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TNO-report

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**Deliverable D3.3 – Presentation of the concept
Hy-Approval handbook to authorities.**

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1. Introduction

The purpose of subtask 3.3 of WP3 was to obtain feedback from authorities in a selected number of member countries on an early concept of the Handbook for Hydrogen Refuelling Station Approval. Final goal was to include these recommendations in the final version of the Handbook, or possibly in future updates of the Handbook.

For this task a questionnaire plus a draft version of the Handbook were sent to the same authorities as in subtask 3.1 (aimed at identification of safety requirements necessary for the approval of an HRS).

For this subtask the (rather incomplete) Draft version 4.0 of 11 May 2007 of the handbook was presented to the authorities in China, Germany, France, Italy and Spain. Draft version 4.1 of 24 May 2007 was presented to the authorities in the Netherlands. The authorities were the same as those involved in the first interview round.

The following questions were posed to these authorities in this second round of consultation:

1. What is your opinion about the structure of the handbook?
2. Which chapters are especially useful for you?
3. Does the handbook provide the information you need in the approval process?
4. Have you any remarks regarding quality, completeness/missing information? Is there information that you think could be left out? Is there information you think is incorrect?
5. Would you use the handbook in the approval process?

In the chapters 2 - 6 the answers to these questions as returned by the various parties are reported as well as other comments that were received. In Chapter 7 some conclusions are drawn.

2. Consultation of authorities in China

On 19 July 2007, CAS invited authorities of Beijing City in China to attend a symposium about the pre-release of the handbook of Hydrogen Refueling Station Approval (Draft version 4.0, with a version translated into Chinese) which was issued on 11 May 2007. The questioned authorities of Beijing City are indicated in the table below:

No.	Authority	Approval role
1	Beijing Municipal Commission of Development and Reform	Project permission issuer
2	Beijing Municipal Commission of Urban Planning	Site-selection issuer
3	Beijing Construction Committee	Building permit issuer
4	Beijing Municipal Bureau of State Land and Resources	Land use permit issuer
5	Beijing Bureau of Quality and Technical Supervision	Charging of hydrogen bottle permit issuer
6	Beijing Fire Brigade Bureau	Fire-fight permit issuer

Besides the above authorities, participants of this symposium include the official of Beijing Municipal Science & Technology Commission (BMSTC), an official of the Demonstration Project for Fuel Cell Bus Commercialization in China (which is also partner of CUTE), and the owner of Beijing Hydrogen Park. One aim of this symposium was of course to get feedback from the authorities; another to disseminate information on the Hy-Approval project as well as this handbook.

All participants were interested in the symposium and the handbook. Some authorities gave a general opinion on the handbook, while others gave feedback according to the table at the end of this chapter. Also CAS has contacted Shanghai HRS to try to get feedback from Shanghai authorities.

2.1. General comments as received from some Chinese authorities

Beijing Construction Committee

In future, HRS in China can not be approved according to the current approval procedure of Beijing Hydrogen Park. This is not a common project. It's a national project and dealt with special procedure. So, we can not regard the current approval procedure as a standardized procedure in future.

It's difficult to reply according to the feedback table, I give my opinion as following:

- 1) Hydrogen fuel has not yet reached the application stage at present, and is still on the stage of demonstration and verification. We can not make a uniform approval procedure for the time being.
- 2) Scientific research and technical department should help the administration understand the property and performance of hydrogen, the potential hazard and the basic safety policy. It will benefit them to understand "what should be done and why it should be" when they approve a HRS.
- 3) If the technique of hydrogen fuel has well developed and reached the application stage, the administration should examine and approve all the construction projects based on a uniform technique standard, and will not do it respectively for each project. Then, scientific research and technical department should make the safety standards (which should be the national standards) on the production, storage, transportation and filling for hydrogen fuel. In addition, the construction technical and safety requirement for the special equipment, such as heat insulation, fire protection, and explosion protection, should be described in these standards. All the information should be used as guideline for the approval of a HRS.

Beijing Municipal Bureau of State Land and Resources

For us, there is no difference between approval of HRS and other project. The approval procedure is the same.

Beijing Bureau of Quality and Technical Supervision

Our bureau is responsible for two kinds of work: testing of special equipments which include pressure vessels, pipelines, etc; issuing certificate of charging of hydrogen bottle. The work mentioned above is according to established Chinese standards, hydrogen itself won't bring new problems. The approval procedure is the same as other project.

Beijing Fire Brigade Bureau

We are mainly concerned about safety distances. However, it is not explained in detail. For example, the handbook does not mention whether safe distance is calculated according to centerline or outer boundary, and the handbook does not explain the basis of determining safety distances. We can not use the safety distances in the handbook directly. If they can be made to standard, we can use it.

2.2. Answers to the questions by Chinese authorities

Country	China	
Authority	Beijing Municipal Commission of Development and Reform	
Approval role	Project permission issuer	
Issue	Opinion	Questions – Remarks
What is your opinion about the structure of the handbook?	Cannot make judgment	
Useful chapters	Chapter 5	Properties of hydrogen are interesting.
Does the handbook provide the information you need in the approval process?	Yes	Interested in basic knowledge of hydrogen energy and the technical solution of HRS.
Remarks concerning missing content	Current technical solution, development trend of hydrogen energy, and cost assessment	
Dissemination/ use of the handbook	Will use it as reference with Chapter 5 and development trend of hydrogen energy.	

Country	China	
Authority	Beijing Municipal Commission of Urban Planning	
Approval role	Site-selection issuer	
Issue	Opinion	Questions - Remarks
General opinion on the structure	This handbook is more like technical standard than approval handbook	
Useful chapters	8.2.1 site selection and HRS lay out are very useful 8.2.2 Hazard zones and safety distances are useful	But 8.2.1 is empty. 8.2.2 is not clear. what's the basis of the safety distance?
Does the handbook provide the information you need in the approval process?	In the process of approval, we want to know the relation between the capacity of HRS and the size of construction scale and the occupied land area. We also concern the safety distances of hydrogen refueling station for fire protection and other special requirement for the surrounded building and public.	
Remarks concerning missing content	In the chapter 7, practical standard and code of hydrogen refueling station, the introduction do not include the standards and codes of our country but of other foreign countries, so there are no guidance for our department to approve the location of hydrogen refueling station and the distances between buildings or structures. Our department hopes to get the detailed specification of correlative standards and codes such as distances of fire protection.	
Dissemination / use of the handbook	The chapter of site selection is empty, which is likely to be referred to in the approval process.	

Country	China	
Respondent	Owner of Shanghai HRS consulted authorities in Shanghai	
Issue	Opinion	Questions - Remarks
General opinion on the structure	It's OK for the structure	
Useful chapters	chapter 5~12 are useful	Chapter 8 is useful, but many parts are empty.
Does the handbook provide the information you need in the approval process?	Such contents as chapter 5~12 can be referred to in some degree.	
Remarks concerning missing content	Some parts are empty, especially for chapter 8. Some practical codes and standards are listed in 7.5. It would be better if important items in these codes and standards about HRS are listed.	
Dissemination / use of the handbook	The application of handbook is limited because the approval procedure is different in different region. Only the local procedure can be applied.	

3. Consultation of authorities in France

3.1. List of authorities questioned

No.	Authority	Approval role
1	Ministère de l'Intérieur, Direction de la Défense et de la Sécurité Civile (DDSC) – Risk and Crisis Management – in charge of technical and chemical hazards	Advisor or/and contributor to the legislation writing
2	Coordination of Hydrogen project founding in the Direction Générale des Entreprises from the Ministère de l'Industrie	Advisor or/and contributor to the legislation writing
3	Ministère de l'Ecologie, du Développement et de l'Aménagement Durables – coordination of the inspection services (DRIRE)	Responsible for legislation
4	Departmental Service of Fire and Rescue (Service Départemental d'Incendie et de Secours) (SDIS) de l'Isère, Fontaine – France	Advisor to permitter

3.2. Answers to the questions by French authorities

Country	France	
Authority	Ministère de l'Intérieur, Direction de la Défense et de la Sécurité Civile (DDSC) – Risk and Crisis Management – in charge of technical and chemical hazards (Mr. Philip)	
Approval role	Advisor or/and contributor to the legislation writing	
Issue	Opinion	Questions - Remarks
General opinion on the structure	The structure of the Handbook seems interesting as a starting point and to get familiar with HRS issue. Still, it seems not sufficient to enable setting of regulations on such installations.	
Useful chapters	The interesting chapters are those related to the description of the techniques involved on these stations as well as those related to safety (chapters 5, 6, 8 and 9).	
Information needed for the approval process	The DDSC would not give its opinion on the approval of a HRS at the local level. But, it would participate to the writing of the regulation on classified installations (to which the HRS would be submitted) and, for this regard, the DDSC considers that this document does not provide the necessary elements to the approval of such installations.	Indeed, the Handbook lacks of more precise elements on the site safety, the potential hazards and its vulnerability (especially faced to external aggressions, such as malevolent acts) given the potential stored capacity and thus the energetic potential of H2 at high pressure (from 200 to 700 bar).
Remarks concerning content	See answer above. The handbook appears as a "catalogue" or a wrap-up of the state-of-the-art of the technical knowledge for the implementation of HRS and of the regulations in force at the European level.	At the chapter 7 ("Codes, regulations,..."), the Seveso II Directive is not quoted as a regulation to satisfy to obtain the HRS approval (thus to produce, store H2) although it is quoted several times in the chapter 15 (p101 for the Netherlands, France, Italy) for that purpose. According to the DDSC, the necessary data related to lessons learnt from acci-

		<p>dents are missing here, as well as data on the risks associated to the high pressures involved. Consequently, technical data (such as from experiments, tests accidental phenomena) are missing to this document in order to better understand, for example, the behaviour of H2 in case of release in an outdoor or confined area.</p> <p>Besides, the document could have contained some information about the extinguishing techniques and the behaviour to have when there is a H2 fire on a storage or also on a H2 vehicle (additional electric risk for vehicle with Fuel Cell + Onboard storage) in order to ensure safety of the rescue services.</p> <p>Finally, the aspects related to the type of storage could be completed. Knowing that about 1/3 of cases, the feed in H2 in HRS is done by road trailers: are the bottles installed on site are dedicated to storage or are there bottles dedicated to transport installed permanently on site? Then, the question of ageing, metal wear off by the gas expansion on bottles is asked. Generally speaking, the H2 logistic chain and the associated risks are not addressed (possibility to transfer risks on the road).</p>
Relevant background information	The wrap-up of the regulatory approaches in Europe is one of the interesting topic of this document, to take into account for possible regulatory evolutions.	
Dissemination/use of the handbook	As given, not really at the national level (see answer #3).	At the local level, it could be useful for the SDIS to give its advise on the approval. The handbook looks more like a benchmark for the implementation of future HRS in Europe than a tool for the relevant Authorities to assess the level of safety on such installations.

Country	France	
Authority	Coordination of Hydrogen project founding in the Direction Générale des Entreprises from the Ministère de l'Industrie (Mr. Faucheux)	
Approval role	Advisor or/and contributor to the legislation writing	
Issue	Opinion	Questions - Remarks
General opinion on the structure		
Useful chapters		
Information needed for the approval process		
Remarks concerning content		<p>H2 can be produced on site but also it can be transported to the HRS. In this case, nothing is said about what is planned during this transportation phase.</p> <p>As future development (maybe is it already existing?), the equipment such as valves, connectors</p>

		<p>should be certified.</p> <p>It would be interesting to work with the Ministry of Domestic Affairs in the field of rescue services' training, on the implementation of specific, harmonized marking of this type of installations easily identified by external actors in case of incident.</p> <p>Concerning the remote control of the installations, some additional specifications could be given about possible leak detectors (reliability, sensitivity, equipment periodic control, ...)</p> <p>The recover at the end of the life cycle could also be addressed, as it is a growing concern in industry.</p>
Relevant background information		
Dissemination/ use of the handbook		

Country	France	
Authority	Ministère de l'Ecologie, du Développement et de l'Aménagement Durables (Mr. Emiel)	
Approval role	Responsible for legislation	
Issue	Opinion	Questions - Remarks
General opinion on the structure	No special comments on the structure of the reports	
Useful chapters	The chapter 9 "Operation and Maintenance" was found interesting.	Still, he wanted to know if the recommendations were given by the manufacturer or based on industrial experience.
Information needed for the approval process	The isolation distances in 8.2.2 are one of the information that would be needed in an approval process.	Still, the distances given in the Tables are confused and too long (for the LH2) to be helpful enough. Besides, some distances are not reassuring, like the distance of 60 m from public establishments.
Remarks concerning content	<p>The Handbook seems confused because it seems to gather 2 different objectives : reassuring the Administration about HRS and giving elements to companies to run a HRS.</p> <p>In a way, this HB could help an operator to gain time on the safety studies. But still, at the French level, the approval process will be the same.</p> <p>Nevertheless, if it is shown that whatever size of HRS with its standard equipment (open air/mounded storage, fences, small shop) have similar safety distances or isolation distances, then the regulation could be revised and a specific regulation could apply for HRS (like it exists in France for LPG or natural gas).</p>	Specific distances should be given (instead of the list, given without references): distance to the fence, distance between the H2 storage and other fuel storage distinguishing mounded storage or not, distance between H2 storage and dispensers of other fuels, ..)
Relevant background information		
Dissemination/ use of the handbook	Due to different factors (H2 alternative in France for example), the document will not change the H2 regulation at the national. Still, a document that would be adopted by experts in the H2 field would be of interest for operators during an approval process as a supporting tool.	

Country	France	
Authority	Departmental Service of Fire and Rescue (Service Départemental d'Incendie et de Secours) (SDIS) de l'Isère, Fontaine – France Represented by Lieutenant-Colonel Nicolas JAL	
Approval role	Advisor to permit issuer (Prefet)	
Issue	Opinion	Questions - Remarks
General opinion on the structure	No specific comment: the structure gives global satisfaction	
Useful chapters	Technical information are appreciated Properties of Hydrogen Description of the typical stations, including safety features Safety distances Operational procedures (e.g. Emergency Response Plan)	Indications of safety distances should be included in order to elaborate fire-fighting procedures. The interviewee stresses the fact that no indication may encourage the authorities to specify these distances with conservative values.
Taking note of		Not much interest in chapter 15 "country specific issues" because national approach is leading in the approval process.
Remarks concerning content	Useful information to be added: <ul style="list-style-type: none"> - Feedback from existing HRS (e.g. list of incidents, as gathered in CUTE) - Description of an existing approved HRS (see remark): only the new environment would need to be assessed in the approval process - Description of the filling processes to be described, including safety measures (during refilling of a vehicle and during refilling of the HRS storage) 	A foreign HRS cannot be used as a reference for the approval of a French HRS until we have an EU uniformed approval process.
Dissemination/ use of the handbook	The Handbook would be a good support during the approval process, as long as information listed above are included.	The interviewee would like to distribute the HB to his colleagues in order to disseminate the information and collect opinions. Documents more specific for the fire fighters would be appreciated. E.g. Toyota has provided detailed information for the fire fighters related to the H2 car.

4. Reaction from authorities in Germany

Only some general comments were received from the German authorities questioned. Their general opinion on the handbook can be summarized as follows:

The use of the handbook in the framework of the permission-procedure after BetrSichV is possible if the existing complex of rules is concretised by it and is supplemented in a suitable manner.

Content and purpose of the handbook should be discussed with the involved parties, that are dealing with the erection and the operation of hydrogen-gas stations, as well as with the ones, that are involved at the permission-procedure.

5. Consultation of authorities in Italy

5.1. List of authorities questioned

No.	Authority	Approval role
1	Lombardy Region's Fire Brigades Headquarters in Milan.	Hierarchically superior to Provincial Fire Brigade Headquarters
2	Provincial Fire Brigades Headquarters of Mantova.	Advisor to SIUC for building permit and operating license. Issuer of Fire Prevention Certificate
3	Lombardy's Regional Environmental Protection Agency (ARPA), Department of Mantova.	Advisor to issuer
4	ISPESL (High Institute for Prevention and Safety in the Working Place)	Inspection authority
5	APAT, Agency for Environmental Protection and Technical Services in Rome	Advisor to Ministry of Environment which is responsible for the enforcement of the Seveso Directive in Italy
6	Local Health Service (ASL) of the Province of Mantova.	Advisor to issuer
7	Mantova City Council's Single Counter for Business Activities (SUIC)	Issuer of permit

5.2. Answers to the questions by Italian authorities

Country	Italy	
Authority	Lombardy Region's Fire Brigades Headquarters in Milan. Personal view of Ing. Dario D'Ambrosio , Director of Regional Headquarters	
Approval role	Hierarchically superior to Provincial Fire Brigade Headquarters	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Unsurmountable linguistic barrier.	
Useful chapters		
Taking note of		In table 14 the wording "Ispettorato" is no more correct, since a couple of years ago the official denomination is "Direzione".
Remarks concerning content		
Dissemination/ use of the handbook		

Country	Italy	
Authority	Provincial Fire Brigades Headquarters of Mantova. Personal view of Ing. Roberto Toldo , Head of Provincial Headquarters	
Approval role	Advisor to SIUC for building permit and operating license. Issuer of Fire Prevention Certificate	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Major linguistic barrier. Good. Comprehensive of all important aspects: <ol style="list-style-type: none"> 1. Properties of hydrogen related to safety 2. Design and Characteristics of HRS 3. Management of HRS and vehicles 4. Legislations in different countries and their comparison Description of Authorities Having Jurisdiction and required permits in different countries	
Useful chapters	Chapter 5 + Chapter 7 + Chapter 15	
Taking note of		In table 7 the units of measure are missing. More information could be included on the production of hydrogen from different feedstocks in relation to the future availability and supply of hydrogen, as well as on different options for on-board hydrogen storage (compressed, cryogenic, etc..)
Remarks concerning content		Perhaps, the Italian technical rule on HRS could be included as annex.
Dissemination/ use of the handbook	They would like to receive the handbook when it is ready	This handbook is useful for a deeper insight on the Italian legislation on HRS and could lead to a more convinced and more grounded advice in the process of HRS approval.

Country	Italy	
Authority	Lombardy's Regional Environmental Protection Agency (ARPA), Department of Mantova. Personal view of Dr. Davide Zapparoli , qualified technician with the Operative Unit: Territory and Integrated Activities.	
Approval role	Advisor to issuer	
Issue	Opinion	Questions - Remarks
General opinion on the structure	It's more like a state-of-the-art review than a handbook. Much more focus on safety than on the environmental impact. The organization in parts and chapters is rational.	Anyway, by taking care of personnel and property safety, also the environmental impact is minimized.
Useful chapters	Chapters on maintenance and inspections	
Taking note of		

Remarks concerning content		They would like the handbook to include also: 1) A table of the Member States' laws implementing the listed UE Directives, as Member States' authorities having jurisdiction make strict reference to National legislation, and sometimes national laws may slightly differ from UE Directives 2) Emission limits for flue gas from the Hydrogen production units, especially those fed on methane and biomass. Description of a few technologies for flue gas treatment and the control of emissions. 3) Emission limits for waste water from the cooling water system in the hydrogen production units. Description of a few technologies for waste water treatment and the control of emissions.
Dissemination/ use of the handbook		Very interest in an Italian translation of the Handbook in its final version.

Country	Italy	
Authority	ISPESL (High Institute for Prevention and Safety in the Working Place) Personal view of Ing. Fausto Di Tosto, Technical Officer in the unit "ATEX and safety devices certification", in Rome	
Approval role	Inspection authority	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Positive. The organization of the document in parts and chapters is rational.	The document has grown much bigger with respect to version 1.
Useful chapters	All chapters dealing directly with the authorizing process, and specifically with the ATEX Directive.	
Taking note of	More emphasis could be given to the engineering description of HRS and related plants, while still considering a target readership of non-expert people.	
Remarks concerning content		
Dissemination/ use of the handbook	He would use it if he'll be involved in the certification of a HRS.	

Country	Italy	
Authority	APAT, Agency for Environmental Protection and Technical Services in Rome. Personal view of Ing. Giovanni Pino , responsible of unit "Technological Innovation".	
Approval role	Advisor to Ministry of Environment which is responsible for the enforcement of the Seveso Directive in Italy.	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Sufficient	Capacity of HRS in terms of amount of stored hydrogen and related applicability of RCS and other Handbook safety information not clearly indicated
Most useful chapters	All the same level	
Taking note of		
Remarks concerning content	Missing of requirements for in-service inspection and applicability of maintenance for systems and relative components	General requirements for hydrogen plants and HRS plant level requirements are missing
Dissemination/ use of the handbook	The information will be very useful in the framework of a new project.	A common guideline for HRS in Europe will be very useful.

Country	Italy	
Authority	APAT, Agency for Environmental Protection and Technical Services in Rome. Personal view of Ing. Gianfranco Capponi , responsible of unit "Integrated risk analysis in industrial areas".	
Approval role	Advisor to Ministry of Environment which is responsible for the enforcement of the Seveso Directive in Italy.	
Issue	Opinion	Questions - Remarks
General opinion on the structure	The structure is linear. Easy to read. The content is interesting.	
Most useful chapters	Chapter 15	Lack of details on Germany. Germany should be at least as detailed as other countries.
Taking note of		The handbook could include a comparison of existing HRS worldwide. Typical layouts of HRS are missing. More emphasis should be given to materials, e.g. special steels, and safety devices to be used in presence of hydrogen. As he expects that HRS personnel will be hardly as technically reliable as refineries' personnel, he would like to know what intrinsic safety measures are taken in HRS to make sure that historical hydrogen-related accidents occurred at refineries can not occur again at HRS, especially accident related to the material resistance to hydrogen at high temperature.
Remarks concerning content		

Dissemination/ use of the handbook	They would like to receive the handbook when it is ready	

Country	Italy	
Authority	APAT, Agency for Environmental Protection and Technical Services in Rome. Personal view of Architect Massimo Simonelli , responsible of the Office for "Natural and anthropic emergency".	
Approval role	Advisor to Ministry of Environment which is responsible for the enforcement of the Seveso Directive in Italy.	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Extensive volume, useful.	Applicability not clearly described. What is the environmental concern of HRS ? Issues related to safety and emergency are mixed up and it is not easy to identify them. The different level of depth for the various chapters and sub-chapters is cause of confusion.
Most useful chapters	Chapter 9.1.3, 11.5, 11.6, 12, 15.7-15.10	Directives, Standards and Codes in chapter 7: legislation on the safety of high-risk plants and emergency planning should be included
Taking note of	Chapter 11 and 12	<p>In general, a reading guide for the various target groups would be useful.</p> <p>In chapter 11.3 some preventive measures are listed. They are very specific. It is not easy to get the general picture and so to understand the comprehensive meaning of these actions. Therefore, it is not easy to check if some relevant step or some important part are missing.</p> <p>Chapter 12 is thoroughly missing. This chapter is relevant in order to assess the vulnerability. Who does the vulnerability analysis ? In which part of the approval process ? And what are the control measures taken by the authorities having jurisdiction (possibly, with the involvement of the advisor bodies) ? These issues should be tackled also in chapter 13.</p> <p>Chapter 15.4.1: the legislation on emergency planning is missing, although the Directive "Seveso II" is mandatory for HRS. The same should be specified in chapters 15.7 and 15.8, including also the local emergency planning and the annexed RIR (Risk of Relevant Incident) technical rule on the environmental impact (Italian DM 9 May 2001).</p> <p>Provide deeper insight on the role of ARPA (Regional Environmental Protection Agencies) and APPA (Provincial Environmental Protection Agencies) as inspection bodies, considering their current involvement in the "Seveso" inspections.</p> <p>In chapter 15.10 explain better what a "contin-</p>

		gency plan" is. In chapter 15.13, Ad.2 Conclusions, the part regarding Italy should be better explained.
Remarks concerning content	Chap 11 e 15 interest in chapter 15 "country specific issues" on national approach (different bodies involved)	Chapter 11.5 requires a better description of the vulnerable targets to be considered. And what is the meaning of "vulnerable" ? Chapter 11.6 falls thoroughly short on giving the exclusive responsibility to the planner. The reference to chapter 9.1.3 gives only a few preparation measures, i.e., fire fighting and emergency response plan, with an outdated list of the available materials and devices. No reference is given to the already established planning techniques. Among the bodies listed in chapter 15.3, the prefectural/provincial authority, which is responsible for the emergency planning, is missing.
Dissemination/ use of the handbook	APAT would like to receive the handbook when it is ready	APAT is interested to know what the status of the handbook will be? A EU guideline?

Country	Italy	
Authority	Local Health Service (ASL) of the Province of Mantova... Personal view of Cesare Ghizzi , Qualified Technician with the Service for Prevention and Safety in the Working Environment	
Approval role	Advisor to issuer	
Issue	Opinion	Questions - Remarks
General opinion on the structure	It's commendable. It gives the state-of-the-art of national and European legislation on the matter and from that the differences among the various member states can be inferred. It would be hard to gather all this information by yourself through internet.	Italy stands out as one of the most carping member state as to the involvement of local authorities
Useful chapters	Chapters on legislation	
Taking note of		
Remarks concerning content	Complete	
Dissemination/ use of the handbook	We could include this document for downloading in the ASL webpage, to be available to project designers who are requested to certify by themselves that their project is compliant to existing national regulations.	Will it be available only in electronic format or also as hardcopy ? I wish I had it when I examined the ZeroRegio HRS project in Mantova, it would have saved me time and made my judgment more grounded. Are there any plans for similar handbook dealing with other kind of plants ?

Country	Italy	
Authority	Comune di Mantova Sportello Unico per le Imprese ed i Cittadini	
Approval role	Issuer of final approval for Hydrogen refuelling station construction	
Issue	Opinion	Questions - Remarks
General opinion on the structure	The manual covers a broad range of topics so it appears interesting due to the transversality of the expertise displayed	It seems a first effort to cover at different levels the innovative field of Hydrogen as automotive fuel and its many opportunities/problems
Useful chapters	Part I and II display a well thought order of information and technical advice	The part I and II of the handbook seem very useful to give a specific overview of the many 'questions' related to the HRS, both from the design team and the authority revisioning the project
Taking note of	Part III is organized in an interesting way but it seems that the approach by comparison is more difficult to handle than the part I and II	The many information collected look not completely organized in a plain and rational way due probably to the different approval procedures in the different countries

Remarks concerning content	1. Part III	The comparison of the different international approval procedures is not completely clearly displayed
	2. Approval flowcharts (15.14)	It seems that the approval flowcharts were not put into a clear scheme and the different country charts look to different one to another
Dissemination/ use of the handbook	Fundamental to help the difficult approval process in lack of european unifying legislation	Probably a unifying EU directive would solve the many problems related to the approval procedure of a HRS

6. Consultation of authorities in The Netherlands

6.1. List of authorities questioned

No.	Authority	Approval role
1	Environmental & Building Department (DMB) Amsterdam	Advisor to issuer
2	Fire Brigade Amsterdam (Ir. R. Beij)	Advisor to issuer
3	VROM Inspectorate	Enforcement of law
4	Owner of HRS: GVB Municipal Transportation Company Amsterdam	Applicant of permit

6.2. Answers to the questions by Dutch authorities

Country	Netherlands	
Authority	Environmental & Building Department (DMB) Amsterdam	
Approval role	Advisor to issuer	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Extensive volume, useful, easy reading though the fact that it is written in English is more time consuming.	Applicability not clearly described, what is minimum and maximum capacity of HRS for which this handbook might be used?
Useful chapters	Chapter 5 + Chapter 7.5 + Chapter 8.2.2	Comparison with other fuels in chapter 5 illustrative. Directives, Standards and Codes in chapter 7.5 very useful. Safety distances interesting in 8.2.2, but foundation not clear.
Taking note of	Chapter 11 and 15	Not much interest in chapter 11 "recommended technical and safety requirements". Neither in chapter 15 "country specific issues" because national approach is leading in the approval process
Remarks concerning content	1. Applicability of maintenance requirements not clear. (Chapter 9.2.1)	What is the source/foundation?
	2. Definition of inspection protocol missing (Chapter 15.9)	
Dissemination/ use of the handbook	DMB would like to receive the handbook when it is ready	DMB is interested to know what the status of the handbook will be? A EU guideline?

Country	Netherlands	
Authority	Ir.Beij of Fire Brigade Amsterdam (personal view)	
Approval role	Advisor to issuer	
Issue	Opinion	Questions - Remarks
General opinion on the structure	There is a lack of coherence in the chapters 8 until 12.	The depth of the information is very different, very global versus very detailed.
Useful chapters	Chapter 5, 6 and 7 are very useful	Comparison with other fuels appreciated. Chapter 7 shows clearly that no uniform regulations exist yet.
Taking note of	Part III; Chapter 15	Nice to read but not very useful for local authorities
Remarks concerning content	Chapters 8 until 12	Comparison with for instance LPG as presented in chapters 5 and 6 would be instructive.
Dissemination / use of	The information would have been	

the handboek	very useful in the framework of the CUTE project.	
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Country	Netherlands	
Authority	VROM inspectorate	
Approval role	Responsible for enforcement	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Partially illegible and incomplete. For the target group a translation into Dutch shall be necessary.	
Useful chapters		
Taking note of		
Remarks concerning content	Chapter 12 (Risk analysis) is not yet described.	This chapter is crucial for approval of hydrogen installations according the Dutch policy. A CEV review by the Dutch RIVM and the VROM Directorate External Safety is advised.
Dissemination / use of the handboek	Without a national memorandum how to use this handbook and and official status the use of the hand-book will be difficult and limited.	

Country	Netherlands	
Respondent	Owner of HRS	
Issue	Opinion	Questions - Remarks
General opinion on the structure	Extensive, detailed	
Useful chapters		
Taking note of	Chapter 10.6 Driver training	Which developments are necessary to achieve a similar situation as for LPG?
Remarks concerning content	Chapter 9.2 Do not specify operations and frequency! Chapter 11. The information shall be logic.	Maintenance according instructions of supplier. Table 10: There are various types of compressors for which the operations are not valid. Which target group needs this type of information?
Dissemination / use of the handboek		Will European standardization follow? Which steps have to be followed to achieve this?

7. Conclusions and recommendations

7.1. Conclusions

As can be expected many of the comments made by the various authorities are very much related to their specific situation, determined by responsibility, local regulations and experience with hydrogen refuelling stations or hydrogen in general. Nonetheless a number of conclusions can be drawn from their comments.

General comments:

- Many interviewees made it clear that the usefulness of the handbook will depend on the status it will gain. If the handbook is not in any way part of or referred to in a country's legislation, its use will be limited. It will be used mainly as a reference document for basic information on hydrogen (refuelling stations) and for (mostly technical) standards that could be relevant for consultation during one's own, country specific, approval process. Its usefulness as a technical reference document was frequently emphasised. From this perspective, country specific issues were considered 'interesting' but not very useful;
- The objective of the document was not always clear. Sometimes it seemed aimed at operators to run an HRS, sometimes it was aimed at maintenance, whereas essential information for approving authorities was often found missing (see below);
- The level of information was found inconsistent. Sometimes information was very detailed, sometimes only general. For instance the chapter on operation and maintenance was very detailed (and its usefulness sometimes questioned), whereas the essential (for approval) chapter 12 was entirely missing.

Lacking information:

- information on safety distances was often cited as insufficient or, where safety distances were mentioned, their origin was unclear;
- More safety information on hydrogen transport would have been appreciated;
- Environmental issues were not addressed (emission limits on flue gas and cooling water);
- Inspection protocols were missing;
- Information on historical accident data (lessons learned) for hydrogen were missing;
- More information regarding fire fighting/emergency planning would have been welcome;
- Information on security (terrorist attacks) would have been welcome;
- Entire absence of chapter 12 (risk assessment).

7.2. Recommendations

After the first interview round (WP 3.1) the following was concluded:

In all interviewed countries either explicitly or implicitly three stages of safety assurance could be distinguished in the approval process of an HRS:

1. *Prevention of accidents by application of state of the art technology and following technical standards*
2. *Creation of a safety zone or safety distance.*
3. *Optimal preparation of emergency services (contingency planning).*

Thus it was recommended that:

1. *The handbook should contain a detailed technical description of the HRS; thereby making sure it is in good agreement with all regulations applicable.*
2. *All safety studies reported should be detailed enough so individual countries can extract the information that is useful for their particular safety approach or policy. This means effect / safety distances should be reported as a minimum (deterministic approach). Probability of corresponding scenario could also be proposed.*
3. *The role of the fire services should be outlined and an emergency response plan should be in the Hy-approval handbook. In this plan the intervention measures for the various incident scenarios at HRSs should be explicitly stated in the handbook. Most of the interviewed parties indicated that they would like to see this. At least emergency measures should be outlined.*

As can be seen from the above the comments returned in the second interview round address all the issues mentioned in the first round.

The results of this second interview round indicate that only recommendation 1 above has been addressed sufficiently (if not excessively) in the draft version of the handbook. Information on the other two was insufficient or incomplete.

The second issue above has been addressed since the interviews. A risk assessment has been performed and will be included in the handbook in chapter 12 and the chapter on safety distances has been revised. The issue of emergency response should still be discussed amongst Hy-Approval participants.

Also some additional issues brought forward in this second interview round should be considered and discussed amongst Hy-Approval parties:

- hydrogen transport,
- environmental issues,
- inspection,
- historic accident data,
- security,
- inclusion or deletion of 'country specific issues'.

Perhaps also a discussion on (the reality, or feasibility of) European standardisation should be considered.

Of course the comments received also reflect the incomplete and immature status of the handbook at the time this subtask was performed and many issues will automatically be addressed upon completion of the handbook. Nonetheless the issue of 'inconsistency' deserves some extra attention as turning the draft document into an internally consistent handbook will still be a significant effort and it should be made clear how this can be achieved in the limited time left (e.g. which input is still required by which party, who is the final editor).