

THE CHALLENGE OF REALISING FUELS CELLS' POTENTIAL CONTRIBUTION TO CLEAN AIR

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Fuel cells are considered by the car industry and most other commentators to be the most promising alternative to the internal combustion engine. Generating electrical power through the reaction of hydrogen with oxygen from air, the fuel cell offers superior energy efficiency, combined with zero emissions at source. Fuel cells play a significant role in the majority of scenarios developed for a sustainable future. However, while fuel cell technology excels in the laboratory and in small-scale field trials, widespread commercial deployment of this disruptive technology raises many technical, economic and societal issues. This paper discusses the potential of low temperature proton exchange membrane fuel cell (PEMFC) technology to contribute to cleaner air and identifies the key challenges that must be addressed before fuel cell technology can realise its potential. The vast majority of air borne pollution in urban centres arises from transport and it is here that fuel cells have most to contribute. The complete elimination of particulates and other pollutants is the natural culmination of the process started nearly 30 years ago of progressively restricting vehicle pollution. The use of hydrogen powered fuel cells would finally remove cars from the air pollution agenda. It is common for debates concerning fuel cells to focus on what fuel to use in the fuel cell and how that fuel will be supplied; the perceived problem being the availability of hydrogen. However, this is not the problem it appears to be for the early introduction of fuel cell vehicles. Distributed generation of hydrogen from different locally desirable feed stocks is feasible and meets the growing security need for diversity of energy supplies. Cost is certainly a challenge for any new technology and PEMFC technology must reduce material costs whilst retaining performance. The paper will review the cost targets for fuel cells and the present cost structure, highlighting development areas and current initiatives. The paper will also outline the potential pathways for the commercialization of fuel cells, including combined heat and power (CHP) for distributed power generation, as well as early opportunities in the transport sector. A comparison with the competition will highlight the potential contribution fuel cells could make to cleaner air and lowering greenhouse gas emissions.