MultHyFuel Launch Event

29/04/2021

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under Grant Agreement No 101006794. This Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation programme, Hydrogen Europe and Hydrogen Europe research.

ETIQUETTE

All participant microphones are muted to keep the audio clear.

Please use Q&A box if you have any questions to the speakers.

This meeting will be recorded. The recording and slides will be available in the MultHyFuel's website https://multhyfuel.eu/.

Should you need access to them before they go live, please send an e-mail to info@multhyfuel.eu

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

MultHyFuel

Enrique Girón

Launch event
29/04/2021

Strong public-private partnership with a focused objective

EU Institutional Public-Private Partnership (IPPP)

Fuel Cells & Hydrogen Joint Undertaking (FCH 2 JU)

Hydrogen Europe

Industry grouping
More than 185 members
50% SME

European Commission

Hydrogen Europe Research

Research grouping
over 83 members

To implement an *optimal research and innovation programme* to bring FCH technologies to the point of market readiness by 2020

FCH 2 JU Objectives

Market readiness of a portfolio of clean, efficient and affordable solutions for our energy and transport systems

Clean Transport

Reduce fuel cell system costs for transport applications

H_2 storage for grid balancing

Demonstrate on a large-scale hydrogen's capacity to harness power from renewables and support its integration into the energy system

Green hydrogen production

Increase efficiency and reduce costs of hydrogen production, mainly from water electrolysis and renewables

Heat & electricity production

Increase fuel cell efficiency and lifetime

Minimal use of critical raw materials

Reduce platinum loading

FCH 2 JU Programme structure

ENERGY

- Hydrogen production and distribution
- Hydrogen storage for renewable energy integration
- Fuel cells for power & combined heat & power generation

TRANSPORT

- Road vehicles
- Non-road vehicles and machinery
- Refuelling infrastructure
- Maritime, rail and aviation applications

CROSS-CUTTING

(e.g. standards, safety, education, consumer awareness, …)

FCH 2 JU:
Total Budget: 1,3 bn €
EC contribution: 646 m €

FCH 2 JU programme implementation

Energy

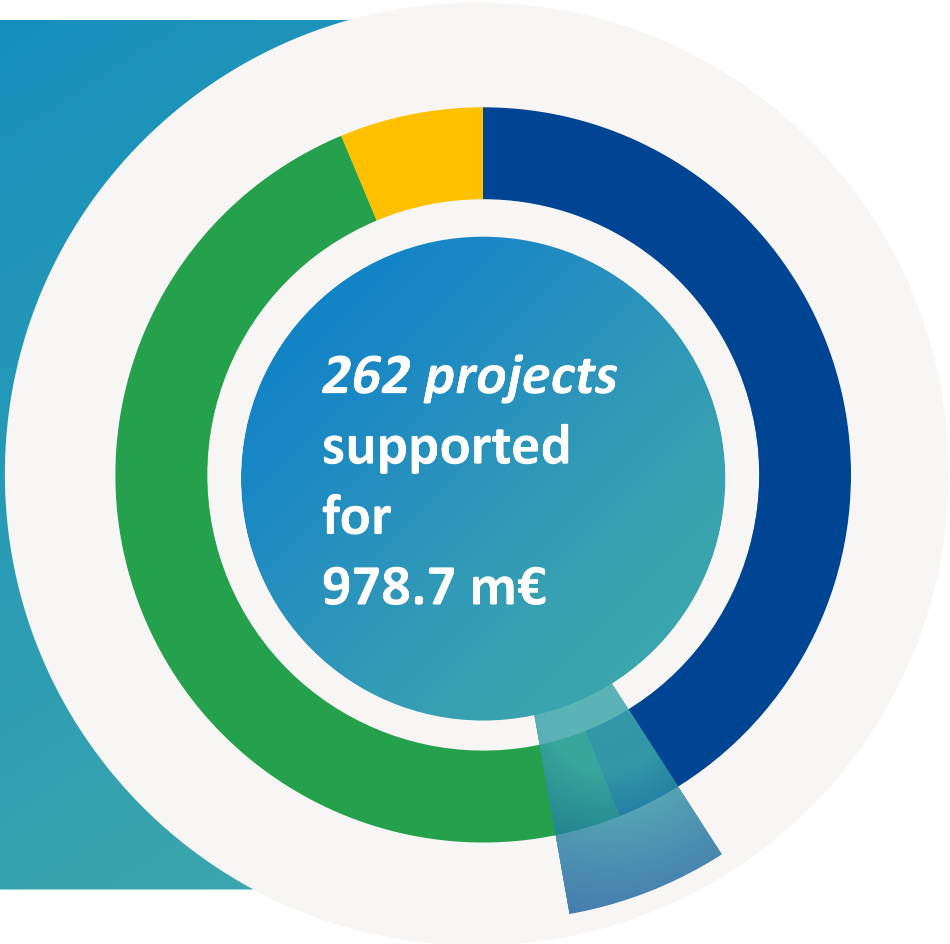
- Hydrogen production and distribution
- Hydrogen storage for renewable energy integration
- Fuel cells for power & combined heat & power generation

Transport

- Road vehicles
- Non-road vehicles and machinery
- Refuelling infrastructure
- Maritime rail and aviation applications

Cross-cutting

- E.g. standards, safety, education, consumer awareness …



46 %
450.6 million euros
144 projects

41 %
404 million euros
70 projects

6 %
58 million euros
43 projects

7 %
66 million euros
5 projects

Similar leverage of other sources of funding: 1 b€

FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

Enrique Girón

For further information
www.fch.europa.eu

@fch_ju

FCH JU

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH 2 JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

MultHyFuel

BACKGROUND AND CONTEXT

With increasing demand for FCEV, Hydrogen Refueling Stations are required to be upscaled and co-located alonsige conventional fuels in commercial and residential areas.

The problem:

- In some countries, specific regulations for HRS don't exist
- Co-location of hydrogen with conventional fuels is not seen in most safety regulations
- Different approaches are taken by different countries

HyLAW

"(…) lack of guidelines and instructions for local authorities can cause **delays** and **extra costs** and may lead to **divergent interpretations** from case-to-case, further complicating the obligations of HRS operators."

2018, https://www.hylaw.eu/

MultHyFuel

MULTHYFUEL: GOALS

Goal

Defining **commonly applicable, effective, and evidence-based guidelines** to facilitate the construction of HRS in multi-fuel refuelling stations.

- Identification of relevant gaps in the current legal and administrative framework;
- Acquisition of experimental data from engineering research on hydrogen leaks, their effects and the effects of mitigation measures;
- Actively engage a community of stakeholders in the overall process, from gap identification to review and validation of the solutions proposed, to facilitate evidence-based policy-making;
- Successfully disseminate the project's results.

WORKPLAN

WP1

State of the art review

Preliminary extensive diagnosis of the existing rules, standards and best practices in the domain.

WP2 & WP3

Analysis and experimentation

New data acquisition through practical experimentation and analysis of information collected.

WP3

Synthesis of results

Generate best practice guidance for national implementation of evidence-based policies.

WP4

Engagement plan

Actively engage a community of stakeholders throughout the process for validation of results and gap identification.

WP5

Communication and dissemination

Maximise project's impact through adequate dissemination of results.

CONSORTIUM

Air Liquide
creative oxygen

ENGIE Lab
CRIGEN

BESPOKE RESEARCH AND CONSULTANCY FROM HSE

Hydrogen Europe

ITM POWER
Energy Storage | Clean Fuel

INERIS
maîtriser le risque
pour un développement durable

kiwa

Shell Hydrogen

snam

ZSW

CALENDAR

2021												2022												2023											
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
			D3.1																																
			D3.2	WS1																															
								D1.2																											
											WS2					D2.2											WS3	D2.4							
																													D3.6	WS4					
																																		D3.7	
																																		D3.8	D4.6

D3.1 – State of the art – technologies
D3.2 – Benchmarking of risk assessment methodology applied to refueling stations
D1.2 – Permitting requirements and risk assessment methodologies for HRS in the EU
D2.2 – Assessment of dispersion for high pressure H2
D2.4 – Fire and explosion hazard assessment summary report
D3.6 – Layout recommendations for multi-fuel stations (separation distances/hazardous areas classification)
D3.7 – Best practice guidelines for multi-fuel stations
D3.8 – Set of recommendations dfor standard
D4.6 – Signed endorsement of key stakeholders to strive for the adoption of common rules

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

WP1 – STATE OF THE ART REVIEW

Preliminary extensive diagnosis of the existing rules, standards and best practices in the domain.

Goal

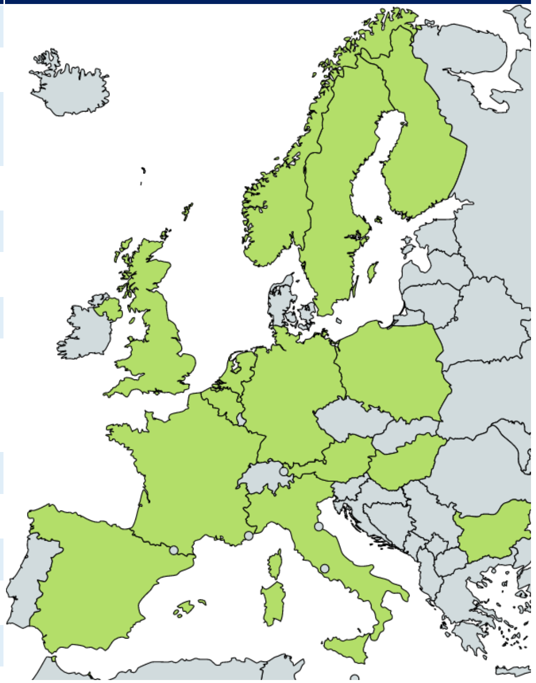
- Collect specific information on requirements, rules, conditions, standards applicable at national level in 14 European countries (Network of National Experts);
- Comparative assessment and gap analysis.

Scope of research

- Existing permitting requirements for HRS;
- Risk Assessment regulations/methodologies;
- Safety or separation distances;
- Intervals and content of equipment maintenance.

Network of National Experts

COUNTRY	ORGANIZATION	EU COVERAGE & REPRESENTATIVENESS
AT	Austrian Energy Agency	
BE	WaterstofNet vzw	
BG	Bulgarian Hydrogen, Fuel Cell and Energy Storage Association	
FI	VTT Technical Research Centre of Finland LTD	
FR	France Hydrogéne	
DE	ZSW	
HU	Hungarian Hydrogen & Fuel Cell Association	
IT	Italian National Agency for new technologies, energy and sustainable economic development and H2 Italy	
NL	NEN	
PL	NEXUS Consultants	
ES	Aragon Hydrogen Foundation	
SE	Hydrogen Sweden	
UK	ITM Power	
NO	Greenstat	



AGENDA

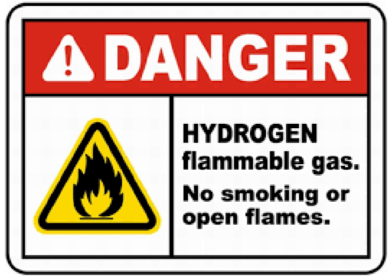
Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH 2 JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

MultHyFuel

OBJECTIVES

- to develop best practice guidelines that can be used as a common approach to **risk assessments** (e.g. suggested methods/tools for risk modelling, Atex, safety distances)

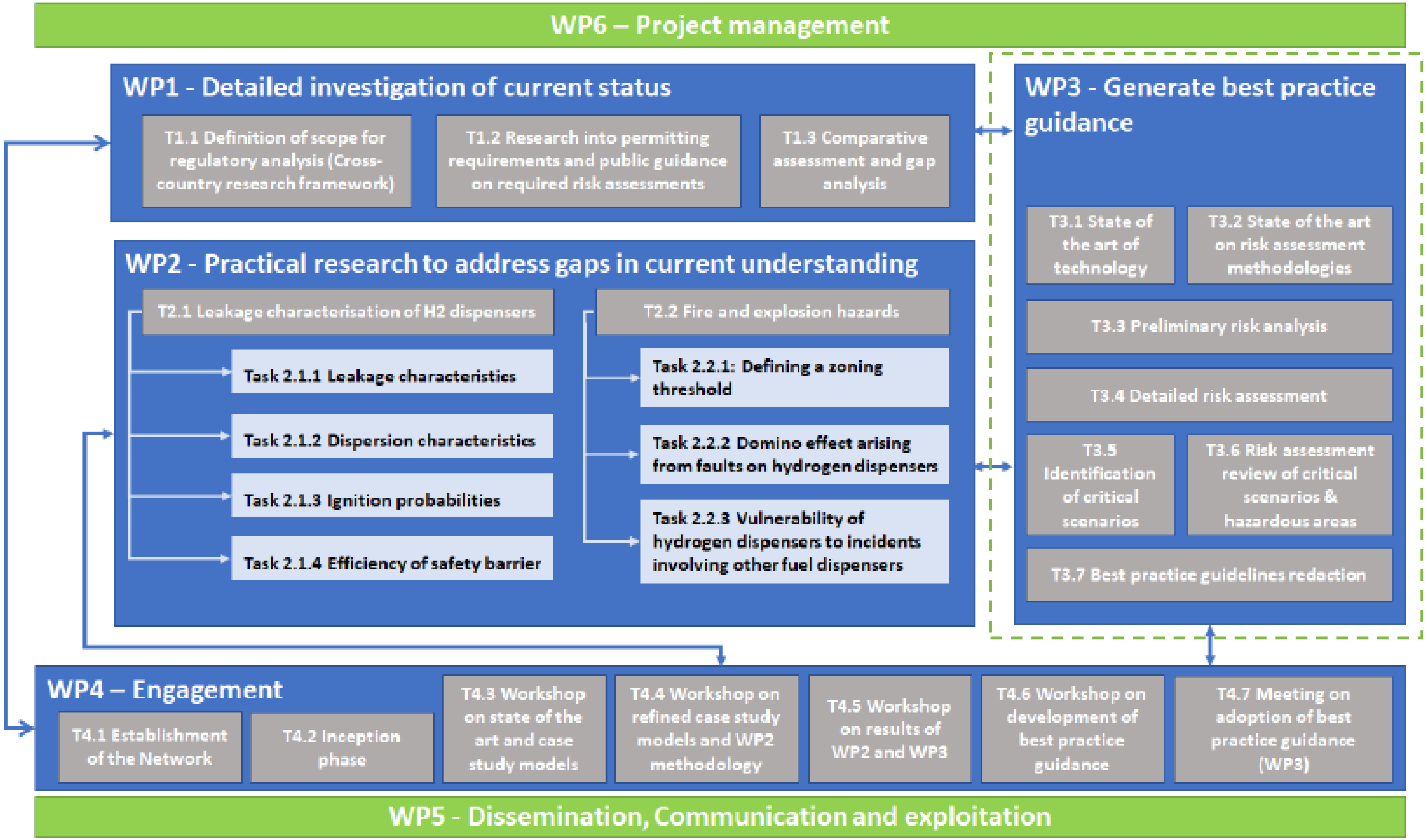
- to determine recommendations for the safe **implementation of H2 dispensers in multi-fuel stations** (separation distances, safety barriers) to be used in standards and regulation relative to HRS



	Consequence				
Likelihood	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	Extreme	Extreme
Possible	Medium	Medium	High	High	Extreme
Unlikely	Low	Medium	Medium	High	High
Rare	Low	Low	Medium	High	High

MultHyFuel

METHODOLOGY



MultHyFuel

METHODOLOGY

- State of the art about **refuelling station technologies** to define 3 case study
- Benchmark of **risk assessments** on H2 & conventional stations to recommend tools/methods for the following tasks
- Preliminary and detailled **risk assessments** on the 3 case study
- Identification of **critical scenarios and safety barriers** to be studied in WP2 (experimentations)
- Review of critical scenarios with inputs from WP2 to refined critical scenarios in order to **define separation, safety distances, hazardous areas**
- Writing **best practices guidelines** for multi fuels stations based on findings of WP3

METHODOLOGY : TASKS 3.1/2 STATE OF THE ART

3.1 State of the art - technology

- Benchmarking oh HRS configurations
- **Output : three case study** to have relevant <u>example systems for the following risk analysis tasks 3.3/3.4</u>
- Presentation to HRS Operators and HRS Manufacturers for validation

	Consequence				
Likelihood	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	Extreme	Extreme
Possible	Medium	Medium	High	High	Extreme
Unlikely	Low	Medium	Medium	High	High
Rare	Low	Low	Medium	High	High

3.2 State of the art – risk assessment

- Benchmarking of literature review and partners inputs on HRS and conventional stations
- **Output : select risk assessment methods and tools** for risk assessment tasks

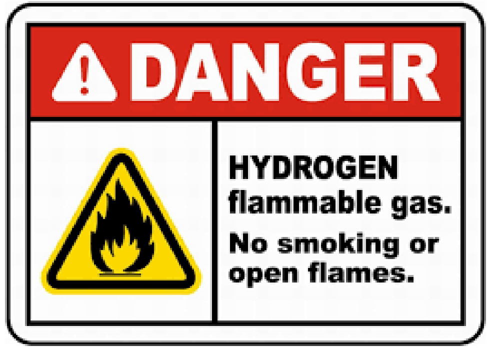
METHODOLOGY : TASKS 3.3/4 RISK ASSESSMENTS

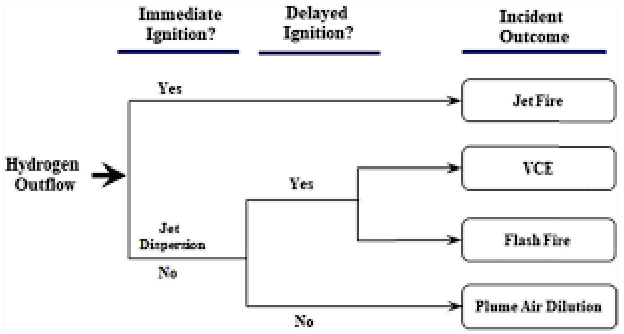
3.3 - Preliminary risk assessment

- **Risk assessments** on the 3 case study
- Brainstorming method in working group with partners experts
- **Output : potential critical scenarios to be studied in details --------------------→**

3.4 - Detailed risk assessment

- **Likelihood and severity** evaluation for the potential critical scenarios with database and modeling tools (fire, explosion)
- Output : **list of scenarios with their severity and likelihood**





MultHyFuel

METHODOLOGY : TASKS 3.5/6 CRITICAL SCENARIOS

3.5 - Identification of critical scenarios

- Definition of risk criteria acceptance
- identification of critical scenarios and related equipments/safety barriers with gap of knowledge
- **Output :** list of **equipment/safety barriers** to be experimented in **WP2**

3.6 - Risk assessment review of critical scenarios and hazardous areas

- WP2 results helps to refine the previous critical scenarios (3.4) -> review
- Calculations of safety distances for dispensers, hazardous area for H2 dispensers
- Outputs: **separation distances & hazardous area classification**

METHODOLOGY : TASKS 3.7 BEST PRACTICES

- Recommandations of **safety barriers** for HRS in a multi-fuel context.
- **Layout recommendations** for HRS dispenser
- Define **hazardous area** around H2 dispenser
- Provide **references to new knowledge** that has been generated by the project in the context of how it can be used for risk assessment and safe design of multi-fuel facilities
- Provide **evidence-based recommendations for future standards** and operation instructions, extracted from the good practice guidelines

Output : Best practice guidelines for multi fuels stations and set of recommendations for informing future standards.

WP3 MAIN OUTPUTS

- **Recommendations on separation distances and safety barriers** for the installation of HRS in existing conventional fuels.

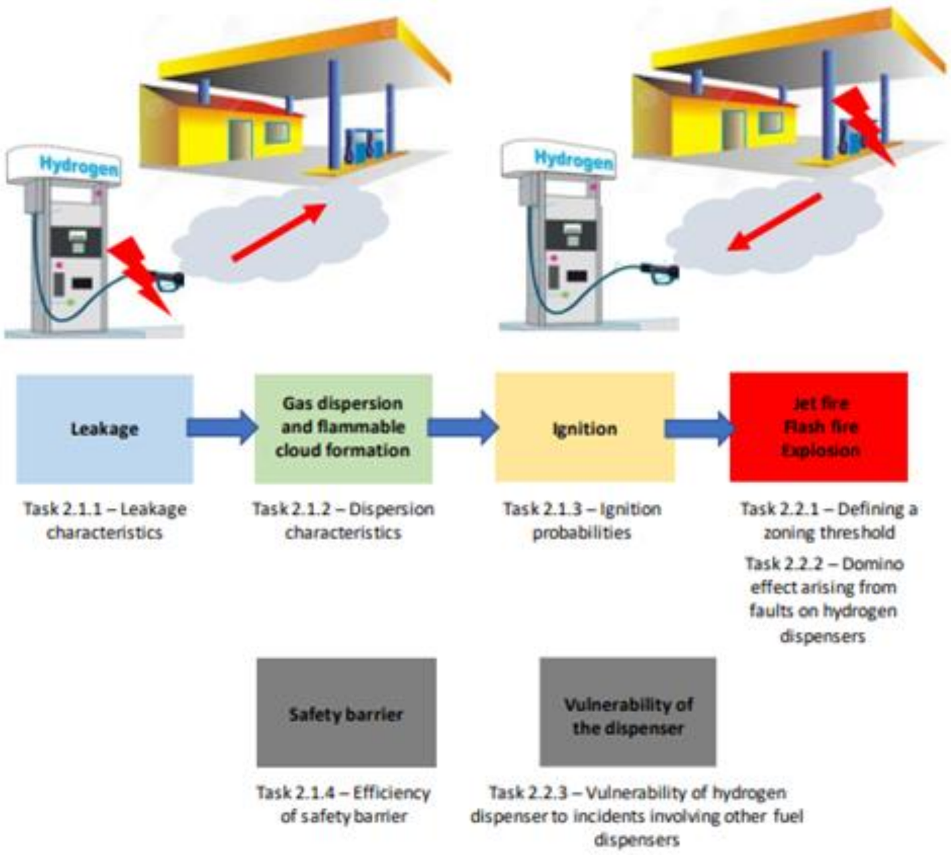
- Recommendations to be used **for future standard establishment related to HRS/multi fuels station (**i.e ISO)

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH 2 JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

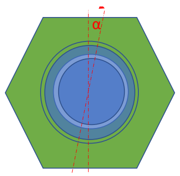
WP2 - EXPERIMENTATION

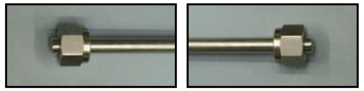
- Filling the gaps to permit the risk assessment exercise and design mitigation for critical scenarios:
  - What are the failure frequencies (given technologies and usage) ?
  - What are the leakage flowrates for those failure modes?
  - What are the cloud characteristics (complex conditions)
  - In which condition will the cloud ignite ?
  - What are the explosion and fire consequences ?
  - What are the real performances of the sagety barriers ?



TASK 2.1.1 – LEAKAGE CHARACTERISTICS

development of the prediction tool → Input from task 3.1: **verification/calibration of the method with experiments and field data** → Input from task 3.3: **quantify the selected "failure configurations"/first matrix (frequency/flowrate)** → **systematic testing of challenging "failure configurations" (frequency/flowrate)** → **Adaptation of the tool/final matrix (Deliverable 2.1)**





- Application:
  - Vis/écrou à 800 MPa limite élastique (σ_e)
  - L= 5.D
  - p=D/10
  - f=0,1
  - Serrage à 80% de cette limite (F)
  - Contrainte de pression (ΔF) = 1% de F
- => nombre de filets n engagés dans l'écrou pour atteindre F=> angle de serrage (**n=0,16**)
- => angle de glissement sous ΔF (**α=0,000016 rad**)
- => nombre de cycle pour atteindre desserrage (**10000 cycles**)

800 MPa

$$\frac{\Delta L}{L} = \frac{n.p}{L} = \frac{n}{50} = \frac{0,8\cdot\sigma_e}{E}$$

200 000 MPa

$$\frac{\beta}{2\cdot\pi} = n$$

0,3   0,8 x 0,01

$$\bar{\alpha} = 4\cdot(1+\nu)\cdot\frac{f\cdot\eta\cdot\sigma_e}{E}$$

$$N_{cyles} = \frac{\beta}{\alpha}$$

- Cycling of hydrogen pressure between 0 and 1.050 bar

TASK 2.1.2 – DISPERSION CHARACTERISTICS

Objectives:

- Numerically study realistic release scenarios using CFD tools
- Focus on scenarios for which existing *“engineering tools”* are not applicable
- Use model outputs to provide insight into dispersion behaviour and the extent of hazardous areas

Inputs/Dependencies:

- Realistic release scenarios – to be defined as part of Task 3.3 – *Preliminary Risk Assessment*
- Source term characteristics – to be identified as part of Task 2.1.1 – *Leakage Characterisation*

Outputs:

- Deliverable D2.2 (report) – *Assessment of dispersion for high-pressure* H_2

TASK 2.1.2 – DISPERSION CHARACTERISTICS

Methodology:

Step 1 – Model validation

Validation Datasets:

- Identify experimental datasets for model validation
- Agree subset of cases to be used in validation exercise with task partners

Validate CFD Models:

- All task partners to undertake model validation simulations with selected CFD models
- Overall evaluation of model performance

Step 2 – Realistic release scenarios

Realistic Releases:

- Identify realistic release configurations in collaboration with Task 3.3

Simulations of scenarios

- Divide scenarios amongst task partners, 2/3 cases per partner
- Simulate the identified realistic release cases to produce outputs needed for task deliverable

Step 3 – Production of written deliverable

Produce D2.2

- To be led by HSE
- D2.2 to include summary of models used, model validation exercise and quantification of model performance
- For realistic release cases, model outputs of flammable cloud extent and time spent within flammable range to be produced and summarised in report

TASK 2.1.3 – IGNITION PROBABILITIES

- It would certainly be difficult to market H2 dispensers if ignition might occur for any kind of leak. Fortunately, experience shows that ignition of hydrogen leaks is not, by far, systematic.

Input from task 3.3 and 2.1.2

Theoretical investigation:

1. **Mechanisms/thresholds**
2. **Presence of the ATEX**

→

Ignition likelihood
as function of scenario
Confrontation to field data
(to deliverable D2.3)

TASK 2.1.4 – EFFICIENCY OF SAFETY BARRIERS

- For critical scenarios , especially those with the largest consequences, safety barriers (breakaway, hose rupture detection with H2 shutdown, abnormal pressure detection safety loop, …) might be required and will be defined in WP3.
- *Suggested safety barriers to be tested :*
  - *Passive breakaway systems*
  - *Excess flow valves*
  - *Active detection via pressure drop, excess flow*
  - *Possibly active detection + shut off valve*

Selection of 4 safety barriers to be fully tested (from deliverable 3.5) and explosion and fire (measured) consequences (task 2.2.2) → **Testing in realistic and measuring the performance (repeatability and residual consequences)**

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH 2 JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

TASK 2.2 - FIRE AND EXPLOSION HAZARDS

The Fire and Explosion Hazards task aims to experimentally study (in real conditions) the consequences of a set of critical failure events on the hydrogen dispenser and surrounding fuelling station.

General Objectives:

1. Design and perform practical research to address gaps in the current understanding of Hydrogen Refuelling Station safety needs in a Multi-Fuel environment.
2. Support the Risk Assessment WP3 with experimental data on critical scenarios and safety requirements

Zoning Threshold (Task 2.2.1)

Determine if there is an appropriate upper limit on the size of a leak based on a Minimum Harm Criteria and if Negligible Extent could be applicable

Domino effect arising from faults H_2 dispensers (Task 2.2.2)

Determine how releases of H_2 within and around the dispenser may cause events to escalate to the surrounding infrastructure.
Determine consequences associated to critical scenarios

Vulnerability of H_2 dispensers to incidents from adjacent fuels (Task 2.2.3)

Improve understanding on how vulnerable H_2 dispensers are to incidents from existing co-located hydrocarbons installations

TASK 2.2.1 ZONING THRESHOLD

Negligible Extent – Possible for Hydrogen Dispenser?

Use definitions from latest IEC 60079-10-2020

→

Work backwards from 0.1m^3 and 50% LFL (H_2 equivalent)
→hole sizes for leaks

→

Assess whether the hole sizes generated are sensible / plausible / practicable in practice and to replicate experimentally

What would the safety distances be for various minimum harm criteria ?

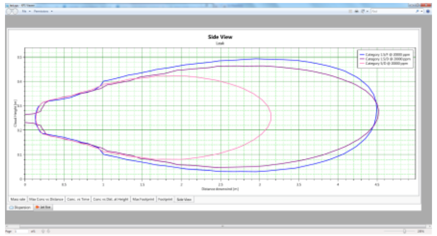
Review and collate minimum harm criteria for UK as a baseline (overpressure, heat flux and noise)

→

Review with data provided from other EU countries to increase range of threshold

→

Create Harm Criteria distances vs hole size using suitable model



→

Perform experimental tests if model validation is required, use experimental set up designed for task 2.2.2.

MultHyFuel

TASK 2.2.2 – DOMINO EFFECTS
H_2 DISPENSER → FORECOURT

Methodology: To build an experimental rig based on:

Hydrogen Refuelling Station

Hydrogen Dispenser – Agree on replica design. It may include:

- Pipework + valves (MAWP)
- Pressure relief (MAWP)
- Hose breakaway, hose, nozzle
- Instrumentation (Temp, Pressure)

Dispenser Supply

- High pressure storage vessel/s
- HP compressor
- Remote operation
- Pressure and temp monitoring

Generic forecourt arrangement

Forecourt layout – Agree with partners.
It may include:

- Other fuel dispenser/s
- Vehicle/s (congestion)
- Support structures
- Vent stack/s

Instrumentation:

IR camera, high speed pressure/temp sensors, heat flux measurements, gas concentration

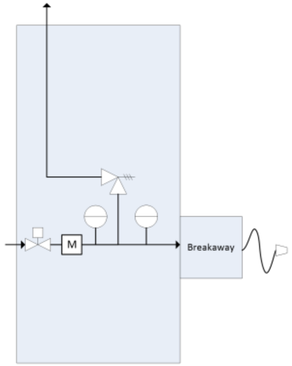
Testing scenarios

Critical scenarios – Defined during task 3.5 (WP3). It may include:

- Directed jet propagating to adjacent objects
- Internal explosion propagating to an external cloud
- Unignited test of small/large bore leaks within dispenser
- H_2 leak inside dispenser – External ignition
- Hose breakaway

High pressure compression and storage

From https://multhyfuel.eu/



Hydrogen Dispenser

Forecourt

MultHyFuel

TASK 2.2.3 – VULNERABILITY OF H_2 DISPENSER FORECOURT → H_2 DISPENSER

Explosion scenarios

Hydrogen Dispenser – Pressurised to operating conditions with H_2
Scenarios - To be defined in task 3.5

- To be carried out in congested environments (e.g. under arrays of cars)
- LPG and petrol sprays to investigate the thermal and mechanical effects on dispensers

Fire scenarios

Hydrogen Dispenser – Pressurised to operating conditions with H_2
Scenarios - To be defined in task 3.5

- Explore H_2 vulnerability when exposed to controlled fire sources (petrol/diesel pool fires, LPG jet): may be used as a function of intensity (including full fire engulfment) and time
- Any contribution of H_2 to total risk will be determined

Potential mitigation measures will be identified (in consultation with all participants) . It may be appropriate to test some of these e.g. passive fire protection

CONTRIBUTION

- Experimental data for the review of the risk assessment WP3– fill knowledge gaps and provide data for critical scenarios
- Identification of potential mitigation measures

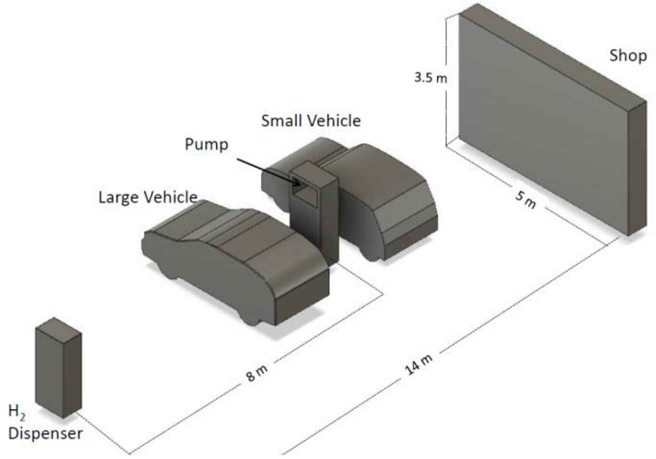


Illustration of Forecourt. Agreement with partners in progress

TASK 2.2 - FIRE AND EXPLOSION HAZARDS (TIMELINE)

Task 2.2.1 Zoning Threshold

Deliverable 2.3

03/21

05/21
Minimum Harm criteria Review

07/21
Modelling simple tools

10/21
Repeat assessment EU Guidance

Experimentation if required

Data Analysis and report writing

08/22

Task 2.2.2 Domino effect Dispenser to Forecourt

Deliverable 2.3

03/21

05/21
Agreement dispenser Forecourt

09/21
End of Design Stage

Installation Commissioning

04/22
Testing Start

Data Analysis and report writing

08/22

Task 2.2.3 Vulnerability H_2 Forecourt to Dispenser

D2.4

03/21

Review Incidents for definition of testing

08/21
End of Design Stage

08/22
Adaptation of experimental rig

Fire and Explosion Testing Forecourt
Data Analysis and Writing

05/23

MultHyFuel

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH 2 JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

MultHyFuel

WP4 – STAKEHOLDER ENGAGEMENT

Goal:

- Achieving a key **stakeholder community** more likely to take-up the project results in core tasks (e.g. policy making / HRS development/component design) due to a progressively built **awareness, commitment, and ownership of project results**.

Targeted stakeholders:

- HRS operators
- HRS component manufacturers
- Public authorities
- Standards developing organizations

Communication:

- A series of **workshops** will be organised at strategic stages of the project
- The team informs at each stage of the process about the status
- Stakeholders become involved providing the team with comments in a **co-creation** perspective

WP4 – PLANNED WORKSHOPS

WS #	Topic	Planned Date
1	Validation of the 3 case study models defined in T3.1	June 2021
2	Validation of refined case study models and WP2 methodology	Dec 2021
3	Results from WP2 and WP3	Apr 2023
4	Development of the best practice guidelines	Jul 2023
Final	Adoption of best practice guidelines	Dec 2023

WP4 – WORKSHOPS LOGISTICS

Before the workshop:

- Targeted stakeholders will receive an invite before each workshop
- Preliminary documentation will be provided, together with the event's agenda

During the workshop:

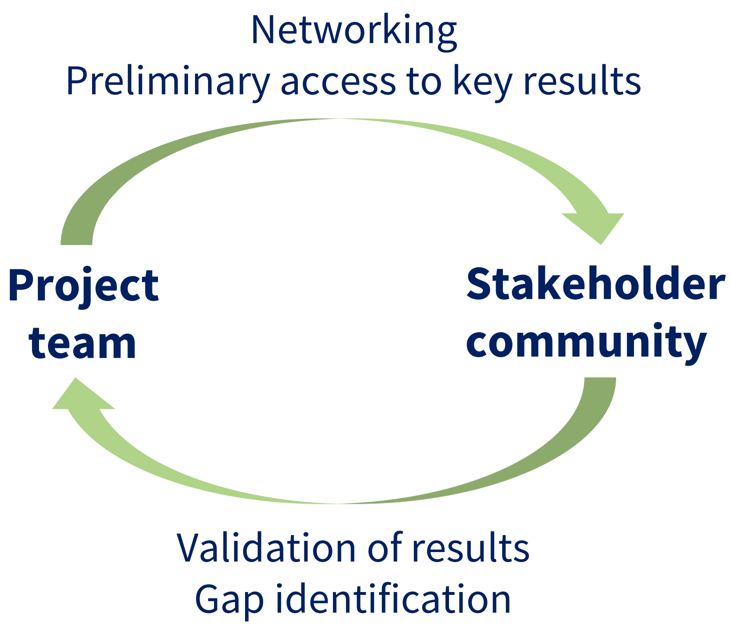
- Project results so far will be presented
- Different formats can be chosen to collect stakeholders feedback (surveys, round tables, bilateral exchanges, etc)

After the workshop:

- Additional feedback or input may be asked after the workshop through questionnaires.

Event type: web conference (by default)

WP4 – HOW TO GET INVOLVED



Targeted stakeholders:

- HRS operators
- HRS component manufacturers
- Public authorities
- Standards developing organizations

Join the community:

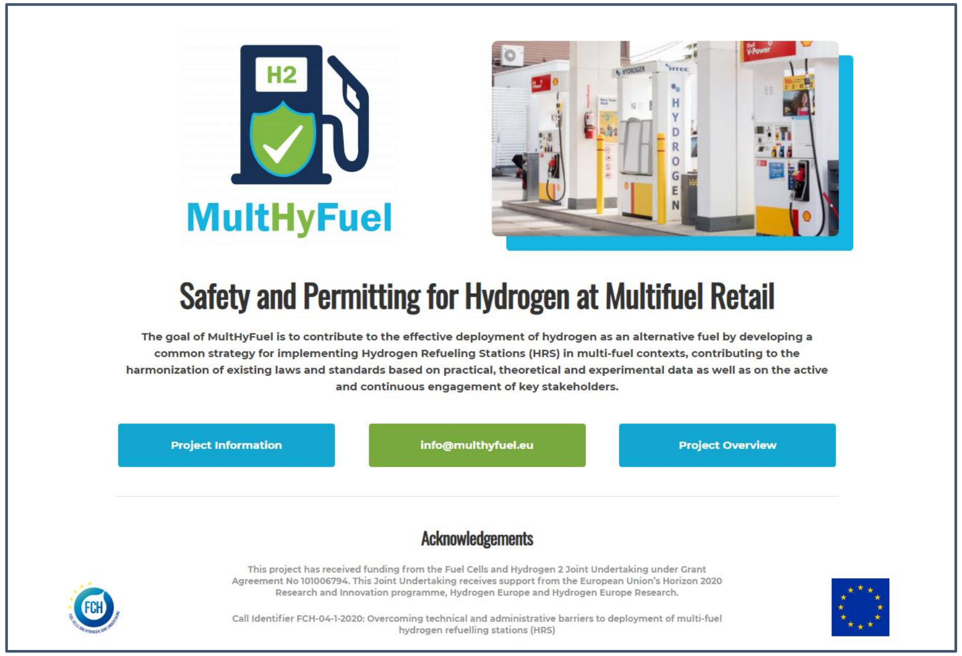
- info@multhyfuel.eu
- Subject: “MultHyFuel stakeholder community”
- You will be added to the mailing list and be invited to the workshops specially targeted for you

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH 2 JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

WP5 - DISSEMINATION, COMMUNICATION & EXPLOITATION

- Public Dissemination
  - Website www.multhyfuel.eu
    - Temporary website
    - Final website under development – to include:
      - Summary of project
      - Public deliverables
      - News from project
      - Communication, dissemination and exploitation plan
  - Contact email: info@multhyfuel.eu
  - Follow-up webinars (details TBC)



- Targeted engagement with standardisation bodies, for example:
  - ISO/TC 197: Hydrogen Technologies
  - CEN/CLC JTC 6: Hydrogen in Energy Systems
  - CEN/CLC Sector Forum Gas – Infrastructure: Mobility
    - recent work on preparing guidance for refuelling station standards from multifuel perspective
  - Others, as identified during project

AGENDA

Time	Subject		Speaker
14:00-14:10	FCH JU contribution		Enrique Giron (FCH 2 JU)
14:10-14:20	Introduction to MultHyFuel		Alexandru Floristean (HE)
14:20-14:25	State of the art review		Alexandru Floristean (HE)
14:25-14:35	From the risk assessment to the general best practice guidelines		Sebastien Quesnel (ENGIE)
14:35-14:45	Experimentation	Leakages, clouds and ignition	Christophe Proust (INERIS)
14:45-14:55		Fire and Explosion	David Torrado (HSE)
14:55-15:05	Key stakeholder engagement		Joana Fonseca (HE)
15:05-15:10	Dissemination of results		Nick Hart (ITM Power)
15:10-15:30	Q&A		

Thank you for your attention!

info@multhyfuel.eu

https://multhyfuel.eu/

MultHyFuel

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under Grant Agreement No 101006794. This Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation programme, Hydrogen Europe and Hydrogen Europe research.