HyResponse

Grant agreement No: 325348

LECTURE - Regulations, codes and standards for first responders

Partner responsible for the deliverable: CCS

Contributing partners: AL, UU

Contents

INTRODUCTION

This document is associated with the activities within Work Package 3 (WP3) "Development of educational training for assessing accident scene status and decision making" of the HyResponse project. One of the objectives of WP3, as stated in the Description of Work (DoW,) is to develop RCS-informed training for First Responders. These materials were used in the face-to-face training of First Responders that took place at ENSOSP on the following dates: 14-18 March 2016, 9-13 May 2016, 6-10 June 2016. Final versions of pedagogic supports (Power Point slides including notes) are publically available at the corresponding page of HyResponse website http://www.hyresponse.eu/members/workpackage_upload.php and are to be integrated into an online training course.

The foundation for the development of the educational materials is the International Curriculum on hydrogen safety training for First Responders reported earlier in the Deliverable D3.1. The teaching materials consist of three sections: Basics of Hydrogen Safety for First Responders (D3.2 and D3.3; University of Ulster - leader); Regulations, Codes and Standards (RCS) for First Responders (D3.4 and D3.5; CCS - leader); Intervention Strategies and Tactic for First Responders (D3.6 and D3.7; AREVA - Leader).

This document reports on the final state of educational materials in RCS for First Responders. The educational material in RCS in the final form of a lecture is prepared using Power Point slides with notes and incorporates the latest state of the art to date in RCS status. These materials were used both by lecturers and trainees during HyResponse pilot training sessions. The final version of HyResponse educational training programme is appended in the deliverable report D3.3.

FACE-TO-FACE PILOT TRAINING SESSIONS

For an overview of the training sessions, please refer to the corresponding full section in the D3.3 report prepared by UU.

STRUCTURE AND SCHEDULE OF HYRESPONSE LECTURES

A brief content of the lecture in RCS for First Responders for educational training materials is included below:

- **Regulations, Codes and Standards (RCS)**
    - **introduction**
    - **short RCS list of fuel cell and hydrogen (FCH) standards**
- **Hydrogen production, storage, transportation and distribution**
- **FCH applications - some examples**
    - **hydrogen refueling stations (HRS)**
    - **stationary fuel cell power systems**
    - **fuel cell electric vehicles**
- **Prescriptive and performance-based approach to hydrogen safety**
        - **hydrogen properties (ISO/TR 15916:2015)**
        - **primary hazards (ISO/IEC Guide 51:2014)**
        - **fire safety engineering principles for buildings (BS 7974:2001)**

The lectures were prepared using Microsoft applications (Power Point and Word) comprised of 69 slides with notes.

FINAL FORM OF LECTURE ON RCS FOR FIRST RESPONDERS

The educational materials (i.e. lecture) on RCS for First Responders are aimed to provide First Responders with the updated RCS knowledge. The lecture is based on the review of the existing RCS in hydrogen and incorporates the latest state of the art to date in RCS status. The materials will provide First Responders with the RCS knowledge of hydrogen production, storage, transportation, delivery and uses in the modern world.

The approach taken in the preparation of the training material for RCS for First responders is intended to facilitate how they assess, plan, execute and adapt to situations that present themselves.

1. To assess various situations one has to be aware of the technologies involved with hydrogen production, distribution and utilization, and their related contextual challenges.
    a. Having a broad idea of how RCS relates to the field as per the application and level of responsibility is essential to being able to seek out key data, (who, what, where, when, how) thus (Slides 7 through 18)
    b. Safety devices, physical configurations, etc. are prescribed through several RCS according to the application.
        i. Electrolysis hydrogen generation process shares a handful of common points through complementary ''functions'' (storage, transportation, distribution) and introduces key safety devices that will be revisited with other technologies and applications. (Slides 20-24)
        ii. Hydrogen Refuelling stations (HRS) along with Stationary Fuel Cells and Fuel Cell Electric Vehicles (FCEV), front row of the hydrogen connection, will be more and more common place, while accessible to general public, thus featuring additional risks. Safety devices viewed previously, along with some additional ones are dealt with, bringing recollection, supporting a better comprehension. (HRS - Slides 28-33, Stationary FC - Slides 35-38 and FCEV - Slides 41-51)

    c. First Responders have to be aware that the Fire Safety Engineering Principles Applied To Building Designs Code of Practice BS 7974 offers guidance through a systemic framework, covering safety of a building and its occupants. It sheds light on the many building safety features from the application of discussed principles. (Slides 64-67)

2. Understanding gaseous and liquid hydrogen characteristics and behaviour is key to helping First Responders make informed decision in emergency situations.

Whatever the application, there is a definite set of general rules that applies to hydrogen depending on its physical state and associated risks. Reviews of the basics help concepts integrated with extracts from ISO/TR 15916:2015 and ISO/IEC Guide 51:2014. (Slides 54-62)

The lectures were prepared using Microsoft applications (Power Point and Word). They are supported with a variety of information (such as pictures, diagrams) and with the embedded links to sources where additional information can be easily found. All the educational materials are to be integrated into an online training course.

CONCLUSIONS

Current document reports on the final form of educational materials in the RCS for First Responders. The lectures slides and notes are uploaded to the HyResponse website http://www.hyresponse.eu/members/workpackage_upload.php