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HYDROGEN FUEL CELLS AND ALTERNATIVES IN THE ENERGY AND TRANSPORT SECTORS POLICY ISSUES FOR DEVELOPING COUNTRIES



A Side-Event at the United Nations Conference on Sustainable Development (CSD-15), New York

4 May 2007, 1:15-2:45 PM

Conference Room B

PANEL

Lynn K. Mytelka, Professorial Fellow, UNU-MERIT & Director of its Fuel Cell Project will provide an overview of the debates on this emerging technology.

Ibrahim Abdel Gelil, Director, Environmental Management Programme, College of Graduate Studies, Arabian University (Bahrain) will discuss Egypt's policies and measures for sustainable transport and its choice with respect to H₂FC bus testing.

Paulo Teixeira, Director, joint UNU-Universidade Federal de Mato Grosso Pantanal Regional Environmental Programme will discuss Brazil's ethanol and biodiesel programmes.

Boni Mehlomakulu, Director of the Natural Resources Division, Department of Science and Technology, South Africa and head of the committee preparing that country's Hydrogen strategy, will discuss hydrogen and fuel cell technology issues for South Africa.

Chair:

Franco Babir, Associate Director, Science and Technology, United Nations Industrial Development Organization, International Center for Hydrogen Energy Technologies, Istanbul



PARTNERS

United Nations University (UNU-MERIT, Maastricht, the Netherlands and UNU-UFMT, Brazil); UNIDO-ICHET (Istanbul); Universidade Federal de Mato Grosso (Brazil); Government of South Africa, Department of Science and Technology; Environmental Management Programme, Arabian University (Bahrain); Shell Hydrogen; International Council for Science, ICSU (Paris); International Development Research Centre –IDRC (Canada); International Energy Association (IEA)

BACKGROUND NOTE

Recent technological advances in the application of hydrogen fuel cells in the transport and energy sectors have drawn considerable attention and increased funding for research, development and the construction of test vehicles, prototype refuelling stations and stationary power plants from both public and private sources over the past ten years. While still in the early stages of development and costly in comparison to conventional electric generation vehicle propulsion and alternative fuel technologies, hydrogen and fuel cells offer a promising solution to address growing concerns over the transport sector's dependence on oil and its impact on climate change and the energy sector's need for off-grid energy and backup power sources.

Fuel cells reverse the long known process of electrolysis, which uses energy to split water into its components. Instead fuel cells use a fuel supply to combine hydrogen and oxygen thus generating an electric current. In the proton exchange membrane (PEM) fuel cells that are the current focus of research in applications of this technology in the transport sector, the process is electrochemical and involves an ion exchange polymer membrane as the electrolyte and electrodes of a fine metal mesh on which a platinum catalyst is deposited. The PEM fuel cell can thus convert hydrogen directly into electricity without combustion or moving parts. In hydrogen fuel cell vehicles (HFCVs) the process is virtually pollution free. But the overall utility of HFCVs in reducing greenhouse gases globally depends upon the way the hydrogen itself is produced. If this takes place through renewable processes that are carbon neutral such as coupling solar or wind power to electrolyzers that split water molecules into hydrogen and oxygen, the overall impact will be significant.

Currently there is a debate about when hydrogen fuel cells might become commercially available in vehicles and for stationary power and how to manage the transition to a hydrogen economy. Like earlier 'disruptive' technologies, hydrogen and fuel cell technologies will affect a broad range of sectors and have significant social, economic and environmental impacts. The importance of their science base and their system embeddedness, moreover, presents particular challenges to their use and diffusion in developing countries. As the introduction of information and communications technology or biotechnology have shown, most developing

countries were ill-prepared to deal with these earlier waves of new technologies. The result were 'technological divides' and 'knowledge and infrastructure gaps' that have lasted for decades. To avoid the problem of exclusion this time around, building the knowledge base and creating the networks that enable developing countries to set priorities and make choices are needed now.

In November 2005, the United Nations University (UNU) took a first step in this direction when it held an international conference in Maastricht on "Hydrogen Fuel Cells and Alternatives in the Transport sector: Issues for Developing Countries" in Maastricht. The purpose of the conference was to raise awareness of emergent hydrogen and fuel cell technologies and to enhance long-term transport and energy decision-making in developing countries. It brought together 35 leading experts from business, government and research organizations in the North and South to review progress in the application of hydrogen and fuel cells in the transport sector and identify key issues for developing countries.

Strong interest was expressed at this conference for the development of follow up activities, notably in information diffusion, awareness creation and capacity building in the area of hydrogen, fuel cells and alternatives in transport and energy. Three of these have already been initiated – the creation of a website, The Fuel Cell Exchange at www.merit.unu.edu, the posting to it of a Policy Brief and the development of the on-line Hydrogen Fuel Cell Exchange monthly monitor. A volume of papers drawn from the presentations to the UNU Hydrogen & Fuel Cell Conference are due to be co-published by IDRC and UNU Press in 2007.

To further the process of exchanging information on hydrogen fuel cells and alternatives in the transport and energy sectors and thus bring developing countries more fully into the discussion on energy and sustainable development, UNU and its partners are co-organizing a side-event at the United Nations Conference on Sustainable Development (CSD-15). The event aims to contribute to building capacity on hydrogen and fuel cells and to the development of roadmaps for a portfolio of choices in the use of sustainable energy sources within the energy and transport sector in developing countries.