

عنوان مقاله:

Fuel Cell Technology for Electric Power Generation and its effect on GHGs emission

محل انتشار:

اولین کنفرانس مهندسی برنامه ریزی و مدیریت سیستم های محیط زیست (سال: 1386)

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خلاصه مقاله:

A fuel cell is a device for directly converting the chemical energy of a fuel into electrical energy in a constant temperature process. In many ways the fuel cell is analogous to a battery, but a battery which is constantly being recharged with fresh reactants. As well as offering a high theoretical efficiency, especially at low temperatures, fuel cells emit low or zero levels of pollutants. They can run on a wide range of fuels, ranging from gaseous fuels such as hydrogen and natural gas to liquid fuels such as methanol and gasoline. Fuel cells could potentially be used to replace conventional power equipment in many cases. The main applications are likely to be in stationary power generation, transportation, and battery replacement. At present there are several different fuel cell types at various stages of development around the world, and for each fuel cell type there are several designs being pursued by differing industrial players. This can make it difficult for those new to the field to identify the issues associated with fuel cell development. The environmental impacts of fuel cell use depend upon the source of the hydrogen rich fuel used. By using pure hydrogen, fuel cells have virtually no emissions except water. Hydrogen is rarely used due to problems with storage and transportation, but in the future many people have predicted the growth of a 'solar hydrogen economy'. Photovoltaic cells convert sunlight into electricity. This electricity would be used to split water (electrolysis) into hydrogen and oxygen, to store the sun's energy as hydrogen fuel. In this scenario, fuel cell powered vehicles or generating stations have no real emissions of greenhouse or acid gases, or any other pollutants. It is predominantly during the fuel processing stage that atmospheric emissions are released by a fuel cell power plant. When methanol from biomass is used as a fuel, fuel cells have no net emissions of carbon dioxide (CO₂ a greenhouse gas) because any carbon released was recently taken from the atmosphere by photosynthetic plants. Any high temperature combustion, such as that which would take place in a spark ignition engine fuelled by methanol, produces nitrous oxides (NO_x), gasses which contribute to acid rain. Fuel cells virtually eliminate NO_x emissions because of the lower temperatures of their chemical reactions. Fuel cells, using processed fossil fuels, have emissions of CO₂ and sulfur dioxide (SO₂) but these emissions are lower than those from traditional thermal power plants or spark ignition engines ... due to the higher efficiency of fuel cell power

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