European hydrogen emergency response training programme for first responders

HyResponse
(325348)

www.hyresponse.eu

HyResponse

European hydrogen emergency response training program for first responders

Commandant (Major) Sébastien BERTAU, (ENSOSP)
Franck VERBECKE, PhD (AREVA Energy Storage)

HyResponse - PROJECT OVERVIEW

- Call topic SP1-JTI-FCH.2012.5.3
- First responder educational and practical hydrogen safety training
- 01/06/2013 -> 30/09/2016 (100% project duration passed)
- Total budget : 2 640 284 €
- FCH JU contribution : 1 858 453 €

mail to : specialized.training@ensosp.fr

HyResponse – Abstract (overview project)

- Hydrogen and Fuel Cell (FCH) technologies and applications both in transport and energy sectors arrive to the market today
- **Fire authorities**' and **First Responders**' awareness and knowledge of these new technologies are limited
- An adequate training is therefore required to provide knowledge and essential skills on:
  - how to handle potential incidents/accidents at FCH systems and infrastructures;
  - how to protect the public with minimum First Responders' own life risk exposure.
- Overall HyResponse project objectives
  - Support the successful implementation of FCH installations into the market by providing **educational and practical hydrogen safety training to First Responders**
  - Facilitate Hydrogen technologies approval

mail to : specialized.training@ensosp.fr

PROJECT TARGETS AND ACHIEVEMENTS

Programme objective/target	Project objective/target	Project achievements to-date	Expected final achievement
MAIP			

Develop first-responder hydrogen safety educational materials in Europe	Develop a comprehensive training for First Responders dealing with all safety aspects of FCH transport and stationary applications:
	• Educational training
	• Operational training
	• Virtual Reality training
		• Content of the educational material Curriculum
		  • Hydrogen safety lectures
		  • RCS training materials
		  • Intervention strategies and tactics
		• Pedagogical scenarios for the virtual and reality training
		• Full educational , operational and virtual reality training tested by up to 71 FRs from 15 countries	

PROJECT TARGETS AND ACHIEVEMENTS

Programme objective/target	Project objective/target	Project achievements to-date	Expected final achievement
MAIP			
Install an European Hydrogen Training Platform on which will be realized full scale exercises	Conception and construction a FCH transport and stationary training platform: • operational training platform • virtual reality training platform	• Operational platform available (commissioned in January 2016) • Virtual Reality platform developed (more than 109 scenarios) • Full training implemented with 71 FRs from 15 countries	
Develop first-responder intervention guide	Deliver an Emergency Response Guide	Intervention methodology developed for transport and stationary FCH applications Emergency response guide realized	Emergency response guide validated and freely accessible

PROJECT TARGETS AND ACHIEVEMENTS

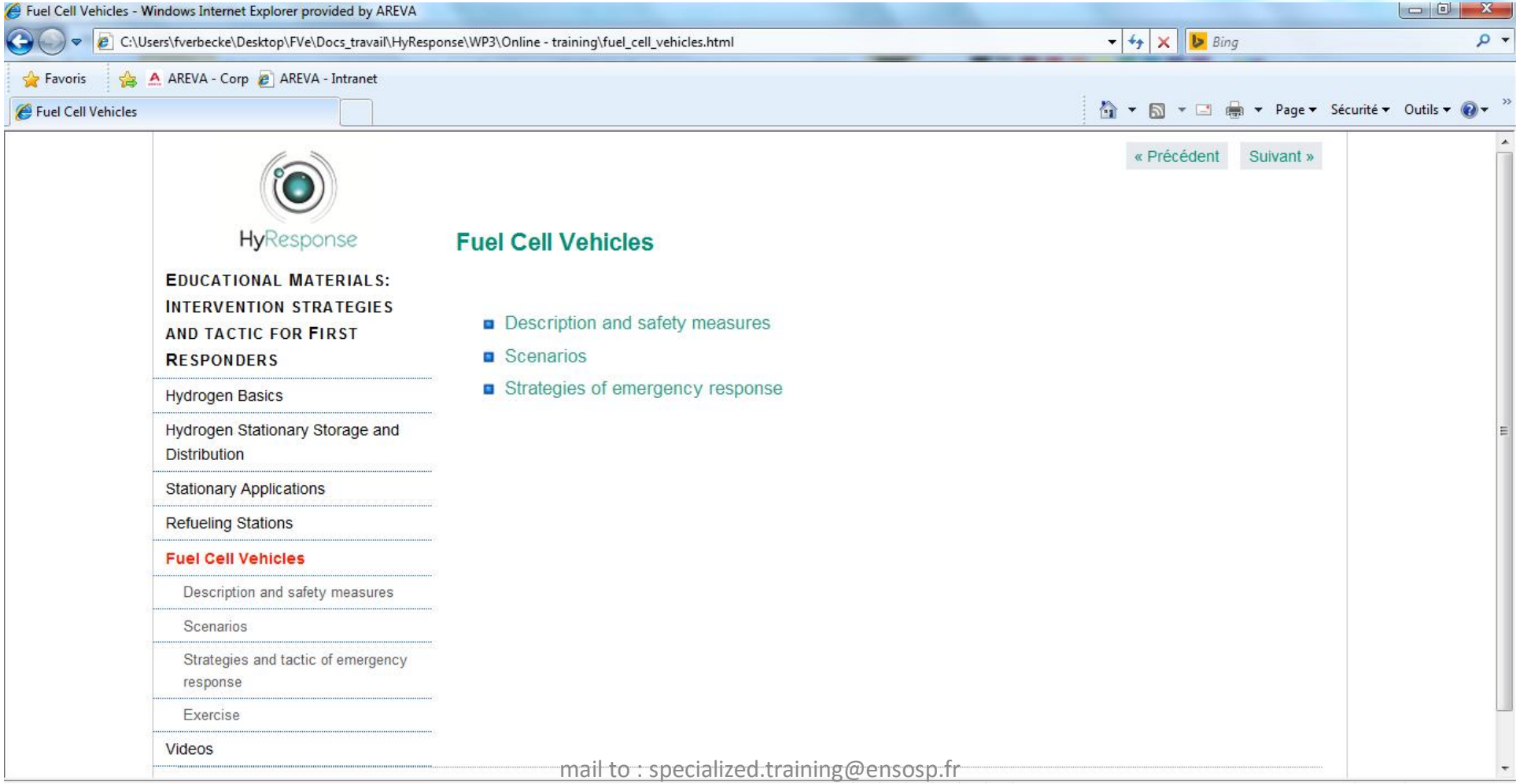
Programme objective/target	Project objective/target	Project achievements to-date	Expected final achievement
MAIP			
Disseminate first-responder hydrogen safety training materials in Europe	Organize 3 training sessions in a face-to-face mode	Training sessions realized 71 FRs trained from 15 countries	

PROJECT TARGETS AND ACHIEVEMENTS

Programme objective/target	Project objective/target	Project achievements to-date	Expected final achievement
MAIP			
Disseminate best practices using online tools	• Free online interactive hydrogen safety training • Free access to the emergency response guide	• Web-based course including educational material on FCH application, their safety concepts, scenarios and related intervention strategies and tactics (available)	Free access to the emergency response guide (after validation)
Dissemination of the program results through public awareness events and initiatives	• Organization of an international workshop for European FR • Participations to international events	• Organization of the 2 International Workshop in 2014 • Participation to several international events	

PROJECT TARGETS AND ACHIEVEMENTS

- Web-based course



PROJECT TARGETS AND ACHIEVEMENTS

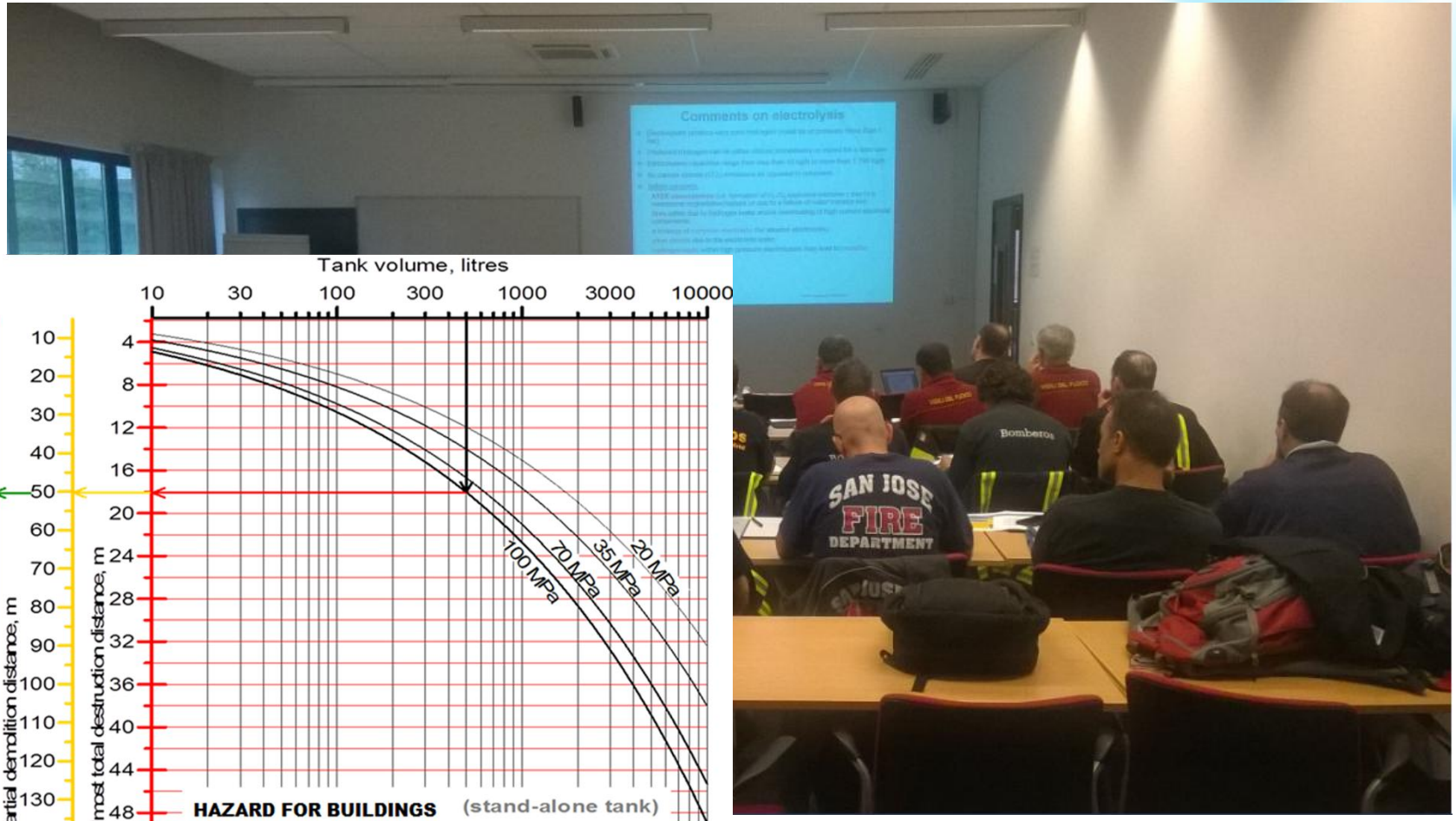
- Face-to-face training sessions
  - About 71 firefighters trainees from about 15 countries
  - Three training sessions
    - 14th-18th of March 2016
    - 9th-13th of May 2016
    - 6th-10th of June 2016

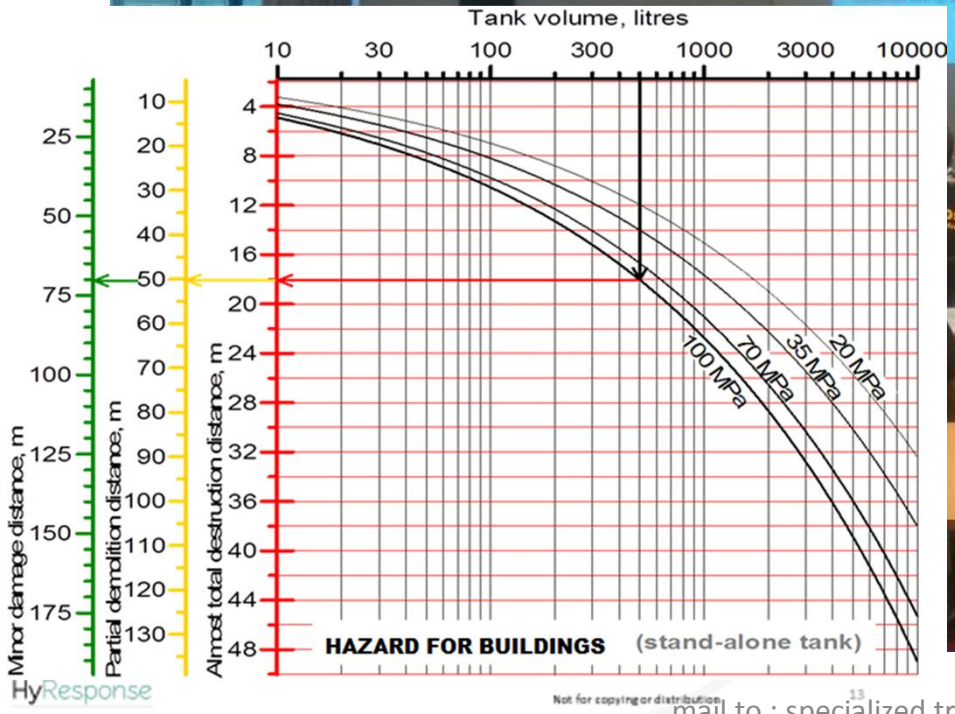
Educational training
Strategies and intervention
Operational training
Virtual reality training

	Monday	Tuesday	Wednesday	Thusday	Friday
8h00- 9h45	FCH application and safety	Safety of storage	Harm and damage criteria	Hazards of H2 use indoors	Ignition sources and prevention
	Hydrogen properties	Methodology and response guide	Unignited H2 releases and their mitigation	Dealing with hydrogen explosions	Motorway accident involving a H2 trailer and hazmat truck
10h15-12h00	H2 fires	FC vehicles (car, bus, forlift, etc.)	Refuelling stations, storage and FC systems	Stationary and mobile applications	
	RCS for First Responders				
12h00-14h00	Lunch				
14h00-15h30	VR tour for presentation of the operational platform	Multi-vehicle accident - FC car in a fire	H2 leak at a refuelling station	Multi-vehicle accident - H2 jet fire from H2 trailer	
	CNG and H2 explosions at various concentrations	Multi-vehicle accident – CNG/LPG car in a fire	FC system default - H2 leak	H2 leak from storage – urban refuelling station	
16h00-17h30	H2, CNG, LPG jet fires	FC bus in a fire on a small road	FC car in a fire at a refuelling station	Urban accident - FC bus in a fire - urban environment	
	Firefighting exercises	Forklift in a fire inside a warehouse	H2 jet fire from industrial storage	Fire in an industrial environment with FC system	
17h30-18h00	Debrief	Debrief	Debrief	Debrief	

PROJECT TARGETS AND ACHIEVEMENTS

- Educational lectures

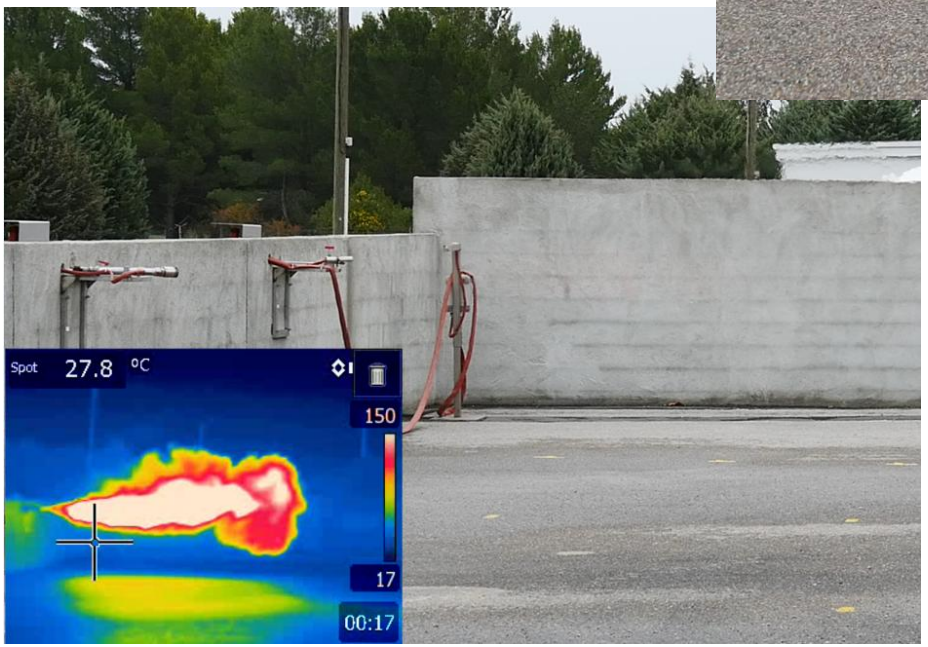


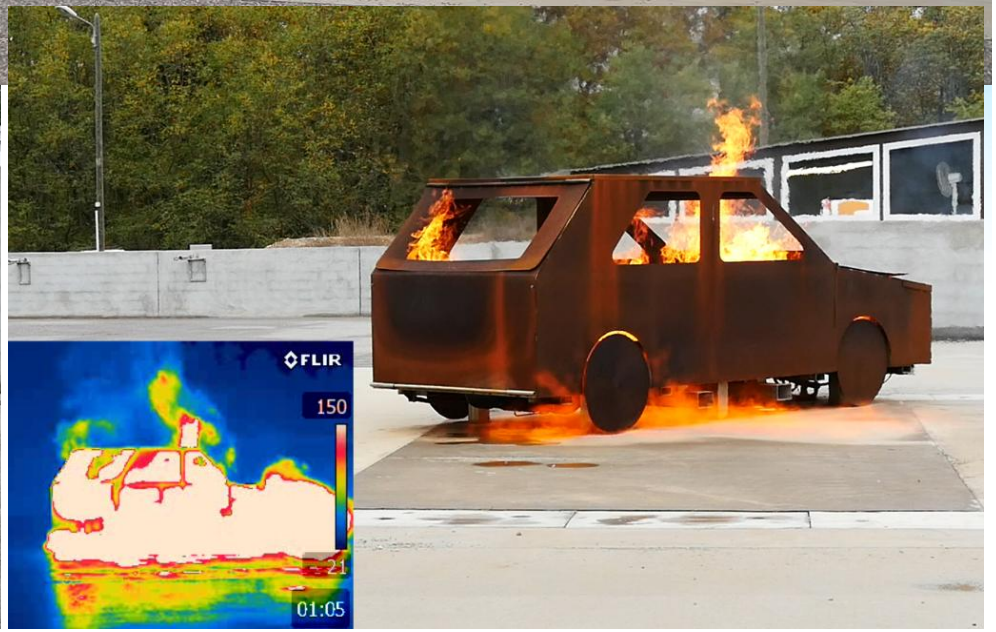


mail to : specialized.training@ensosp.fr

PROJECT TARGETS AND ACHIEVEMENTS

- Operational training
  - 2500 m² platform
  - 109 scenarios
  - Fuel comparison:
    - H2 (700, 350, 200 bar)
    - CNG (200 bar)
    - LPG (20 bar)





PROJECT TARGETS AND ACHIEVEMENTS

Jet fire tool (LPG, CNG, H2 20 to 700 bar)

PROJECT TARGETS AND ACHIEVEMENTS

PROJECT TARGETS AND ACHIEVEMENTS

Explosion comparison tool

PROJECT TARGETS AND ACHIEVEMENTS

Dismateled H2 trailer

PROJECT TARGETS AND ACHIEVEMENTS

Refueling station (dispenser)

PROJECT TARGETS AND ACHIEVEMENTS

Fuel cell container

PROJECT TARGETS AND ACHIEVEMENTS

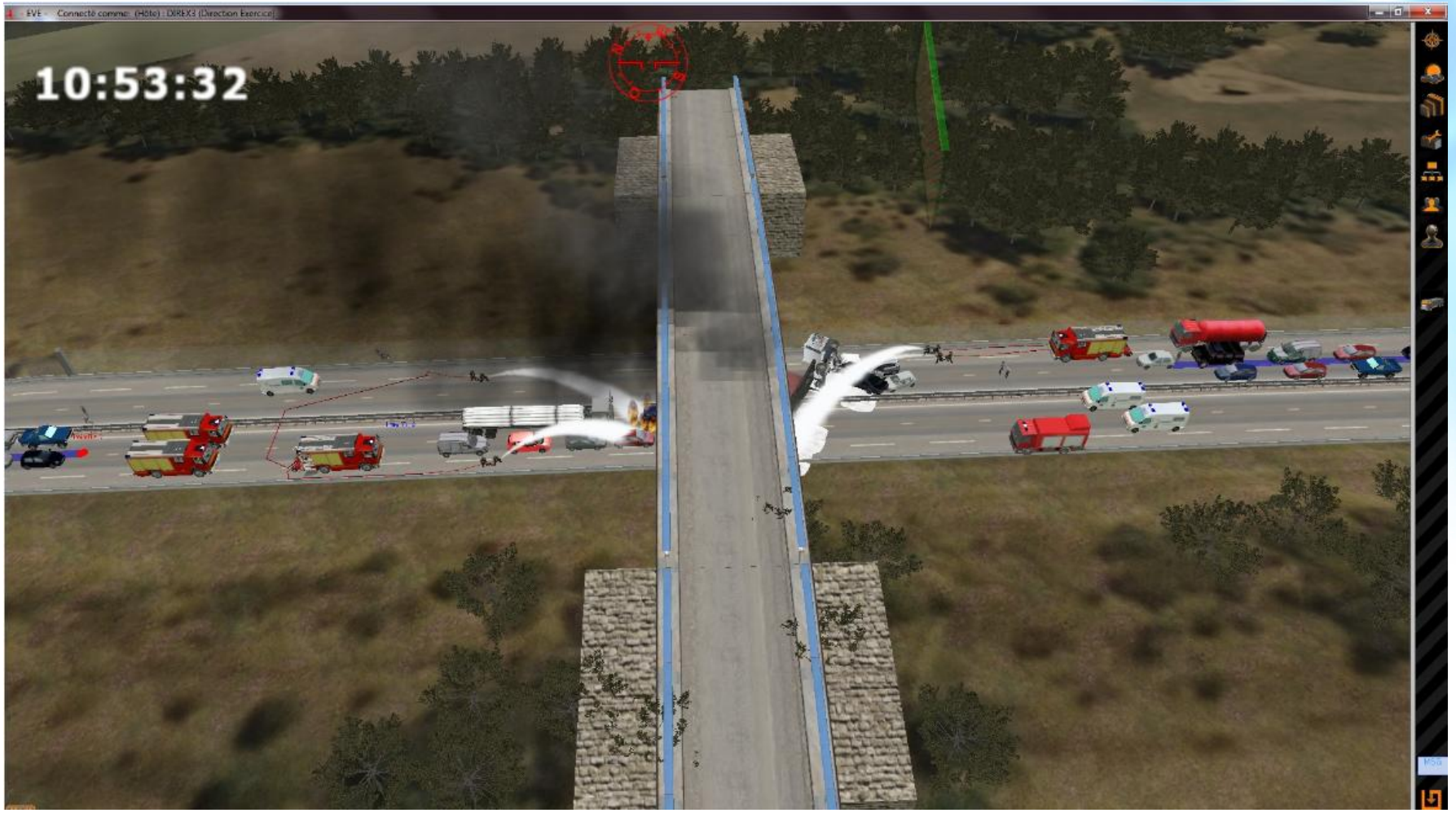
Technical area

PROJECT TARGETS AND ACHIEVEMENTS

mail to : specialized.training@ensosp.fr

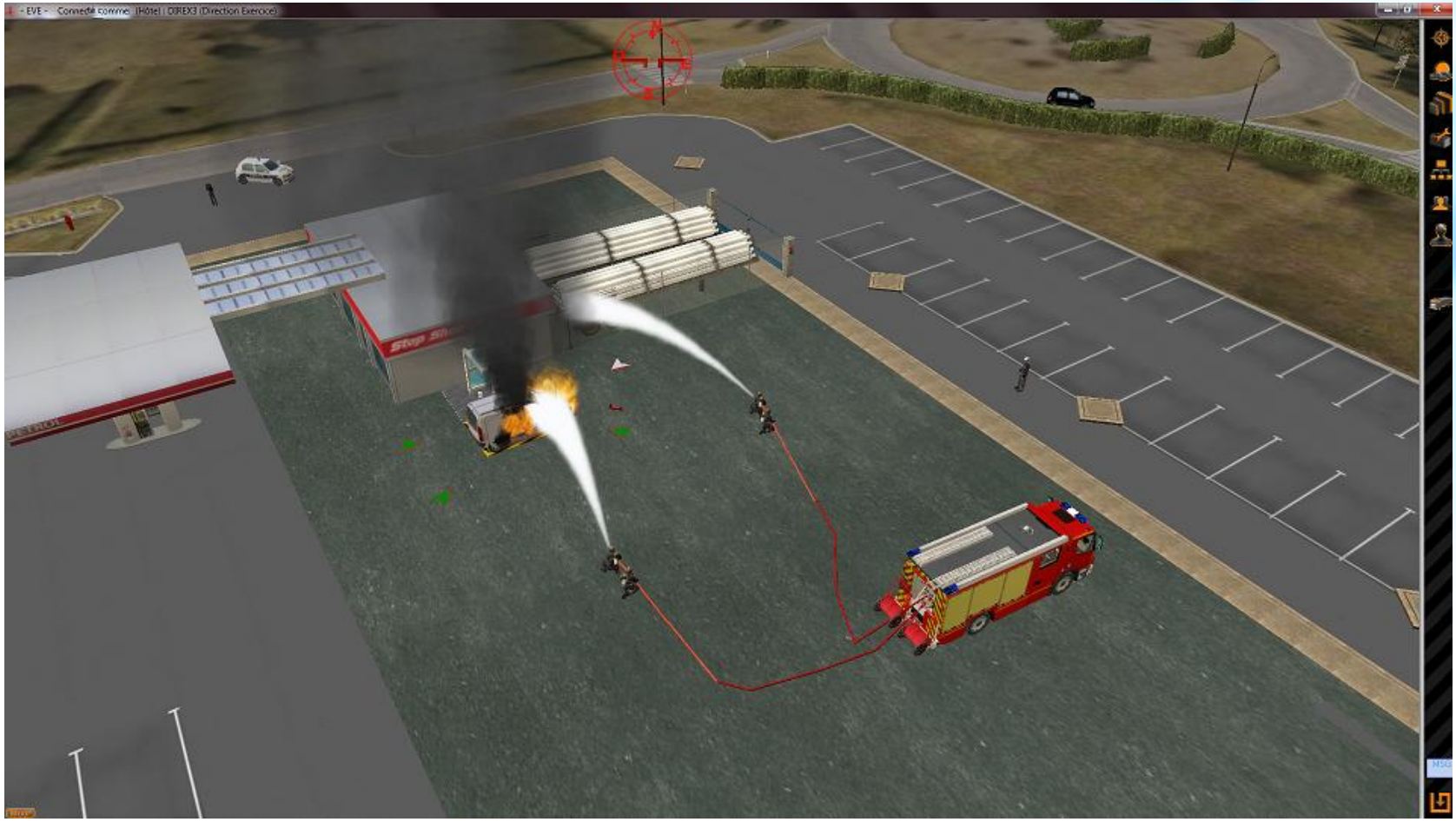
PROJECT TARGETS AND ACHIEVEMENTS

- Virtual Reality training platform



mail to : specialized.training@ensosp.fr

PROJECT TARGETS AND ACHIEVEMENTS



mail to : specialized.training@ensosp.fr

PROJECT TARGETS AND ACHIEVEMENTS

- First training session (March) Feedback

PROJECT TARGETS AND ACHIEVEMENTS

- Second training session (May) Feedback

mail to : specialized.training@ensosp.fr

PROJECT TARGETS AND ACHIEVEMENTS

- Third training session (June) Feedback

mail to : specialized.training@ensosp.fr

RISKS AND MITIGATION

- Due to major organizational changes in ASE and ENSOSP during year 2014:
  - The consortium asked for a 4 month extension of the project duration up to 2016, September 30th.
  - The extension was accepted.

SYNERGIES WITH OTHER PROJECTS AND INITIATIVES

- Collaboration with the International Association of Fire and Rescue Services (CTIF)
  - Commission “Extrication and New Technologie”
- International collaboration
  - USA with DOE and Pacific Northwest National Laboratory
  - Japan with Technova and HySUT
- European Fire Services
  - Germany, Austria, Belgium, Croatia, Spain, France, Italy, Norway, Netherlands, Poland, Portugal, UK, Sweden, Czeck Republic
- Industry
  - SNECMA
- Fire services outside Europe
  - USA, Japan, Taiwan, China
- Automotive car manufacturer
  - Toyota, Hyundai,

HORIZONTAL ACTIVITIES

- Training activities organised by the project
  - 1st International workshop on hydrogen safety training for first responders workshop, 3-4/09/2014, Aix-en-Provence, France
  - 1st training session: 14th-18th of March 2016
  - 2nd training session: 9th-13th of May 2016
  - 3rd training session: 6th-10th of June 2016
  - 2nd International workshop on hydrogen safety training for first responders workshop, 29-30/06/2016, Aix en Provence, France

- Project work in safety, regulations, codes, standards, general public awareness

  Support to :
  - Standardization regarding rescue sheet (CTIF)
  - ISO draft standards regarding harmonized signs and symbols for alternate energy carriers (CTIF)

DISSEMINATION ACTIVITIES

- 1st International Workshop on Hydrogen Safety training for first responders workshop in 09/2014, Aix-en-Provence, France
- European Technical School on Hydrogen and Fuel Cells, June 23-27, 2014 - Crete, Greece, « Safety of hydrogen and fuel cell technologies: industrial research perspective »
- HySafe International Workshop on hydrogen safety, 11/11/2014 Washington USA « Hydrogen Emergency Response Training Program for First Responders – HyResponse »,
- New Energy Carriers in Tunnels and undergrounds systems, 11/03/2014, Marseille, France, "Safety aspects of new energy carriers (focus on Hydrogen) from Firefighter's point of view"
- Busworld Turkey 2014, « Fuel Cell Bus and Hydrogen Safety Training for First Responders », Istanbul, Turkey, April 24-27, 2014
- International Conference on Hydrogen Safety training, "European Hydrogen Emergency Response training programme for First Responders", October 19-21, 2015 Yokohama (Japan)
- Conference of the International Association for Fire and Rescue Services (CTIF), Rome (Italy), 09/12/2015
- WHEC 2016 – Spain
- 2nd International workshop on hydrogen safety training for first responders workshop, Aix en Provence, France (29-30/06/2016)
- Research priority workshop on Hydrogen Safety, 26-27 september 2016, Petten, The Netherlands

EXPLOITATION PLAN/EXPECTED IMPACT

- What has your project changed in the panorama of FCH technology development and/or commercialisation?
  - Support the successful implementation of FCH installations into the market by providing **educational and practical hydrogen safety training to First Responders**
- Project's results to be exploited by the European First responders community:
  - Free online access to teaching materials
  - Web-based course and interactive virtual reality exercises
  - European Emergency Response Guide freely accessible (soon)
- On demand sessions available in 2017:
  - Various duration from 1 to 5 days
  - Depending on the trainees, the session will be provided in French or English (Spanish under request)
- 2nd stage of the European emergency response training program: "*Train tomorrow's First Responder Trainers and Hazmat Officers*"
  - Train tomorrow's European First Responder trainers and hazmat officers who will then further replicate the European Hydrogen Safety Training Program in their country and in their language

- Thank you for your attention

- For any information about the project and/or 2017 sessions please mail to :
- Specialized.training@ensosp.fr