Research on Construction Energy Conservation Technologies in Architecture Engineering

Jinxu Li

Chongqing Vocational Institute of Engineering, Chongqing, China

Keywords: Energy conservation technologies, Architecture engineering, Construction engineering

Abstract: With the rapid development of urbanization in recent years, the number and scale of construction projects continue to expand. It also aggravates the consumption of resources, making the already tense resource situation more rigorous. Therefore, at the present stage, it is necessary to make full use of construction energy conservation technologies to achieve effective protection of resources and environment. This paper analyses various problems and key energy saving technologies in construction engineering to give some references for the relevant researchers.

1. Introduction

With the rapid development of China's social economy, people's living standards have also improved [1]. People's consumption of various resources is also increasing gradually, which causes us to think about measures to reduce waste of resources. At present, there are still many energy-consuming areas in the construction field, which need to reduce energy consumption through energy saving. With the gradual increase of construction projects, China is facing severe energy shortage. This is contrary to our sustainable development strategy. In view of the above problems, energy-saving construction technology of building engineering has been widely used in housing construction, and the effect is obvious. Global energy crisis and deteriorating environmental pollution urgently require the integration of energy-saving concept in construction. Reasonable use of energy-saving technology in severe form can effectively promote the sound development of the construction industry. In order to give full play to the role of this technology, we should combine the actual construction situation to promote the development of the construction industry and give full play to the role of energy-saving technology. Energy-saving construction technology of building engineering is to use the construction technology of environmental protection and low energy consumption in the actual construction process to realize the effective saving of hydropower, materials and energy, reduce the impact and damage to the environment, and realize the rational allocation of resources and effective control of cost. At present, in the construction process of construction projects, some construction enterprises are excessively pursuing economic benefits and paying insufficient attention to building energy conservation, which leads to the continuous growth of energy consumption in construction projects and has a greater impact on the environment. Therefore, it is necessary for construction enterprises to pay attention to the application of building energy-saving construction technology, effectively reduce energy consumption in the construction process, comprehensively improve the economic and social benefits of construction enterprises, and promote the construction of energy-saving society [2].

2. Existing Circumstances of Technologies Application of Construction Energy Conservation

2.1 The Idea of Energy Conservation and Environmental Protection Has Not Been Deeply Rooted in the Hearts of People

Due to the lack of attention to the concept of building energy conservation and environmental protection, in the actual design work, designers only regard the safety, fashion and beauty of the structure of the house and the use area of the building as the primary consideration, while the quality, performance and environmental protection factors of the house are usually neglected and often the

  DOI: 10.25236/erems.2018.199

building plan has been determined. In the process of construction drawings review, it was found that the quality and performance of houses and the requirements of energy saving and environmental protection of houses did not meet the prescribed standards. In order to save manpower, material resources and time, designers cannot overthrow and redo the original design scheme, but can only adjust it slightly, resulting in the construction effect of the building is not ideal, lack of energy-saving and environmental protection concept, only focusing on the unique appearance of the building will also lead to the construction of the house cannot meet the design requirements. Therefore, designers should fully understand the significance of energy saving and environmental protection in housing construction, and take reasonable measures to achieve the purpose of saving resources and protecting the environment. The design of building structure has the characteristics of complexity and comprehensiveness. There are close links between different design links. Only by considering the overall structure and realizing the coordination of energy-saving and environmental protection design, can the energy-saving and environmental protection benefits really be brought into play. In the process of building construction, although many building units have realized the importance of energy saving and environmental protection and taken corresponding measures, they have not taken comprehensive consideration of building construction, often neglect the integrity of energy saving and environmental protection design, and over-pursuit of form reduces the coordination and feasibility of design schemes, so energy saving and environmental protection design cannot be truly reflected [3].

2.2 The Technologies of Energy Conservation and Environmental Protection Need to be Upgraded

The research on energy-saving and environmental protection design of housing construction in China started late [4]. At this stage, there is no mature design system, and the level of related technology is still relatively backward. It is difficult to meet the energy-saving and environmental protection design needs of different forms of building structures. Part of the work is still at the stage of theoretical research, and cannot be applied to practical design, energy saving and environmental protection cannot be truly reflected. Lack of awareness of energy saving and environmental protection leads to the lack of energy saving technology application. In the process of building design, designers often lack a careful analysis of the building environment and conditions in accordance with the actual situation of the building, resulting in energy-saving and environmental protection technology cannot be applied to housing construction. In the process of building design, only paying attention to the use of high-tech energy-saving and environmental protection technology, ignoring the use of low-cost energy-saving technology, resulting in a significant increase in the cost of housing construction. In the design process, without considering the actual situation of the building, the use of high-standard idealized design scheme makes the building construction effect cannot meet the standard of architectural design requirements, and naturally cannot achieve the effect of building energy conservation and environmental protection. People's aesthetic concepts are constantly improving with the improvement of the quality of life, but only pay attention to aesthetics, but ignore the energy-saving design of shading and ventilation needed by buildings, resulting in many building designs cannot achieve the effect of energy saving and environmental protection.

2.3 The Materials of Energy Conservation and Environmental Protection Has Not been Widely Applied

The economic benefits, unreasonable metal materials which are easy to rust, scale, corrosion and leakage are often selected in the structural design of houses. In the process of use, not only the loss of metal materials is large, but also secondary pollution is easily caused to the environment. In the process of building design, we did not take into account the constant change of building shape, and did not do a good job in predicting the actual consumption of building materials. Before the construction, we need to choose the corresponding building materials. At present, the choice of energy-saving building materials is often neglected in the selection of building materials in our country. Usually, some materials with good appearance but high energy consumption are selected.

The requirement of beauty is obviously higher than the requirement of energy-saving. Therefore, a lot of resources have been wasted before the formal construction. For example, in interior decoration, in order to meet people's requirements for aesthetic grade, designers usually choose good-looking but energy-saving materials to achieve the greatest aesthetic degree, but at the same time it also causes waste of resources. In order to add pollutant ingredients in production, the additive ingredients are strictly controlled, and additives containing heavy metals, formaldehyde and other substances are not used, so that the final product will not affect health. Energy-saving and environmental protection materials should be able to give residents a green and healthy living environment, achieve the effect of green decoration, and improve the quality of life of residents. Decoration materials themselves should have some unique properties, such as improving the air environment, functionality and stability, chemical reaction will not appear harmful substances. Material should also have the characteristics of antimicrobial, temperature regulation and so on.

3. Construction Energy Conservation Technologies in Architecture Engineering

3.1 Energy Conservation and Environmental Protection of Wall Engineering Design

In recent years, the insulation of external wall sandwich has been widely used in China. Its typical advantage is that it is not affected by the external environment. This technology not only slows down the rapid loss of indoor temperature in cold winter, but also avoids the temperature rise of the exterior wall caused by high intensity solar radiation in hot summer, thus reducing the indoor temperature, and solves the physical loss caused by the excessive temperature difference between inside and outside in different seasons. On the other hand, it also creates a comfortable environment of warm winter and cool summer in the building. Therefore, from the point of view of reducing energy consumption, we should vigorously promote building exterior wall insulation technology and technology, so that it can be widely implemented building energy-saving technology has become a basic building technology in contemporary architecture. With the emergence of various high-tech thermal insulation and energy-saving technologies and new thermal insulation and energy-saving materials, thermal insulation and energy-saving technology of building exterior walls has been continuously improved, which provides a strong guarantee for green low-carbon life and sustainable development. In the setting of the wall insulation layer, according to the actual situation, the insulation material is selected, and the construction method of pasting, plastering or composite method is adopted to achieve a reasonable construction effect. Most of the traditional walls are made of clay bricks and cement bricks with low cost. The thermal insulation and thermal insulation effect are relatively poor. To achieve the relevant standards of thermal insulation, a considerable thickness of the wall is needed, which results in the waste of building resources. Under the guidance of the concept of energy saving and environmental protection, light steel keel wall technology can be used to mix a certain proportion of lime, gypsum cement or polymer into light aggregate to enhance the thermal insulation effect and reduce waste of resources. In the wall coating work, the coating should be uniform, neither too thin nor too thick, but to meet the coating standards. Dry hanging technology is adopted to enhance the insulation effect of the wall and save the space of the wall. In public buildings, air layer can be used to meet the requirements of heat insulation and water proof.

3.2 Energy Conservation and Environmental Protection of Ground Engineering Design

Ground is an important part of energy-saving and environmental protection design of buildings. In the design of energy-saving and environmental protection for the ground, first of all, the building construction standard should be taken as the basic requirement to ensure the quality of the ground construction. Provide basic guarantee for housing construction. The selection of ground materials is an important link in the design of energy saving and environmental protection. When choosing construction materials, comprehensive consideration should be given to the attributes, materials, properties and quality of materials, and high-quality materials that meet engineering standards should be selected, with particular attention to the physical and chemical properties of materials. In the construction of ground radiation heating, because of the need to lay insulation layer on the ground, it

is necessary to ensure that the ground is dry, flat, clean and so on, in order to ensure the tightness between the surface layer and insulation layer, which is also the basic ground construction requirements. Cracks existing in the application of key technologies of energy-saving construction in housing construction projects seriously endanger the construction of the whole project, and these construction cracks are generally reflected in the reduction of thermal insulation effect of construction projects. Thus, the problem of waste of resources appears invisibly. After analyzing the causes of construction cracks in housing projects, it is found that the main cause of cracks is the construction disclosure of building exterior wall structure. In this process, we also need to strictly follow the construction requirements, and after the completion of construction, we also need to ensure that the wood floor surface filling layer is dry. When the ground construction is completed, we need to do a good job of recording and acceptance. Insulation materials should be used as far as possible in the construction of moisture proof protection layer. The main purpose is to reduce the influence of external moisture on the ground. At the same time, it is necessary to control indoor air temperature, whose temperature range should meet the requirements of ground construction and reduce the moisture content of insulation layer. In addition, as far as the moisture in the air is concerned, it will also affect the properties of underground surface and ground materials to a certain extent. In order to reduce this effect, the surface materials generally need to use microporous materials.

3.3 Energy Conservation and Environmental Protection of Engineering Design of Doors and Windows

In the energy-saving and environmental protection design of doors and windows, the basic application functions of doors and windows should be guaranteed as the premise, and the thermal insulation and sealing of doors and windows should be strengthened to prevent the loss of indoor heat energy, reduce the frequency of air conditioning in winter, so as to achieve energy-saving and environmental protection effect. In the design process, the heat transfer coefficient of doors and windows can be reduced, the heat dissipation speed can be slowed down, and the thermal insulation effect can be achieved. In order to achieve better sealing effect, elastic materials can be used at the joints of doors and windows to reduce the voids as much as possible. At the same time, foam materials can be used to seal gaps between doors and windows to prevent heat loss. In building construction, doors and windows are usually made of wood, plastic and steel-aluminum materials. The heat transfer coefficient of doors and windows made of wood and plastic materials is relatively low. In order to achieve the goal of energy saving, it is necessary to strengthen the selection of materials for doors and windows in the construction of doors and windows, and observe and analyze in detail the vertical angle of doors and windows, rain leakage, wind pressure resistance and air permeability. If the deformation of doors and windows is serious and the sealing is insufficient, it should be prohibited to install them. Meanwhile, in the process of installation, it is necessary to deal closely with the junction of doors and windows frames with windows, beams and columns, walls and other positions. In order to improve the effect of energy saving and heat preservation, energy saving materials with high thermal resistance and low energy consumption should be selected as far as possible. For glass windows, the main purpose is indoor lighting, which is also an important attribute of glass windows. Through effective analysis of its parameters, it can be concluded that the best glass is to choose double-layer glass, endothermic glass, reflective glass and other characteristic glass. The energy-saving construction technology of door and window installation should also be well controlled in the process of installation. On the premise of energy-saving construction technology, the quality of door and window installation should be strictly controlled, and regular errors such as deformation and excessive cracks should be noticed. In addition, when installing doors and windows, we should deal with the contact areas around the doors and windows. When pasting seals on doors and windows, attention should be paid to whether the seams are cleaned up.

4. Conclusion

Implementing the concept of energy saving and environmental protection in the construction process is of great significance for protecting the environment and saving resources. In order to reduce energy consumption, ensure the construction quality of housing construction projects and improve the performance of housing buildings, it is necessary to incorporate the concept of energy conservation and environmental protection into the construction of housing buildings. In order to realize the energy-saving and environmental protection design of building, systematic consideration should be taken according to the actual situation. At the same time, we should attach importance to the greening role in the construction, use new environmental protection technology and new clean energy to realize the sustainable development of the construction industry, and then promote the construction of resource-saving and environment-friendly society.

References

[1] Liu Zhisheng. Housing Construction Energy Conservation Technology Application [J]. Construction & Design for Engineering, 2017(13): 198-199+202.

[2] Peng Lin. Research on Key Technologies of Energy-saving Construction of Building Construction Engineering [J]. Value Engineering, 2018(32): 199-200.

[3] Liu Yang, Fan Yongfa, Wang Liyong. Measurement and Analysis of Energy Conservation Rate for Green Construction Engineering [J]. Construction Technology, 2015, 44(10): 69-71.

[4] Xu Pengcheng, Gu Pingdao. Discussion on construction energy conservation research status at home and abroad [J]. Shanxi Architecture, 2015, 41(22): 184-185.