Chapter 13
Hydrogen Energy:
Adaptation and Challenges

Kutubuddin Sayyad Liyakat Kazi
https://orcid.org/0000-0001-5623-9211
Brahmdevdada Mane Institute of Technology, Solapur, India

ABSTRACT

There will be a direct correlation between the success of the adoption and this particular element. Following the application of the WASPAS methodology to the investigation of the challenges, it has become abundantly evident that the issue of Formulate Recommendations is the individual that occurs in the highest position. Since the WASPAS approach was utilized, this is the situation that has arisen. The issue that is rated second is the Economic Factors challenge, which is next followed by the challenge which is ranked third, that is the Technological Readiness challenge, and finally, the challenge which is ranked fourth is the Policy Frameworks problem: the order in which the challenges are ranked. It is for this reason that the important building needs to be constructed as quickly as feasible to ease the environmental problem as quickly as possible. This is a key step that must be taken with the goal of hydrogen energy to fulfill the conditions for widespread adoption.

INTRODUCTION

It is said by Sultabanu (2023) that electric energy is an essential component of modern living. Electric energy serves as the source of power for a broad variety of devices, ranging from home appliances to industrial equipment. According to Needa (2024), as society gets progressively nearer towards a future that will be characterized by increasing levels of electrification, it is becoming more important than it ever has been before to have a comprehensive understanding of the complexity of electric energy. Within the scope of this investigation, we will investigate a wide range of aspects pertaining to electric energy, including its generation, distribution, consumption, and the significance of energy management that is focused on efficiency.

According to Prashant (2023), the generation of electric energy is accomplished through the utilization of a variety of distinct modes of operation. Utilizing fossil fuels (like coal, natural gas, oil), nuclear power, and renewable sources (like solar, wind, hydropower, and geothermal) are some of the ways that fall under this category. Every single generational strategy comes with its own unique set of advantages

DOI: 10.4018/979-8-3693-8980-5.ch013

and challenges that individuals must take into consideration. However, despite the fact that power plants that run on fossil fuels are typically dependable and have the ability to provide substantial quantities of electricity, these also serve as a source of pollution as well as emissions of greenhouse gases. The use of renewable energy sources is lauded for its long-term viability and their minimal impact on the environment. Nevertheless, contingent upon the weather conditions, these sources may be subject to intermittency issues.

In recent years, that has evolved a distinct trend towards renewable energy, that has been fueled by technological developments as well as an increased awareness towards the implications of climate change. This trend has been pushed by both of these factors concurrently. The intermittent nature of renewable energy sources is causing a number of problems, but recent advancements in energy storage technologies, like as batteries, are helping to remedy some of these problems. These new developments are helping to facilitate this transformation.

Therefore, Kutubuddin (2024) asserts that Due to the fact that it is an indispensable component in our day-to-day activities, as well as in the operation of industry and the economy on a global scale, electric energy is perhaps the most significant aspect of modern life. It would be impossible to overstate the significance of this energy source due to the fact that it is both environmentally friendly and adaptable. This is especially true when taking into consideration the present drive towards energy solutions that are both more environmentally friendly and sustainable than those that are currently under development.

Advantages of making use of electric power:

- • Electric energy is incredibly efficient in terms of the transfer of energy, which it's a task of the explanations for why technology so convenient to use. Not only is it easy to generate, but it also has the capability of being sent over long distances with just a little amount of loss experienced. A high population density in metropolitan regions needs an abundance of energy sources which are both trustworthy and immediate. This efficiency is especially crucial in metropolitan areas because of the high population density.
- Repercussions for the Natural World: Electric power, particularly when it is produced from renewable sources like wind, solar, and hydroelectric power, produces a far smaller impact on the environment in comparison to fossil fuels. This is especially true when the electricity is created from renewable sources. This is accomplished by reducing emissions of greenhouse gases, which not only serves to improve air quality but also contributes to the fight against climate change.
- Progresses in the Field of Technology An extensive range of modern technology, like electric vehicles, smart houses, and mobile devices like laptops and smartphones, all get their electricity from electric energy. Electric energy constitutes the source of electricity for all of these technologies. As battery technology and energy management systems continue to progress, electric energy becomes an increasingly viable option for a wide range of applications. This is due to the fact that electric energy can be stored in batteries. The accessibility of electric energy is also being improved as a result of these improvements, which are also increasing its efficiency.

In the field of electric energy, particularly in the field of renewable energy, there is a substantial amount of employment creation taking place. This industry also makes a substantial contribution to the expansion of the economy. Several regions are seeing economic growth as a consequence of the