

The Hydrogen Economy in the 21st Century: A Sustainable Development Scenario

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A long-term hydrogen-based scenario of the global energy system is described in qualitative and quantitative terms here, illustrating the key role of hydrogen in a long-term transition toward a clean and sustainable energy future. In an affluent, low-population-growth, equity and sustainability-oriented B1-H2 world, hydrogen technologies experience substantial but plausible performance and cost improvements and are able to diffuse extensively. Corresponding production and distribution infrastructure emerge. The global hydrogen production system, initially fossil based, progressively shifts toward renewable sources. Fuel cells and other hydrogen-using technologies play a major role in a substantial transformation toward a more flexible, less vulnerable, distributed energy system which meets energy needs in a cleaner, more efficient and cost-effective way. This profound structural transformation of the global energy system brings substantial improvements in energy intensity and security of supply and results in an accelerated decarbonization of the energy mix, with subsequently relatively low climate impacts. Such energy-system path might still be not sufficient to protect against the risk of high climate sensitivities, but hydrogen-based technologies emerge as flexible options for the energy system and, thus, would be prime candidates for a risk management strategy against an uncertain climate future.

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