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What role can hydrogen play in a global sustainable energy strategy?

John Andrews and Bahman Shabani
RMIT University, Australia

This paper addresses the fundamental question of where hydrogen might fit into a global sustainable energy strategy for the 21st century that confronts the three-pronged challenge of irreversible climate change, uncertain oil supply, and rising pollution. It is argued that the exclusive 'hydrogen economy' must be recast to show how hydrogen has critical complementary applications to batteries and biofuels in an economy that relies almost entirely on renewable energy and energy efficiency. Hydrogen has a crucial role to play in road and rail vehicles requiring a range comparable to today's petrol and diesel vehicles; in coastal and international shipping; in air transport; and for longer-term seasonal storage on electricity grids relying mainly on renewables. A hierarchy of spatially-distributed hydrogen production, storage and distribution centers relying on local renewable energy sources and feedstocks could limit the required hydrogen pipeline network to the main metropolitan areas and regions by complementary use of electricity as a major energy vector. Bulk hydrogen storage would provide the strategic energy reserve to guarantee national and global energy security in a world relying increasingly on renewable energy. Some general guidelines for integrating hydrogen into sustainable energy futures are proposed. The projected role of hydrogen in a number of major recent global sustainable energy strategies is critically reviewed, including the IEA's World Energy Outlook 2012, and IPCC's special report on Renewable Energy Sources and Climate Change Mitigation. The key challenges facing hydrogen energy and technologies are thus identified and ways to overcome these barriers are suggested.

Biography

John Andrews, BA(Natural Sciences) and MA (Cambridge University, UK), Ph.D. (RMIT University, Australia), has nearly 40 years' experience in research in the sustainable energy field. He played a pioneering role in assessing, developing, and deploying wind energy technologies for Australia. His seminal book, Living Better with Less (Penguin, 1981) was one of the first works to articulate sustainable development in the Australian context. Since 2003 A/Prof Andrews has led the renewable-energy hydrogen group at RMIT'. He has published 13 scientific over the past five years on sustainable hydrogen energy, including a major review paper in 2012 on the role hydrogen can play in a global sustainable energy strategy in the International Journal of Hydrogen Energy.

john.andrews@rmit.edu.au