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Abstract

# Sustainable Development via Hydrogen Energy

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**Abstract:**
The energy carrier hydrogen is a key facilitator of sustainable energy, via hydrogen energy systems and can contribute significantly to enhancing global sustainability. As easily accessible fossil fuel supplies become increasingly scarce and environmental concerns escalate in impact and expand, hydrogen energy is likely to become an increasingly important. With the world's energy sources becoming less fossil fuel-based, hydrogen and electricity are expected to be the two dominant energy carriers for the provision of end-use services, in a hydrogen economy. A hydrogen economy involves many types of hydrogen energy systems, which together allow greater use of renewable energy resources. Numerous commercial and pre-commercial processes exist for producing hydrogen from all kinds of fossil fuels as well as from nonfossil fuel sources like solar energy, wind energy, bioenergy energy and various other types of renewable in addition to nuclear energy. Technologies for the storage, transport and distribution of hydrogen also exist and are undergoing development. Technologies are in use and undergoing development for utilizing hydrogen as an energy carrier, especially in transportation and by energy utilities. The technologies needed for hydrogen energy systems are undergoing much research and development, and advances are constantly being made. Routes to hydrogen production are possible from various energy sources. Both renewable and non-renewable energy sources are utilizable for hydrogen production. Renewable energy options are usually considered more sustainable. In this presentation, the role of hydrogen as an energy carrier and facilitator of sustainable energy is described and illustrated, and hydrogen energy systems that can contribute to a sustainable world are reviewed and discussed.

**Biography:**

Marc A. Rosen is a Professor at the University of Ontario Institute of Technology in Oshawa, Canada, where he served as founding Dean of the Faculty of Engineering and Applied Science. Dr. Rosen was President of the Engineering Institute of Canada. A registered Professional Engineer in Ontario, he serves as Editor-in-Chief of several journals and as a Director of Oshawa Power and Utilities Corporation. With over 60 research grants and contracts and 900 publications, Dr. Rosen is active in sustainable energy, environmental impact, and energy technology (including renewable energy and efficiency).

Much of his research has been carried out for industry, and he has written numerous books. Dr. Rosen has worked for such organizations as Imatra Power Company in Finland, Argonne National Laboratory near Chicago, and the Institute for Hydrogen Systems near Toronto. Dr. Rosen has received numerous awards and honors, and is a fellow of several societies and organizations.

**Recent Publications:**

1. Rosen, M.A. and Koohi-Fayegh, S. 2016. The Prospects for Hydrogen as an Energy Carrier: An Overview of Hydrogen Energy and Hydrogen Energy Systems. Energy, Ecology and Environment 1(1):10–29.
2. Jianu, O.A., Wang, Z., Rosen, M.A. and Naterer, G.F. 2016. Experimental Investigation of Particle Dissolution Rates in Aqueous Solutions for Hydrogen Production. Heat and Mass Transfer 52(10):2067–2073.
3. Bingham, R., Rosen, M.A. and Agelin-Chaab, M. 2016. Feasibility of a Hybrid Solar and Wind Power System for an Island Community in The Bahamas. International Journal of Renewable Energy Research 6(3):951-963.
4. Rad, F.M., Fung, A.S. and Rosen, M.A. 2017. An Integrated Model for Designing a Solar Community Heating System with Borehole Thermal Storage. Energy for Sustainable Development 36C:6-15.
5. Khalid, F., Dincer, I. and Rosen, M.A. 2016. Analysis and Assessment of an Integrated Hydrogen Energy System. International Journal of Hydrogen Energy 41(19):7960-7967.



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