



Grant agreement No: 325348

Deliverable Number – D4.3

Realisation, installation and commissioning of the operational hydrogen training facility

Status: Final version

Dissemination level: CO - Confidential

Partner responsible for the deliverable: AREVA Energy Storage

Contributing partners: ENSOSP, AL, CRISE, UU



European Hydrogen Emergency Response training programme for First Responders

Authors:

Name¹: **Verbecke Franck**, Audrey Duclos

Name²: Sebastien Bertau

Name³: Adrien Zanoto

Name⁴: Eric Maranne

¹ Partner organisation: AREVA Stockage d'Energie

² Partner organisation: ENSOSP

³ Partner organisation: ALAB

⁴ Partner organisation: CRISE

Author printed in bold is the contact person for this document.

Date of this document: 28 September 2016

File name: D4.3_HYRESPONSE_ Realisation, installation and commissioning of the operational hydrogen training facility.doc

Document history

Revision	Date	Modifications made	Author(s)
V1	18/01/2016	First draft version	Franck Verbecke Sébastien Bertau
V2	26/02/2016	Detailed description of the training platform	Sébastien Bertau Eric Maranne Franck Verbecke Audrey Duclos Adrien Zanoto
V3	14/09/2016	Finalization of the deliverable	Franck Verbecke Sébastien Bertau

TABLE OF CONTENTS

1. OBJECTIVE OF D4.3	4
2. OVERALL VIEW OF THE PLATFORM	4
3. CONSTRUCTION	5
4. AVAILABLE TOOLS	14
4.1 JET FIRE PLATFORM.....	14
4.2 700 BAR HYDROGEN CAR	16
4.3 ALTERNATIVE ENERGY CAR	16
4.4 EXPLOSION PLATFORM.....	16
4.5 DISMANTLED H₂ TUBE TRAILER.....	17
4.6 MOCK-UP DISPENSER.....	18
4.7 MOCK-UP FUEL/ELECTROLYSER CONTAINERISED SYSTEM	19
4.8 TECHNICAL AREA	11

1. Objective of D4.3

The goal of the deliverable is to show the construction, the installation and the commissioning that was performed on ENSOSP site, following the technical specifications defined in D4.2.

AREVA SE (located close to ENSOSP site) has subcontracted companies to realize the manufacturing work including site preparation, foundation construction, building construction, hook-up electrical connection, plumbing connections, hook-up to water main, hook-up to sewer, gas connexions, system and control command connexions, etc. AREVA has organised, monitored and supervised the site construction and the training system.

The overall budget for the construction of the operational hydrogen training facility, including manpower, equipment (system control command, software, container, gas pipes and components, storage capacities, camera, valves, thermal imaging, hydrogen sensors, etc.), gas logistic and maintenance, etc. has been estimated to be 500 k€.

2. Overall view of the platform



3. Construction

The



European Hydrogen Emergency Response training programme for First Responders



Piping network connection to the Alternative Energy Fuel car (LPG, CNG, H2)



Piping network



European Hydrogen Emergency Response training programme for First Responders



4. Overall overview of the platform



European Hydrogen Emergency Response training programme for First Responders

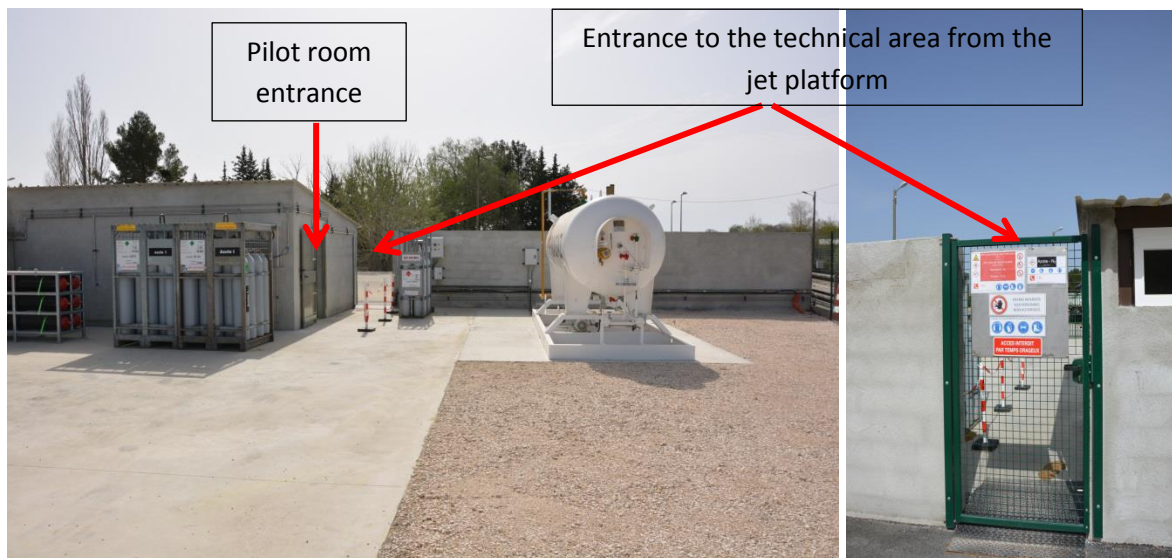


5. Technical platform area

The photo below presents the overall technical platform



Entrance to the technical area from the jet platform

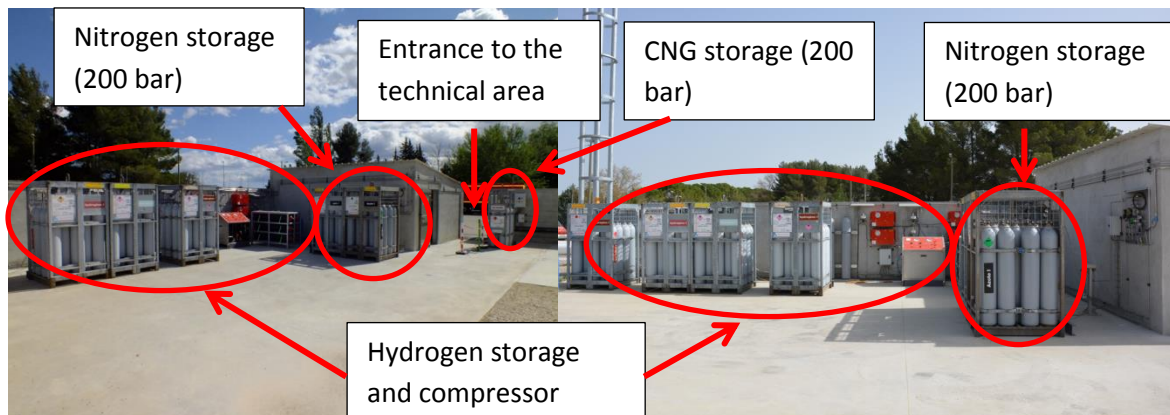


European Hydrogen Emergency Response training programme for First Responders

The photos below show the pilot room and the pilot console.



The technical hydrogen and nitrogen area is shown on the photo below.



The hydrogen 700 bar compressor and 700 bar storage

European Hydrogen Emergency Response training programme for First Responders



The LPG storage is presented below



The technical facility for the explosion platform is shown platform



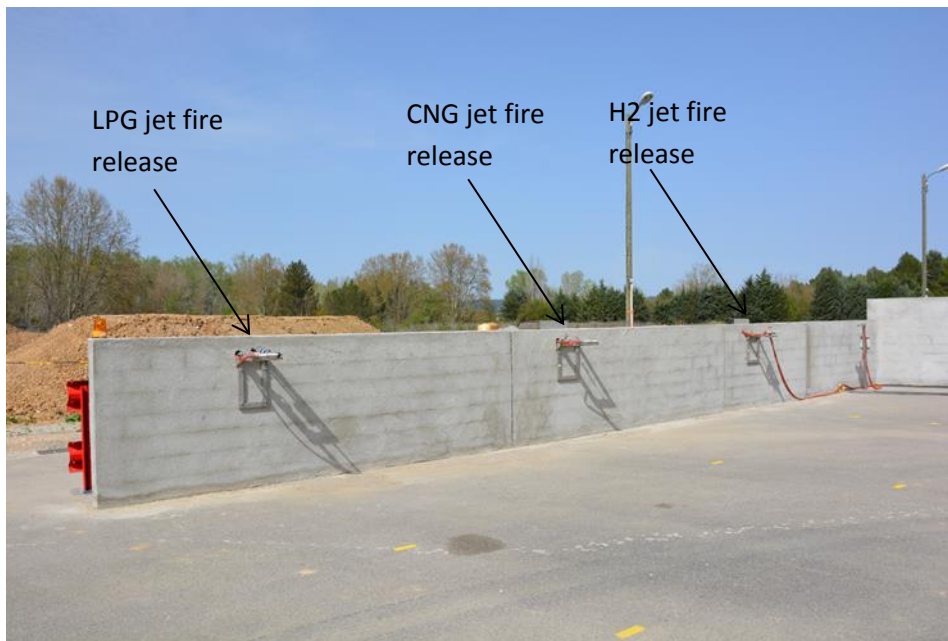
6. Available tools

6.1 Jet fire platform

The jet fire platform is able to reproduce

- LPG jet fires at 20 bar
- CNG jet fires at 200 bar
- H₂ jet fires at 700, 350 and 200 bar with 2 ignition sources (close to the release point and away from the release point)

The operational jet fire platform



European Hydrogen Emergency Response training programme for First Responders

The two photos below show the hydrogen (right) and LPG (left) jet fire release and ignition sources



20 bar LPG jet fire



200 bar CNG jet fire



6.2 700 bar hydrogen car

The photos below the 700 bar hydrogen car.



6.3 Alternative energy car

The alternative energy car is able to reproduce fires from the motor compartment, passenger compartment and boot but also to reproduce

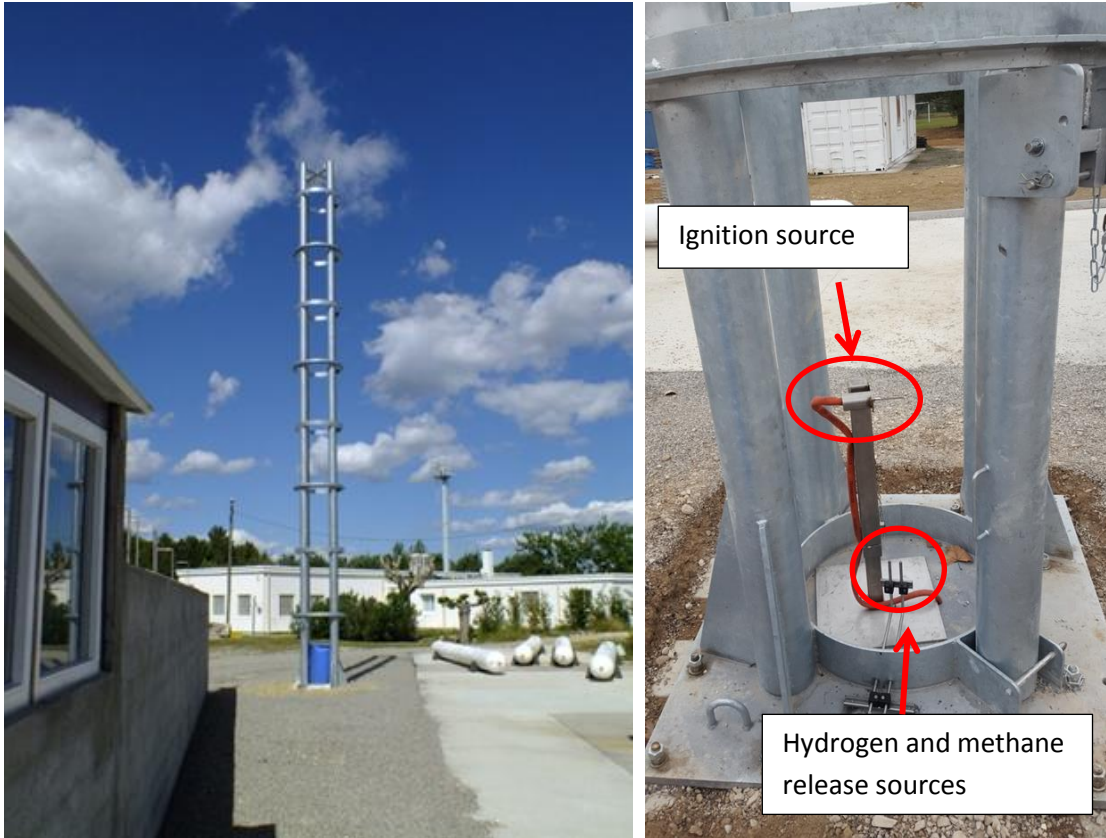
- LPG: 20 bar
- CNG: 200 bar
- H2: 350 bar
- Battery fire



6.4 Explosion platform

The explosion platform is able to

- H2: 4%, 10%, 15%, 20%, 30%, 50% (vol.)
- CH4: 4%, 9%, 12%, 15% (vol.)



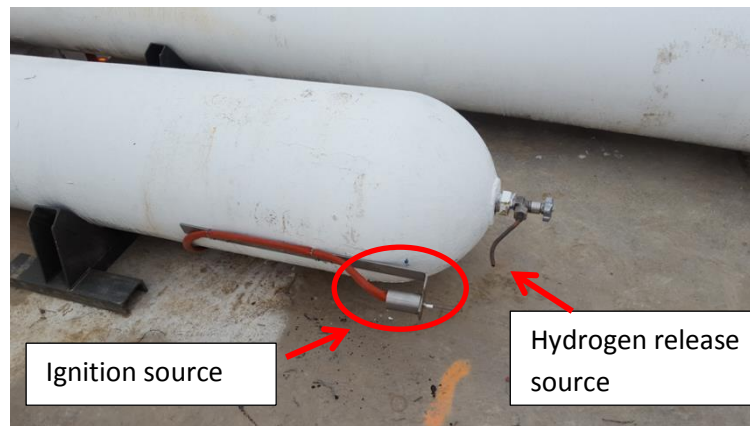
6.5 Dismantled H₂ tube trailer

The dismantled H₂ tube trailer platform is presented on the photo below.

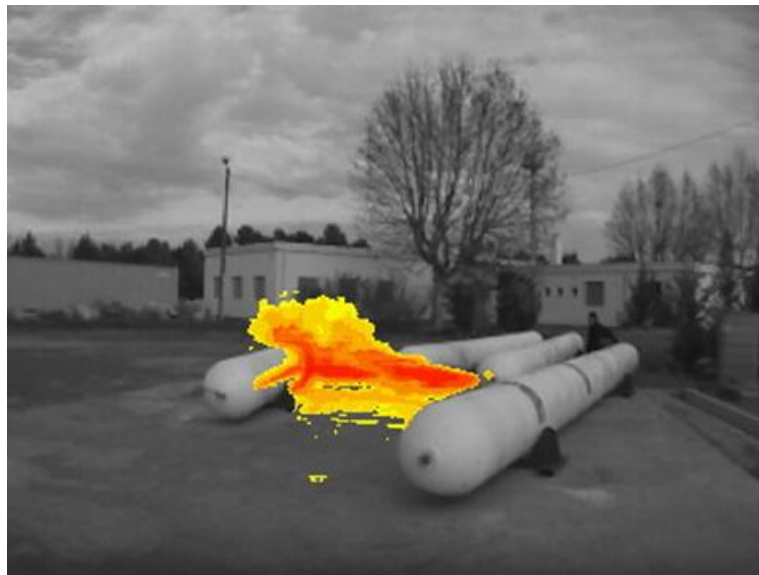


The photo below shows the hydrogen release source from the tube trailer as well as the ignition source.

European Hydrogen Emergency Response training programme for First Responders



The photo below shows the visualisation using the thermal camera of a hydrogen jet fire released from the tube trailer.



6.6 Mock-up dispenser

The photo below shows the mock-up dispenser.



6.7 Mock-up Fuel/Electrolyser containerised system

The photos below shows



Simulating fire

