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PROJECT FINAL REPORT

Publishable Summary Report

FCH JU Grant Agreement number: 256823

Project acronym:	**HYFACTS**
Project title:	**Identification, Preparation and Dissemination of Hydrogen Safety Facts to Regulators and Public Safety Officials**
Funding Scheme:	**CSA**
Period covered:	**from 03.02.2011 to 31.07.2013**

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the grant agreement

[2] The home page of the website should contain the generic European flag and the FCH JU logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm; logo of the FCH JU, available at: http://ec.europa.eu/research/fch/index_en.cfm). The area of activity of the project should also be mentioned.

The HyFacts Project is a "Coordination and Support Action (CSA)" and aims to develop and initiate dissemination of training material for Regulators and Public Safety Officials, which are responsible persons and work for entities, having to position themselves in the increasing number of upcoming installation of hydrogen-related technologies in public areas, companies, universities, research centres fairgrounds, harbour sites and other places where fuel cell and hydrogen (FCH) installations and mobile applications shall be installed and operated in the near future and has been funded by the European Commission's Fuel Cell and Hydrogen Joint Undertaking (FCH JU).

FCH technologies are relatively new to the public as well as to institutions which are dealing with issues like building regulations, local regulations, public safety and permission of technical installations or even much earlier in the project development. Most of the staff of these institutions does not have the necessary knowledge to judge on safety aspects based on real facts but tend to take decisions on the basis of either obsolete or incomplete knowledge or refuse to take any decision at all. This situation leads to heavy delay of decisions or to technically unreasonable, costly and sometimes also very ineffective safety measures to obtain the approval of, say, a hydrogen refuelling station or the allowance to use hydrogen applications such as cars, busses or forklifts in public spaces. On the way to an increasing number of hydrogen related installations and vehicles throughout Europe, it can be expected that also more and more of these will be placed outside the major cities, where some projects might already have been implemented or where the liaison between the local industry which is active in this specific field and the relevant officials is already established. This will lead to more decentralised and smaller entities getting in touch with the relevant competent authorities with hydrogen related issues and the competent authorities will have to take profound decisions.

Significant efforts have been devoted to identifying and prioritising the audiences that would need to be trained to facilitate the commercialisation of hydrogen and its related technologies like decentralised hydrogen production, hydrogen storage and distribution systems, hydrogen refuelling stations, stationary fuel cells for combined production of heat and power (CHP) and other hydrogen consuming devices. A vision and road-map for the establishment of permanent training activities for the targeted audiences by recognized institutions, along with the proposal specific initiatives is an important outcome of the project. A large amount of knowledge on the behaviour of hydrogen that is very useful for developing safety approaches that are well adapted to the new use of hydrogen as an energy carrier has been developed during the last years (e.g. HySafe, the Network of Excellence by the European Commission who funded HySafe under its Sixth Framework Programme). These are now being applied for the engineering design of new products and applications. It is therefore very important that the persons in charge of ensuring public safety be trained on these new safety approaches.

The HyFacts project has developed and will disseminate fully up-to-date contemporary material for customized training packages for regulators and public safety experts providing accurate information on the safe and environmentally friendly use of hydrogen as an energy carrier for stationary and transport applications under real conditions. The training material is focussing on the fundamental aspects of hydrogen safety and on the safety approaches and criteria developed in standards and according to which hydrogen systems are engineered for the safe use of hydrogen under all circumstances.

Fuel Cell and Hydrogen Technologies shall be implemented in Europe in order to gain specific knowledge in applying these technologies and bringing them to a breakthrough by reaching the

necessary “critical mass”. Only if the number of fuel cell cars, refuelling stations, small and large centralised and decentralised hydrogen systems in operation increases can the necessary impact on public acceptance and involvement be achieved. In order to achieve this aim, the regulators, which sometimes hold up approval of systems prior to their implementation, need to be trained to better understand the safe use of hydrogen and its related technologies much better and should even be brought to a supportive attitude. Once the regulators and competent authorities across Europe . It will be a clear signal also for public and private Research and Technical Development (RTD) investment to increase their efforts and try to achieve realistic goals which before have been thought to be too unconventional. Funds for implementing hydrogen technologies are used much more effectively if not only the technology developed can function in the right way but if they can be certified on the basis of true knowledge of the regulators. Support of the RTD efforts in the member states can be strongly supported if the technologies developed can be used in the everyday life and large-scale implementation brings results from the use in the field. The regulators need to better understand the background of some very time-consuming developments and that their support is not only highly appreciated but inevitable for the success of the whole implementation of the hydrogen technologies. It is clear that hydrogen and fuel cell technologies are part of the energy solution for the future. Safe introduction of FCH installations needs knowledgeable regulators and competent authorities, working with the developers of FCH technologies.

The overall programme of the FCH JU is divided into four major horizontal application areas (AA): Transportation & Refuelling Infrastructure; Hydrogen Production, Storage & Distribution; Stationary Power Generation & CHP; and Early Markets. All of these areas will be included in the teaching material and will be explained on the basis of the latest research results, implemented technologies but also on accidents which occurred because some basic properties of hydrogen were not taken into account. All technologies of the different application areas can only be widely introduced across Europe if they are well understood by regulators and thus can be used in a way as other technologies today, without fear but with the necessary realistic evaluation.

The successful achievement of the impact of the HyFacts teaching material is determined by the quality of the teaching material defined by factors like:

- Technical completeness
- Up-to-date research results integrated
- Plausible links between different topics
- Appealing form of the teaching material
- Concise information with examples of well designed principles
- Suitable and modular courses for the particular audience adjusted to their status of knowledge

For a successful transfer of knowledge it was important to have the audience involved at a very early stage in order to tailor the training packages to their specific needs. This has been achieved by issuing questionnaires and asking the potential audience identified earlier about their current status of knowledge and their (perceived) required knowledge for delivering to provide well underpinned decisions based on science and engineering principles.

The first step for the development of the teaching material was to design and activate the project website (D5.1) and to identify the relevant contacts (D3.1) which made it possible to send out the questionnaire (D3.2) and make it available as online questionnaire in order to receive an indication on which content of the teaching material the relevant target group would be interested for their daily work. The questions for the questionnaire have been chosen by the

partners in accordance of the primarily identified necessity to structure the teaching material in a way that it will be useful for the primary target group. The identified contact list has been used to directly contact many of the future users of the teaching material and will also be use for the dissemination of the project results. In D3.3, the results of this questionnaire are described. A total of 76 qualified answers were received from Germany, France, United Kingdom and Italy and have been analysed as basis for the definition of the following parameters: Training content (focus on hydrogen safety, RCS and separation distances for HRS), training duration (1-2 days), frequency (yearly) and institution which is conducting the training (similar institution to TÜV SÜD Akademie).

This input has been reflected in the structuring and content of the teaching material (D2.1), which was the basis for the detailed collection of the content of the teaching material (D2.2), resulting in a document with a volume of 376 pages of technical content, consisting of 6 chapters with 156 figures and 52 tables. D2.2 (not public) can be seen as the main working document of the HyFacts project and contains the raw information based on good engineering practice but also international standards and actual research results.

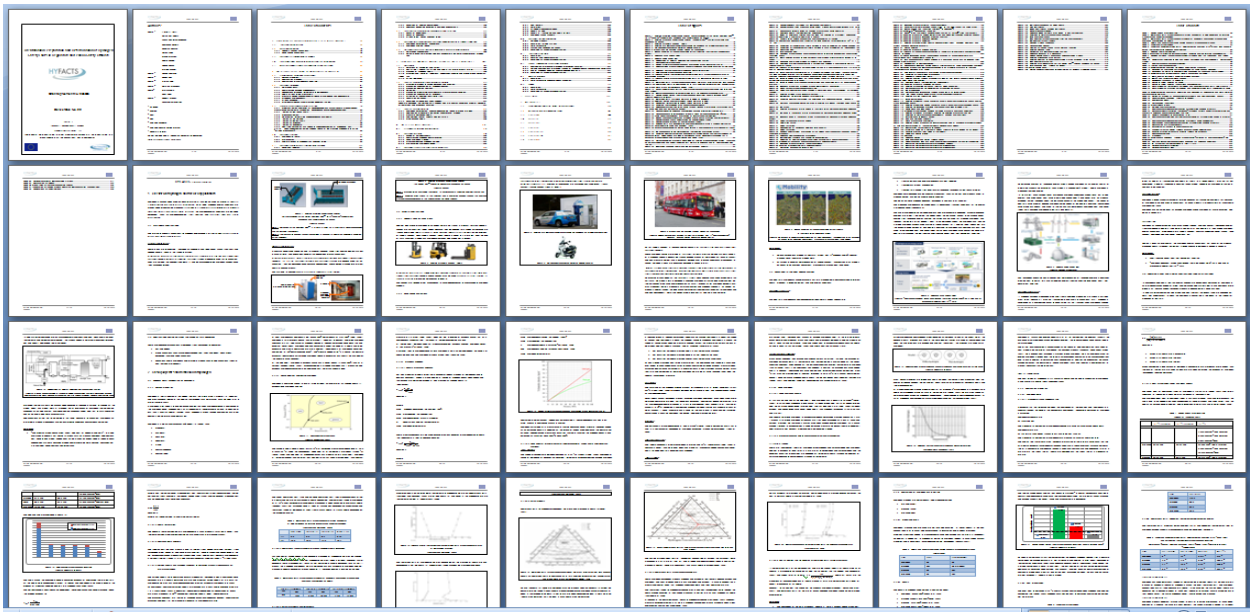
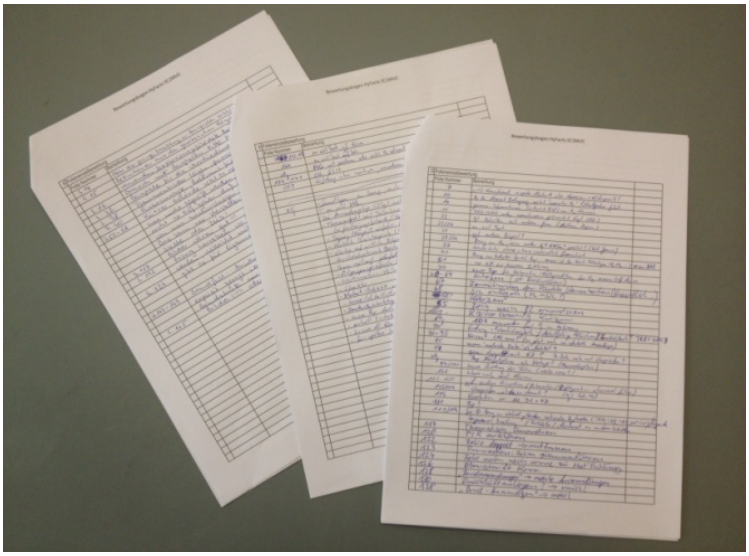


Figure 1: Snapshot of D2.2 (Technical content as basis for the teaching material)



The basic document has been transferred into a useable format consisting of 215 slides and 379 pages of text in form of a “handout” for the participants (D4.2), which all have been presented in the first Short Course in Munich at TÜV SÜD Akademie (Milestone 7) on 11/12 September 2012 with 11 participants from the primary target group, supporting the HyFacts project with their high-quality feed-back ad basis for the further improvement of the teaching material regarding content and duration of the course.

Figure 2: Ceompleted feedback forms from the participants

In the second Short Course (Milestone 9), which has been conducted in Belfast at the University of Ulster on 24/25 January 2013 with 24 participants of the primary target group and additional participants from the industry, the material has further been improved and has been finally tested in the third Short course (Milestone 10) on 6/7 June in Rome (IT) before reaching its final status (D4.3) in PM30.

The consortium has successfully cooperated and all project partners have professionally delivered their input with a high level of engagement and reliability.

Figure 3: The HyFacts Logo

Please consult the HyFacts website www.hyfacts.eu and find the deliverables as well as the teaching material and other interesting links to the partners and hydrogen-related courses.

List of the project partners with contact persons:

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