

Pre-normative research for safety of hydrogen driven vehicles and transport through tunnels and similar confined spaces

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FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

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Summary

The present deliverable aims to analyse and to update the Dissemination, Communication and Awareness Plan (DCAP) of the HyTunnel-CS project. To perform this task, based on information collected from the partners of the project, the FHa with the support of IFA and NEN has developed a complete analysis of the first 12 months of the project.

This deliverable analyses and updates the target audiences identified in the initial version of the DCAP by introducing the fire-fighters schools and the Regulation, Codes and Standard (RCS) organization. It has also adapted the main messages for the different actors, aiming to present a clear and positive vision of the project. Added to this modification, the HyTunnel-CS webpage is presented, by analysing its sections and by explaining what users may find in each of them.

Moreover, an analysis of the current status of the National Networks is done, presenting the conclusion that further efforts need to be done in order to increase the National Network size. The synergies existent between HyTunnel-CS and other European or national projects is studied and possible action to boost collaboration among the projects is presented.

This deliverable also considers the current status of general actions as the newsletter, the dissemination activities and publications performed and that are planned. An updated list of international events is presented with the venue when possible.

To achieve a wider dissemination of the HyTunnel-CS project, the connection with forums to participate is analysed, emphasizing the possibilities to participate or collaborate in the European Hydrogen Safety Panel (EHSP) or in normalization committees.

Finally, this report briefly studies which are the applicable Key Performance Indicators (KPIs) for the dissemination strategy of the project. Even if the current status of the dissemination strategy of the project is satisfactory, possible actions to improve are also presented.

Keywords

Dissemination, Communication, Awareness, Hydrogen, HyTunnel-CS, Hydrogen, Safety, website

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Nomenclature and abbreviations

CEN-CLC	<i>Comité Européen de Normalisation- Comité Européen de Normalisation Electrotechnique</i>
CTIF	<i>Comité Technique International de prévention et d'extinction du Feu</i>
D	Deliverable
DCAP	Dissemination, Communication and Awareness Plan
EHSP	European Hydrogen Safety Panel
FCH 2 JU	Fuel Cells and Hydrogen 2 Joint Undertaking
FHa	<i>Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón</i>
IFA	International Fire Academy
ISO	International Standardization Organization
JTC	Joint Technical Committee
KPI	Key Performance Indicator
NEN	Royal Netherlands Standardization Institute
RCS	Regulation, Codes and Standards
SAB	Stakeholders Advisory Board
TC	Technical Committee
VIN	Vehicle Information Number
WHEC	World Hydrogen Energy Conference

Definitions

Dissemination: to spread or give out something, especially news, information or ideas, widely.

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1. The HyTunnel-CS dissemination strategy (FHa, NEN, IFA)

The aim of the HyTunnel-CS project is to perform pre-normative research for safety of hydrogen driven vehicles and transport through tunnels and similar confined spaces (FCH-04-1-2018). The main ambition is to facilitate hydrogen vehicles entering underground traffic systems at risk below or the same as for fossil fuel transport.

The HyTunnel-CS dissemination strategy was presented in the D6.1 Dissemination, Communication and Awareness Plan (DCAP) [1]. The dissemination strategy evolves as far as the project is active, and an update is needed from time to time. This document presents the 1st update of the DCAP, analysing the points to be considered and the activities carried out during the first 12 months of the project and presenting those planned.

The DCAP is a toolset that has to be complementary to the outcomes resulting of the project developments, having the common goal of maximising the impact. Some of these tools remain stable on time as the logo of the project, but others need to be reviewed. Its main objective is to pass on the main messages to the determined audiences, especially those whose influence has been marked as “high”.

1.1 Determination of audiences

Stakeholders or interest groups are, from a broad perspective, any group or individual that may affect or be affected by the achievement of the project's objectives. For an adequate development of the same, it is possible to determine the following groups and interest, of which some fundamental criteria are exposed in terms of their management. The relevant information is summarized in the Annex I. Determination of audiences.

1.2 Communication messages about hydrogen and the HyTunnel-CS project

Below are some proposed messages for dissemination to the indicated audiences or others in the communication tasks that are carried out around the HyTunnel-CS project. These messages should be clear and appropriate as it has been remarked in previous meetings of the project. The development of the project has shown that the most important messages are:

- The HyTunnel-CS project will carry out critical analysis of effectiveness of conventional safety measures in tunnels and other underground transportation infrastructure.
- The HyTunnel-CS project will generate unique experimental data regarding the interaction of hydrogen with safety equipment and systems of underground transportation infrastructure using the best European hydrogen safety research facilities and real tunnels.
- The HyTunnel-CS project will create deeper knowledge of the relevant physics to underpin advanced hydrogen safety engineering and develop innovative prevention and mitigation strategies.

- The HyTunnel-CS project will prepare harmonised recommendations for intervention strategies and tactics for first responders providing conditions for their life safety and property protection during accidents with hydrogen powered vehicles in tunnels, underground parking, etc.
- The HyTunnel-CS project will develop recommendations for inherently safer use of hydrogen vehicles in underground transportation systems. These recommendations will be shared with the RCS agents and the industry, to achieve a huge dissemination.
- The HyTunnel-CS project will produce commonly agreed, scientifically based recommendations for the update of relevant RCS and level up the safety culture of using hydrogen cars in general and especially in confined spaces.

Other important messages to communicate are, but not limited to:

- Hydrogen is a chemical element, very light and with a large amount of energy per unit mass. From the point of view of energy use, it allows to store large amounts of energy from any primary energy source.
- Hydrogen is as safe as any other industrial gas when it is handled properly by trained personnel.
- The results of HyTunnel-CS go beyond the duration of the project and it is planned to establish mechanisms so that the cooperation experiences developed not only with manufacturers but also with first responders last in time.
- The HyTunnel-CS project will develop further existing and new contemporary computational fluid dynamics and finite element models, simpler engineering correlations of relevant physics models, hazard and risk assessment tools; validate them against generated experimental data for use as predictive tools for safety design.
- The HyTunnel-CS project will reduce over-conservatism thanks to the scientific work which is carried out during the project.
- The HyTunnel-CS project is supported by stakeholders as universities, manufacturers, industrial actors and regulation codes and standard actors.

The number and selection of messages may be modified and completed in upcoming updates of this document.

2. Webpage analysis (FHa)

With a simple and already operational approach, the HyTunnel-CS webpage (<https://hytunnel.net/>) is one of the main dissemination tools of the project. It will be maintained with contributions from all partners, who have a link in their respective web pages to HyTunnel-CS to disseminate, ensure its visibility and improve its Search Engine Optimization. The expected maintenance of the project webpage covers the project development time and two additional years after its finalisation. During this period of time, the public deliverables will be available in the webpage.

Based on the roles of the HyTunnel-CS website presented in the D6.1 [1], the webpage has been created with the section's structure presented in Figure 1:

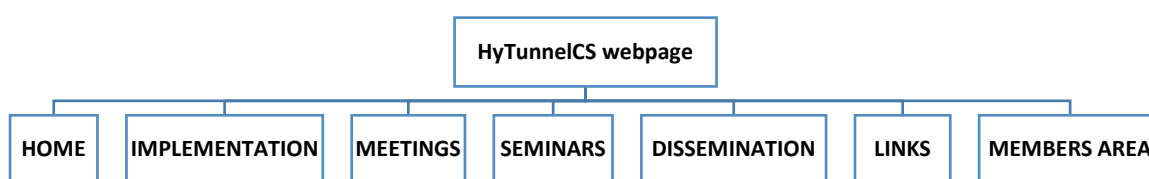


Figure 1. Webpage main structure

- **IMPLEMENTATION:** This section has detailed information about the project structure of the project, with sub-sections dedicated to each work package of the project. Additionally, this section presents the list of deliverables of the project (with links to the public ones that are already approved) and the list of project milestones.
- **MEETINGS:** This section presents the list of project meetings, with the venue and dates. In addition, for each of the meetings already held, an informative note has been created, with a brief summary of the meeting.
- **SEMINARS:** This section details which are the seminars planned during the project. For each of the seminars there is a sub-section with information about the event as the venue and the planned structure of the event.
- **DISSEMINATION:** In this section, the objective is to inform the webpage user about general news about tunnels and safety (News Feed section), give access to the newsletters and present the recommendations for different actors arising from the HyTunnel-CS project in the future.
- **LINKS:** This section provides a well developed list of useful links for the user covering different topics as Hydrogen Safety, Associations, RCS, Projects, Databases, Vehicles and Fuelling Stations and Education topics.
- **MEMBERS AREA:** This section allows the HyTunnel-CS project partners and Stakeholders Advisory Board (SAB) members of the project to share data and reports in a safe way. The access to this section is only available with a user and password account.

3. National networks (FHa, NEN, IFA)

The National Networks is the base for a wider dissemination of the project. There are currently 39 representative members in the database. To develop the database, several reminders have been sent out to project partners. Further efforts to expand the NN group should and will be performed.

Due to the Data Protection Regulation, the process to become member of the National Network has been slightly modified. The national partner must share the document presented in the Annex I with the potential National Network member and a representative member of this entity should send the document filled to the WP6 leader (FHa) to fulfil the register.

Some partners have sent the document to different agents as the ones presented below these lines:

- **Dutch Institute for Safety (*Instituut Fysieke Veiligheid*)**. It is the institute for disaster relief and public crisis management in the Netherlands.
<https://www.ifv.nl/Paginas/Institute-for-Safety.aspx>
- **Tunnel Safety Knowledge Platform (*Kennisplatform Tunnelveiligheid, KPT*)**. KPT is the platform for all questions about tunnel safety in the Netherlands. It is funded by the Dutch Ministry of Infrastructure and Water Management.
<https://www.kennisplatformtunnelveiligheid.nl/>
- **TNO**, the Netherlands Organisation for applied scientific research.
<https://www.tno.nl/en/>
- **Asociación Española de Túneles y Obras Subterráneas (AETOS)** AETOS is a forum platform to share information among tunnels and underground space designers in Spain. (<http://www.aetos.es/>)

Additionally, information raised from the fire-fighters perspective said that in most countries fire services are municipal organisations. Laws are given on a regional level or by federal states. Basic regulations are mostly given on a national level. The *Comité Technique International de prévention et d'extinction du Feu* (CTIF) is an international organisation, but unfortunately many fire services do not use CTIF as a source of information for the reason explained above. Therefore, it is deemed crucial the dissemination of the project outputs and recommendations with fire-fighters via the fire academies which are run by regions or federal states. Thus, HyTunnel-CS should address mainly the fire academies. They will be willing to provide specific information on hydrogen issues for first responders via their websites and they will be the potential of the project national networks.

4. Synergies with other projects (FHa)

Since HyTunnel-CS is a project of the FCH2 JU and also is aligned with the different existing national initiatives in Europe in relation to hydrogen mobility, working meetings should be promoted with these entities and with relevant projects that are already underway in the European Union, such as HyResponder, HyLaw, H2Me, etc.

The HyTunnel-CS will collaborate closely with the International Association for Hydrogen Safety and the EHSP, both promoting and disseminating hydrogen safety culture, within and outside the FCH2 JU.

Moreover, during the HyTunnel-CS project development, several projects with possible synergies have been detected. The possible synergies are presented below:

SUVEREN

Safety of Urban Underground Structures due to the Use of New Energy Carriers (<http://www.suveren-nec.info/?lang=en>)

This project, sponsored by the Federal Ministry of Education and Research of Germany aims to study the safety concepts, guidelines and standards which are based on design parameters like heat releases rates, fire mitigation and evacuation concepts based on the transition from combustion driven vehicles towards the new energy carriers as electricity or hydrogen.

The SUVEREN consortium is formed by *Bundesanstalt für Materialwirtschaft*, The Research Association for Tunnels und Transportation Facilities (STUVA) and FOGTEC Brandschutz GmbH & Co. KG and associated partners as the French *Institut National de l'Environnement Industriel et des Risques* or the Fire Brigade from Munich.

The scopes of HyTunnel-CS and SUVEREN projects are complementary, as long as the objective from both projects is equivalent. A close interaction between the consortiums should be boosted and possible interactions could be the participation of the SUVEREN project partners and SAB in future events of the HyTunnel-CS project as the Stakeholders Workshop.

The initial contacts with the project have already been done.

PRESLHY

Pre-normative Research for Safe Use of Liquid Hydrogen (<https://preslhy.eu/>)

PRESLHY is an FCH2 JU co-funded project (Grant Agreement No 779613) which aims to address pre-normative work for the safe use of liquid (cryogenic) hydrogen as an energy carrier, by identifying safety critical areas where knowledge gaps exist and specific standards are needed. Those gaps will be closed by developing and validating new appropriate models and engineering correlations.

This project is coordinated by the Karlsruhe Institute of Technology from Germany and 5 out of the 9 project partners are also HyTunnel-CS members. Moreover, some project partners belong to the HyTunnel-CS SAB. It is expected thus, that the outcomes of this project may be shared to the HyTunnel-CS project and all the collaboration possibilities will be promoted (participation in events or use of both communication networks).

HyResponder

European Hydrogen Train the Trainer Programme for Responders.

The aim of this FCH2 JU project (Grant Agreement No 875089) aims to develop and implement a sustainable “train the trainer” programme in hydrogen safety for first responders. This project is coordinated by the University of Ulster and it is expected that the outcomes of the HyTunnel-CS project will be used during the HyResponder project development, as long as the safety issues and work with fire-fighters and first responders is being already performed by the HyTunnel-CS project.

Potential communications and participation to events, added to the information shared from the HyTunnel-CS project towards HyResponders should be the actions to perform. Additionally, as it has been stated in the National Network section, the participation in this project of fire-fighters schools will be the best way to promote the results among the fire-fighters.

Added to these projects, more potential projects have been identified and FHa has started to contact them.

5. Newsletters (FHa)

Visitors to the HyTunnel-CS website have the opportunity to sign up for a newsletter which will give regular updates, develop HyTunnel-CS profile, and achieve wider stakeholder recognition. It will use examples from HyTunnel-CS activities, interviews with project ‘champions’, quotes from end users and will highlight HyTunnel-CS success and linked opportunities. This will also be distributed via a database of stakeholders and interested parties.

The first newsletter was developed at the beginning of the project and it is available in the HyTunnel-CS project webpage. A screenshot is presented in Figure 2. The first newsletter aimed to present the project partners as well as giving general information about the project.



European project HyTunnel-CS is officially launched!



The aim of the HyTunnel-CS project is to perform pre-normative research for safety of hydrogen driven vehicles and transport through tunnels and similar confined spaces.
The main ambition is to facilitate hydrogen vehicles entering underground traffic systems at risk below or the same as for fossil fuel transport.

Figure 2. 1st newsletter

The second newsletter is planned for month 13 of the project, which corresponds to March 2020. The main objective of the second newsletter will be to publish the stakeholder’s

workshop and the international fire-fighters workshop which will be held in May 2020. Additionally, information about the public deliverables and the project developments during the first 12 months of the project will be also presented.

According to the first version of the DCAP, the newsletter was supposed to be sent twice a year. However, after the assessment of the consortium, it has been decided that one newsletter per year is a more attainable goal and can also meet the communication objectives.

6. Publications and dissemination activities already performed & forthcoming actions (FH_a, NEN)

Since the HyTunnel-CS project has been developing for a year, the number of dissemination activities is expected to have been growth now as the first numerical and experimental data have been obtained and verified. Nevertheless, there have been already some actions that are remarkable, as the presentation from the *Danmarks Tekniske Universitet* at The Danish Hydrogen and Fuel Cell Day 2019 (*den danske brint og brændselscelledag 2019*) or the HyTunnel-CS Questionnaire (October to December 2019)

The HyTunnel-CS questionnaire has been developed for D1.4 (Report on critical analysis of RCS for tunnels and similar confined spaces) to identify and analyse gaps in national RCS for inherently safer use of hydrogen in tunnels and similar confined infrastructure and to make recommendations for new or updated RCS. This questionnaire has been distributed to relevant contacts via national HyTunnel-CS partners. It included a brief elaboration on the HyTunnel-CS project and the approached contacts have been able to provide input on the basis of which recommendations for updated/new RCS will be made at a later stage in this project (D6.4). The contacts have been given the opportunity to be kept informed of the further course of the project (by passing on their email address) and have been approached to e.g. become a member in the National Network.

As the future potential dissemination activities are numerous, a table of forthcoming events/activities which was initially developed as part of the HyTunnel-CS dissemination plan [1], has been updated.

This updated list is presented in Table 1. Nevertheless, there are more actions performed at national level that are not covered by this table where the HyTunnel-CS outcomes will be presented. The most remarkable action is that the HyTunnel-CS project will be present in the WHEC 2020 in Istanbul.

Name	Place	Date
Hannover Messe	Hannover Germany	- 20-24 April, 2020
World Hydrogen Energy Conference (WHEC) 2020	Istanbul- Turkey	5-9 July, 2020
World Tunnel Congress 2020	Kuala Lumpur, Malasya	15-21 May 2020
World Hydrogen Technology Convention 2021	Montreal, Canada	TBC
European Hydrogen Energy Conference 2020	Madrid, Spain	4-6 November
International Conference on Hydrogen Safety 2021	London, United Kingdom	21-22 January

Table 1. List of forthcoming events.

As well as these events, there are presentations already planned at conferences for the year 2020. Some of them are:

- V. Shentsov, H. Takeda, K. Takeno, D. Makarov, V. Molkov, *Influence of nozzle shape on hydrogen-air mixing for high pressure hydrogen jet*, **H2FC Supergen Hydrogen Research Conference 2020**, University of Nottingham, UK, 17-18 February 2020
- V. Molkov, D. Makarov, S. Kashkarov, *Explosion-free in a fire composite hydrogen storage tank* **H2FC Supergen Hydrogen Research Conference 2020**, University of Nottingham, UK, 17-18 February 2020
- W. Dery, V. Shentsov, S. Kashkarov, D. Makarov, V. Molkov, *Numerical study of instantaneous high-pressure hydrogen release in a tunnel*, **H2FC Supergen Hydrogen Research Conference 2020**, University of Nottingham, UK, 17-18 February 2020
- V. Molkov, S. Kashkarov, D. Makarov, *Breakthrough safety technology of explosion free in a fire tank for compressed gaseous hydrogen storage*, **23rd World Hydrogen Energy Conference (WHEC 2020)**, Istanbul, Turkey, July 5-9 2020
- P. Russo, F. Marra, M. Mazzaro, F. Pilo, D. Marini, C. Vianello, G. Pucci, *Spatial and radiative characteristics of large scale hydrogen jet-fires*, **CISAP9**, Venice, Italy, September 20-23 2020

7. Potential participation to forums (FHa, NEN, IFA)

The participation of the HyTunnel-CS project partners in forums should be a tool to disseminate the results and good practices of the project. As an example directly linked with fire-fighters: there are many misconceptions regarding their activities and practices outside the fire-fighter's community; thus, the participation should promote a reliable and valuable information exchange.

Examples of these misconceptions are:

- Many people think fire-fighters would be able to do proper measurements at the scene which is impossible to do in practice.
- On the other side many people think fire fighting is very dangerous which it is not if done in a proper way and following the available best practices.
- Swedish experts on fire protection recently proposed to fill oxygen in the bottles of breathing apparatuses to enable fire-fighter to stay longer at the fire front. Pure oxygen would kill the fire-fighters.

Based on this issues related with fire-fighters, it might be helpful to inform scientists and engineers about the results of HyTunnel-CS regarding first response as well as the first responders alone. The forums which are suitable to do so need to be addressed yet.

From a wider dimension, this information flow may be performed thanks to the participation on safety forums. Among these possible forums, the HyTunnel-CS could be of special interest for the **EHSP**.

The EHSP, launched by the FCH2 JU in 2017, aims to promote and disseminate hydrogen safety culture within and outside of the FCH 2 JU programme. This panel is composed by a multidisciplinary pool of safety experts grouped in task forces according their expertise. As long as the leader of the Task Force 1 and other members of the EHSP are members of the HyTunnel-CS consortium, it can be assumed that the information raised from this project will flow towards this panel.

Added to these international forums and conferences, and linked with the expected actions linked with RCS, the partner Royal Netherlands Standardization Institute (NEN) has identified the forum **CEN/CLC/JTC6 Hydrogen in energy systems**.

This Joint Technical Committee (JTC) of the European Committee for Standardization (CEN) deals with standardization in the field of systems, devices and connections for the production, storage, transport and distribution, measurement and use of hydrogen from renewable energy sources and other sources, in the context of the European strategy for the development and acceptance of the hydrogen market. The scope includes cross cutting items such as: terminology, Guarantee of Origin, interfaces, operational management, relevant hydrogen safety issues, training and education.

JTC6 meets biannually in March and October in Brussels. Presentation/input on the HyTunnel-CS project at JTC6 should be facilitated given that some of the HyTunnel-CS partners are also active members of JTC6, including NEN as secretary and HyTunnel-CS project coordinator Prof. Vladimir Molkov of Ulster University as member.

8. Workshops and events (FHa, IFA)

HyTunnel-CS will use opportunities to deliver workshops at events to gather feedback from participants or from experts on particular issues.

Moreover, a close cooperation will be established with relevant National and International projects ensuring networking activities and knowledge sharing. During the first period of the HyTunnel-CS project, the 10th of September 2019, in Karlsruhe, Germany took place the “**Internal seminar on knowledge and technology exchange**” chaired by Christian Brauner from International Fire Academy (IFA) where several topics as the existing strategies, tactics and procedures, and scenarios were discussed.

The notes of the seminar are included in the D5.1 “Report on existent intervention strategies and tactics for first responders” [2]. A general conclusion based on the outcomes of the project from the fire-fighters perspective is that there is no need to organize specific workshops for hydrogen issues.

According to the present stage of our work it can be assumed, that there will be no need of new techniques to tackle hydrogen incidents. Every procedure needed (e.g. ventilation, extinguishing etc.) is known and established. Only strategies and tactics - in other words: the sequence of actions - must be adapted specifically to hydrogen risks.

As an example, fighting fire in electric vehicles is much more complex and requires special techniques indeed. There are already special trainings provided by fire academies. A proposal from the fire-fighters perspective is that the hydrogen specific strategies and tactics could and should be integrated in the curricula of such trainings.



Figure 3 Special pillars for providing access to the batteries in the bottom of an electrical vehicle (TESLA M3)

Forthcoming actions are under the preparation scheme, among them the “**International workshop of first responders**” or the “**Stakeholders Workshop**”, both in May 2020.

8.1 International workshop of first responders held by IFA

As required by the head of the HyTunnel-CS project all partners of the project are invited to participate in this workshop. The event will take place in Balsthal on 7-8 May 2020. The drafted programme is:

8.1.1 Gain consistent understanding of possibilities and limitations of HY-intervention

Inspection of IFA training and simulation facilities (road tunnel, railway tunnel, garages)

- What are the specific conditions for intervention in tunnels and garages?
- What are the possible actions taken by fire-fighters?
- Why is ventilation the most important factor?
- What behaviour by users has to be expected?



Figure 4. IFA road tunnel

- Demonstration of fire fighting in tunnels/garages
- Participants can observe from safe distance (watching from short distances is possible only for those who are trained in using breathing protection and have been medically examined)



Figure 5. Training fire fighting in road tunnel

- Presentation and discussion of tactics (in IFA tactical centre)



Figure 6. IFA tactic centre

8.1.2 Development / optimization of tactics for Hydrogen intervention

- Practical tests with mobile small and large ventilators in road tunnel, railway, multi-storey car park, underground car park



Figure 7. Ventilator in front of IFA railway tunnel

- Discussion of all participants on benefits and risks of ventilation in tunnels, car parks etc.

8.2 Stakeholders Workshop

HyTunnel-CS has scheduled a Stakeholders Workshop in Rome on 4-5 May 2020. This workshop will present the results and advances of the project to the industrial and the academic collaborators and users. Their feedback will be taken into account and discussed to enhance the activities programme for the rest of the project. So as to reach this goal, the workshop will involve:

- Tunnel authorities, tunnel managers and designers, tunnel operators and safety officers.
- Hydrogen-powered vehicles and hydrogen delivery transport developers and manufacturers.

The available information about this event is already available on the project website (https://hytunnel.net/?page_id=286) and a detailed agenda will be published as soon as it is drafted.

This workshop will be promoted through the National Networks and the Stakeholders Advisory Board.

9. Collaboration with standardization committees (NEN, IFA)

There are several possibilities for collaboration with standardization committees to provide inputs from the project with Technical Committee's (TC):

- **CEN/CLC/JTC6 Hydrogen in energy systems, WG 3 "Hydrogen Safety"**
One of the tasks of this WG is to provide a technical report on safety in confined environments related to mobility, using relevant input from the HyTunnel-CS project. In its task, the WG has declared to follow up on the work of the HyTunnel-CS Project.
- **ISO/TC 197 Hydrogen technologies**
The scope of this TC lies in standardization in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen.
- **International Energy Agency Hydrogen Implementing Agreement (HIA), Task 37 Hydrogen Safety (2015-2021)**
The work plan and objectives of this task are designed to support the acceleration of safe implementation of hydrogen infrastructure through coordinated international collaborations and hydrogen safety knowledge dissemination.
- **HySafe - Safety of Hydrogen as an Energy Carrier**
It is the European Commission Network of Excellence for Hydrogen Safety. Its work packages include "Hydrogen ignition and jet fires", "Hydrogen Explosions", and "Risk assessment methodologies".
- **United Nations Economic Commission for Europe - Global Technical Regulation #13 Hydrogen and Fuel Cell Vehicle Safety (UN ECE GTR #13 HFCVS)**

This regulation specifies safety-related performance requirements for hydrogen-fuelled vehicles, and aims to minimize the risk of serious injury due to fire, burst or explosion related to the vehicle fuel system.

The above mentioned committees have been contacted by NEN for possible collaboration or to provide them with input from the HyTunnel-CS project, to ensure the sustainable implementation of the project outcomes.

Added to these standardization committees, and linked with the needs faced by the first responders, the HyTunnel-CS project should consider also the possibility of the introduction of data transmission technology for optimizing the **ISO 17840 “Road Vehicles-Information for emergency responders”**.

The most important information of all for fire-fighters is that there is a hydrogen incident. Since incidents with liquefied petroleum gas or natural gas are at least partially similar, information is needed to know whether a gas-powered vehicle is involved. This information is obviously relevant. Without information about the drive type, an incident specifically correct action of the first responders will not be ensured; however, this applies not only to hydrogen-powered vehicles but also to all types of drive, for example, to pure electric vehicles, in view of the battery problem.

The CTIF Commission for Extrication & New Technology accomplished very important work that is beneficial to all relief workers worldwide¹. Here the ‘UN Decade of Action for Road Safety’ is at the centre, with as the most important goal: shortening the intervention time because of which the survival chances of the victims increase, as well as striving for optimal security for both the victims and the relief workers at the place of the incident.

The ISO 17840 standardized the information that is made available by the industry & car manufacturers for the first and second responders. The CTIF Commission for Extrication & New Technology worked on determining one structure in the Rescue Sheets and in the *Emergency Response Guides* that are drawn up by the manufacturers for new models. The rescue information is directly linked to recognizable pictograms.

Of course, in a tunnel this crucial information regarding the type of propulsion is not safely available with the current state of the art, because logos and labels on the vehicles could be unrecognizable due to crash effects or fire. Therefore, one way of implementing the standard and optimize the availability of rescue information is the use of data transmission technology (e.g. E-call).

Based on the Vehicle Information Number (VIN), a data set about the vehicle’s properties can be sent out to a receiver as early as possible, providing the first responders with crucial information.

These technological tools are already being used in Formula 1 by *Federation Internationale de l’Automobile* ‘accidents data recorders’ & ‘telemetry’. This standardized responder device will

¹ CTIF is the ‘International Association of Fire and Rescue Services’ and has as its main goal supporting and stimulating the cooperation between the fire departments and other emergency services from all over the world. CTIF ensures scientific research, the publication of articles and reports, the organization of different commissions and working groups and the cooperation with other bodies than the rescue services that are also working in the field of prevention and security

help first responders to make critical and lifesaving decisions even when there is no network (3G/4G/...) available.

It is a further developed and improved version of the E-call system that works as an important information source and backbone. The information can be sent out directly to the fire engine & crew, their dispatching or even collected by the tunnel infrastructure itself and forwarded in case of emergency. In these cases, we would talk about 'Vehicle-to-Vehicle' or 'Vehicle-to-Infrastructure' communication lines. All information in case of emergencies could be available by 'scanning' the VIN of all vehicles at the moment they enter an underground infrastructure.

10. Conclusions (FH_a)

The dissemination activities of the HyTunnel CS project will be boosted from this period to the end of the project expected in February 2022. Important indicators like the increase of the size of the National Networks need to be addressed. Nevertheless, the overview of the first period is positive. Analysing the indicators presented in D6.1, mostly all the tasks are in progress and in some of them there are actions indicated.

Key Performance Indicator	Status
Initial version of the Awareness, Communication and Dissemination Plan of the HyTunnel-CS project and its updates.	Ongoing
HyTunnel-CS summary execution report that reflects all the activities carried out.	To be done at the end of the project
Press releases: at least 5 press releases, corresponding to the most important milestones of the project.	Discussed
Work meetings and conferences, with at least 15 publications in journals.	Work in progress
At least four specific work meetings to transfer experiences to interested entities.	Work in progress
At least 3 publications for technical journals specialized in hydrogen and fuel cells.	Work in progress
Maintenance and updating of the website with the collaboration of all project partners.	Work in progress
Development of news boards describing the project on the HyTunnel-CS website, in the partners' websites and in their physical locations (screens or panels).	Work in progress
Publication of information about the project on social media with the collaboration of all partners in its dissemination through their respective profiles.	Work in progress
Publication of leaflets and posters for local dissemination.	Work in progress
Preparation of quarterly reports of social media, monitoring the increase of followers and fans in each social media, mentions and comments, interactions and quality of the same.	Discussed

Table 2. Dissemination Key Performance Indicators analysis.

Discussed topics:

Press releases. At least 5 press releases, corresponding to the most important milestones of the project.

During the collection of information for this deliverable, no press releases have been released and thus no media impact has been detected. To address the 5 press releases, the following events are considered: the project workshops (2), the Mid Term Review Meeting (1), the final workshop and the final project meeting (2).

Preparation of quarterly reports of social media, monitoring the increase of followers and fans in each social media, mentions and comments, interactions and quality of the same.

As long as the project does not have specific social media, this monitoring should be performed by means of analysing the webpage impact. Possible suggested tools are Google Analytics.

Additionally, the current status of the project meetings and events is summarized in Table 3.

No.	Meeting	Location	Dates	Status
1	Kick-off meeting	UU, Belfast, UK	27-28 Mar 2019	DONE
2	1st progress meeting (includes internal seminar on knowledge and technology exchange)	KIT, Karlsruhe, Germany	11-12 Sep 2019	DONE
3	2nd progress meeting	CEA, Grenoble, France	4-6 Feb 2020	DONE
4	Stakeholders' workshop	URS, Rome, Italy	4-5 May 2020	Under preparation
5	International workshop of first responders	IFA, Balsthal, Switzerland	7-8 May 2020	Under preparation
6	3rd progress meeting	NCSR D, Athens, Greece	16-18 Sep 2020	Under preparation
7	Midterm review	Brussels, Belgium	TBC November, 2020	
8	4th progress meeting	USN, Porsgrunn, Norway	2-4 Feb 2021	
9	5th progress meeting (includes 2-day internal seminar on research conclusions for use by emergency services, M30 to M31)	HSL, Buxton, UK	14-17 Sep 2021	
10	6th progress meeting	IBZ, Brussels, Belgium	15-16 Feb 2022	
11	Dissemination conference	FCH JU, Brussels, Belgium	17 Feb 2022	

Table 3. Current status of planned events.

References

- [1] Maite Imirizaldu, Miguel Zarzuela, y Mercedes Sanz, «Dissemination, Communication and awareness plan», Deliverable 6.1. HyTunnel-CS (Grant Agreement Number 826193)
- [2] Christian Baumer, Tom Van Esbroek, Donatella Cirrone, Dmitry Makarov, y Alfonso Bernad, «Report on existent strategies and tactics for first responders», Deliverable 5.1. HyTunnel-CS (Grant Agreement Number 826193)

Annex I. Determination of audiences

Target audience	Influence	Objective	Message	Possible dissemination tool or channel
Community, national and regional administration	High	Inform Raise awareness	General information about the project: Beneficiaries, phases, results and achievements Benefits derived from the developed cooperation	Project events Explanatory meetings Distribution of project outcomes, e.g. newsletter Transfer of socio-economic and environmental benefits of the action
Beneficiaries and partners of the project	High	Accompany Support Raise awareness	Communicate the results and the progress of the project Coordinate communication Cooperation in the dissemination and distribution of tasks	Internal communication Participation in events of other partners and groups Joint meetings with other entities Project work meetings and networking among partners Participation in events, fairs and congresses
Small Medium enterprises and large companies	Medium	Inform Attract	General information about the project results and business opportunities	Sending information, e.g. via newsletter Meetings Demonstrative acts Technical sessions

Stakeholder Advisory Board	High	Inform Involve	Business opportunities and business transformation Cost effectiveness Security and simplicity of operations Dissemination	Meetings Workshops Generation of contents Sending material Experiment demonstrations Actions with media Introduce their feedbacks frequently
Research and educational centres	Medium	Inform	General information about the project Technological developments	Sending information, e.g. via newsletter Technical sessions Project presentations
Event organizers	High	Inform Involve	Business opportunities and business transformation Cost effectiveness Security and simplicity of operations Dissemination	Training Generation of contents Sending materials for exhibitions Demonstration events Actions with media and interest groups

Vehicle Safety Companies	High	Inform Involve	Business opportunities and business transformation Cost effectiveness Security and simplicity of operations Dissemination	Training Generation of contents Sending materials for exhibitions Demonstration events Actions with media and interest groups
Clusters and sectorial organizations related to hydrogen	Medium	Inform	General project information	Sending information, e.g. via newsletter Meetings with associations and other representative projects
General and specialized media	High	Inform	General information of the project and evolution Construction of prototypes Cooperation Technological developments Associated investments Energy sustainability	Sending information periodic meetings. Participation in events Offer of contents (written and audiovisual) that are generated with the project Provision of qualified HyTunnel-CS spokespersons Participation in radio, TV and special written or online programs Driving experiences

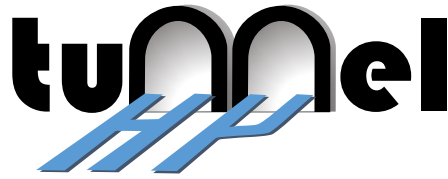
				Transfer of socio-economic and environmental benefits of the action
Promoters of other related initiatives	Medium	Inform Collaborate	General project information Opportunities for cooperation	Meetings Participation in events Forums of the sector Search for collaborations and support in diffusion
Economic and social agents at European level	Low	Inform	General project information Business and employment opportunities Environmental benefits and sustainability	Explanatory meetings Participation in the events that are organized Collaboration for dissemination in sectorial organizations
Tunnel Safety agencies or companies	High	Inform Involve	Business opportunities and business transformation Cost effectiveness Security and simplicity of operations Dissemination	Training Generation of contents Sending materials for exhibitions Demonstration events Actions with media and interest groups

RCS actors	High	Inform Involve	Communicate the results and the progress of the project	<p>Invite RCS actors to join national networks of HyTunnel-CS project</p> <p>HyTunnel-CS Partners to join national relevant platforms to inform about the project</p> <p>HyTunnel-CS Partners to organise national workshops at the end of the project</p> <p>HyTunnel-CS Partners to write policy papers for each recommendation on new/updated RCS (to share national and with TC's) that can also be placed e.g. on HyTunnel-CS website and websites national platforms</p>
Fire-fighter community	High	Inform Involve	<p>Communicate the results of the project</p> <p>Experiences exchange</p>	<p>As long as the information must flow in the proper order, contact with fire-fighters schools to provide the useful information</p>

To overcome language barriers¹, and to improve the wider dissemination of the results of the project, the content must be translated to all relevant EU-languages

¹ Fire services trust at most in experience. Let it be their own experience or experience gathered from other fire-fighters. With a view to the language issue change of experience will be organised on a national level or within the language areas. e.g. for German within the countries of Germany, Switzerland, Austria and partly the Netherlands. It will be very difficult to organise exchange of experience on a supranational level.

Annex II. National Network registration template



Pre-normative research for safety of hydrogen driven vehicles and transport through tunnels and similar confined spaces

Fuel Cells and Hydrogen Joint Undertaking (FCH2 JU)
Grant Agreement Number 826193

Confirmation for National Networks

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FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

Summary of National Network

The HyTunnel-CS project through this National Networks will collaborate with researchers and experts in underground traffic systems and hydrogen safety to integrate their knowledge and activities into the project and disseminate the project results more efficiently.

The members of the National Network will serve as a bridge between the work developed within the project and the non-project stakeholders who may be interested in the HyTunnel-CS findings.

National Members will not have specific obligations to the consortium, but can be very valuable in giving feedback to the project outcomes and further disseminating them.

If you have any questions or need more information, please do not hesitate to contact Alfonso Bernad (abernad@hidrogenoaragon.org).

National Network Registration

Please, if you are interested in participate as member of the HyTunnel-CS National Networks, fill the following document with your information.

COUNTRY:

PARTNER WHO HAS CONTACTED YOU:

COMPANY NAME:

SECTOR/SPECIALISATION:

CONTACT PERSON:

CONTACT MAIL:

CONTACT PHONE:

Data Protection - Privacy policy

This Privacy Policy is intended for HyTunnel-CS National Networks members. It describes how we collect, store, use and retain your personal data. It also describes how you can change the data that we hold and the ways in which your data is used.

1. Where is your data stored? The data are stored on the members area of HyTunnel-CS project website. Access to this area and your data is strictly limited to the members of HyTunnel-CS consortium and European Commission, and is controlled through password protection.

2. How do we collect data about you? The data that HyTunnel-CS holds about you is collected directly through the present form. Data include: your country, company and specialisation, name, contact email and phone number.

3. Why do we collect data about you? We collect data about you in order to: keep in touch with the project news; invite you to a range of project events including workshops, conference, etc.; update you regarding the status of HyTunnel-CS research and info that may be of interest; send you the project newsletter; contact you to ask information about your specialisation field.

4. What data do we hold? Your email address may be stored in the newsletter contact lists of the consortium members.

5. Who will we share your data with? Your data will be shared within the HyTunnel-CS consortium and European Commission.

6. How long do we retain your data? Your data will be retained for the whole duration of HyTunnel-CS project. Project partners may use your contact beyond HyTunnel-CS project to send you newsletter or other project promotional materials.

7. How can you control the way in which we use your data?

You can contact us by email to let us know how and why you want to hear from us, or if you no longer want to hear from us at all: abernad@hidrogenoaragon.org.

Please use the same contact for any complaint about the way in which your data is being gathered, stored or used.