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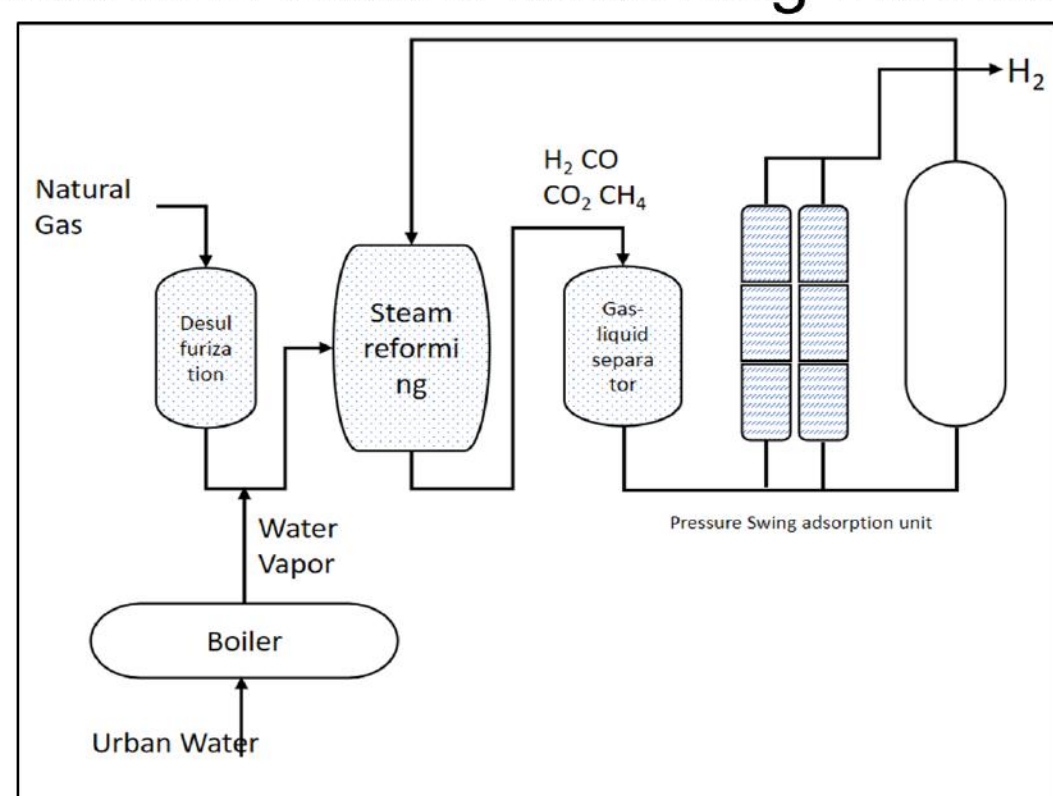
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Summary

This paper compares three principal hydrogen production technologies and analyses the current development status. It is found that hydrogen produced from renewable energy should be the most promising solution for future hydrogen applications in terms of sustainability and environmental friendliness.

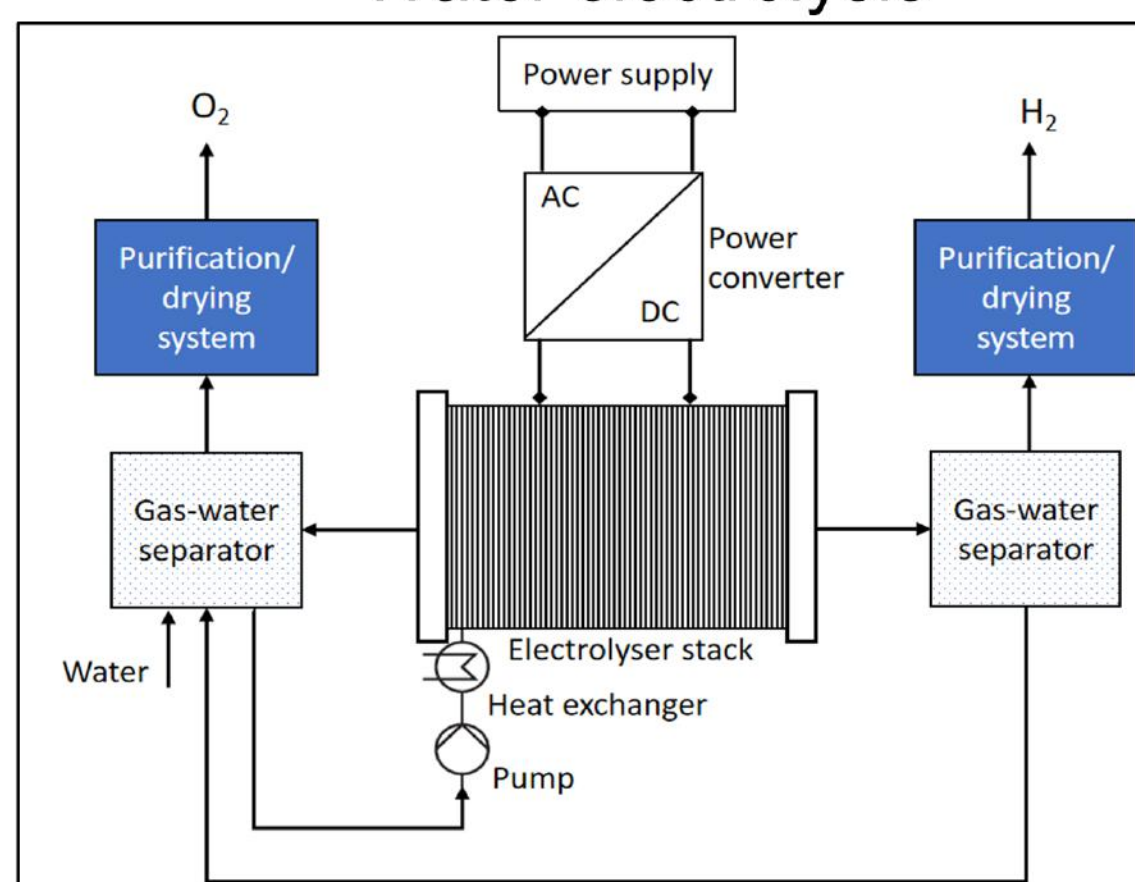
Keywords: hydrogen production, electrolysis, methane steam reforming, coal gasification.

Methane steam reforming method



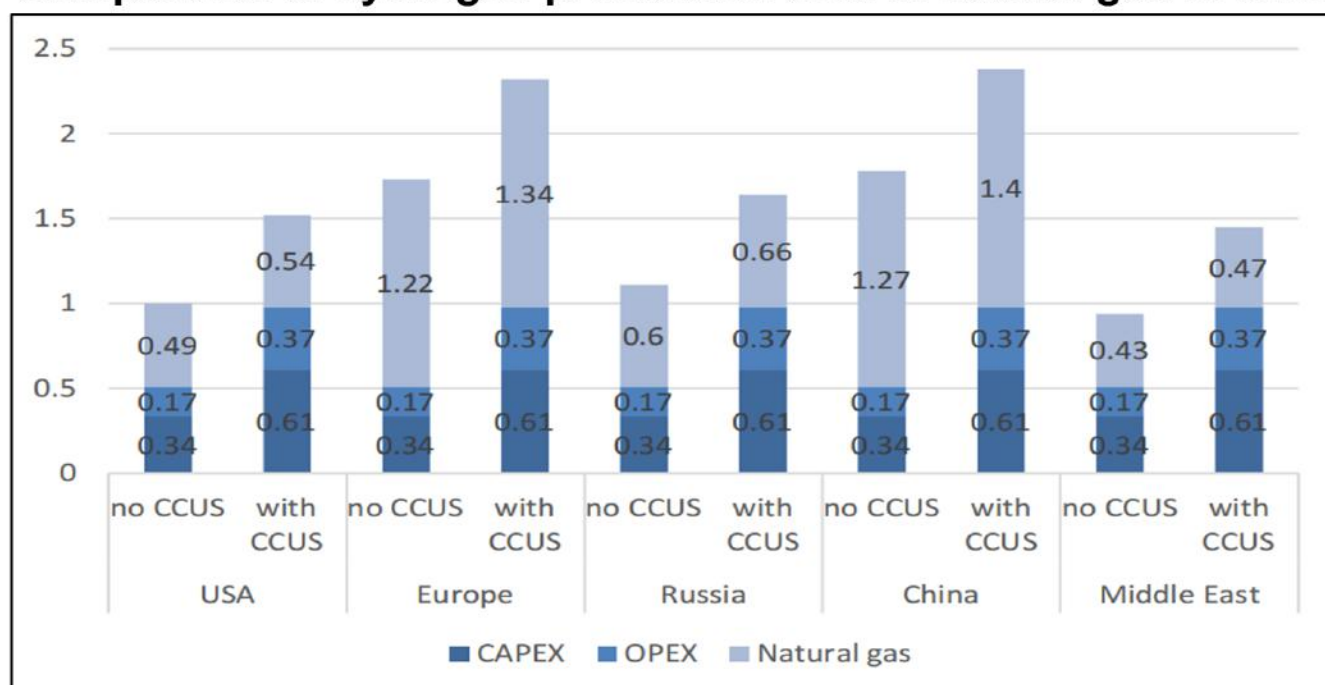
The feed-in natural gas needs to be desulfurized and pre-treated, and then the syngas is prepared through reforming reaction. The carbon monoxide in the syngas is converted into hydrogen and carbon dioxide through water gas conversion, and finally, the carbon dioxide is removed by pressure swing adsorption to obtain hydrogen.

Water electrolysis



The principle of hydrogen production by water electrolysis is to connect the two electrodes in the water to the power supply in an electrolytic cell to conduct electricity. When a sufficiently high voltage is applied, the water is decomposed into hydrogen and oxygen at the cathode and anode respectively.

Comparison of hydrogen production cost of natural gas in different regions



It can be seen that the cost of hydrogen production from natural gas is affected by a series of technical and economic factors, of which natural gas price and fixed investment cost are the two most important factors. The price of natural gas is the largest cost component, accounting for 45% to 75% of the total cost of hydrogen production. The carbon emission of the methane steam reforming method is 285g of carbon dioxide per kWh, which is equivalent to 9.5kg of carbon dioxide per 1kg of hydrogen produced.

Conclusions

Renewable feedstocks and sustainable energy sources for hydrogen production, replacing traditional fossil fuels and current power systems, will make it possible to realize the so-called hydrogen economy, the main goal of which is the large-scale production of hydrogen using readily available energy sources, to replace the current electricity economy based on fossil fuels. To build a hydrogen economy, along with hydrogen production, storage and transportation, and distribution, supporting strategic policies. This not only has a great impact on the development of hydrogen fuel cell vehicles, but also provides a possible solution to achieve a zero-emission society.