Key role of construction industry in achieving the goal of sustainable energy worldwide

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Abstract. This paper presents the critical and important role of the construction industry in sustainable energy. The first section describes the energy concept and explains the relation of each energy branch with strategic aspects. The energy concept is a fundamental concept that underpins the entire field of sustainable energy. It is essential to understand the different types of energy and their interrelationships to develop effective strategies for achieving sustainable energy goals. Then the key factors of sustainability are recognized. These factors include environmental, social, economic considerations, and technology development that must be taken into account when developing sustainable energy solutions. The classification of these factors leads to the identification of an exact area in which the construction industry can directly contribute to the goal of sustainable energy in the near future. By focusing on these key factors, the construction industry can help to create a more sustainable future for all.

Keywords: Sustainable energy, construction industry, environment

1 Introduction

In recent years, the challenges of environmental issues related to energy sector have caused a crisis in human societies and countries have faced serious problems [1]. Undoubtedly, the future of the world needs more and more attention to environmental issues. Renewable energy technologies and efficient energy utilization are identified as the most effective potential solutions to current environmental issues [2]. On the other hand, energy supply is one of the most important and basic issues that the countries of the world are facing now. Things like finding sustainable alternatives to fossil fuels and increasing energy demand have pushed countries to develop and use renewable energy [3]. At the same time, there is an urgent requirement for a significantly faster energy transformation. To achieve global climate objectives, the utilization of renewable energy sources must increase by at least six times compared to current government plans. This would demand an even greater acceleration of the impressive progress already witnessing in the power sector [4, 5].

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The construction industry is responsible for a significant proportion of global energy consumption and carbon dioxide emissions. In fact, construction activities account for 36% of global energy consumption and 39% of global carbon dioxide emissions [6]. Therefore to minimize these impacts, the industry has been seeking to introduce sustainable practices throughout its entire production chain [7]. The construction industry can contribute to the development of a healthier built environment and support the achievement of cleaner air throughout various life cycle stages, such as optimized construction processes and the use of healthier materials. International agreements and policies, such as the Sustainable Development Goals (SDGs), can facilitate the sustainable development of the construction industry [8]. In this paper, the strong connection between the terms ‘energy’ and ‘construction industry’ will be investigated and depicted in detail. In the first section, the concept map of energy, strategic aspects of energy [3], and different modes of energy’s effect on our lives will be investigated. In the later section, the general concept of sustainability, and the key relation of construction industry with different branches of sustainability and energy will be presented.

2 Energy in term of conception

The industrial revolution and the invention of energy-intensive engines facilitated the development of today’s knowledge-based society, where citizens live in greater comfort, increasingly use fast modes of transportation, and are continuously in contact with modern electronics. Throughout the centuries, human society has evolved by using energy in increasingly larger quantities. Today, the consumption of vast amounts of energy in thermal, chemical, mechanical, and electrical forms is absolutely necessary for the functioning of contemporary society, the prosperity of nations, and the survival of our civilization [9]. To find out the importance role of the construction industry in the future prospective of sustainable energy [10], the explanation of various type of energy classification is necessary. Fig.1 shows the classification of the energy in term of production, consumption and storage in detail.
Fig.1. The classification of the energy in terms of production, consumption, and storage in Fig.2 the energy concept is divided in a different manner for explanation of the relation with the terms of production, consumption, and storage.

![Energy Classification Diagram]

Fig.2. The classification of the energy in terms of production, consumption, and storage

The strategic aspects of energy [3], which is more important for defining the sustainability framework in the field of energy illustrated in Fig.3. This classification directly connected to the factors which define the space of sustainability. In other words, the conditions of sustainability is to be provided when all strategic aspects of security, environmental, social, economic growth and technology development be considered (Fig.4).
Fig.3. The strategic aspects of energy

Fig.4. The sustainability conditions

3 Construction industry and sustainable energy

As mentioned, the construction industry holds significant responsibility for a considerable share of global energy consumption and carbon dioxide emissions[6]. As such, any modifications within this sector possess the potential for substantial environmental and energy-related impacts on a global scale [11]. In order to realize the objective of sustainable energy in the construction industry, it is imperative to thoroughly investigate and consider all strategic aspects encompassing security, environmental concerns, social, economic growth, and technological advancements.

Within the realm of energy production and storage, the environmental aspects [12–14], including climate change, air pollution, water contamination, and soil pollution, are intrinsically linked to the technological advancements in the construction of energy infrastructures and transmission networks. Furthermore, the selection of construction
materials, insulation techniques, and structural types for various building projects can intensively change the impact of construction industry in the section of energy consumption. The emerging of novel composite materials [15] characterized by exceptional mechanical and thermal properties can significantly impact the construction industry's contribution to the global attainment of sustainable energy targets.

In terms of economic growth, geographical conditions should be considered in urban planning and design. This important, but less obvious, factor can significantly influence the energy consumption of the extended area, especially in large cities. In the technological part of the construction industry, the improvement of modeling and simulation techniques for different types of structures can also lead to the optimization of design and, consequently, the reduction of materials, which is directly related to sustainability. Moreover, the increasing population and the subsequent demand for new infrastructure and residential spaces directly involve the construction industry within the social sphere of energy. Consequently, a comprehensive investigation and analysis of all the factors described are necessary to attain the transcendent objective of sustainable energy. The construction industry must exert substantial efforts to ensure the safeguarding of all critical factors essential for the future well-being of our planet.

4 Conclusion

Construction industry plays a critical and important role in sustainable energy. In this paper, the conception and strategic aspects of energy have been described. Afterward, the key factors of sustainability are recognized, leading to the identification of specific areas in which the construction industry can directly contribute to the goal of sustainable energy in the near future. Research findings reveal that the construction industry has extensive links with various branches of energy, contributing significantly to the promotion of sustainability. In order to effectively harness the transformative potential of the construction industry in promoting sustainable energy, rigorous planning and the development of comprehensive policies are indispensable.

References


