EERA
European Energy Research Alliance

Coordinating energy research for a low carbon Europe

EERA Joint Programme on Fuel Cells and Hydrogen Technologies

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Number participants and associates:	22 in total; 18 participants and 4 associates from 13 European Countries, 172 person - year per year committed

Why a Joint Programme on Fuel Cells and Hydrogen Technologies?

Fuel Cells and Hydrogen are explicitly mentioned in the SET-plan as part of key technologies to reach the renewable energy and emission reduction goals set for 2020 and 2050. The technologies are attractive because of their high efficiency (heat and power), low environmental impact, and modularity. Over the last 5 years, significant technological progress has been made. However, there is a consensus in industry and academia that significant long-term research is still needed to realize the currently foreseen commercialisation of passenger vehicles from 2020 and to start fuel cell commercialisation in the field of stationary applications (both micro CHP and CHP for residential/decentralised power plants).

JP Fuel Cells and Hydrogen Technologies –visions and objectives

The general objective of the JP FCH_2 is to align medium to long term pre-competitive research activities at EERA institutes and associated institutions to create a technical-scientific basis for further improvement of Fuel Cells and Hydrogen technologies. The JP will align and explore synergies with (i) the research grouping N. ERGHY, (ii) the European public-private partnership FCH JU, and (iii) other JPs. Most of the partners involved in the present JP are also members of FCH –JU. The initial focus of JP FCH_2 is fuel cells and electrolysers. When the JP work has commenced, complementary technologies/topics (i.e. new sub-programmes) will be added as appropriate, taking into consideration other on-going and planned EERA joint programmes.

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Joint Programme on FC and H_2 technologies Sub- programmes

SP1 Electrolytes (Deborah Jones, CNRS – Simona Barison, CNR)

This sub-programme deals with developing new generations of high-performance, low-cost and durable electrolyte materials for low and high-temperature fuel cells and electrolysers. Activities are harmonised in particular with SP2 on Catalysts and Electrodes, to develop an integrated mid and long-term research programme for the electrochemical core of the technology.

SP2 Catalysts & Electrodes (Peter Holtappels, DTU – John Irvine, University St. Andrews)

The sub programme targets the development a highly active, low cost and durable catalysts/electrodes. This is addressed by identifying requirements of each electrochemical process which defines the type of electrode to be used. A rational support and catalyst design is targeted, combining expertise to investigate rate-determining steps for the processes involved in low, intermediate and high-temperature fuel cells, electrolysers and regenerative cells.

SP3 Stack Materials and Design (Nikolaos Margaritis, FZJ – Marie-Laure Fontaine, SINTEF)

The sub programme concentrates on issues that allow the cost-effective manufacturing of 'robust' stacks, denoting stacks that can be rapidly thermally and load cycled and that can tolerate vibration, transient operation, fuel and air impurities etc. The issues encountered are very much focused on materials and novel design development for successful product engineering.

SP4 Systems (Asif Ansar, DLR – Jari Kiviaho, VTT)

This sub programme deals with developments made on both a system level and a component level. The system level approach includes development of innovative fuel cell system concepts, while for the function/components level general targets will be decreased costs of components, prolonged life-time and availability of components.

SP5 Modelling, Validation and Diagnosis (Mathias Gérard, CEA – Martin Andersson, Lund University)

The sub programme generates better understanding of the degradation mechanisms and the relationships with operating conditions through a more detailed development of mathematical descriptions of phenomena for the prediction of performance and lifetime. Advanced methodologies of experimental characterization will support the validation and verification of the numerical models.

SP6 Hydrogen Production and Handling (Robert Steinberger-Wilckens, Univ. Birmingham – Asuncion Fernández, CSIC)

The sub programme targets cost-effective and efficient non-electrochemical hydrogen production methods, by improving catalysts and materials, identifying novel approaches, optimising materials processing, and developing new, break-through designs for hydrogen production systems.

SP7 Hydrogen Storage (Marcello Baricco, University of Turin – Klaus Taube, HZG)

The sub programme focuses on research, development and optimization of different technologies for hydrogen storage and their combinations: compressed gas, liquid hydrogen, hydrogen carriers (solid state-based hydrogen storage in metal hydrides, porous materials and irreversible hydrides and in organic liquids).