
Hydrogen Economy Challenges And Opportunities

ABSTRACT

Hydrogen is the most abundant element in the universe. When used as a fuel hydrogen produces clean energy and water (H₂O). The Hydrogen economy is considered as a sunrise industry which would help to achieve as many goals. Such as reducing energy consumption and emissions, also stimulating economic growth. Hydrogen economy is also the long term goal of many nations, which can potentially provide energy security, and environmental and economic benefits. However, the transition from a conventional petroleum based energy system to a hydrogen economy involves many uncertainties.. This seminar report is going to give a review about the challenges and opportunities of the hydrogen economy also it is going to give the recent trends and emerging application of hydrogen as a fuel. since, Hydrogen holds out the promise of a genuinely sustainable global energy future. Also hydrogen is a clean energy carrier that can be produced from any primary energy source. By considering the wide range of applications and researches going on, Hydrogen could prove to be the answer to our growing concerns about energy security, urban pollution and climate change.

INTRODUCTION

We are living in world that adapts with innovative and sustainable technologies in an enormous rate. That is, we are seeking better energy options which are efficient and economically viable for the future. By finding a secure energy source most of the problems that we are facing today would be eliminated. Many different approaches are under scientific investigations or being utilized in this regard. However, adopting clean and emission-free energy source would be a major break-through in this regard.

HYDROGEN: CLEANEST ENERGY IN THE WORLD

Hydrogen was first observed and collected long before, it was identified as a unique gas by Robert Boyle in 1671. Hydrogen is the first element in the periodic table with one proton and one electron in its atomic structure. In normal conditions it is a colorless, odorless, insipid gas formed by diatomic molecules H₂. Its atomic number is 1 and its atomic weight is 1.00797 g/mol. It is one of the main compound of water and all inorganic matter on earth. It has several unique properties such as lighter than air, odorless, non toxic, and its carbon free etc. and more over it is one of the most abundant in the universe, by combining all these properties together we could say that, it would be a better fuel when compared to other conventional energy sources.

FOSSIL FUEL VS HYDROGEN FUEL

Today most of our energy needs are covered by conventional energy sources such as fossil fuel. Since our energy needs are increasing in an unpredictable way, our consumption of energy along with dependence of fossil fuel based energy sources are increasing. utilization of these fuel causes liberation of several harm full substance to the atmosphere. The major example is that CO₂ emission which in turn causes our environment. So an alternative fuel which must be

technically feasible, economically viable, easily convert to another energy form when combusted, be safe to use, and be potentially harmless to the environment should be a needy one. One of the primary advantages of hydrogen as a fuel is its abundance. It can be extracted from natural gas or water and is present in a number of other chemical compounds. Hydrogen is also an element and can't be destroyed (only recombined with other elements), meaning that the world's supply will never be exhausted, as with fossil fuels.

CURRENT STATUS OF HYDROGEN AS A FUEL IN THE WORLD

Today hydrogen is primarily produced from natural gas (48%), liquid hydrocarbon (30%), coal (18%) and electrolysis of water (4%) , (Sperl and Cannon 2004) It can also be produced through the conversion of fuel gas produced by biological or thermal processes, but this option is under development and is not economic (Vogel 2004). In the future, hydrogen could be produced from water and sunlight via direct photobiological, photochemical, or photoelectrochemical means (Turner 2004).

Today, hydrogen is used in the refining industry as a petrochemical for hydrocracking and desulphurization. In the chemical industry, it is used for ammonia production and fertilizer for agriculture. It is also used for applications in the metal production & fabrication, methanol production, food processing and electronics sectors. As an "industrial gas," hydrogen is already a big global business with strong fundamentals.

HYDROGEN ECONOMY

Hydrogen economy as a network of primary energy sources linked to multiple end uses through hydrogen as an energy carrier. Hydrogen adds flexibility to energy production and use by linking naturally with fossil, nuclear, renewable and electrical energy forms, any of these sources can be used to make hydrogen [18] .

CHALLENGES

Many of the technologies for realizing extensive use of hydrogen in the economy face significant barriers to development and successful commercialization. Major technological and cost breakthroughs are needed before the hydrogen economy can become a reality. The cost of supplying hydrogen energy using current technologies, which have been developed over many decades, is still very high compared to conventional energy technologies. And some major technical problems need to be resolved.

OPPORTUNITIES

If the world made the transition to a hydrogen economy. An efficient and competitive hydrogen production, storage and transport system will be built. If we can overcome the major barriers such as production and transportation in a safe and economically reliable way .Hydrogen would become widely accepted as a clean, safe and sustainable form of energy. If the Cities and towns are filled with highly efficient hydrogen-powered vehicles conveying people and goods, emitting only water vapour and driving along with only a gentle hum. It would help to achieve an energy efficient cleanest world .

CONCLUSIONS

We can say that if we can create cleanest energy in the world , the future that will depend mostly on hydrogen. However there are several factors need to be overcome. Such as, Clean hydrogen technologies are available but costs remain challenging. Policies that create sustainable markets for clean hydrogen, and also innovative technologies and ideas should be welcomed by the energy experts in the world ,for the sustainable production and implementation of hydrogen economy.

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