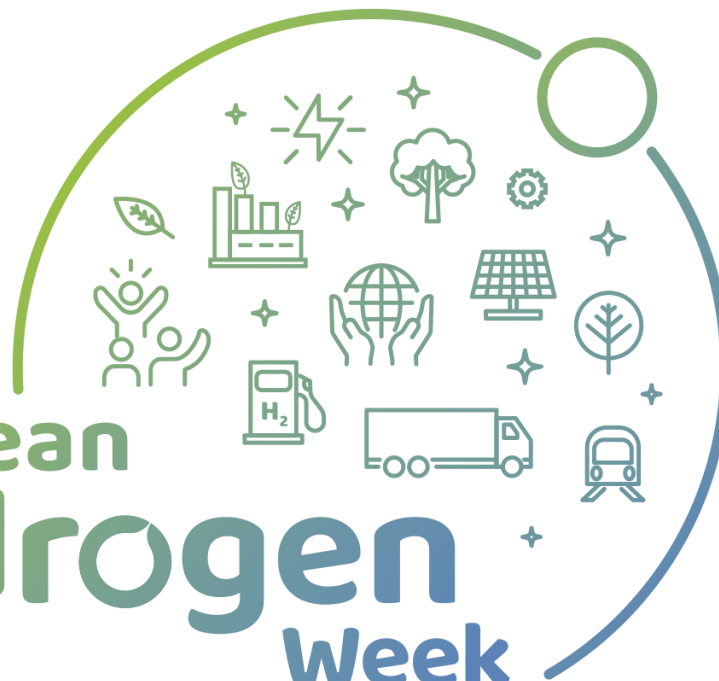


EUROPEAN HYDROGEN SAFETY PANEL

EHSP

European
Hydrogen
Week



Iñaki Azkarate

<https://www.fch.europa.eu/page/european-hydrogen-safety-panel>

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#PRD2021
#CleanHydrogen



Project Overview

A brief timeline



- In 2006 and 2009, the NoE HySafe suggested an activity for sharing lessons learned and hydrogen safety experience across project boundaries.
- In 2014 the International Association for Hydrogen Safety HySafe proposed the installation of a safety panel to the Executive Director and Governing Board of the FCH JU.
- After several discussions about formal aspects, terms of reference, vision, mission, mandates, etc...
in 2017, the FCH 2 JU launched the European Hydrogen Safety Panel



Vision // Strategic Role

Reflecting the FCH 2 JU vision

- Hydrogen plays a key role in the Energy System constituting a safe and sustainable Energy Carrier.
- Hydrogen is an enabler of the Energy Transition towards a decarbonized system.



EHSP ROLE: to provide within FCH-JU independent safety expertise, objective information, education and training in different forms for various groups of stakeholders and support the anticipated upscaling of hydrogen energy application.

Mission, Objectives and Corresponding Activities

The EHSP assists the FCH 2 JU both at programme and at project level

- to assure that hydrogen safety is adequately managed, and
- to promote and disseminate hydrogen safety culture

Activities
structured in
4 Task Forces



Scope of Activities

The EHSP assists the FCH 2 JU both at programme and at project level

TF1 Support at
Project level



- Coordination of a package of measures to avoid any accident by integrating safety learning, expertise and planning into FCH2 JU funded project.
- e.g. Safety plans review, in-situ reviews, workshops, ...

TF2 Support at
Programme level



- Answering urgent questions, short introductions to hydrogen safety
- Collaboration with international organisations...

TF3 Data collection
and assessment



- Support to HIAD - Hydrogen Incidents and Accidents Database
- Analysis of existing events, derive lessons learned and provide recommendations, collaboration with similar activities of the US DoE, EIGA,...

TF4 Public Outreach



- Development of a comprehensive outreach, education and training programme for the safety component of FCH2 JU projects
- Newsletter and website,...

Current EHSP Members - the Pool of Experts



Inaki Azkarate



Stuart Hawksworth



Thomas Jordan



Georg Wilfried Mair



Marta Maroño



Daniele Melideo



Vladimir Molkov



Ernst-Arndt Reinecke



Pratap Sathiah



Ulrich Schmidtchen



Etienne Studer



Trygve Skjold



Tom Van Esbroeck



Elena Vyazmina



Jennifer Wen

Outcomes: Safety Planning Guidance

SAFETY PLANNING AND MANAGEMENT IN HYDROGEN AND FUEL CELLS PROJECTS - GUIDANCE DOCUMENT

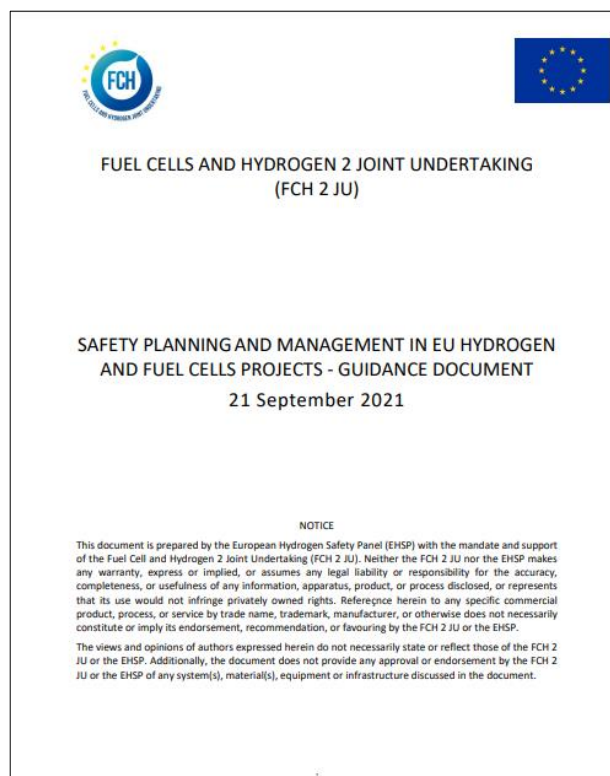


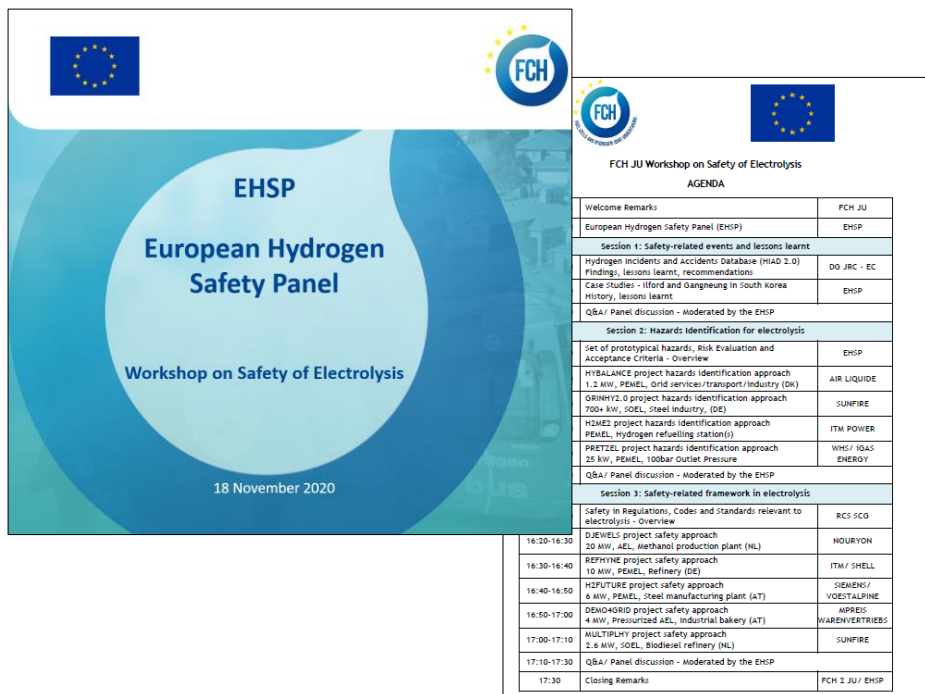
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Outcomes: Workshops

2020

Safety of Electrolysis



EHSP
European Hydrogen Safety Panel
Workshop on Safety of Electrolysis
18 November 2020

FCH JU Workshop on Safety of Electrolysis		
AGENDA		
Welcome Remarks	FCH JU	
European Hydrogen Safety Panel (EHSP)	EHSP	
Session 1: Safety-related events and lessons learnt		
Hydrogen Incidents and Accidents Database (HIAD 2.0)	DG JRC - EC	
Findings, lessons learnt, recommendations		
Case Studies - Ilford and Gangneung in South Korea	EHSP	
History, lessons learnt		
Q&A / Panel discussion - Moderated by the EHSP		
Session 2: Hazards Identification for electrolysis		
Set of prototypical hazards, Risk Evaluation and Acceptance Criteria - Overview	EHSP	
HYBALANCE project hazards identification approach	AIR LIQUIDE	
1.2 MW PEMEL, Grid service/transport/industry (DK)		
ORINHY2.0 project hazards identification approach	SUNFIRE	
700+ kW, SOEL, Steel industry, (DE)		
H2ME2 project hazards identification approach	ITM POWER	
PEMEL, Hydrogen refueling station(s)		
PRETTEL project hazards identification approach	WIM/ IGAS ENERGY	
25 kW, PEMEL, 100bar Outlet Pressure		
Q&A / Panel discussion - Moderated by the EHSP		
Session 3: Safety-related framework in electrolysis		
Safety in Regulations, Codes and Standards relevant to electrolysis - Overview	RCS DCO	
16:20-16:30	DJEWEL project safety approach	NOURYON
20 MW, AEL, methanol production plant (NL)		
16:30-16:40	REFHYNE project safety approach	ITM / SHELL
10 MW, PEMEL, Refinery (DE)		
16:40-16:50	H2FUTURE project safety approach	SIEMENS / VÖESTALPINE
6 MW, PEMEL, Steel manufacturing plant (AT)		
16:50-17:00	DEMOMORIO project safety approach	MAPRES
4 MW, Pressurized AEL, industrial bakery (AT)		
17:00-17:10	MULTIPLY project safety approach	SUNFIRE
2.6 MW, SOEL, Biodiesel refinery (NL)		
17:10-17:30	Q&A / Panel discussion - Moderated by the EHSP	
17:30	Closing Remarks	FCH 2 JU / EHSP

2021

Safe Storage of Hydrogen



European Hydrogen Safety Panel
Workshop on Safe Storage of Hydrogen
18th November 2021

10:20-10:30	H2M2 / H2M2 project	
10:30-10:40	- Light-duty vehicles	
10:40-10:50	- Heavy-duty vehicles	
10:50-11:00	- CO&C Tanks	
11:00-11:10	HYPERMEL project	
11:10-11:40	Safe design of TPGD/TPD-free tanks	UNIVERSITY OF ULSTER
11:40-11:45	Q&A / Panel discussion	EHSP
11:40-11:45	Break / contingency time	

Safety at the Hydrogen Laboratory



ONLINE WORKSHOP
Safety at the hydrogen laboratory

Sharing best practices for safe layout and operation of laboratories with a significant inventory of hydrogen

An online webinar organised by the European Hydrogen Safety Panel (EHSP) and the Fuel Cells and Hydrogen 2 Joint Undertaking (FCH 2 JU), in cooperation with ...

Outcomes: Assessment and lessons learnt from HIAD 2.0



FUEL CELLS AND HYDROGEN 2 JOINT UNDERTAKING (FCH 2 JU)

Statistics, lessons learnt and recommendations from
the analysis of the Hydrogen Incidents and Accidents
Database (HIAD 2.0)

21 September 2021

NOTICE

This document is prepared by the European Hydrogen Safety Panel (EHSP) with the mandate and support of the Fuel Cell and Hydrogen Joint Undertaking (FCH 2 JU). Neither the FCH 2 JU nor the EHSP makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favouring by the FCH 2 JU or the EHSP.

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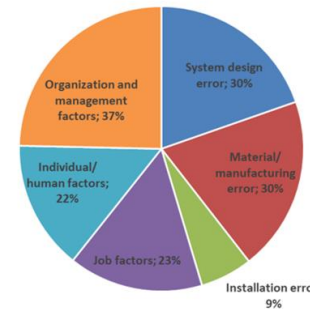
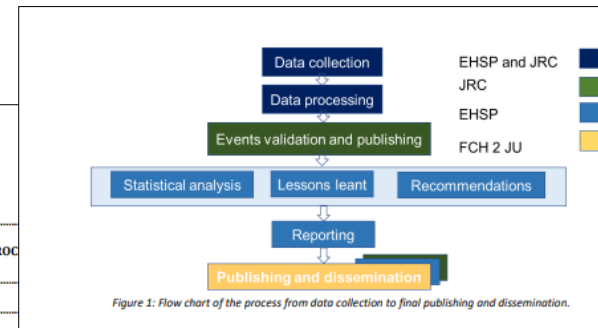


Figure 9: Causes of hydrogen incidents (multiple causes per event considered).

Table 1: HIAD 2.0 events classified by consequence and operation mode

Total number events	Number events by consequence			
	Explosions	Jet fires	Unignited hydrogen release	No hydrogen release
424	238	117	55	14
	Number events by operational mode			
	Normal operation	Outside normal operation	Unclear	
	299	113	12	

Table 2: HIAD 2.0 events classified by industry sector

Sector	Number of events by sector
Chemical/ Petrochemical industry	259
Hydrogen transport and distribution	43
Nuclear power plant	23
Laboratory / R&D	15
Power generation	13
Hydrogen production	10
Aerospace	5
Entertainment	3
Hydrogen-powered vehicle	2
Stationary fuel cell	0
Other/Unknown	34
Other	34
Total	461

Finally, Table 3 lists the number of events according to causes. It should be noted that some events had multiple causes.

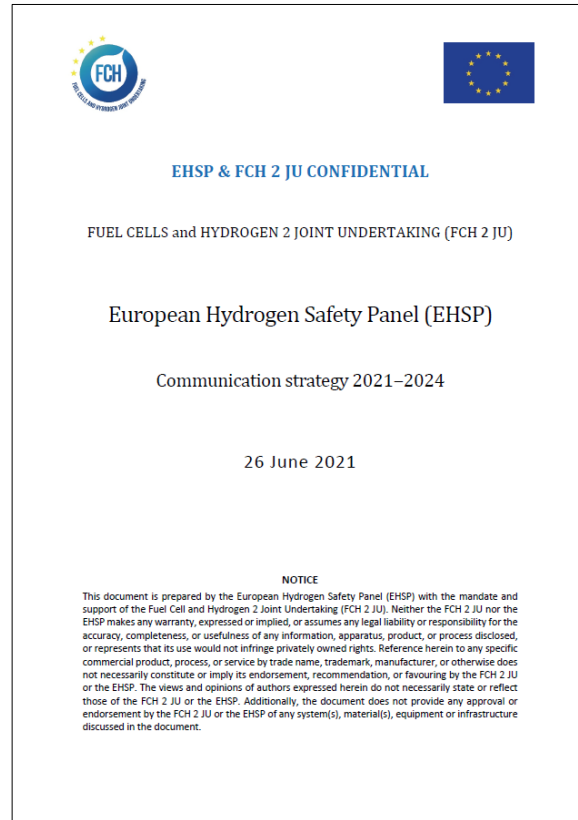
Table 3: HIAD 2.0 events classified by causes

Cause	Number of events by causes
System design error	126
Material/ manufacturing error	127
Installation error	38
Job factors	98
Individual/ human factors	94
Organization and management factors	158

Outcomes: Public Outreach

Communication Strategy // Website // FAQs // TIM // KEY MESSAGES

<https://www.fch.europa.eu/page/european-hydrogen-safety-panel>



EHSP Communication Strategy 2021-2024 EHSP & FCH 2 JU Confidential

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3



KEY MESSAGES

1. Hydrogen will play an essential role in energy systems as a clean and sustainable energy carrier.
2. To bring the benefits of hydrogen to society, hydrogen technologies must be safely developed and used across a variety of applications and sectors.
3. Hydrogen systems can be as safe as systems based on conventional energy carriers, provided the specific properties of hydrogen and the hydrogen system are properly addressed.
4. Hydrogen safety is an active area of research that supports the implementation and operation of hydrogen systems.
5. The EHSP provides impartial expertise and objective information to relevant stakeholders, including the public.
6. The EHSP supports stakeholders on issues related to hydrogen safety, including general advice, safety reviews, and accident investigations.
7. The EHSP supports and promotes the development of strong safety cultures in organisations engaged in hydrogen technologies.

EHSP: An essential, open and free resource



FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

EXTRANET

Follow



ABOUT US

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PROJECTS

STAKEHOLDER FORUM

PROGRAMME REVIEW

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GROUP

**EUROPEAN HYDROGEN SAFETY
PANEL**

Call for expression of interest

GUARANTEES OF ORIGIN FOR
HYDROGEN

FCH VALUE CHAIN

CALL FOR EXPRESSION OF INTEREST

Call for expression

Call for expressions of interest to set up a list of independent experts to assist the Fuel Cells and Hydrogen 2 Joint Undertaking for tasks in relation to the European Hydrogen Safety Panel.

The complete details of the call, including all information and objectives of the call, detailed eligibility requirements, and what and how to submit an application can be found here (hyperlink to our internal document that we have prepared for the call available [here](#))

Additional documents available for this call:

- Notice of call for expression of interest – publication number 2017/S 17-408163
- [Legal entity templates](#)
- [Financial identification](#)
- [Registration Form](#)
- [Privacy statement](#)

Instructions for applications

Candidates meeting the eligibility criteria contained in the full [Call for Expressions of Interest](#) are requested to submit their applications electronically

**Interest in participating?
Call for expressions of interest
open!**

#PRD2021
#CleanHydrogen



European
Commission

Thank you very much
for your attention

