CORPUS PUBLISHERS

Environmental Sciences and Ecology: Current Research (ESECR)

ISSN: 2833-0811

Volume 6 Issue 1, 2025

Article Information

Received date : February 27, 2025

Published date: April 7, 2025

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Keywords: Hydrogen production and utilization, renewable energy, hydrogen storage, opportunities, and difficulties.

DOI: 10.54026/ESECR/10111

Mini-Review Article

Review of Hydrogen production: Opportunities and Difficulties

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Abstract

Social, ecological, political, and economic issues are important. The availability of environmentally friendly, safe, and reliable energy sources is extremely important to the company for sustainable growth and good quality of life. Our constantly increasing energy requirements are caused by substantial population and economic growth, increasing the use of fossil fuels, a significant portion of this demand, but increasing the issue of increased Greenhouse Gas Emissions (GHG) and resource depreciation. These challenges require a global shift from traditional energy sources to renewable energy sources. In contrast to lifecycle bases, some applications, in comparison to lifecycle bases, can generally be recognised as sustainable fuel pathways and new energy vectors as normal roles in contrast to synthetic fuels. The current state of the art in the production of blue and green hydrogen, renewable energy sources, hydrogen consumption, storage, and the major obstacles and possibilities in the commercial implementation of such systems were critically analysed in this review study. Hydrogen appears to be the most sustainable renewable energy source for the combination of fuel energy source functions and energy storage modalities. However, some of the most promising renewable energy sources for the production of hydrogen, such as the sun and winds, are sporadic. This work completes the discussion of the most important obstacles and options related to hydrogen implementation at production, storage, and commercial scales.

Introduction

The world population and global economic development have increased significantly, which is what causes the increase in energy requirements. A key part of the industrial revolution in all countries is power generation [1]. Most of these increasing energy conditions are met by fossil fuels, and these traditional resources are on a bad path due to speed. Increased CO_2 emissions and global warming are the main drawbacks of using these traditional resources (fossil fuels) [2]. Given the growing environmental issues, renewable energy resources are the most promising candidates to replace these traditional fuels [3]. Global warming, environmental issues, and increased greenhouse gas emissions (THG) are prerequisites for moving renewable energy sources from traditional energy sources [4-5]. This article discusses the most important obstacles to the commercial implementation of renewable energy hydrogen production systems.

Important Obstacles and Possibilities

Given the fact that the hydrogen density is rather low (41 g/m^3), it is difficult to store it [6]. Hydrogen is a secondary (storage) energy source that must be produced from the main energy source, and the reaction suffers constant losses throughout the conversion process, so the production cost of hydrogen is higher than the cost of energy used in IT [7]. Hydrogen offers an important opportunity to decarbonise the marine sector by using the outside of coastal wind energy to produce blue hydrogen. It is stored as ammonia and used for cross-section imports/exports [8]. Ammonia cracks on standard materials to prepare hydrogen. The most important source of hydrogen production worldwide is natural gas reform [9]. Environmentally friendly solutions prefer a global shift in traditional renewable energy sources as they resolve many concerns such as CO_2 footprint, environmental issues, greenhouse gas emissions, and carbon emissions taxes [10]. Challenges in the hydrogen economy compared to traditional energy sources includes

1. Reducing the cost of hydrogen production,
2. Clean, carbon-free, environmentally friendly systems for mass production, and
3. Hydrogen storage systems for patient and mobile applications
4. [11-15] strength cells. Most of these issues regarding the hydrogen economy can be solved by the production of hydrogen with renewable energy. Hydrogen has several advantages compared to fossil fuels. When it comes to transportation, liquid hydrogen works better than other liquid fuels, such as gasoline, alcohol, and jet-arm tape. When hydrogen is converted to an appropriate form of energy. Hydrogen is the safest fuel when it comes to toxicity and fire. Hydrogen can be produced using environmentally friendly resources such as nuclear energy, natural gas, coal, biomass, solar, geothermal energy, wind, and hydroelectric power generation. Hydrogen also promotes the use of renewable energy sources such as sporadic winds and the sun. However, physical, technical, financial, and social obstacles are important for the widespread introduction of hydrogen. The most important obstacles to the commercial adoption of these technologies include advance payments, the intermittent nature, and infrastructure costs.

Conclusions

Tmethanol and ammonia, hydrogen becomes a new energy vector. The major obstacles to the creation of hydrogen, its use, storage, transportation, distribution, and commercial implementation of such systems were all thoroughly checked in this study.

Hydrogen is made from both traditional and renewable energy sources. Renewable energy sources such as solar, wind, geothermal energy, hydroelectric power, Ocean Thermal Energy Conversion (OTEC), and biomass are found in hydrogen production. Some of the potential renewable energy sources, such as solar and wind, are sporadic, and hydrogen appears to be the most promising for use as fuel, energy transporters, and storage media. As a potential fuel and unique energy source solution, hydrogen gains more recognition due to its benefits, availability of alternative conditions, and friendships of users around the world. This overview study compares a variety of non-renewable hydrogen production systems based on system design, cost, infrastructure, and efficiency. It also explains that all methods of hydrogen production are considered with the help of renewable energy, and efforts are taken into consideration. The report also includes a thorough analysis of hydrogen storage, transportation, and infrastructure, considering previous efforts and current challenges. Green hydrogen can be produced by expanding or modifying the hydrogen production system to fossil fuels to integrate carbon capture and storage/carbon capture and utilization systems that absorb the released contamination. The main advantages and important difficulties in the production, storage, transportation, and distribution of hydrogen and economic use are also discussed.

Acknowledgements

The authors thank the experimental system of the Faculty of Marine Engineering Technology & Information, University of Malaysia, Telenganu (UMT). Tageperg-55368 was used for this task.

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