

Notes on the

33th IEA Executive Committee Meeting

“Advanced Fuel Cells” in Oslo, 2-3 November 2006.

The IEA Implementing Agreement on “Advanced Fuel Cells” consists of the 3 technology annexes on SOFC, MCFC, PEFC and the three application annexes Stationary, Portable, Transportation.

The SOFC Annex reported on the successful annual meeting in Finland, June 2006, where world-wide status was reviewed and SOFC degradation mechanisms were studied. Next meeting 2 June 2007 prior to SOFC X in Nara.

The MCFC Annex reported on moves towards commercialization and a number of topical workshops. The prime MCFC manufacturer, FCE in the United States, has now more than 20% of their applications with biogas.

The PEFC Annex reported on lively and increasing cooperation as mentioned in an extensive Progress Report. Japan shared their experience from 1000 residential power systems demonstrating 16% primary energy reduction. Next PEFC Annex workshop will be held 27-28 November at Forschungszentrum Juelich.

The Stationary Annex, after their annual meeting in Rome in June 2006, reported on grid interactions with large numbers of fuel cell installations (NEDO Japan). Next meetings will be 19-20 March 2007 in Juelich, and 15 October 2007 in San Antonio.

The Portable Annex is highly active in developing air breathing systems and engaged in new testing methods (safety/environmental tests and performance testing). Next annex meeting will be September 2007.

The Transportation Annex has been inactive, but will be revitalized with ECN Petten as new Operating Agent.

As usual in the autumn ExCo meetings, countries reported status and progress:

Austria mentioned new mobile and stationary fuel cell programmes to be evaluated in competition with other energy systems.

Belgium has established a Flemish fuel cell network, VITO works on reversible electrodes for energy storage. Fuel cell buses are planned in Antwerp by December 2006.

Canada operates the NRC Fuel Cell Program (Vancouver & ICPET) with low temperature SOFC developments, high temperature membranes, advanced membranes (80°C replacement for Nafion), low methanol cross-over for DMFC, DMFC anode catalyst project, and a MEA manufacturing project (MEAs and bipolar plates).

In Denmark, there is the strong SOFC programme between Risoe and Haldor Topsoe targeting manufacture of 10,000 cells per year, new funding programmes from ForskEL, and a fresh go at high temperature PEFCs.

Finland is characterized by the SOFC engagement of the large ship engine company Wärtsilä preparing a 20 kW system demonstration with Topsoe stacks and research centre VTT testing both Topsoe and Juelich 5 kW stacks in competition. Also 20 kW methanol driven APUs for ships and small 20 W AFC. Leadership in the EU LargeSOFC Integrated Project.

France works on portable micro fuel cell systems, on PEFCs for transportation in the 20-80 kW range (but Renault fuel cell R&D moved to Nissan). Strong CEA engagement in PEFC, SOFC development and high temperature electrolysis for hydrogen generation.

Germany, with a total fuel cell and hydrogen funding level of 135 M€ per year, is extensively engaged in PEFC, DMFC, MCFC and SOFC development. PEFC vehicles by DaimlerChrysler are tested in many parts of the world and other fuel cell vehicle fleets with PEFC are in operation (HyCHAIN) or in preparation. New moves into high-temperature PEFC promise easier fuel handling and more robust operation in vehicles under hot ambient conditions. DMFC, both microsystems and kW applications on scooter and forklift, make progress. MCFC now with 14 HotModule sites in Germany have progressed beyond 20,000 hours of operation. In the SOFC arena, new consortia have been established and kW size stacks and systems are in testing and demonstration. Recently also 1 kW household units from CFCL in Australia and SOFC interest of Vaillant for RPG, residential power generation. Work on APUs (Auxiliary Power Units) for cars, trucks and airships is a new development area with strong interest from BMW and Airbus. On the R&D side, recent moves to coordinate actions on SOFC degradation.

Italy is active in fuel cells at a variety of levels: Siemens Turin operates the 100 kW SOFC power station that was refurbished from the previous Arnhem and Essen operation, EniTecnologie, University Perugia, CNR-ITAE and Eurocoating have new SOFC programmes. Ansaldo enters a multi-MW development phase with a modular MCFC systems from 30 kW to several MW (Matrioska concept). Demo units are in preparation for the Marghera (Venice) hydrogen park and Agip prepares filling stations for various forms of renewable energy.

Japan has 1000 residential systems installed, targets high efficient PEFCs that are durable and affordable. In SOFC, work is progressing on high durability, high performance, clarification of degradation mechanisms and improvement of power density. Also new applications are sought for SOFC.

The Netherlands has defined three transition regions for hydrogen and fuel cells: Rotterdam demo site around hydrogen production; Arnhem of local hydrogen production, local fuel cell transport and local stationary applications; and Petten on system innovation and hydrogen generation from natural gas and renewables.

Norway is reporting on increasing fuel cell work by SINTEF, Prototech, University of Oslo, DNV (FellowSHIP offshore supply vehicle) and Powercell-Statoil-Volvo engagement in a truck APU.

Sweden is looking forward to the 5 kW SOFC from Acumentrics to be installed in Hammarby Sjöstad. The two national fuel cell developers are now Volvo-Powercell and Cellkraft.

Switzerland has HEXIS and HTCeramix for SOFC development, an SOFC consortium with ETHZ, EPFL, EMPS and ZHW and PEFC work at the Paul-Scherrer-Institute in Villingen involved in the Michelin-PSI vehicle.

The UK announced a new Energy Technologies Institute and reported London plans to procure up to 70 hydrogen powered vehicles by 2010. The new Ceres-British Gas venture targets SOFC residential power generation.

The United States operates a very successful SECA programme for efficient and affordable SOFC development where General Electric was the first partner to fulfil all the phase 1 requirements both in performance and in cost projections. In the low temperature area, there is an exciting development where PtNi alloys bring tenfold more activity compared to Pt alone.

Guest participants were Turkey (low temperature fuel cells in the 1-5 kW range and 500 kW MCFC naval generator) and Dr Tsotrodīs (coordinator FCTestNet, announced workshop on fuel cell degradation 19-21 September 2007 in Crete).

The chairman, Dr Lars Sjunnesson, reported on the formation of the European Joint Technology Initiative JTI.

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