland." The extra energy of this building is also returned to the energy network. Other features include LED lighting and a system for recycling waste and rainwater. The square of a 16-storey building angel with an area of 30439 square meters and the area of each floor is 2694 square meters. This building is like an egg that has been cut. Designed to the south by a glass roof, it can make the most of daylight. This glass roof is also used for natural ventilation.



**2. Crystal Building, London, UK:** Crystal, in East London, offers Leeds and BREEAM prospects for future use of fossil fuels. The glass-fronted building was built near the London Olympic Park. The crystal building was

commissioned by Siemens, a global technology company, and designed by Wilkinson Air. The building uses Siemens technologies such as a stairway that receives heat and energy from the flow of people. All electricity in this building is generated by solar panels. The building has a combination of LED and fluorescent lights, the light of which is adjusted depending on the amount of daylight. The roof of the building collects rainwater, recycles it and prepares it for reuse. Pipes laid in the ground are also used to provide energy for heating and cooling of this building. These pipes transfer heat from the ground to the building in winter and heat from the building to the ground in summer. Some of these pipes are said to be located at a depth of 150 meters.



**3. Bryant Park Building, New York, USA:** Brian Park, Bank of America Tower, is the first high-rise building to have LEED certification. Located in Manhattan, this tower is one of the greenest and most stable skyscrapers in the world. In addition to having CO<sub>2</sub> monitors, toilets without the need for water and LED lighting, this building has a power plant that produces 4.6 MW of clean and sustainable energy. It is said that the materials used in this building are mainly recycled materials or recyclable materials.



**4. Shanghai Tower, Shanghai, China:** At 632 meters, it is the tallest skyscraper on the planet after the Burj Khalifa in Dubai and the tallest tower in China. This building was designed by Jensler Architecture Group. The design and construction of the Shanghai Tower began in 2008 and was completed in 2015. The cost of building the Shanghai Tower is estimated at \$ 2.4 billion. This tower is like cylinders that are connected to each other. There is a distance between the outer and inner wall, which is the public space of the building. In the space between the outer wall and the inner wall, there are gardens and recreational spaces. The 258-room Shanghai Hotel is located on the 84th to 110th floors of the building. Wind turbines located at the top of the structure provide the energy needed for outdoor lighting and green space. Also, the transparent walls of the building allow natural light to flow in the building and reduce the need for artificial light. Intelligent controls control everything from ventilation to heating and lighting, and help reduce energy bills in the building.



**5. Pearl River Tower, Guangzhou, China:** The Pearl River Tower is one of the tallest office buildings in Guangzhou, China. The 309-meter-high tower was built in 2012 in Guangzhou, China. The Pearl River Tower with solar panels, energy saving system and wind turbines is on the list of buildings with sustainable architecture in the world.





**6. Moon and Sun Mansion, Deju, China:** The 75,000-square-foot Moon and Sun Mansion is one of the largest solar structures and sustainable architecture in the world. In addition to using solar panels to generate energy, this structure also has energy storage glass. It is said that this building saves more than 88% in energy consumption. The building was designed and built by the famous Chinese engineer Ming Huang. Ming Huang, also known as the King of the Sun, is a member of the Chinese parliament.



**7. Wank Center, Shenzhen, China:** This structure, located on the south coast of China, has solar panels that provide 10% of the building's energy. Also, all furniture, floors and doors are made of bamboo.



**8. Manitoba Hydro, Winnipeg, Canada:** This building uses a passive natural ventilation system. This feature has optimized energy consumption in this building. The building has a geothermal system for heating and cooling the space. Roof gardens and triple glazed windows are other features of sustainable architecture in this building. Thanks to these features, more than 60% of energy is saved.



**9. Bahrain World Trade Center, Manama, Bahrain:** This tower is one of the tallest towers in the Middle East. Two large wind turbines with a diameter of 29 meters, build between the two sail towers and generate pure energy of the building.



### **Conclusion:**

Sometimes the reliability of all three economic, cultural, social and environmental systems is called the triple foundation line by which the durability and success of development and design are evaluated. Literally,

sustainable architecture focuses on the reliability of architecture, both as a discipline and as a product of a discipline. In cases where the emphasis is on axes such as the future, the best way is to design and plan the public domain, in this regard, such as: key arguments, urban-architectural concepts and interesting and noteworthy reliability that are strongly intertwined. Ecological methods and cultural reliability cannot be committed separately. Environmental guarantee responsibility means cultural sensitivity, cultural reliability that must include ecological awareness. For cities without a compatible combination of the two, there will be no sustainable future.

Recently, many environmental technology methods fail before they are successfully completed; Because of the inability of their designers to identify the socio-cultural context and content of architecture, or to understand the needs and expectations of those who intend to use it. In fact, here we are talking about forgetting how local culture and values should be preserved and not forgotten. This really affects the success or failure of a project. The global process of technological advancement in the fields of information and communication has led to an increase in consumption, sustainable urbanization and the international growth of capital, and trade around the world has turned culture with new racial patterns and cultural relations into the unexpected of mixed cultures. At the same time, the rapid growth of technology is contributing to the increase in environmental problems on a global scale, which can be seen in ecological disasters, such as the rapid depletion of natural resources and species and high consumption and increasing amounts of energy loss. It is thus understood that the artificial environment as a prominent cultural branch and the main consumer of energy and resources seriously implies in both processes. Knowledge is always inevitably indigenous; Inseparable from its possessions, one may hide or obliterate this fact, but one cannot eliminate it.



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