

Executive Summary

The European research related to hydrogen safety has been largely fragmented. To overcome this fragmentation, to support the needed integration and focusing of the related efforts the European Commission created a new instrument, the so-called Networks of Excellence (NoE). The goal of the NoE HySafe is to provide the basis to facilitate the safe introduction of hydrogen as an energy carrier, by removing the safety related obstacles. Thus, the integration of the dispersed efforts will contribute to a sustainable development in Europe.

The objectives of HySafe are to

- strengthen, focus and integrate the fragmented research on hydrogen safety,
- form a self-sustained competitive scientific and industrial community,
- promote public awareness and trust in hydrogen technologies and
- develop an excellent safety culture.

The network has been constituted with 24 partners from 12 European countries and one partner from Canada, the University of Calgary. There are 13 partners from public research institutions, 7 industrial partners and 5 universities.

HySafe is coordinated by the Forschungszentrum Karlsruhe. The coordinator contact is:

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More than 120 scientists from these institutions have been nominated to contribute to the network. This number was the basis for the determination of the maximum EC grant, which is 7 Mio Euro for 5 years. The total budget is approximately 13 Mio Euro for the same period.

The HySafe logo



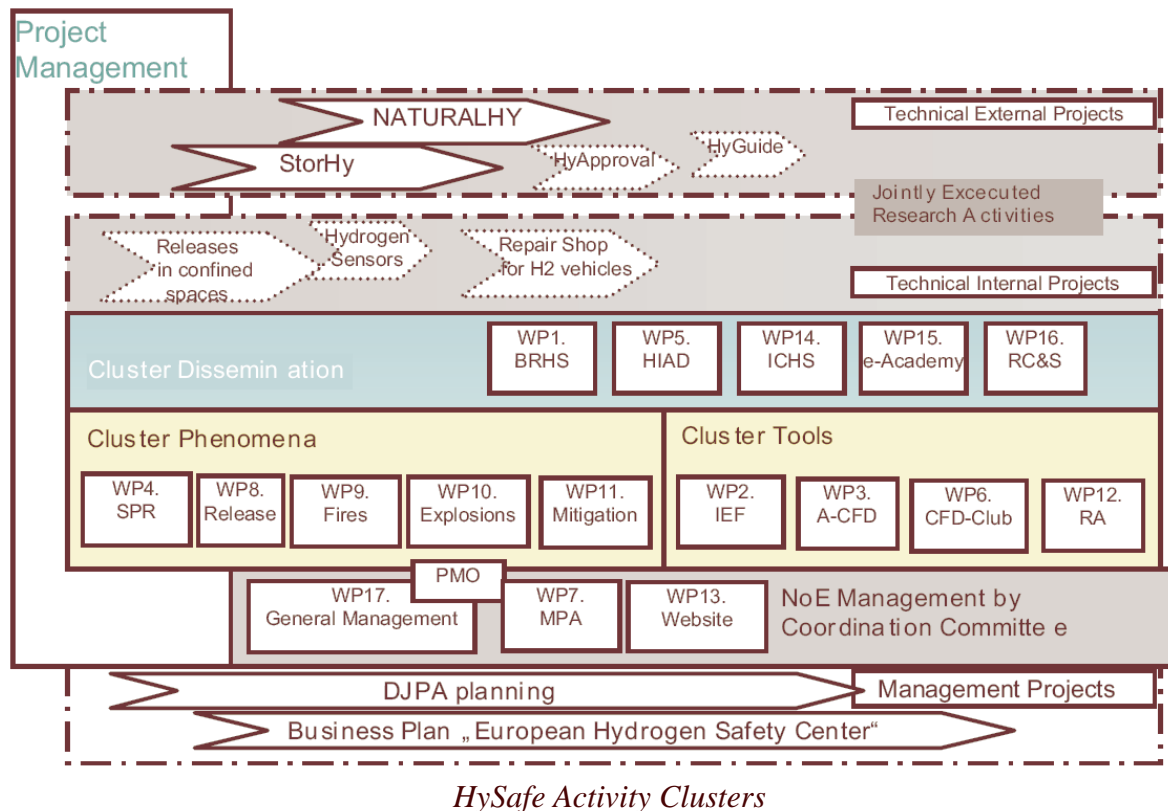
may be downloaded from the website www.hysafe.net/

The network activities formally started on March 1st, 2004. In the meanwhile the organisational structure described below has been fully set up, two internal projects have been successfully launched and some first considerable integration results have been reached by these activities.

<i>Name of Institution</i>	<i>Abbrev.</i>	<i>Country</i>
Forschungszentrum Karlsruhe GmbH	FZK	DE
L'Air Liquide	AL	FR
Federal Institute for Materials Research and Testing	BAM	DE
BMW Forschung und Technik GmbH	BMW	DE
Building Research Establishment Ltd	BRE	UK
Commissariat à l'Energie Atomique	CEA	FR
Det Norske Veritas AS	DNV	NO
Fraunhofer-Gesellschaft ICT	Fh-ICT	DE
Forschungszentrum Jülich GmbH	FZJ	DE
GexCon AS	GexCon	NO
The United Kingdom's Health and Safety Laboratory	HSE/HSL	UK
Foundation INASMET	INASMET	ES
Inst. Nat. de l'Environnement industriel et des RISques	INERIS	FR
Instituto Superior Technico	IST	PT
European Commission - JRC - Institute for Energy	JRC	NL
National Center for Scientific Research Demokritos	NCSR	EL
Norsk Hydro ASA	NH	NO
Risø National Laboratory	Risø	DK
TNO	TNO	NL
University of Calgary	UC	CA
University of Pisa	UNIP	IT
Universidad Politécnica de Madrid	UPM	ES
University of Ulster	UU	UK
VOLVO Technology Corporation	Volvo	SE
Warsaw University of Technology	WUT	PL

Table 1: HySafe consortium members with their national origin

The structuring of the HySafe work follows a matrix arrangement with risk control levels from release, via ignition and fires, via explosions to mitigation and risk assessment control indicating the different columns. The rows are reserved for the different applications, like large scale production, distribution, street vehicles, other vehicles and portable applications. The activities are arranged in the four activity clusters: “Phenomena”, “Tools”, “Dissemination” and “Management”. The allocations of the activities in these clusters and the relationship with Internal and External Projects is depicted in the figure below.



Results of Cluster “Phenomena”

The work package 4 finalised the Phenomenon Identification and Ranking Table (PIRT). For this activity a very detailed analysis of all different scenarios and phenomena has been conducted. Internal and external experts voted on the importance and available knowledge of the combinations of phenomena and scenarios.

The derived HySafe research headlines “Releases in (partially) confined areas” and related “Mitigation” are still valid. On this basis the two internal projects InsHyde and HyTunnel have been designed and launched

Results of Cluster “Tools”

The detailed catalogue of the experimental facilities has been translated to the website. It contains more the 80 hydrogen specific testing facilities including all relevant details. A printable version is published on the HySafe website as Deliverable D09 <http://www.hysafe.org/index.php?ID=40&deliverable=9>.

In work package 6 the third but first blind benchmark exercise SBEPV3 has been started. The Applied CFD group delivered important pre-test calculations for the determination of the most sensitive parameter setting in the associated INERIS tests.

The first results have been analysed carefully. The post-calculations after the forwarding of the experimental results will give an insight especially in meshing and turbulence model sensitivities of all involved CFD tools.

The common use of the database REDIPHEM has been decided. It is provided on a royalty free basis by the partner Risø. This software will help to manage the inter-code comparisons and the storage of experimental data besides the simulation results.

Results of Cluster “Dissemination”

The first version of a Literature Database is freely accessible on the website and the database of industry involved in hydrogen technologies has grown considerable (currently approximately 2000 entries).

The work package 5 developed for the HIAD database a preliminary input template and provided this to all partners. The first cases are input and the planning promises a public interface during this year. Due to the steady information exchange, an easy merging of the parallel US DoE development will be easily done, if needed. A request to the EIGA for sharing information similar as with the TNO database has been initiated.

The first edition of the Biennial Report on Hydrogen Safety is going to be published in summer 2006. There are unforeseeable difficulties in the editing of the large (>300 pages) multi-author document. However, a first draft has been circulated within this reporting period.

The e-Academy had a very successful year. Two project proposals of this activity have been supported by the EC in the frame of the Marie-Curie-Program.

So, the first Summer School on Hydrogen Safety “HyCourse” will be organised already this year in Belfast, UK. During this event first content will be added to the unique and iteratively improved curriculum (<http://www.hysafe.org/index.php?ID=68>).

The early stage training network HySAFEST still offers research opportunities to young researchers, willing to work on attractive safety relevant topics. All this constitutes the first educational program of this kind and quality in Europe. However, via the HFP-IET contacts to other educational programs are maintained. The current version of the curriculum designed for safety engineers may be browsed on <http://www.hysafe.org/index.php?ID=68>.

The first International Conference on Hydrogen Safety had a very successful start. More than 200 participants joint this first event of this kind. It attracted many other organisation and projects like the Japanese Project Ardenty, the EC projects StorHy, NATURALHY and CUTE, the International Association for Hydrogen Energy and the Italian National Fire corps. As an approved IPHE event it housed the IPHE workshop related to regulations, codes and standards. The next conference will be organised in San Sebastian September 11-14, 2007 (further details under <http://conference.ing.unipi.it/ichs>).

Results of Cluster “Management”

The communication and management features of the website www.hysafe.net have been improved in many aspects..

For a simplified exchange of ideas and real collaboration on the website a Wiki server suited for technical content is set-up.

The collection of ideas for new projects and activities induced the follow.

In the tools cluster a HySafe tool for a simplified consequence analysis will be developed. This development will be complemented by the assessment of the safety distance concepts in the risk assessment work package. A safety assessment framework for FP7 will be proposed by the strategic orientated work package 7.

Two concise proposals to the latest EC calls have been submitted by the network. One proposal relates to the pre-normative research needed to develop guidelines for the safe installation and operation of small stationary hydrogen applications. This proposal has the acronym **HyPER** (Hydrogen PERmitting Guidelines).

The other proposal was the extension of the HySafe concept on an international stage and the early foundation of an international expert network on hydrogen safety. In peer review sessions the experts should inform each other about the latest developments relevant to hydrogen safety. The acronym of the related proposal is **HyGlobe**.