Application of Renewable Energy in Architectural Design

Jing Peng[1], Di Cheng[2]

[1]Wuhan Oriental Construction Group CO., LTD, Wuhan, 430000, China

[2]School of Arts and Communication, China University of Geosciences, Wuhan 430074, China

Keywords: renewable energy; architectural design; application

Abstract: With the rapid development of our country's construction industry, the energy consumption is also rising year by year, which has a great impact on our energy and environment. The use of renewable energy can effectively solve the problem of resources and promote the development of environmental protection. By analyzing the application of renewable energy in architectural design, this paper appeals to construction enterprises to reduce the use of non-renewable energy and achieve the effect of resource recycling.

1. The Meaning and Importance of Renewable Energy

Renewable energy refers to resources that can be reused in nature, including common solar and wind energy. The utilization of renewable energy can ensure the recycling of resources and reduce the loss of resources. We should know that the earth's resources are limited, not inexhaustible, people must pay attention to the use of resources, or when the earth's resources are exhausted, people will regret it. On the other hand, the use of living resources in construction can alleviate environmental pollution. Construction needs a large environment and various resources to assist. In this process, water and air environment will be polluted. Through the use of renewable resources, resources can be recycled and prevented. The production of harmful substances reduces environmental pollution. At the same time, the utilization of renewable resources can achieve the goal of sustainable development. Energy consumption and environmental pollution have always been major obstacles to the sustainable development strategy in China. If renewable resources can be used in the construction industry, it will be conducive to responding to the call of the state, realizing an important strategy of sustainable development and accurately implementing the concept of energy conservation.

The problem of energy use is not only a national problem. Facing the energy consumption brought by economic development, the earth's resources are facing the dilemma of exhaustion. If the energy use can not be reasonably controlled, then our living environment will be destroyed sooner or later. Building construction not only provides people with comforTable living environment, but also is an important part of promoting economic development. However, it is also one of the industries with the largest energy consumption. For the construction process, we must strictly control, strengthen the government rules and regulations, so as to limit the use of non-renewable resources, and promote the positive development of society through effective combination with environmental protection materials.

2. Types of renewable energy

2.1 Solar Energy

Solar energy is currently widely used in energy, mainly because solar energy is easy to use and suiTable for a wide range of areas. Solar energy is mainly radiated to the relevant equipment through the sun, the equipment through the collection of sunlight, which can produce power supply, refrigeration and other functions. Solar energy can be applied to the construction industry mainly because the use of solar energy is not limited by the region, in any region can collect sunlight, thus producing a role, the requirements for conditions are relatively low. In addition, solar energy has the

  DOI: 10.25236/icceme.2019.014

nature of reuse and no pollution. In the construction process, it can be used indefinitely without considering the problem of energy use, which largely solves the problem of building construction resources.

2.2 Wind Energy

Wind energy is also widely used at present. Compared with solar energy, the conditions of using wind energy are limited. Wind energy is generated by the carrying capacity of wind in the air, so wind energy is affected by air density and wind power. It can be found that, in order to use wind energy in the construction process, we need to understand the wind power in the current environment, and use the wind conditions suiTable for the energy required for construction is the key to ensure the smooth progress of construction. In addition, we also need to consider whether the intensity of wind energy will affect the progress of construction, so as to improve it. The degree of good wind energy. Wind energy can also play a role in reducing temperature in construction, so the temperature requirements of construction environment should be properly understood.

2.3 Water Power

Water resources in the environment change into water vapor in the air through evaporation, and then encounter cold air, condense into ice and snow, and land on the ground, forming rivers. Such a cyclical process is exactly who can produce it. Water energy is generated by the continuous flow of water, which is applied to the construction process. In many cases, water energy can also be applied to the process of hydroelectric power generation, thus forming a kind of renewable energy. However, due to the relatively small capacity generated in this process, it is not as widely used as solar and wind energy.

2.4 Geothermal Energy

Geothermal energy refers to the energy generated in the interior of the earth and collected by relevant equipment. It also includes tidal energy in some coastal areas, which is generated by the movement of the ocean, by the influence of surface temperature, and by the summary of relevant equipment, all constitute a kind of geothermal energy. Geothermal energy is generally used in power generation during construction, but it is also used in heating and cooling.

2.5 Biomass Energy

Biomass energy is a kind of renewable energy which is stored in living plants and then supplied to related production. For example, we often see that methane produced by anaerobic digestion of burning straw is a renewable resource for life, manufacture and use. However, the proportion of biomass energy in renewable resources is relatively small, and the application of biomass energy in construction links is relatively limited.

3. Current Situation and Reasons of Renewable Energy Application in Construction Links

3.1 Application Status

By making full use of renewable resources, we can effectively alleviate the shortage of resources in China. Facts have proved that in a long period of time, through the use of renewable resources, China has reduced a large part of the environmental and resource problems, which can be said to have made some achievements. This is mainly due to the attention paid to renewable resources by the national government and construction enterprises. In recent years, the government has launched many policy documents for the use of renewable energy, clarifying the direction of sustainable development of the country, providing development goals for enterprises and people, thus enhancing the concept of the use of renewable resources. On this basis, the national government has carried out a lot of practical actions to support the implementation of the use of renewable resources in the construction process, to help enterprises proceed from reality, know the application examples, and implement the goal of sustainable development. At present, the use of renewable resources in China's construction industry has made some achievements, but there is still room for growth.

3.2 Reasons and Countermeasure Analysis

For renewable resources have not been fully rational use, mainly because China's relevant policies are mainly concentrated in the large-scale production process, the implementation of relevant policies in life needs to be strengthened. In addition, the cost of facilities and equipment for renewable energy utilization is too high, which also affects the utilization of renewable energy. Construction enterprises need to control the cost of the whole construction process. Some small and medium-sized enterprises are difficult to pay their corresponding costs, resulting in the insufficient use of renewable energy. Some construction enterprises are not clear about the operation of renewable resources production process due to the limited technology level, resulting in waste of resources, inefficient use of renewable resources, but also limited the full use of renewable energy. In addition, the current equipment collection of renewable energy is not high, which may be affected by technology, but also by the quality of equipment, which also caused some losses. At present, although the government has increased the publicity of renewable energy, but the scope of influence is limited. Therefore, the government should make policy decisions, increase publicity, and at the same time, restrict the rules and regulations, so as to standardize corporate behavior and strengthen the use of renewable energy. The government invests in accelerating the development of related technologies for renewable energy utilization. At present, the high cost of facilities and equipment has limited the pace of renewable energy utilization. China should strengthen the development of related technologies in order to reduce the cost of equipment.

4. Application of Renewable Energy in Architectural Design

4.1 Application of Solar Energy

Solar energy is widely used in construction industry because of its convenience. The main way is to collect solar energy through thermal insulation wall panels, and then transfer heat to heat collection equipment through heat collection pipelines. In the construction process, solar energy is provided for heating, power generation, refrigeration and other related activities. Therefore, the use of solar energy should mainly take into account the construction environment, mainly the direction of construction, so as to determine the collection of solar energy. On the basis of this guarantee, we can ensure a good environment for solar energy collection, and equipped with related equipment and facilities, so as to ensure the use of solar energy. However, through the analysis of traditional solar energy collection methods, it is found that if the solar light is not strong, it is difficult to ensure the application of solar energy. Therefore, with the progress of technology, photovoltaic technology has been developed. The photovoltaic technology has the same capacity as the collector plate, which can enhance the absorption of solar light, thus ensuring the use of solar energy when the light is not strong. This situation in the construction industry should be more high-rise construction, through the solar energy can provide heating services for residents. The main way is to fully collect the sunlight through the collector plate and photovoltaic technology, convert it into solar energy, transport the energy through cold water, and provide heating services for people. In this process, we can ensure that the environment is pollution-free, make full use of solar energy through photovoltaic technology, and improve the utilization rate of solar energy.

4.2 Application of Wind Energy

There are two main applications of wind energy. On the one hand, the buildings are ventilated to ensure the comfort of residents living. On the other hand, it generates electricity through wind power. It can be found that the application of wind energy mainly considers two aspects, one is the local climate, the other is the environmental problems of buildings. For some coastal areas, the climate is relatively humid. In the construction process, the designer must make a complete plan. According to the local environment and the quality of the building, the impact of wind on the building environment should be considered. Appropriate changes in the orientation and angle of the building, so as to ensure the impact of air flow inside the building on residents'living. In addition, the impact of the size of wind on the building environment should also be taken into account. The

second is to consider the environment of the building. For some places where buildings are relatively dense, the use of wind energy is not very good. At this time, it is best to follow a wind catching device on the top floor of the building, so as to ensure the full use of wind power. Wind catching equipment can also ensure the direction of the wind, thus providing residents with a suiTable living space. For some open areas, in the construction process, we should fully consider the impact of local climate, and on this basis determine the height and direction of the building, so as to ensure the comforTable and healthy living environment.

4.3 Application of Geothermal Energy

The principle of geothermal energy generation is mainly through the heat generated by radioactive elements in the decay process of the earth while absorbing solar energy in the shallow layer of the earth. Nowadays, geothermal energy is mainly realized by ground source heat pump technology, which can provide heating and cooling for buildings. In winter, ground source heat pump technology is used to collect heat from underground soil to heat buildings. In summer, the heat in the building is discharged to the soil to ensure the comfort of the building environment. Therefore, in this process, the first thing we should pay attention to is the environment of building construction and the situation of underground energy. Therefore, in the early stage of construction, the local geological environment should be explored and studied, and the location of the building should be reasonably planned.

4.4 Other Applications

At present, biomass energy is one of the important energy sources that have not been fully exploited, and there is still a great space for biomass energy to improve. Like other renewable energy sources, biomass energy can be reused in nature, never exhausted, and has no impact on the environment. The main way is to cut down trees and deal with them accordingly to form the available energy in construction, especially the treatment of crop straw. At present, the treatment of crop straw is not scientific enough. Most of them adopt burning method, which not only makes crop straw unreasonable, but also produces environmental products. Pollution came into being. It is also because the corresponding technology of renewable energy utilization has not been spread to rural areas, which leads to this phenomenon. Crop straw can be digested by biogas digester to produce methane, which can be reasonably used in buildings. Exceptions, with the development of China's economy, more and more garbage is produced. The energy generated by the disposal of these garbage can also be collected by relevant equipment, and then reused. There are also some tidal energy existing in coastal cities in China, which can be directly applied to the construction process, but also collected through pipelines for storage. The tidal energy collected during the day can be used for power generation at night. This also enables tidal energy to be directly utilized locally, avoiding the intermediate transport process, effectively controlling the increased costs, and improving the utilization of tidal energy. Therefore, the development space of biomass energy in our country still occupies a large part. Through the government's relevant policy propaganda, we can ensure that the theory of sustainable development spreads all over the streets, affects the construction process of large and small buildings, and ensures the utilization of resources, energy and environmental security of our country.

5. Summary

With the development of economy, the consumption of energy is also increasing, especially in the construction industry, the need for energy is enormous. With people's endless exploitation, the earth's energy resources have been facing a state of exhaustion. In order to solve the energy crisis, China has put forward the important idea of sustainable development, through the use of renewable resources, to replace energy consumption, but also to meet the needs of the construction industry. Through the analysis of solar energy, wind energy and other common energy applications, this paper provides enterprises with ways and means of using renewable energy. At the same time, it also puts forward that biomass energy has not been rationally utilized, hoping to attract people's

attention through the publicity of national policies, increase the intensity of renewable energy utilization, ensure the recycling of energy, promote the implementation of sustainable development strategy, and raise people's awareness of environmental protection.

References

[1] Liu Yamin. Application of green energy-saving technology in architectural engineering design [J]. Intelligent City, 2016,2(10): 272-273

[2] ZhongJunbin. Research on the integrated application of green architectural design concept in architectural design [J]. Residence, 2018 (22): 128

[3] Kou Xingting, Wang Zijuan. Application of Renewable Energy in Low Energy Consumption Building Design of Agricultural Houses in Weifang Area [J]. Construction Materials &Decoration , 2017 (13): 85-86

[4] Pan Mingmin. Application of Building Energy Conservation and Renewable Energy in Green Building [J]. Jiangxi Building Materials, 2017, (22): 100-101

[5] Chen Fengfang. Research on the Utilization of Renewable Energy in Architectural Design [J]. Metallurgical Collections, 2017, (04): 73-74