All about Hydrogen

What is hydrogen?

Hydrogen is the simplest, most abundant and lightest element in the universe. It is a non-toxic odourless gas which burns readily with oxygen producing considerable heat energy.

Hydrogen Production

Hydrogen is not found in nature in its pure (elemental) form on earth and must be produced or reformed from a primary source.

Hydrogen from Fossil Fuels

Steam reforming of natural gas is currently the most widely used and economical method of producing hydrogen. Close to 98% of hydrogen is presently generated from fossil fuels such as natural gas.

Researchers such as those at the CSIRO in Australia are working on new technologies to produce hydrogen fuel from Australia's coal reserves.

The Integrated Gasification Combined Cycle (IGCC) technology currently being researched at CSIRO is based on converting coal, or other solid hydrocarbon fuels, into a fuel gas or syngas. The syngas can be burned in a gas turbine for electricity generation, or used as a fuel in other applications, such as hydrogen-powered fuel cell vehicles.

This process results in improved efficiencies and reduced emissions when compared to traditional technologies. (See separate fact sheet on this process).

Hydrogen from Renewable Energy Sources

Hydrogen can also be produced by electrolysis through renewable means. Electrolysis involves passing an electric current through water to produce hydrogen and oxygen. If the electricity used in this process is produced from renewable energies such as solar, tidal or wind, then greenhouse gases emitted in the process are negligible.

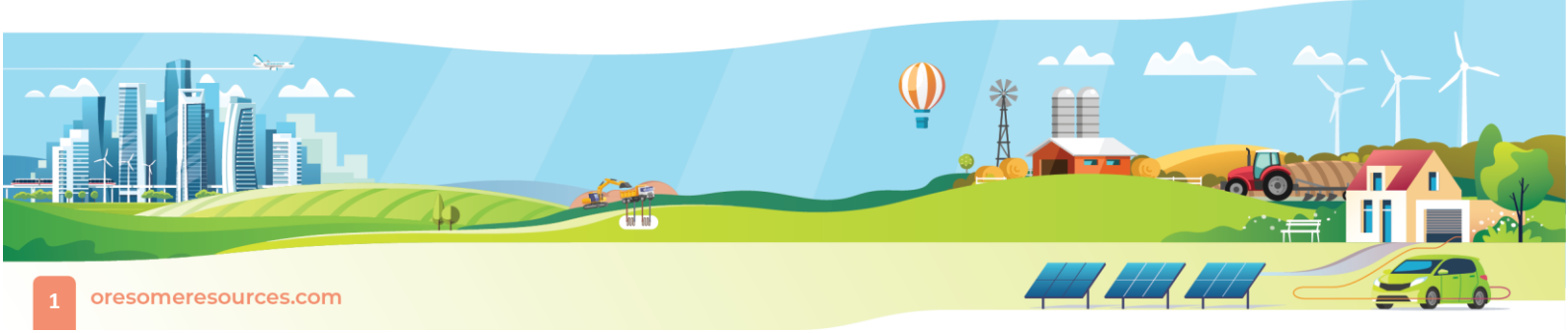
Other forms of production, such as photoelectrolysis which uses the sun's energy and water to produce hydrogen and oxygen and photobiological which uses bacteria/algae to produce hydrogen hold some promise for efficient and cost effective production in the future.

However technologies such as this are still in their developmental phase and need more time and research to become viable. Biomass or municipal waste gasification may also be used for hydrogen production.

Hydrogen Uses

Hydrogen is used in many different industry processes, such as the production of plastics, fertilisers and petroleum products.

Hydrogen may be used to power steam turbines or as fuel in a vehicle internal combustion engine to power fuel cells.



Hydrogen Fuel Cells

The Hydrogen Fuel Cell converts chemical energy in the form of hydrogen and oxygen into an electric current and the by-products of water and heat.

Hydrogen fuel cells are being developed for cars, portable power systems, and electric power generation. Hydrogen fuel cells have been used for many years on-board space shuttles, providing electricity and drinking water for the astronauts. Hydrogen is also used as the rocket launch fuel.

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