D2.2

Report on permitting requirements

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Index of Contents

Index of Tables

Index of Figures

Partners short names

ENVI	Parco Scientifico Tecnologico Per L'ambiente Environment Park Torino Spa
IMI	Institute For Methods Innovation
IME	Fundacion IMDEA Energia
APRE	Agenzia per la Promozione della Ricerca Europea
CNH2	Centro Nacional Del Hidrogeno
RIGP	Regionalna Izba Gospodarcza Pomorza
CLUSTER TWEED	Cluster Tweed
BH2C	Balkanski Vodoroden Klaster

Abbrevations

ATEX	Explosive Atmospheres
CAR	High-Efficiency Cogeneration Plants
CEF	Connecting Europe Facility
CNG or GNC	Compressed Natural Gas
Dx.y	Deliverable number "y" of work package "x".
EIA	Environmental Impact Assessment
FC	Fuel cells
FCEV	Fuel Cell Electric Vehicle
HRS	Hydrogen Refuelling Station
IEA	Integrated Environmental Authorization (AIA in Italy, AAI in Spain)
IED	European Directive on Industrial Emissions
IPPC	Directive on Integrated Pollution Prevention and Control
LNG	Liquified Natural Gas
LPG	Petrol Liquified Gases
micro-CHP	Cogenerators (Combined Heat and Power)
P2H	Plastic-to-hydrogen
PNIEC	Integrated National Plan for Energy and Climate
QRA	Quantified Risk Analysis
RES	Renewable Energy Source
SEA	Strategic Environmental Assessment
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Transport Network
TSO	National Transport System Operator
WP	Work package

ANSFISA	(Italy) National Agency for Railway and Road and Highway Infrastructure Safety
APPA	(Italy) Provincial Agency for Environmental Protection
ARPA	(Italy) Regional Agency for Environmental Protection
ASL	(Italy) Local Health Agency
AU	(Italy) Single Authorization
CTR	(Italy) Regional Technical Committee
DM	(Italy) Ministerial Decree
DPR	(Italy) Decree of the President of the Republic
ISPRA	(Italy) Higher Institute for Environmental Protection and Research
MiTE (now MASE)	(Italy) Ministry of Ecological Transition (now Ministry of Environment and Energy Safety)
NRRP (or PNRR)	(Italy) Italian National Recovery and Resilience Plan
PAS	(Italy) Simplified Authorization Procedure
PAUAR	(Italy) Single Accelerated Regional Authorization Procedure for sectors of strategic importance
PAUR	(Italy) Single Regional Authorization Measure
PCT (PTRC / PTCP)	(Italy) Territorial Coordination Plan (regional/provincial level)
PRG	(Italy) General Regulatory Plan
PTM	(Italy) Metropolitan Territorial Plan

PTR	(Italy) Regional Territorial Plan
PUA	(Italy) Single Environmental Procedure
PUC	(Italy) Municipal Urban Plan
SCIA	(Italy) Certified Notification of Start of Activity
SSPC	(Italy) Simple Systems of Production and Consumption
SUAP	(Italy) Single Desk for Productive Activities
TICA	(Italy) Integrated Text of Active Connections - TICA
TUE	(Italy) Building Law, Consolidated Building Act
LISTA	(Spain) Law to Promote the Sustainability of the Andalusian Territory
LSE	(Spain) Electricity Sector Law
LSH	(Spain) Hydrocarbons Sector Law
MITECO	(Spain) Ministry for Ecological Transition and the Demographic Challenge
RD	(Spain) Royal Decree
RDL	(Spain) Royal Legislative Decree

Executive Summary

This deliverable is part of WP2 “Stakeholders’ requirements’ analysis”, whose aim is to map the different countries’ instruments and procedures linked to hydrogen and fuel cells permitting. Regulations and standards have been studied for several European countries, distinguishing three main groups: the HYPOP consortium countries, the EU-13 countries and the Frontrunner countries (France, Germany, Switzerland and The Netherlands).

Differences between countries have been observed, since some countries have shown precise hydrogen-related pieces of legislation while in many others no specific regulations have been identified. For example, in Italy the “Reform 3.1 "Administrative Simplification and Reduction of Regulatory Barriers to the Diffusion of Hydrogen" introduced some updates with the aim of speeding up the integration of hydrogen in the national safety regulations and authorization procedures, boosting in that way a wider implementation. In France, an ad hoc law decree (Law-Decree No 2021-167 of 17 February 2021 relating to hydrogen) has been published, while in Spain there is only a specific legislation for hydrogen refuelling stations (Royal Decree 542/2020 of 26 May amending and repealing various provisions on industrial quality and safety). At the same time, Poland is actively working to provide a sound permitting framework for hydrogen. The regulatory gaps are being covered with corresponding existing regulations (legislation for Natural Gas, Chemical Products Storage, Pressure Vessels, etc.).

On the other side, some commonalities have been identified, like the application of environmental permitting procedures (usually Environmental Impact Assessment, Strategic Environmental Assessment or Integrated Environmental Authorisation), deriving from European Directives, and land use/ urban planning. These latter are usually covered by regional or municipal authorities, so there may be differences even within the same country. Safety and people health are also taken into account in many permitting procedures.

A review of the current legislation (or the lack of it) has been done, considering also some of the hydrogen projects developed, ongoing or to be developed in each studied country. The consortium experiences, the literature available and the contacts expertise have been included with the aim of representing the diverse status of hydrogen technologies implementation and the hydrogen legislative framework throughout the European Union.

1 Introduction

HYPOP project is a Clean Hydrogen Partnership funded project with the main objective of raising public awareness and trust towards hydrogen technologies and their systemic benefits.

More specifically, WP2 aims to analyse the state of art of hydrogen regulations in terms of safety, permitting and certification throughout the European countries, identifying the possible barriers and gaps and mapping the main requirements for this kind of technologies.

To achieve this goal, stakeholders' involvement has been promoted through surveys, emails, meetings and participation in events. Two categories of stakeholders have been defined: technology manufacturers/ technology adopters and public authorities involved in H_2 projects, and several contacts have been carried out so as to map the regulations established and applied in each scenario (geographic region or specific activity/project). Finally, an analysis of the main barriers and gaps and a general comparison between the different countries has been done.

2 Methodology

The methodology behind WP2 considered different key elements that reflect the typical features of a stakeholders' engagement activity aimed at gathering information about the perception from institutions towards hydrogen technologies and approaches followed by project developers to fulfil the relevant permitting requirements. The same methodology adopted for D2.1 is replicated for the analysis of permitting requirements described in this Deliverable 2.2 as it is based on the centrality of the role of institutions to boost hydrogen economy and ensure trust in hydrogen technologies. We therefore refer the reader to the description of the methodology in D2.1. For reference, here are reported the groups of Countries analysed, with a mapping of the information found.

As for the safety aspects, information on planning procedures will be continuously gathered during the next phase of the project, with an update of this document to be provided as appendix to the Guidelines on permitting to be produced by project HYPOP as final outcome.

Table 1 Geographical coverage of the information gathered

		Information on permitting found?
HYPOP Countries	Belgium	Y
	Italy	Y
	Spain	Y
EU-13 Countries	Bulgaria (also HYPOP country)	Y
	Poland (also HYPOP country)	Y
	Croatia	Y
	Cyprus	To be collected
	Czech Republic	To be collected
	Estonia	Y
	Hungary	Y
	Latvia	Y
	Lithuania	Y
	Malta	Y

		Information on permitting found?
	Romania	To be collected
	Slovakia	To be collected
	Slovenia	Y
Frontrunner Countries	France	Y
	Germany	Y
	Netherlands	Y
	Switzerland	Y

3 Preamble: EU Regulatory Framework - a set of common Permitting requirements

Authorization procedures of plants in Europe follow a comprehensive regulatory framework designed to ensure safety, environmental sustainability, and effective integration with urban planning. A set of European Directives, as implemented by Member States through national legislation and regulations, must be abided to. On top of that, local regulations affect the integration of the facilities within the local spatial planning. Key directives include ATEX, PED, SEVESO, REACH, and various environmental impact and urban planning regulations, all of which play essential roles across different sectors, from heavy industry to vehicle refuelling stations.

Table 2 EU Permitting Framework influencing Hydrogen technologies in Industry, Mobility and Residential sectors

EU Permitting	Goal
ATEX directives (2014/34/EU and 1999/92/EC)	They establish requirements for equipment and protective systems used in potentially explosive atmospheres. This is particularly important for plants handling flammable gases, vapours, or dust. Under ATEX, areas must be classified based on explosion risks, and equipment in these zones must meet stringent safety standards to prevent accidents. Compliance involves hazard assessments, risk mitigation, and the use of certified ATEX equipment. See D2.3 for details about application to hydrogen technologies.
Pressure Equipment Directive (PED 2014/68/EU)	It applies to the design and conformity of pressure vessels, pipelines, and other high-pressure equipment used in industrial settings. For both manufacturing plants and refuelling stations, PED mandates that pressure-related risks be minimized through structural integrity and design standards, with assessments typically conducted by an authorized notified body. This regulation ensures that high-pressure systems are safely managed to avoid incidents that could endanger workers and the public. See D2.3 for details about application to hydrogen technologies.
SEVESO III (Directive 2012/18/EU)	It is crucial for facilities that handle large quantities of hazardous substances, establishing measures to prevent major accidents and mitigate their consequences on human health and the environment. Facilities meeting specific threshold levels for dangerous substances must implement strict safety protocols, create emergency response plans, and inform local authorities and communities about potential risks. SEVESO compliance is also significant for hydrogen refueling stations and industrial plants where chemicals are stored, as it

EU Permitting	Goal
	mandates safety planning and risk reduction strategies to prevent catastrophic incidents.
REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals, Regulation (EC) No 1907/2006)	It aims to protect human health and the environment from the risks posed by chemicals. Under REACH, companies must evaluate and report on the safety of chemicals they manufacture, import, or use, ensuring that substances are safely managed throughout their lifecycle. In industrial plants and refuelling stations, REACH compliance involves monitoring the handling of hazardous substances and substituting harmful chemicals with safer alternatives when possible.
Environmental Impact Assessment (EIA) as mandated by Directive 2011/92/EU	EIAs require plants designers to analyse and address potential environmental impacts, including those on air and water quality, biodiversity, and waste management. For refuelling stations and industrial facilities alike, an EIA serves as a critical step before receiving operational permits, providing transparency through public consultations and aligning projects with environmental standards.
Urban Planning regulations	They play an essential role in authorization of industrial plants and refuelling station approvals, ensuring that facilities integrate harmoniously within urban landscapes. Facilities must align with local land-use plans and consider infrastructure, transport logistics, and potential impacts on neighbouring areas. Buffer zones and design adjustments may be necessary to prevent issues such as noise pollution, traffic congestion, and contamination.

4 Summary of the requirements and barriers of the approaches adopted by the different countries

For the different countries (groups: HYPOP Countries, EU-13 and Frontrunners), HYPOP performed an in-depth analysis of the hydrogen specific permitting regulations– see section 10. The following tables summarise the information collected, whilst also already presenting a synopsis of the requirements and barriers found from the analysis of the current regulations, by Country and country group.

Section 10 shows in details the operating procedures and protocols, the variety of authorities involved for different topics, the main elements characterizing innovations introduced at country/local level (if present) to support hydrogen projects implementation. It also highlights gaps in the regulatory framework representing potential barriers.

The following table serves as a synopsis of the findings, showing also a first comparison amongst countries' approaches for the different sectors of application of hydrogen. The degree of information obtained for a few countries also allows to identify the strengths and weaknesses within each approach. In the following section, a broader evaluation of the strengths and weaknesses of each approach has been further evaluated against a set of parameters that have been considered

Table 3. Requirements and barriers for Industry, Mobility and Residential sectors – HYPOP COUNTRIES (in green: strengths, in red: weaknessess).

	Countries	Requirements for Industry	Requirements for Mobility	Requirements for Residential
HYPOP COUNTRIES	Belgium	Different permits and procedures for each Belgian region.	HRS can be built in residential areas, provided that the noise regulation is respected. An ad hoc safety study has to be done by an accredited external expert for each HRS to be built.	No information (the Belgian strategy consider that the residential sector should be the last application to use hydrogen)
	Italy	Reform 3.1 from the Italian "Next Generation EU" Plan includes regulations for hydrogen. A production threshold (100 Gg/year) defines whether a plant is national or regional competence.	Some regulatory references for road mobility and no clear framework for railway transport	Fuel cells are considered micro-CHP (regulated by a Legislative Decree). The connection to the building's electric grid is key for the permitting.
	Spain	No differentiation between production technologies and scale, i.e.: same level of complexity for, e.g., reforming and electrolysis, large scale and small scale	Hydrogen is considered as a fuel on filling stations for gas-fueled vehicles according to Royal Decree 542/2020.	No specific procedure for connecting a domestic fuel cell. Fuel cells are not considered cogeneration equipment in the new Royal Decree.

Table 4. Requirements and barriers for Industry, Mobility and Residential sectors – EU13 COUNTRIES (in green: strengths, in red: weaknesses).

	Countries	Requirements for Industry	Requirements for Mobility	Requirements for Residential
EU-13 COUNTRIES	Bulgaria (also HYPOP country)	More information to be found to confirm gaps in regulatory framework	Specific ordinance for fixed HRS with gaseous H2	Rules for other gases are followed although some first examples of implementation of H2 communities might bring about some changes
	Poland (HYPOP country)	Some regulations related to production of hydrogen, but lack of a comprehensive regulatory framework	The permitting procedure for fuelling stations includes environmental, urban planning and safety requirements. It requires coordination between local urban planning authorities, environmental inspection and fire departments.	Examples of domestic applications are evolving with a complex set of regulations to be followed (see section 11)
	Croatia	No specific permitting requirements defined specifically for H2 due to immaturity of implementation	No specific permitting requirements defined specifically for H2 due to immaturity of implementation	No specific permitting requirements defined specifically for H2 due to immaturity of implementation
	Cyprus	More information to be found	More information to be found	More information to be found
	Czech Republic	More information to be found	More information to be found	More information to be found
	Estonia	More information to be found to confirm gaps in regulatory framework	No information has been found, although some projects for HRS, buses, etc. are arising	More information to be found to confirm gaps in regulatory framework
	Hungary	The permitting process for the construction of a hydrogen production plant depends on the project duration. No lower limit is given in the IPPC legislation (Gov.Dec. 314/2005.), so	No special permitting requirements found for HRS. Min. Decree 2/2016 NGM could be considered, but this legislation was primarily	No information has been found

	Countries	Requirements for Industry	Requirements for Mobility	Requirements for Residential
		theoretically the same permitting procedure should be conducted, from environmental point of view, for small hydrogen production installations as for the huge ones. No specific H2 production permitting requirements found.	developed for permitting CNG/LNG refueling stations.	
	Latvia	H2 production restricted only to land classified as industrial; specific classification of H2 production plant according to polluting emissions, issued by State agency but no difference amongst production technologies	Common C permit for HRS, but Public administrations would evaluate HRS projects case by case	Fuel cells are regulated as any other micro CHP
	Lithuania	More information to be found to confirm gaps in regulatory framework	More information to be found to confirm gaps in regulatory framework	More information to be found to confirm gaps in regulatory framework
	Malta	More information to be found to confirm gaps in regulatory framework	More information to be found to confirm gaps in regulatory framework	More information to be found to confirm gaps in regulatory framework
	Romania	More information to be found	More information to be found	More information to be found
	Slovakia	More information to be found	More information to be found	More information to be found
	Slovenia	Only pilot projects, and for hydrogen production follow permitting procedures not specifically related to hydrogen but mainly to natural gas.	Only pilot projects, and for hydrogen distribution follow permitting procedures not specifically related to Hydrogen but mainly to natural gas.	More information to be found

Table 5. Requirements and barriers for Industry, Mobility and Residential sectors – Frontrunner COUNTRIES (in green: strengths, in red: weaknesses).

	Countries	Requirements for Industry	Requirements for Mobility	Requirements for Residential
FRONTRUNNER COUNTRIES	France	Law-Decree No 2021-167 is specific for hydrogen and includes information about traceability, guarantees of origin, self-consumption, etc. The Energy Code also has a full chapter devoted to hydrogen.	The permitting procedure for HRS can be a mix between the procedures for a H2 production unit and a H2 storage unit depending on the technical characteristics. Specific regulation for HRS, regulation of the characteristics of hydrogen as an energy source for road transport, etc.	According to Law-Decree No 2021-167, hydrogen can be injected into the existing natural gas networks. For H2 storage, a simplified procedure if the amount is between 100 kg and 1 ton.
	Germany	Hydrogen is included in some general legislation for industrial projects (Land Use Ordinance, Federal Emissions Control Act, etc.). H2 networks are regulated by Energy Industry Law, Combined Heat and Power Production Act, DVGW rulebook and Renewable Energy Law.	Hydrogen vehicles are affected by the German Traffic Ordenance. There are also requirements and explanations for H2 safety in motor vehicle repair shops. HRS are affected by a national standard and there is an approval guide for HRS.	Combined Heat and Power Production Act and Renewable Energy Law can be applied.
	The Netherlands	More information to be found	Regulation for the construction and maintenance of an HRS and the delivery of hydrogen to vehicles and tools (PSG 35).	More information to be found

	Countries	Requirements for Industry	Requirements for Mobility	Requirements for Residential
	Switzerland	The permitting requirements can be of federal, cantonal, and municipal nature, or a combination of these. A procedure is applied to simplify interactions between authorities and the exchange of information. In the case of hydrogen production plants, the building procedure is the main authorization process.	The permitting requirements can be of federal, cantonal, and municipal nature, or a combination of these. A procedure is applied to simplify interactions between authorities and the exchange of information.	The permitting requirements can be of federal, cantonal, and municipal nature, or a combination of these. A procedure is applied to simplify interactions between authorities and the exchange of information.

5 Strengths and weaknesses with comparison of safety approaches in EU countries

This section aims to highlight strengths and weaknesses, similarities and differences between the various safety approaches of the countries for which information has been collected. The areas of comparison ranged from hydrogen production to infrastructure for mobility and residential applications.

5.1 Strengths and weaknesses

The following table provides the strengths and weaknesses for hydrogen technologies implementation in industry, mobility (research on HRS with on-site hydrogen production is linked to industrial applications) and residential sectors. Missing information will be the focus for the remaining duration of the project where the stakeholders' engagement workshops to be organized within the scope of the Work package 4 are aimed to cover as much as possible these gaps.

The parameters against which the strength/weakness analysis has been performed are:

- Evidence of existence of a regulatory framework for permitting
- Existence of H2 -specific procedures
- Evidence of permitting guidelines (for H2 technologies)
- Evidence of cooperation with and overall positive attitude towards hydrogen by public authorities

These parameters are considered to represent the main characteristics of a permitting regulatory framework and approach favouring hydrogen technology's implementation hence their availability/application/ evidence is considered in general a positive element. However, the association between parameters and colours (hence positivity or negativity) has been decided according to the main elements found during the regulatory frameworks and best practices analysis, and as output of the stakeholders' engagement activities in terms of perception and opinions. Nevertheless, it does not intend to reflect fully the current situation for each country as case-by-case situations should be considered.

The table can be read as follows:

- Where information is missing, "n/a" (not available) is reported;
- If the lack of information to date reflects a regulatory gap, this is shown as a weakness;

- If the chosen parameter refers to the readiness of the hydrogen specific permitting regulatory framework or to the existence of any guidelines issued at national or local level in the country and if it corresponds to a positive or negative best practices, green or red colours are associated respectively to indicate a strength or a weakness.

Table 6. Overall mapping of strengths and weaknesses of the regulatory framework

HYPOP Countries	Regulatory framework (i.e., safety, environment, urban/building)	H_2 specific procedures	Permitting guidelines	Cooperation with and perception of public authorities
Belgium				
Italy				
Spain				
EU-13 Countries	**Regulatory framework (i.e., safety, environment, urban/building)**	**H_2 specific procedures**	**Permitting guidelines**	**Cooperation with and perception of public authorities**
Bulgaria (HYPOP country)				
Poland (HYPOP country)				
Croatia				n/a
Cyprus	n/a	n/a	n/a	n/a
Czech Republic	n/a	n/a	n/a	n/a
Estonia				n/a
Hungary				n/a
Latvia				n/a
Lithuania				n/a
Malta				n/a
Romania	n/a	n/a	n/a	n/a
Slovakia	n/a	n/a	n/a	n/a
Slovenia				n/a
Frontrunner Countries	**Readiness of regulatory framework (i.e., safety, environment, urban/building)**	**H_2 specific procedures**	**Permitting guidelines**	**Cooperation with and perception of public authorities**
France			n/a	
Germany				
Netherlands		n/a		n/a

5.2 Comparison among Countries analysed

While hydrogen is being intensely promoted across the European Union, the study of the different European Legislative Frameworks has shown up an uneven pace among the analyzed countries when it comes to the deployment of hydrogen projects and the establishment of hydrogen-related normative.

Some specific regulations for hydrogen and hydrogen technologies have been identified. That is the case of the "Reform 3.1 "Administrative Simplification and Reduction of Regulatory Barriers to the Diffusion of Hydrogen" in **Italy** and the "RD 542/2020 of 26 May amending and repealing various provisions on industrial quality and safety" for HRS in **Spain** or the "Law-Decree No 2021-167 of 17 February 2021 relating to hydrogen" in **France**.

Apart from this, **the environmental legislation** has proven to be of great importance for the permitting procedures of hydrogen plants. There are European Directives aimed to a better regulation of industrial actions towards sustainability, and consequently, European countries have produced their own national legislations, such as Legislative Decree April 3, 2006, no.152 and subsequent amendments (Environmental Code) in Italy. This issue has even come to the regional level, as in the case of Spain, where different laws have been identified for elaborating an EIA depending on the autonomous community (Law 2/2020 of 7th of February, of Environmental Evaluation of Castilla-La Mancha, Law 7/2013, of 26 November, on the legal regime of installation, access and exercise of activities in the Balearic Islands). In Belgium, environmental permits are also a regional competence. Something similar occurs to **land use:** in most cases hydrogen installations must be built in industrial land, which often depends on the urbanism plan of every municipality. **Legislative framework in Italy and Spain generally limits the hydrogen technologies within industrial areas**. Instead, in the case of **Belgium in general there are not specific constraints** provided that the hydrogen technologies (including HRS) are installed or built within an area compatible to the specific land use and the surrounding activities. At the same time, **some specific applications are evolving differently from the legal point of view:** in Italy fuel cell technologies are defined as technologies for cogeneration and thus their use in residential sector is conceived. Instead, in Spain, recent amendments to legislation cancelled the previous mention of fuel cells from the legislation.

Obviously, **industrial security** must be taken into account in all the stages of the project's lifecycle.

A **huge contrast** has been observed between the different European countries: while France, Germany, Netherlands and Switzerland arise as the "frontrunner countries", due to their advanced adoption of hydrogen technologies (as an example, Germany already considers hydrogen vehicles in the German Traffic Ordinance), in many EU-13 countries hydrogen is just taking off. Poland and Bulgaria are an example of this, since several hydrogen projects are planned to be developed in the upcoming years, but little legislation and previous experiences have been identified. **Some priorities or rejections among hydrogen applications** have also appeared in some countries: that is the case of Belgium putting the residential use as the lowest priority or Malta favouring electric vehicles over hydrogen vehicles.

To conclude, it can be stated that, despite the irregular speed, hydrogen deployment is undoubtedly advancing across Europe. Sometimes projects run faster than legislation, but it is clear that actions are being taken towards a better regulation of hydrogen projects. For that reason, it is difficult to take a steady picture of the legislative framework or the projects developed and it is difficult to put two European countries on the same level for comparison.

6 Best practices for permitting of hydrogen in industry

The following section shows the best practices identified showing the permitting approaches applied for:

- green hydrogen and ammonia production, destined either to use within an industrial plant or destined to distribution for other uses including mobility;
- storage of hydrogen for different uses.

6.1 ITALY: green H_2 production in the Steelmaking sector

The use of hydrogen in hard-to-abate sectors such as the production of metals and chemicals is a lever towards a more sustainable industrial ecosystem. In this context, **a stakeholder involved in the production not only of metals but also of ammonia and methanol was contacted**. The stakeholder has also been involved in funded European projects such as GrInHy2.0 and HytecHeat.

The main information obtained regarding permitting and safety requirements is related to **an Italian project for the replacement of methane with green hydrogen for steel production**. It would be the first case of green hydrogen application on an industrial scale in the steel sector in Italy through a set of solutions for hydrogen production, distribution, and use.

From the authorization perspective, the stakeholder tends to develop a permitting plan that supports the client in the process and that enhances interaction with competent authorities. The stakeholder focuses only on demonstrating the project's feasibility according to urban planning tools related to landscape and land use designation. This approach applies not only to this project but also to other cases. From a safety perspective, the authorization process involves applying the technical fire prevention rule for electrolysers and contacting the local competent fire brigade authority. **The interaction with the authorities has been positive**, especially thanks to the technical documentation supporting the project, following the provisions of the **performance regulation "engineering approach to safety" through the Ministerial Decree of May 9, 2001.**

WINNING APPROACH: see table below

Table 7 Drivers for an easier permitting approach from stakeholders to public authorities for Industrial applications in Italy

Development of an internal permitting plan
Goal: to support stakeholders' clients with all the procedures and documentations needed for their interaction with local permitting authorities.
Cooperation with Local Fire Brigade
Goal: to inform and train safety authorities about hydrogen technologies working principles and main features. To assess preliminary the project and to receive a first green light for the safety approach adopted.
Preparation of a preliminary risk assessment
Goal: to inform and train safety and other public authorities, especially about the renewable hydrogen production technologies
Application of the Prescriptive regulation for Hydrogen production from electrolysis (see Deliverable 2.1)
Goal: to avoid waste of time in modifying the safety requirements included in the regulatory framework (i.e., due to the nature of the activities undergoing on an industrial site, the safety requirements of the Italian regulation are generally easier to satisfy compared to mobility and residential sectors in case of on-site hydrogen production, storage and use)

6.2 ITALY: green hydrogen production for distribution and use in railway applications

The following best practice is also linked to the mobility sector and its permitting requirements and barriers as a renewable hydrogen production plant is conceived for distribution purposes, especially of rail vehicles and in a second phase of the project also for FC vehicles for public transport.

In the railway sector, hydrogen is gaining more resonance at the Italian level thanks to Recovery and Resilience Fund (i.e., Piano Nazionale di Ripresa e Resilienza, PNRR) and the Hydrogen Valley project in Lombardy (H2iseo). In particular, an interview was conducted with one of the main partners involved, as a part of the overall project (called Valcamonica project), for the production and distribution of hydrogen in the province of Brescia. The part of the project related by the stakeholder included the electrolysis plant located near the train distribution station. **From an environmental perspective, the authorization procedures have not yet been initiated, but the stakeholder shared the possibility of applying for a Single Authorization (AU) procedure.** The project does not include the concept of "functional connection", as the plant is intended to produce hydrogen only for its downstream use and not for integrated use within the plant itself (at least at this stage of knowledge). For this reason, the authorization procedure should not require an Environmental Impact Assessment (EIA), except for other requirements that can be present due to the site-specific features of the environmental permitting. The water consumption associated with the hydrogen production plant was also considered as a potential parameter for EIA applicability.

As a chemical plant manufacturing an inorganic chemical product, the electrolyser falls within the facilities that must present an Integrated Environmental Authorization (AIA). However, the stakeholder reports the need to propose threshold values for this authorization as well.

6.3 ITALY: green hydrogen production and use within a refinery plant

This best practice concerns the production and use of renewable hydrogen within a refinery located in the Autonomous Region of Sardinia. The project involved installing a 20 MW **electrolyser** (for 4,000 Nm^3/h), connected to the national grid and powered by renewable energy (solar, hydroelectric, and wind) produced by RES plants owned by the same installer. Although the plant do not present a connection to the refinery that creates operational dependence, the electrolyser is installed within the industrial site. Moreover, since the hydrogen produced by the electrolysis plant is used for the refinery's activities, it falls within the definition of an integrated chemical plant.

However, the **annual hydrogen capacity is below the threshold** indicated in the Italian environmental regulation, and therefore **the stakeholder must submit an EIA application directly to the competent authorities designated by the Sardinia Region.** The stakeholder submitted its project to the Autonomous Region of Sardinia within the **PAUR procedure**, attaching, along with the Environmental Impact Assessment (EIA), the following permits to demonstrate its conformity from an environmental, urban planning, and building perspective:

- **Integrated Environmental Authorization (AIA)** under Title III-bis of Part II of Legislative Decree 152/2006 and subsequent amendments, issued by the Metropolitan City of Cagliari– Environment Sector – Integrated Environmental Authorizations Service- AIA Office;
- **Landscape authorization** under article 146 of the legislative decree 22 January 2004, n. 42 (Code of Cultural Heritage and Landscape, according to article 10 of the law 6 July 2002, n.

137) and subsequent amendments, issued by the Sardinia Region – General Directorate of Territorial Planning and Building Supervision, Southern Sardinia Landscape Protection Service;

- **Examples of territorial constraints and urban planning considered**:
    - Buffer zones from watercourses, lakes, and the sea coast, according to art. 142 of Legislative Decree 22 January 2004, n. 42 (Cultural Heritage Code);
    - Area falling within a contaminated or potentially contaminated site, under Title V of Part IV of Legislative Decree 152/06 and subsequent amendments.
    - Regional Environmental Energy Plan of Sardinia (PEARS);
    - Water Protection Plan;
    - Regional Plan for the remediation and protection of air quality. Environmental aspects also addressed air pollutant emissions. Air quality monitoring is conducted by a regional agency: Regional Agency for Environmental Protection (ARPA). There was a total of seven atmospheric vents, which did not represent an emission into the atmosphere under the definition of art. 268.b. of Legislative Decree n. 152/2006, as they consisted of non-polluting gases, such as water vapor, hydrogen, or oxygen. From the perspective of environmental authorizations, since the municipality where the plant will be located has also issued a particular Acoustic Classification Plan for the municipal territory, the project proposal had to take into account the acoustic emissions into the environment produced by the hydrogen plant. The study of the environmental acoustic impact required demonstrating compliance with the following regulations (for example):

- Law n.447/1995 "Framework Law on Acoustic Pollution";
- Deliberation of the Sardinia Region n.30/9 of 08/07/2005 "Criteria and guidelines on acoustic pollution";
- Deliberation of the Sardinia Region n.62/9 of 14/11/2008 "Regional directives on environmental acoustic pollution" and provisions on environmental acoustics;
- Municipal Acoustic Classification Plan "Deliberation of the City Council n.6 of 04/11/2011;
- Prime Ministerial Decree 14 November 1997 "Determination of the limit values for sound sources".

WINNING APPROACH: full demonstration of alignment with local and national laws supports the application to further permitting

6.4 SPAIN: green Hydrogen production for use in ammonia synthesis

Production of renewable hydrogen can be a driver for the decarbonization of industrial sectors like those where ammonia is produced. The following best practice shows one of the largest green hydrogen plants for industrial use in Europe, located in Puertollano (Castilla-La Mancha, Spain) and intended to feed the nearby Fertiberia ammonia plant. Its capacities are:

- A 100-MW photovoltaic plant;
- 20-MWh storage capacity in the form of lithium-ion batteries;

- 20-MW electrolysis (one of the largest hydrogen production systems).

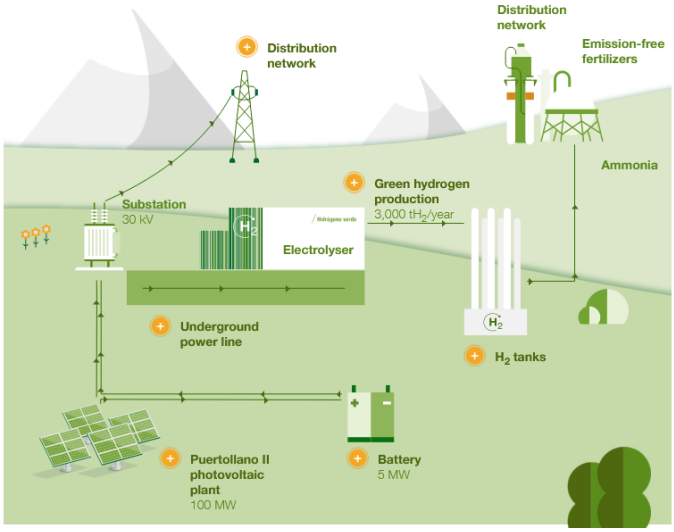

Figure 1 Simplified graph of the Iberdrola plant in Puertollano (Castilla-La Mancha, Spain). Source: https://www.iberdrola.com

A detailed description of the permits required for the deployment of this kind of projects in Castilla-La Mancha are detailed below, distinguishing **land use, environmental processing, municipal licensing and industrial safety. This best practice can be compared to the Spanish permitting national framework and with the information included in the Andalusian permitting guidelines as referred to a different Autonomous Community of Spain.**

The information collected can be summarised as follows.

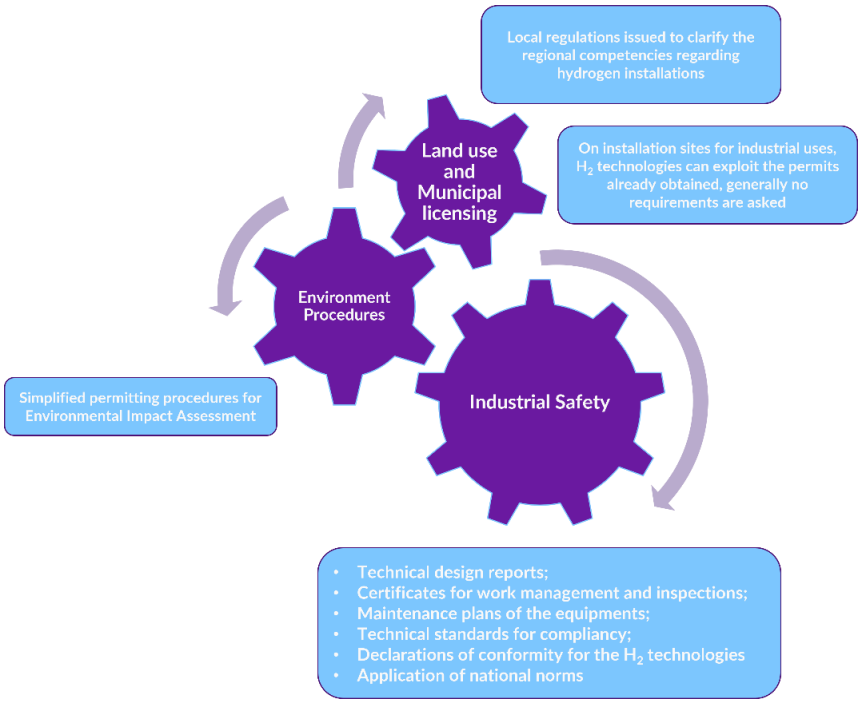

Figure 2 Key elements for permitting of Hydrogen technologies in Industrial sector (Spain)

Land use and urban planning requirements

Hydrogen production facilities are usually required to be placed in urban industrial land. In the case of this project, no procedures have been needed since the location on existing industrial land was already considered in its conception.

Nevertheless, some legislation that can be useful in this matter is:

- **Law 5/2020 of 24th of July, of Urgent Measures for the Declaration of Priority Projects in Castilla-La Mancha,** which is partially modified by the Legislative Decree 1/2023, of 28th of February approving the revised text of the Law on Spatial Planning and Urban Development. This law enables the deployment of priority projects in rustic land through automatic reclassification and exceptions in terms of maximum occupancy limits and minimum parcel of land.
- **Spatial planning Law.** The article 19 contemplates the possibility of declaring a project "Project of Singular Interest" for being socially or economically interesting. This could lead to facilitating possible expropriations and reducing administrative timeframes.

Although these regulatory tools are of an exceptional nature, they are considered very interesting for a hydrogen project related to the generation or use of renewable hydrogen, in addition to the political support that exists nowadays to promote this type of projects.

Licenses for installation and operation of hydrogen technologies depend on the **local authorities** involved. For this reason, **case-by-case urban planning requirements** can be present.

For further details, local ordinances should be consulted, as the particularities of each municipality (natural or landscape resources, existence of archaeological remains, etc.) may give rise to additional formalities.

Environmental procedures and requirements

As it occurs in the rest of Spain, the environmental regulations aim to evaluate, prevent and mitigate the possible adverse effects that hydrogen projects could produce to the environment and the public health.

Environmental regulation from Castilla-La Mancha is aligned with national and European legislation through the next items:

- **Law on integrated pollution prevention and control (Royal Legislative Decree 1/2016 of 16th December).** Establishes the requirements and procedures for obtaining the Integrated Environmental Authorisation. It will require the preparation of a "Basic Project for the Activity", with a minimum content in terms of a description of the activity and its impact on the safety of people and the environment, location, resources to be used, emissions generated, application of mitigations or "best available techniques", etc.
  During its processing, an urban planning report must be issued by the municipality in whose territory the installation is located and it must undergo a period of public information and, if discharges are foreseen, a report must be obtained from the corresponding basin management body.
  - Link for the procedure: https://www.jccm.es/sede/tramite/JB6

- **Law 2/2020 of 7th of February, of Environmental Evaluation of Castilla-La Mancha.** Sets a frame for environmental impact assessment (EIA) in projects likely to affect the environment, including those related to hydrogen. Key requirements for hydrogen projects under this law include:
    - Environmental Impact Assessment (EIA). In the case of projects for the production of electrolytic, photo-electrolytic or photocatalytic hydrogen from renewable sources, apply the "simplified environmental assessment" (article 45 of Law 21/2013, of 9 December, on environmental assessment), which requires a smaller volume of documentation to be submitted and a reduction in resolution times.
    - Consultation of Public Administrations and interested parties (in the case of simplified processing) or Public Consultation (in the case of ordinary processing).
    - Environmental Impact Report (simplified processing) or Environmental Impact Statement (EIS) for ordinary processing: Based on the EIA and public consultations, the competent authority will issue a document, which may approve, condition or reject the project depending on its environmental compatibility.

- **Decree 242/2004, approving the Environmental Assessment Regulation in Castilla-La Mancha**: Regulates the specific environmental assessment procedures for the autonomous community, adapting the requirements and procedures to regional particularities. It includes local adaptations, defines regional competences and defines protection measures for certain natural areas.

Table 8Steps of the simplified procedure (mandatory) for obtaining Environmental Impact Assessment for industrial applications (Spain)

1) Stakeholder starts the Environmental procedure
Submission of a request to start an EIA to the "Órgano sustantivo" (the body of the competent state, regional or local public administration (PA) for environmental impact assessment). • Application for start of EIA; • Environmental document; • Receipt of fees payment; • Documentation required by sectoral legislation.
2) Public administrative authority assessment of the documentation
Checks the adequacy of the documentation presented and sends it to the environmental organ (EO). The promoter has 10 business days to correct possible issues. The PA will send it to the EO within 1 month from receipt of the complete file.
3) Environmental Permitting Authority
1) Reception of the file. Start of the EIA procedure. 2) Consult the affected public administrations and interested people (30 business days from receipt to respond). 3) Prepare and submit the environmental impact report (Resolution). 3 months from receipt of the start application and other documentation. 4) If the project generates significant effects on the environment, the project must undergo an ordinary EIA. It can also occur that the project does not have significant adverse effects on the environment. 5) Notify the PA and promoter and it will be sent for publication in the Official journal of Castilla-La Mancha (Diario Oficial de Castilla-La Mancha, DOCM) (15 working days).
4) Public administration final check
PA assesses whether the authorization of the project or the filing of the file is appropriate (15 business days from the adoption of the resolution of the authorization procedure, the decision is sent to the DOCM)

Lastly, with regards to environmental procedures, it should be pointed out that, in the event that a hydrogen production plant or unit is integrated into a facility that already has an integrated environmental authorisation, the Circular Economy Department must be notified in case the thresholds of article 14 (criteria for substantial modification) of Royal Decree 815/2013 of 18 October are exceeded, in order to modify the existing integrated environmental authorisation due to a significant change in the environmental impact of the plant.

Permitting procedure for compliancy to Industrial safety of hydrogen technologies

In Castilla-La Mancha, the European directives and national regulations related to industrial safety are implemented through local regulations and specific permitting procedures to ensure that industrial plants operate according to the highest standards of safety and sustainability.

The main regulations/procedures that would apply in the construction and commissioning of a hydrogen production or utilisation facility are the showed in the following table.

Table 9 Examples of the regulations and the procedures needed for hydrogen production, storage and handling (Spain)

Regulation	Procedures and documentation
Low Voltage Electrical Regulations	• Proof of payment of the corresponding fees. • Project or, where applicable, technical design report. • Certificate of works management (in the case of having submitted the project). • Installation certificate with its corresponding user information annex, in quintuplicate. • Certificate of initial inspection with favourable result qualification, from the Control Body. https://www.jccm.es/tramites/1002270
High Voltage Electrotechnical Regulations	• PROJECT • FINAL WORK CERTIFICATE signed by the corresponding qualified technician • CERTIFICATE ACCREDITATING THE EXISTENCE OF A MAINTENANCE CONTRACT signed with an installation company for high voltage installations (if the owner of the installation, in the opinion of the Administration, has the necessary means and organisation to carry out his own maintenance, and assumes its execution and responsibility for it, he will be exempted from contracting it) • INSTALLATION CERTIFICATE, according to the established model, which must include at least the following: • The data referring to the main technical characteristics of the installation according to the project, documenting, where appropriate, the variations in the work carried out with respect to the project. • Technical report with a favourable result of the verifications prior to commissioning, carried out as specified in ITC-RAT 23. Where applicable, the reference of the certificate of the control body that carried out the initial inspection, with a favourable result. • Express declaration that the installation has been executed in accordance with the project, with the requirements of the Regulation on technical conditions and safety guarantees in high voltage electrical installations and its complementary technical instructions, and, when it is foreseen that the installations are to be handed over to electrical energy transmission and distribution companies, with the particular specifications approved to the electrical energy transmission and distribution company. Where applicable, it shall identify and justify the variations that have occurred in the execution of the project in relation to what was foreseen in the project.

Regulation	Procedures and documentation
	• Copy of the corresponding declarations of conformity of the components of the installation that are obliged to do so according to ITC-RAT 03. https://www.jccm.es/tramites/1002245
Pressure Equipment Regulation	• Project/sketch of principle and plan or sketch of the installation (as appropriate). • Responsible declaration of the competent technician/designer (if a project is required). • Technical direction certificate (if the installation required a project) • Declaration of responsibility of the competent technician in charge of the execution of the works/works (in the case of requiring a certificate of technical direction of work) • Installation certificate • Declarations of conformity of pressure equipment or assemblies and, where appropriate, of safety or pressure accessories. • Periodic inspection report of level C (in the case of used equipment) or level B as appropriate. https://www.jccm.es/tramites/1002263
Chemical Product Storage Regulations	• Storage project or, where appropriate, a document signed by the owner or legal representative (report). • Responsible declaration of the competent technician/designer (in the case of requiring a project). • Certification signed by the qualified technician who is the project manager (if the installation required a project). • Declaration of responsibility of the competent technician in charge of the execution of the works/works (in the case of requiring a works manager's certificate). • Certificate by the authorised inspection body (if the installation did not require a project). • Certificate of construction of the vessels issued by the manufacturer (in accordance with the provisions of article "documents" of the corresponding ITC). • Documentation accrediting the availability of insurance, guarantee or other equivalent financial guarantee covering civil liability that may arise from storage, with a minimum amount per claim as established in article 7.2 of the Regulation on the Storage of Chemical Products, approved by RD 656/2017, of 23 June. https://www.jccm.es/tramites/1002262
Fire Protection Regulations	• Responsible declaration of the competent technical designer (in the case of requiring a project). • Certificate of work management (if the installation required a project). • Declaration of the competent technician responsible for the execution of the works/works (in the case of requiring a works management certificate). • Certificate(s) of the installation(s) • Documentation accrediting that a maintenance contract has been signed with a duly authorised maintenance company that covers, at least, the maintenance of the equipment and systems subject to the Regulation on fire protection installations, approved by RD 513/2017, of 22 May. https://www.jccm.es/tramites/1002243
	• Project (level 2 installations)/ technical report (level 1 or level 2 installations with A2L) of the installation actually executed. • Risk analysis of the installation (level 2 installations with A2L). • Certificate from the refrigeration company confirming personnel authorised to handle A2L gases (level 2 installations with A2L). • Responsible declaration of the competent technician project designer (in the case of requiring a project).

Regulation	Procedures and documentation
Regulation of Refrigeration Installations	• Technical certificate of work management (only for level 2 installations) (Model included in the register book). • Declaration of responsibility of the competent technician in charge of the execution of the works/works (in the case of requiring a technical/works management certificate). • Certificate of the installation, signed by an authorised refrigeration/RITE company and, when its participation is mandatory (in accordance with IF-15), by the director of the installation. (Model included in the refrigeration installation register book). • Certificate of the electrical installation, by a low voltage installer or, failing this, a report from the LV installation company. • The declarations of conformity of the pressure equipment (in accordance with R.D. 709/2015, of 24 July, and R.D. 108/2016, of 18 March) and, where appropriate, of the safety or pressure accessories. • EC declarations of conformity (in accordance with R.D. 709/2015, of 24 July), of the installation as a whole, in the case of compact equipment, and for the rest of the installations, of all the pressure equipment including the declarations of conformity of the piping when applicable. • Copy of the installation owner's civil liability insurance policy, when this is established (level 2 installations). • Maintenance contract with a refrigeration installation company (level 2 installations, when it is not a self-maintenance company). https://www.jccm.es/tramites/1002248
Regulation of installations for the supply of gaseous fuels	• Construction project of the installation • Responsible declaration of the competent technical person whis the designer and director of execution of the works/works. • Certificate of works management, including an annex • Installation certificate • Inspection certificate • Maintenance plan, either through an external contract or by own means. https://www.jccm.es/tramites/1002259
Major Accident Regulation	• For ALL establishments to which RD 840/2015, of 21 September, is applicable (both lower and higher-level establishments): Notification or its update, in accordance with the provisions of art. 7. • For HIGHER LEVEL ESTABLISHMENTS, in addition: Safety report or its update, as provided for in Art. 10. https://www.jccm.es/tramites/1002267

6.5 SPAIN: green hydrogen production for diversified applications

Green Hysland project aims to deploy a fully-functioning hydrogen ecosystem in the island of Mallorca, Spain, turning the island into Europe's first H_2 hub in Southern Europe. This will be achieved by producing green hydrogen from solar energy and delivering it to the end users, such as the island's tourism, transport, industry and energy sectors, including gas grid injection for green heat and power local end-use.

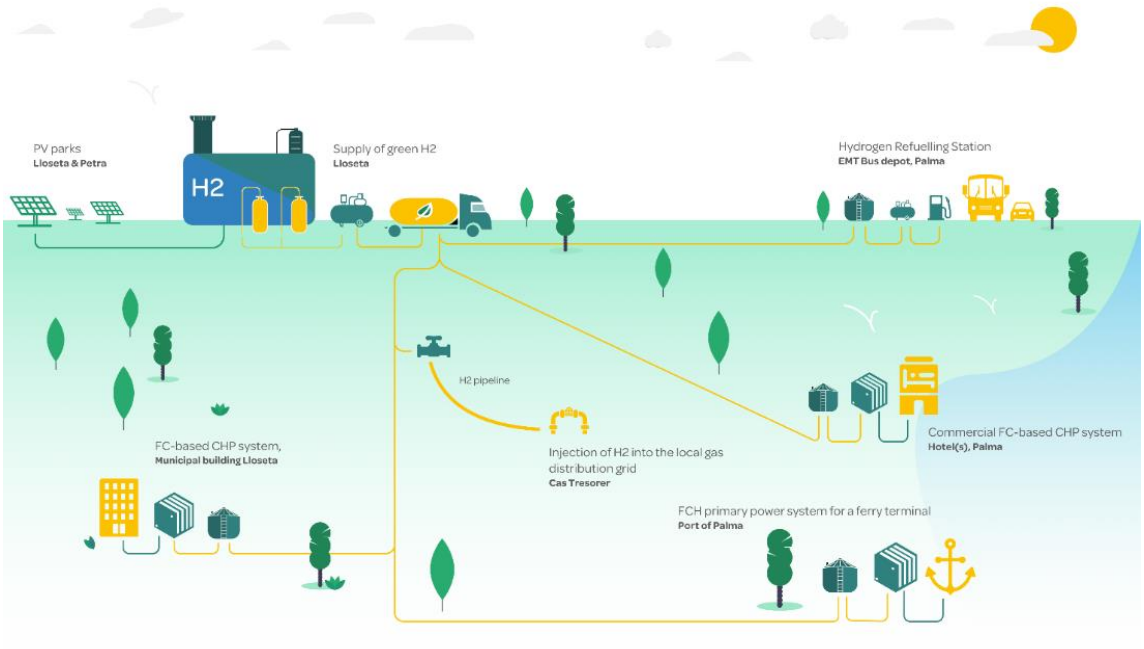

Figure 3. Green Hysland project in Mallorca (Balearic Islands, Spain). Source: https://greenhysland.eu

Stakeholders engaged during WP2 activity and the information research carried out by the partners allowed to distinguish the main norms that have been considered for this project, with a specific focus on the Hydrogen production plant aimed to satisfy the hydrogen valley off takers, as**:**

- **land use requirements;**
- **environment requirements;**
- **industrial safety requirements**.

In terms of **land use**, the following normative has been considered:

- Law 12/2017, of 29 December, of urban planning of the Balearic Islands;
- Insular Territorial Plan of Mallorca approved by agreement of the Plenary of the Consell Insular de Mallorca on the 13th of December 2004 - BOIB núm. 188 Ext. of 31-12-2004; Updated according to the modification number 1 approved on the 3rd of June of 2010. BOIB núm. 90 of 15-06-2010 and with the modification number 2 approved on the 13th of January 2011 - BOIB núm. 18 Ext. of 4-02-2011;
- Subsidiary regulations of LLOSETA City Council in its Ordinances on the use of land in building;
- Royal Legislative Decree 2/2008, of 20 June, approving the revised text of the Land Law;
- Law 6/1997, of 8 July 1997, on rural land in the Balearic Islands;
- Law 12/2014, of 16 December, agrarian of the Balearic Islands;
- Law 2/2014, of 25 March, on land planning and use (Balearic Islands).

Regarding **environmental framework**, apart from the national **Law 21/2013 of 9 December on Environmental Assessment**, the following regional laws stand out:

- Law 12/2016 of 17 August, of Environmental Assessment of the Balearic Islands.
- Law 7/2013, of 26 November, on the legal regime of installation, access and exercise of activities in the Balearic Islands.
- Law 11/2006 of 14 September, on environmental impact assessment and strategic environmental assessments in the Balearic Islands (Regulation repealed, with the exception of the third, fourth and fifth additional provisions, by the sole repealing provision. 2.a) of Law 12/2016, of 17 August).

It should be noted that Law 12/2016 is repealed since August 2020, with the exception of the reference to the fifth additional provision of Law 11/2006 of 14 September 2006, by the sole repealing provision 3.a) of Legislative Decree 1/2020 of 28 August. On the other side, the study on the regulatory treatment of projects incorporating hydrogen technologies carried out by the Spanish Hydrogen Association (AeH2) points out the **Law 7/2013, of 26 November, on the legal regime of installation, access and exercise of activities in the Balearic Islands** as the regional regulation for **EIA** and **IEA**. **These procedures last around 4 and 9 months respectively and are responsibility of Balearic Islands Environment Commission.**

For industrial safety, a similar approach to the ammonia plant, previously described, has been applied for the hydrogen production through electrolysis.

Apart from this, other pieces of legislation considered are:

- CTE: Technical Building Code and its different basic application documents.
- Specific standards of the electricity supply company GESA/ENDESA.
- Law 8/2017, of 3 August, on universal accessibility in the Balearic Islands.
- Law 7/2013 on integrated licences for activities in the Balearic Islands.
- Law 6/2019, of 16 February, amending Law 7/2013, of 26 November, on the legal regime of facilities, access and exercise of activities of the Balearic Islands.
- Law 10/2019, of 22 February, on climate change and energy transition.
- Royal Decree 833/75 on the protection of the atmospheric environment.
- Order of 18 October 1976 on the prevention and correction of industrial atmospheric pollution.
- Decree 96/2005, of 23 September of 23 September 2005, on final approval of the revision of the Balearic Islands Energy Sectoral energy sector plan of the Balearic Islands
- Decree 33/2015, of 15 May, of final approval of the modification of the Sectorial Energy Master Plan of the Balearic Islands
- Law 4/2017, of 12 July, of Industry of the Balearic Islands.
- Law 6/2009 of 17 November on environmental measures to promote investment and economic activity in the Balearic Islands.

Different H2 elements and the related permitting issues of the Hydrogen valley are described in the following sections to focus on specific hot spots.

From the HYPOP consortium it has been possible to contact one of the companies working in Green Hysland deployments for the **permitting of the H_2 pipeline and injection station**. According to their experience, **the authorities involved in the deployment of the hydrogen pipeline was the Balearic Government**, while the **MITECO has been addressed for the blending system**.

The **non-existence of a specific framework for the administrative processing of hydrogen pipelines and their injection into the natural gas grid** has been pointed as a major obstacle. However, the **collaboration from Central and Regional Administration** to advance in the processing of the projects should be also considered.

In this regard, it should be noted that the first precepts regarding this specific framework were approved **after the start of the processing of these projects**, through **Royal Decree Law 6/2022 of 29th March** (urgent measures in response to the economic and social consequences of the war in Ukraine) and **Royal Decree Law 14/2022, of 1 August**, on economic sustainability measures in the field of transport, grants and study aids, as well as energy saving and efficiency measures and measures to reduce energy dependence on natural gas.

6.6 BELGIUM: storage of hydrogen for use in testing facilities

Beblue is a company specialized in cryogenic tests. It allows equipment to be tested and certified in very specific conditions. These tests are mainly carried out with nitrogen and liquid oxygen.

Recently, in collaboration with the CRMgroup research center, they set up the **Materhyum project** which consists of carrying out **materials tests using hydrogen**. Beblue could therefore provide certification on technical equipment using liquid hydrogen. This project was validated and public financial support was granted.

In order to store hydrogen on their site, a permit application was submitted in January 2023. In order to complete this file, they carried out the steps that we described above concerning the regulations on permit applications and on the safety:

- **Demarcation of danger zones given the risk of explosion;**
- **Identification of ATEX zones;**
- **Ad-hoc safety study.**

A specific document for hydrogen guideline is missing in Belgium and permitting procedures would be faster with a reference document. That is the reason why **they have used the French Guideline to validate their work** (***Guide pour l'évaluation de la conformité et la certification des systèmes à hydrogène***, 2021 written by France Hydrogen and INERIS).

In addition, hydrogen implies **ATEX environment**. To fulfil this obligation, they follow the international standard **IEC60079-10-1**.

Up to now, the permit is still on process and they are waiting the validation of the Walloon region. One of the **main hot spots of the entire procedure regards the wastewater disposal** which indeed represents an issue to deal with according to this stakeholder.

6.7 SWITZERLAND: Official guidelines as a key element for permitting gaps identification and cooperation among stakeholders and public authorities in Switzerland

The following best practice focuses on the need for clarity in the permitting framework for emerging sectors like renewable hydrogen mobility and residential.

Gaps of permitting framework, legislations not specific for hydrogen technologies, unclear roles and competencies of the public authorities involved in all the permits associated to hydrogen technologies can hinder the deployment of hydrogen mobility.

The interaction with stakeholders from Frontrunner countries like Switzerland, which are far ahead in the development hydrogen mobility and renewable hydrogen production compared to other EU countries, allowed the **analysis of the permitting guidelines issued at national level for hydrogen production plants**[1]**.** The in-depth description is provided in the following section where a technical focus on requirements and barriers of permitting framework is provided. What is worth to mention and useful both for industry and mobility applications is **the cooperation scheme between public authorities issuing different types of permits** and the identification of a main authority that behaves like an entry point supporting the different stakeholders of the hydrogen value chain. The permits needed depend on the site and project specific features, especially if a hydrogen production in the HRS facility is foreseen. Safety, environmental and urban/building issues can be managed promptly due to this permitting approach.

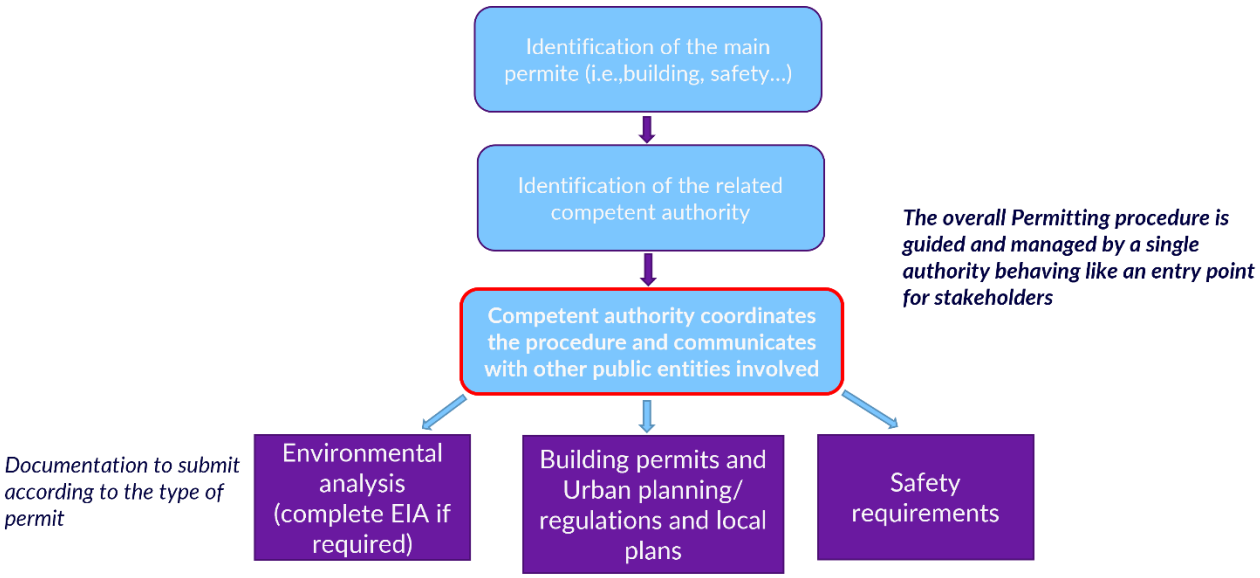

Figure 4 Permitting approach from guidelines issued in Switzerland

[1] https://pubdb.bfe.admin.ch/de/publication/download/11554

7 Best practices for permitting of hydrogen in mobility

The following section contains the best practices identified in terms of permitting approaches applied for:

- HRS with on-site production and storage;
- Mobile HRS
- Railway vehicles
- Buses.

7.1 ITALY: HRS with on-site production and storage

The following best practice involves hydrogen technologies for production, distribution, and storage for applications in mobility and industry (due to the presence of a hydrogen production plant through electrolysis considered as an industrial facility). Environmental and urban/land planning permitting procedures are the focus of this subsection.

This best practice concerns a Power to Gas facility comprised of a 100 Nm^3/h electrolyser (approximately 500 kW power) for hydrogen production, a photovoltaic system (about 1 MWp power) for electric energy production used by the **electrolyser** (also planned connection to the existing electric grid), a storage system for the produced hydrogen (capacity of 100 kg for transport uses and 300 kg for residential, industrial, and campus uses), and a **hydrogen refuelling station**. The hydrogen production facility is not under state jurisdiction because, based on the available technical information, it does not exceed the threshold for the product class of 100 Gg/year (included in the Italian Environmental Law, "Testo Unico Ambientale, D.lgs 152/2006"). Therefore, jurisdiction passes to the territorially competent Region, the Autonomous Region of Sardinia, which in this case requested the submission of a PAUR (Regional Single Authorization Decree). This application included an Environmental Impact Assessment (EIA), encompassing the Environmental Incidence Assessment (V.Inc.A), and the following permits:

- **Integrated Environmental Authorization (A.I.A.).** The competent authority was the Metropolitan City of Cagliari – Environment and Territory Protection;
- **Single Authorization (AU)** under Legislative Decree 387/2003 for the construction and operation of the Electrolyser for hydrogen production and related infrastructure connected to a photovoltaic power plant. The stakeholder submitted the Single Authorization Application, under Article 12 of Legislative Decree no. 387 of 2003 on 16/05/2022. The competent authority is the Sardinia Region – Department of Industry, Energy Service, and Green Economy.

Integrated Environmental Authorization has been taken into account during the permitting process. Activities that fall under the IPPC classification are carried out as defined in Annex VIII to the second part of Legislative Decree 152/2006: (Activity 4 (Chemical Industry) - "4.2. Manufacture of inorganic chemical products, in particular: paragraph a) gases, such as ammonia, chlorine or hydrogen chloride, fluorine and hydrogen fluoride, carbon oxides, sulfur compounds, nitrogen oxides, hydrogen, sulfur dioxide, carbonyl dichloride" while accessory but technically connected activities, PV park, and Laboratory Area, are not identifiable as IPPC activities.

The main urban planning instruments of the municipality where the plant was to be realized were also considered in order to obtain the approval with the current building and urban planning

regulations. Below are some references to such plans, which have regional and local character and therefore may differ depending on the project's location:

- Regional Landscape Plan and environmental constraints;
- Hydrogeological Management Plan (PAI);
- Municipal urban plan and acoustic planning: from which the classification of the production site in zone D1 (Industrial, Craft, Commercial, and Storage "consolidation of existing activities") emerges. The area is intended for agricultural use and has never been affected by productive activities;
- Current Acoustic Classification Plans in the municipal territory.

Additionally, to the EIA and the mentioned authorizations, the competent authorities issued the following permits (also related to safety aspects):

- No Objection Certificate for Electric Network Interferences. Competent authority: MISE - Ministry of Economic Development;
- Approval of the electric connection project. Competent authority: Managing Entity;
- Opinion of conformity with fire prevention regulations, Presidential Decree 151/2011. Competent authority: Provincial Fire Brigade.

In this best practice, the complex and long permitting procedures and the related barriers typical of industrial plants can be associated also to mobility applications, negatively affecting Hydrogen refuelling stations, as showed in the table.

Table 10 Requirements and barriers from industrial field, local urban planning and safety regulations affecting HRS in Italy

Hydrogen production for HRS
Connection with Hydrogen production and distribution can lead HRS to be considered as industrial facilities where inorganic chemical products are generated **(barrier)**
Urban planning involving local authorities
• land use planning and environmental protection of natural habitat **(requirement and barrier)**; • connection to the electric grid **(requirement)** • local noise emissions and acoustic regulations **(barrier)**
Application of the Prescriptive regulation for Hydrogen production from electrolysis and for Hydrogen refuelling stations (see Deliverable 2.1)
When the two facilities are connected and installed on contiguous areas, strict safety prescriptions for industrial equipment like electrolysers are applied and safety distances can be hard to be satisfied **(requirement/barrier)**

7.2 SPAIN: mobile HRS and fuel cell hybrid power pack for rail applications

Hydrogen refuelling stations can be of different configurations. This can bring to major issues and uncertainties both from the public authorities involved in the permitting and the stakeholders that are interested to implement innovative solutions for mobility. Mobile and/or containerised solutions, with or without on-site hydrogen production, are spreading widely around EU, especially by means of EU funded projects as a fundamental driver for the transition towards a hydrogen economy.

The following best practice regards an EU funded project called FCH_2RAIL where a fuel cell hybrid power pack for rail applications was developed. As described in Deliverable 2.1, the mobile, modular and compact layout for refuelling light and heavy duty vehicles allowed a single HRS to be transported in 3 different regional refuelling sites of Galicia, Aragon and Madrid. **Interaction and communication with the public local authorities was necessary to register the installation and be able to operate it.**

As described in the following figure, the system is modular. It can consist of 1 to 4 containers, each of which contains a hydrogen refuelling station component (compressor, 2 storage systems and dispenser). Each container is then individually transported by road to its new destination once the refuelling of the vehicle is completed. Specifically, within the FCH2RAIL project, this hydrogen refuelling station (HRS) prototype has been used to refuelled a bi-mode hydrogen train demonstrator which implements the FCHPP system. The system does not include on-site production of hydrogen by means of an electrolyser. Hydrogen is provided to the refuelling station by a gas supplier.

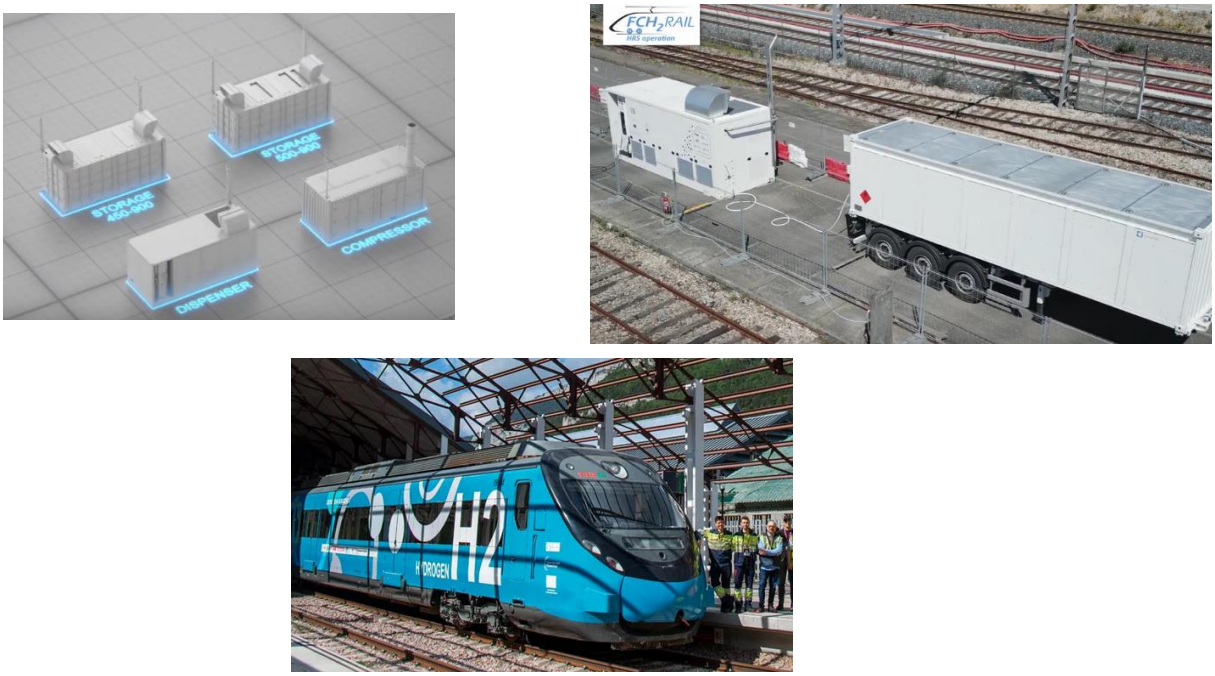

Figure 5 HRS layout for refuelling of H_2 rail vehicles
Credit: CNH2 and CAF (CC BY-NC-ND 4.0)

A customized permitting procedure was created to overcome the current gap of Spanish framework that does not consider the refuelling of such innovative Fuel cell-based vehicles. This process was time demanding but provided a first case in Spain spreading knowledge and increasing perception both from authorities and stakeholders' points of view.

Table 11 Customized mobile HRS registration protocol for H_2 rail vehicles (FCH2rail)

1) Preparation of the technical documentation for the HRS prototype
Development of the Project according to the regulation "ITC-ICG-05 Refuelling stations for gas vehicles;
The Project must include a green light from an engineering college;
Development of a maintenance plan;
Fire fighting project (if applicable)
2) Declaration of conformity and installation
Installation of the prototype on the selected site;
Obtaining a work certificate from an authorised engineer;
Installation of pressurised gas and low voltage. The certification is issued by a competent company (if applicable);
Inspection of the installation by a control body, which issues an inspection certificate. Documental and on-site inspection of the installation;
3) Paperwork for permitting procedure
Collection of all documentation and certifications; Initiation of the IT procedure to register the installation and payment of the fee for uploading the documentation produced.

Some of these steps are also reported in the Spanish regulation for HRS.

More details about the safety requirements applied in the project for the HRS can be checked in Deliverable 2.1. In general terms, the national regulation focuses on the importance of applying the risk assessment, ATEX zoning and technical standards ending in a performance-based approach that provides general provisions without a priori safety distances. **In terms of perception, high attention is paid towards the quantity of hydrogen stored.**

7.3 SPAIN: mobile HRS for mobility in port - H_2Ports

H2Ports European project demonstrates and validates two innovative solutions based on FC technologies and a hydrogen mobile supply station. The systems have been installed within the environment of the port of Valencia.

The overall system consists of a container with the compressor and control panel and a semi-trailer on which the buffer and dispensing system are installed. Hydrogen gas is refuelled by an external truck at 200 bar and unloaded in a 50,000 L storage tank at 33 bar. Since the HRS is installed on a semi-trailer equipped with wheels and can therefore move on the road, the international ADR regulation was applied. The systems safety was considered to be compliant to the regulation. This regulation required all pressure lines connecting the different components of the system to be depressurised.

The permitting restrictions were dictated and agreed together with the Port of Valencia's ownership body and management authority.

Safety requirements were fulfilled applying risk assessment methods, ATEX study and considering safety barriers and mitigation measures preventing any access to not allowed and trained personnel.

This best practice opened to the possibility to implement safely decarbonization routes based on hydrogen technologies for port operation activities. Moreover, it has been an opportunity for institutions and fire brigades to understand the behaviour and potentiality of hydrogen.

Figure 6 HRS system installed in the Port of Valencia (H2Ports)

7.4 POLAND: Hydrogen refuelling station

Apart from this, hydrogen refuelling stations are also gaining interest in Poland: **ORLEN** is a Polish multinational oil refiner, petrol retailer and natural gas trader, and, in line with its strategy, it is consistently investing in environmentally friendly hydrogen technologies. As part of "Clean Cities - Hydrogen mobility in Poland (Phase I)," one of the largest national projects in terms of hydrogen production volume, **the company will build two publicly accessible hydrogen refuelling stations in Poznań and Katowice**, as well **as a mobile station in Włocławek.** They will be suitable for use by all hydrogen-powered vehicles - both in the 700-bar pressure standard for cars and 350 bar for buses and heavy transport. The planned infrastructure will enable the refuelling of a total of more than 40 buses, as well as passenger cars and other hydrogen-cell-powered vehicles.

The main companies and bodies involved are PKN Orlen, Calvera, UDT (*Urząd Dozoru Technicznego*), PSP (*Państwowa Straż Pożarna* or State Fire Service) and TDT (*Transportowym Dozorem Technicznym*).

The permitting requirements considered in this project are as follows:

First of all, **Article 5 of the Law of July 7, 1994. - The Construction Law** (Journal of Laws of 2020, item 1333, as amended) indicates that a construction object, as a whole and its individual parts, together with related construction equipment, should, taking into account the expected period of use, be **designed and built in the manner specified in the regulations**, including technical and construction regulations, and in accordance with the principles of technical knowledge.

In addition, **the proposed law on amending the Law on Electromobility and Alternative Fuels will soon introduce a definition of a hydrogen station and basic requirements for its construction and operation**.

A hydrogen refuelling station is a construction object that constitutes a utility-functional whole. Accordingly, its design, construction, release for operation and operating rules are regulated by numerous normative acts on construction, technical, safety or environmental aspects. In addition to generally applicable regulations, there are technical standards - national and international, which systematize the available technical knowledge on an ongoing basis and set the highest standards for the construction of such facilities. Therefore, **the lack of national regulation on a given issue does**

not prevent the construction of hydrogen stations. It only means that in this regard, the investor has a certain discretion limited by other regulations and the obligation to exercise due diligence and appropriate standards, which suggests, for example, the use of the above-mentioned technical standards.

Accordingly, in the design, construction and operation of hydrogen refuelling stations, in particular, the provisions of the following legislation should be applied. It is suggested to use the indicated technical standards, which are exemplary and should be used on a voluntary basis.

- **The Decree of the Minister of Climate and Environment dated October 7, 2022 introduces detailed technical requirements for hydrogen stations**. These include rules for safe operation, repair and modernization, based on ISO 19880-1 and PN-EN 17127 standards. Stations must also comply with ISO 19880-2 and PN-EN ISO 17268 standards, especially for refuelling dispensers.
- A hydrogen station should have **technical documentation, operating instructions in Polish, installation diagrams and an explosion hazard assessment**. Also important are regular technical inspections, including examinations by the Office of Technical Inspection and Transport Technical Inspection, documented by protocols. Fees for issuing opinions and carrying out tests are 20% of the average monthly salary in the economy for the initial examination and up to 20% for the operational examination.

The regulation also requires that **two independent power sources or a generator are provided**. The station should be equipped with equipment to measure the amount of hydrogen refuelling and be protected against unauthorized access, leaks, collisions and fire hazards.

Regarding the **construction and design of hydrogen refuelling stations**, the applicable legal acts are as follows:

1. the Act of July 7, 1994. - Construction Law (Journal of Laws of 2020, item 1333, as amended);
2. the Act of October 3, 2008 on providing information about the environment and its protection, public participation in environmental protection and environmental impact assessments (Journal of Laws of 2021, item 247);
3. the Law of March 27, 2003 on spatial planning and development (Dz.U.of 2021, item 741);
4. the Law of December 21, 2000 on technical supervision (Journal of Laws of 2021, item 272, i.e.);
5. the Law of August 19, 2011 on the transportation of dangerous goods (Journal of Laws 2021, item 756);
6. the Regulation of the Minister of Infrastructure of April 12, 2002 on the technical conditions to be met by buildings and their location (Journal of Laws 2019, item 1065, as amended);
7. the Regulation of the Minister of Transport and Maritime Economy of March 2, 1999 on the technical conditions to be met by public roads and their location (Dz.U. of 2016, item 124, as amended);
8. the Regulation of the Minister of Infrastructure of January 16, 2002 on technical and construction regulations for toll highways (Journal of Laws 2019, item 1644);
9. regulation of the Minister of Economy, Labor and Social Policy of July 9, 2003 on the technical conditions of technical supervision in the operation of certain pressure equipment (Journal of Laws 2003 No. 135 item 1269);

10. the Regulation of the Minister of Development dated July 11, 2016 on requirements for pressure equipment and pressure equipment assemblies (Journal of Laws 2016 item 1036);
11. the Ordinance of the Council of Ministers of December 7, 2012 on the types of technical equipment subject to technical supervision (Journal of Laws 2012, item 1468);

In terms of **fire protection,** hydrogen refuelling stations should, taking into account their expected period of use, be designed, built, maintained and operated in a manner specified in the regulations, including technical and construction and fire safety regulations, and in accordance with the principles of technical knowledge, ensuring compliance with the basic requirements of fire safety.

For the **use of hydrogen infrastructure**, the following regulations and standards should be considered:

1. the Act of December 21, 2000 on technical supervision (Journal of Laws 2021, item 272, i.e.);

2. the Act of August 19, 2011 on the transportation of dangerous goods (Journal of Laws 2021, item 756);

3. the Regulation of the Minister of Economy, Labor and Social Policy of July 9, 2003 on the technical conditions of technical supervision in the operation of certain pressure equipment (Journal of Laws 2019, item 211);

4. the Regulation of the Minister of Development of July 11, 2016 on requirements for pressure equipment and pressure equipment assemblies (Journal of Laws of 2016, item 1036);

5. the Ordinance of the Council of Ministers of December 7, 2012 on types of technical equipment subject to technical supervision (Journal of Laws of 2012, item 1468);

6. the Order of the Minister of Entrepreneurship and Technology of May 21, 2019 on the manner and procedure for verifying qualifications required for operation and maintenance of technical devices, and the manner and procedure for extending the validity period of qualification certificates (Journal of Laws of 2019, item 1008).

7.5 BELGIUM: New hydrogen refuelling station for practical training on hydrogen cars

Technifutur is a technical training centre. One of these centres is dedicated to automobile and motorcycle mechanics. Its site is located next to the Spa Francorchamps circuit (Campus Automobile Spa Francorchamps). **Practical training on electric cars but also on hydrogen cars** is carried out on this site. In order to improve these trainings**, the installation of a hydrogen refuelling station has been studied.**

This study has been carried out by HINICIO. HINICIO is a strategy consultancy firm specialized in energy transition and sustainable mobility. They are recognized as a leading player in the hydrogen field in Europe and the Americas.

HINICIO has provided a report for this project where a reglementary study has been performed. **The document is confidential**, but the list of the directives, standardizations and rules can be shared.

International and European standards

Table 12 International and European Standards considered for the implementation of HRS in Belgium

Type of regulation	Scope	Reference	Subject	Description
Directive	Europe	2014/94/EU	Alternative fuel infrastructure directive (AFID)	Common directive to deploy alternative fuel infrastructure
Standards	International	ISO/TS 19880-1	General requirements for refuelling station	Technical specifications for public and private refuelling stations
	Europe	EN 17127	General requirements for refuelling station	European transposition of ISO/TS 19880-1
	International	ISO 14687-2 + ISO 19880-8	Quality conformity and Hydrogen purity	Quality specification for hydrogen use for mobility
	Europe	EN 17268	Hydrogen purity	European transposition of ISO 14687-2+ and ISO 19880-8
	International	ISO 17268	Recharging connectors	Standards for the design, the security and the operations of refuelling connectors
Sector standards	International	SAE J2601-1 SAE J2601-2 SAE J2601-3 SAE J2601-4	Refuelling protocols for: Light vehicles Hight vehicles Forklift Slow refuelling	Security and performance limits for refuelling stations (350 bar and 700 bar)
	International	SAE J2799	Communication between vehicle and refuelling station	Description of infrared communication between the vehicle and the refuelling station (350 bar and 700 bar). This communication system must also correspond to the SAE J2601 standard.

European directives on safety considered in Belgium.

Table 13 European directives on safety for HRS in Belgium

Reference	Subject	Description
2012/18/UE	SEVESO	CE conformity which is guarantee by the builder of the refuelling station
IED-2010/75/EU	Industrial emission	
ATEX95-94/9/EC	Explosive atmospheres	The system is not subject to the ATEX directive since it won't work under explosive atmospheres
ATEX137-99/92/EC		
MD-2006/42/EC	Machines	CE conformity which is guarantee by the builder of the refuelling station
PED-97/23/EC, TPED-1999/36/EC	Pressurized equipment	
LVD-2006/95/EC	Low tensions	
EMC-2004/108/EC	Electromagnetic compatibilies	

Regional safety standard (as indicated in Deliverable 2.1)

The **DGO3 (General Operational Directorate for Agriculture, Natural Resources and Environment) is the competent authority at regional level to issue an environmental permit** necessary for the construction of the hydrogen station.

A specific interview with the competent staff of the DGO3 made it possible to specify the **operating conditions to be taken into account for the installation of a hydrogen station on the Francorchamps Automotive Campus:**

- Hydrogen does not yet have sectoral conditions and is therefore **subject to specific conditions within the framework of the environmental permit.**
- The hydrogen station studied **does not imply SEVESO classification**. The storage quantities for a station corresponding to the specifications are well below the SEVESO thresholds.
- The **safety distances** to be respected from buildings, the neighborhood and parking lots **must be greater than the thermal radiation in the event of an explosion** (risk of fire propagation)
- This distance in the case of a non-SEVESO classified site is **calculated by the DGO3 using a simulation tool** in the case of the environmental permit application. An exception can be made so that this is done upstream of the request.
- **The DGO3 can also issue operating conditions to prevent possible "domino effects".** In the case of this specific project, there is no equipment deemed dangerous around the specific studied site.

As it can be seen, the general approach for the permitting of a hydrogen refuelling station would need a **combination of specific risk assessed study and the application of the existing technical standards** for both environmental and safety aspects.

7.6 GERMANY: HRS Guidelines

Guidelines have demonstrated to be a valuable tool for the stakeholders of the hydrogen value chain to implement innovative hydrogen projects. Moreover, they are usually a proof of the greater involvement of the public authorities which are updated and take advantage of the knowledge shared by the experts about the recent developments. On the other hand, official guidelines issued at national or local level can reflect the existing knowledge and engagement of public authorities that could provide clarity to the stakeholders applying for the permitting processes.

Indeed, Germany has a strong technical background on hydrogen technologies for industry, mobility and residential sectors as proved by the network of Hydrogen refuelling stations for both compressed and liquid hydrogen.

At national level, specific guidelines for hydrogen mobility are issued highlighting the structure of the German administrative framework and the different permitting procedures which vary according to two main factors: the quantity of hydrogen stored on site and the presence of on-site hydrogen production[2]. The following figure shows these differences. The greater the quantity of hydrogen stored, more complex the regulatory framework to be applied and a longer procedure requiring the parallel work of different authorities.

Figure 4: Concentration effect of the procedures

Parameters relevant to approval	Procedure
H_2 storage less > **3 t total storage**	According to the German **Ordinance on Industrial Safety and Health** (BetrSichV – **Betriebssicherheitsverordnung**) Section 3 § 18, **approval required with building permit.** Notes and explanations on implementation can be found in LV 49 of the State Committee on Industrial Safety and Health (LASI – Länderausschuss Arbeitsschutz und Sicherheichstechnik) of 2017.
H_2 storage less **≥ 3 t** and **< 30 t total storage**	**Federal Immission Control Act** (BImSchG – Bundes-Immissionsschutzgesetz) **Simplified procedure**
H_2 storage less **≥ 30 t total storage** and/or **on-site electrolysis on an industrial scale**	According to the **Federal Immission Control Act** (BImSchG) **Formal procedure**
For storage of **> 5 t taking into account other substances** with respective weighting	**Störfall-Verordnung** (12. BImSchG) **Hazardous Incident Ordinance** ("Störfall-Verordnung" – 12th BImSchG).

Guidelines HRS (no on-site production < 3 tonn)

Figure 7 Classification permitting procedures for HRS as a function of the capacity of hydrogen stored in Germany

Moreover, guidelines provide a clear explanation of the permitting steps needed, a list of documents to collect, authorities to engage and of best practices and opinions from the experts for those hydrogen refuelling stations without on-site hydrogen production and a quantity of hydrogen below 3 tonn. This guideline was created in cooperation between authorities and industry partners to provide information on the authorisation procedures to be applied nationwide in Germany for compressed gaseous hydrogen refuelling stations for on-road vehicles and without on-site production. The normative reference is an official document "German Ordinance on Industrial Safety".

[2] https://rcs.now-gmbh.de/wp-content/uploads/2023/11/Approval-guide-for-hydrogen-for-Germany.pdf

The guidelines contains:

- best practices
- checklist of the relevant documentation
- Experts opinions
- Information about relevant stakeholders to involve in the procedure

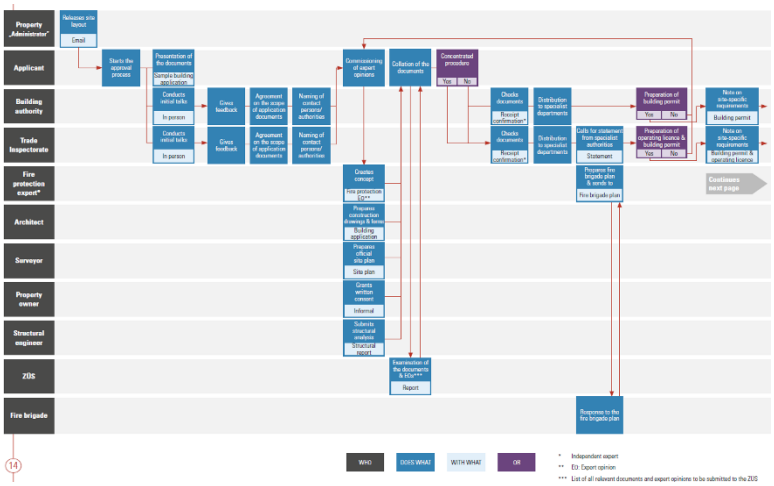

Figure 8 Scheme of the Permitting procedure for HRS (according to German Ordinance on Industrial Safety and Health)

The first step is to identify the authority responsible for issuing the permit, which may vary depending on the federal state and municipality and the type of procedure. In addition, it is advisable to initiate direct discussions with the responsible authorities in order to receive initial feedback on the project. Given the limited number of experiences, the guide does not exclude the possibility of applying existing procedures such as those for natural gas stations.

The procedure starts with a preliminary phase in which certain documents are provided to the identified authority (the building authority in this case):

1) definition of the layout of the site planned for the installation;
2) preparation of draft construction documentation;
3) consultations with the building authority.

Subsequently, the authorities responsible for the various permits provide feedback, assign a reference contact for the file and provide applicants with information on the documentation to be produced and the contacts or additional authorities to be contacted to continue the procedure. The documentation is also the basis for evaluation by other authorities in charge of environmental assessment, town planning, etc.

The inspection by a certification body is subject to the evaluation of the compiled documentation and the opinion of external experts.

The procedure can then be either concentrated or nonconcentrated.

In the first case, the documentation is sent to a specific authority that evaluates it and forwards it to all the departments of the administrative offices of the various authorities concerned. In this case, the applicant only receives confirmation of the positive outcome of the authorisation procedure.

In the second case, however, the procedure is longer, about three months after the authorities receive the documents. The documents are validated in parallel by two authorities, one building authority and one supervisory authority responsible for the control of legal regulations of commercial law, as

well as labour, environmental and consumer protection. The supervisory authority also consults the specialised authorities for safety aspects:

- Preparation of a fire plan;
- The opinion of an independent fire protection expert;
- A statement from the fire brigade command about the submitted fire protection plan

After appropriate evaluations, the two authorities involved can issue the permits, also separately. Once the permits have been approved, construction activities are initiated, which may involve inspection. The following figure exemplifies the overall permitting approach for HRS in Germany.

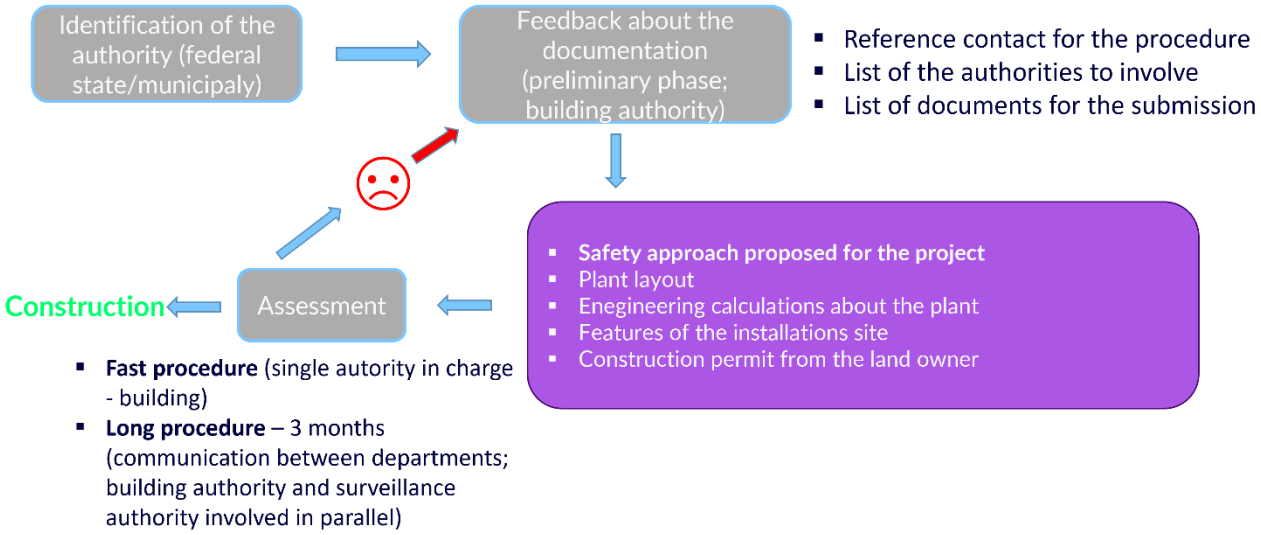

Figure 9 German guidelines as support for stakeholders: scheme of the procedure (HRS storage < 3 ton)

7.7 ITALY: homologation of hydrogen trains

The first Hydrogen Valley in Italy, H2iseo, is primarily related to **railway and road mobility**, as it involves three plants for the production, storage and distribution (HRS) of green gaseous hydrogen that will supply the first models of hydrogen-fueled trains on an isolated railway line in the Lombardy Region. Additionally, part of the produced hydrogen will also serve to fuel FC buses for urban public transport.

The project has three phases. The first phase consists of the building of the first 6 hydrogen-powered electric trains and their delivery by 2024. These trains will be manufactured by Alstom. By the first half of 2025, a first hydrogen production plant will also be built at the Iseo station. Secondly, the entire fleet will be replaced through the deployment of another 8 electric trains. Moreover, two additional hydrogen production plants are planned to be built in the Brescia and Edolo areas by 2026. Finally, it is expected that other vehicles apart from trains will be able to use the hydrogen produced by the plants. This will start with public transport and the 40 buses managed in Val Camonica by FNM Autoservizi.

In this context, the permitting procedures for railway hydrogen fueled vehicles can have an indirect impact for replication in other projects. Commissioned by the Italian Ministry of Infrastructure and

Transport, the **National Agency for Railway and Road and Highway Infrastructure Safety (hereinafter ANSFISA)** published "**Guidelines for the authorization of hydrogen railway vehicles**". This document could boost hydrogen mobility in railway sector and provides examples of the experimental procedures for ANSFISA to issue measures of:

- authorization for market admission of hydrogen-powered vehicles under Article 21 of Legislative Decree 57/2019;
- authorization of types of hydrogen-powered vehicles under Article 24 of Legislative Decree 57/2019;
- authorization for commissioning of structural subsystems and hydrogen-powered vehicles under Article 29 of Legislative Decree 50/2019.

The various phases of the permitting procedures envisage a series of functional activities. A short list is reported below:

Table 14 Permitting steps functional for innovative hydrogen-based vehicles

1) Extend the stakeholders and public authorities involvement
Involvement in the preliminary phase of all stakeholders, such as the railway company, the infrastructure manager, maintenance responsible entities, and not just the individual vehicle manufacturer. The involvement of research bodies for innovative aspects related to the use of hydrogen is also strongly recommended;
2) Steps to achieve compliancy of innovative solutions for hydrogen mobility
• Development, by the vehicle manufacturer, of a list of type and acceptance tests; • Execution of compatibility tests on the network for the specificity of hydrogen fuel; • Execution of traction tests (on vehicle and/or in a simulated environment) with batteries alone in case of degradation of the hydrogen fuel system; • Execution of an experimental operation period after the authorization release to test the "system's" performance under real usage conditions.
3) Integrated safety approach
Drafting of an overall risk analysis of the railway system that considers various risk aspects related to the different scopes of the stakeholders involved.

The safety studies carried out on the specific traction part of the hydrogen-powered vehicle should be performed by an independent safety assessment body in accordance with Annex II of Regulation (EU) No. 402/2013 and amendments, which will issue an assessment report evaluating the adequacy of the results in terms of risk management and control and whether the risk management process has been correctly applied.

The main documents that needs to be produced following the risk management analyses at the vehicle and system level consist of:

- a safety plan;
- hazard analysis;
- hazard log;
- safety demonstration;

- safety report.

7.8 SPAIN: procurement and compliancy of bus fleet for public transport

The following procedure is referred to the GreenHyland project described previously.

The **procurement of the city bus fleet** has been carried out by tender, which stipulated the following:

- The tenderer shall prepare and submit the Environmental Product Declaration (EPD) following the international EPD system according to the Product Category Rules for PUBLIC AND PRIVATE BUSES AND COACHES PRODUCT CATEGORY CLASSIFICATION: UN CPC 49112 & 49113, version 1.1) as well as according to the principles and procedures of ISO14025: 2006;
- The tenderer shall submit a declaration of compliance with REACH (EC 1907/2006) and, within the same Environmental Product Declaration, shall include a 'List of banned and declarable substances' specifying the non-existence of banned substances and informing of the quantity of restricted or declarable substances;
- The tenderer shall provide a declaration of responsibility for programmes and procedures for the recycling of all components and parts of the Vehicle that ensure compliance with regulations and the protection of the environment and people;
- The manufacturer shall provide a self-declaration that he will comply with the EU EPC Criteria applicable to transport, together with all the documentation supported by documentary verification of compliance. The criteria are available at the following link:

http://ec.europa.eu/environment/gpp/pdf/criteria/transport.pdf

It can be seen that also for hydrogen buses, Green Public Procurement must be followed.

Requirements and barriers about hydrogen mobility can also refer to innovative FC vehicles like rail vehicles and buses for public transport. The following figure highlights the different key factors that supported the permitting of rail vehicles and buses in Italy and Spain, respectively. Innovativeness of the hydrogen solutions can require more of these elements but this selection was done referring to the best practices analysed. The final goal is to show how hydrogen solutions should be designed, manufactures and tested to integrate within a wider infrastructure which is not only made of hydrogen refuelling stations but can involve other entities whose point of view needs to be considered.

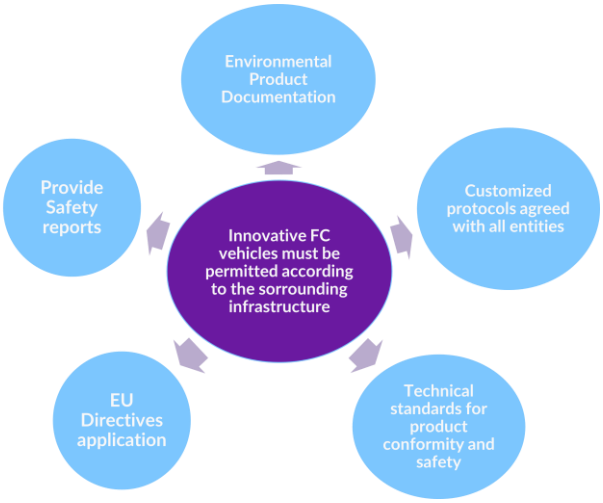

Figure 10 Elements to consider to integrate innovative FC vehicles with the Refuelling infrastructures of railway and public transport sectors

7.9 POLAND: hydrogen thanks for FC vehicles

All manufacturers of LPG, CNG and LNG tanks, as well as compressed hydrogen tanks for the propulsion of internal combustion engines in vehicles, before placing them on the market, are required to have them tested, for approval, for compliance with the requirements set forth in the following documents:

- Regulations No. 67 and Regulation No. 110 of the United Nations Economic Commission for Europe, which are annexes to the Agreement Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted to Vehicles and the Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, done at Geneva on March 20, 1958;
- Regulation (EC) No. 79/2009 of the European Parliament and of the Council of January 14, 2009 on type-approval of hydrogen-powered motor vehicles and amending Directive 2007/46/EC;
- Regulation No. 134 of the Economic Commission for Europe of the United Nations (UNECE) - Uniform provisions concerning the approval of motor vehicles and their components with regard to safety issues related to the operation of hydrogen-powered vehicles [2019/795].

On the basis of approval, TDT (*Transportowy Dozór Techniczny* or Transport Technical Inspection) conducts acceptance tests of tanks at domestic manufacturers.

On the other hand, the technical requirements for the construction, testing and operation of specialized pressure equipment, which include LPG, CNG and LNG tanks, as well as compressed hydrogen tanks, are specified in the **Regulation of the Minister of Transport of October 20, 2006** on **technical conditions for technical supervision in the design, manufacture, operation, repair and modernization of specialized pressure equipment.**

In the case of hydrogen tanks installed in the vehicle supply system, documentation should include:

- A certificate of the manufacturer of the hydrogen tank, in the case of new tanks installed for the first time in the vehicle with the following information:

- tank manufacturer;
- type, factory number, tank capacity;
- the date of manufacture (month and year) and its service life;
- approval number;
- working and test pressure;
- dimensions of the tank;
- a document confirming that the tank has successfully passed a hydraulic test as required by Annex IV Part 2 of Commission Regulation (EU) No. 406/2010 of April 26, 2010.

- A certificate from the vehicle manufacturer or its authorized representative (dealer) that the hydrogen system has been installed and checked, containing at least:
  - type and Vehicle Identification Number (VIN) of the vehicle;
  - confirmation that the hydrogen system components meet the requirements set forth in Regulation (EC) No. 79/2009 of the European Parliament and of the Council of January 14, 2009 and Commission Regulation (EU) No. 406/2010 of April 26, 2010 or UNECE Regulation No. 134;
  - a statement confirming the correct installation of the hydrogen system and compliance with the regulations in force in this regard;
  - confirmation that the hydrogen system has been tested for leaks with positive results;
  - data on the tank.

Tests of LPG, CNG, LNG and hydrogen tanks installed in vehicle power systems are carried out by TDT inspectors at plants authorized by TDT field divisions to prepare the tanks in question for testing. These plants must meet the relevant requirements in terms of premises, equipment and personnel.

Activities related to the preparation for testing of tanks for LPG, CNG and LNG gas, as well as H_2 compressed hydrogen, used for the propulsion of internal combustion engines in vehicles, may be carried out by a business entity that obtains the appropriate authorizations to perform these activities from the relevant field branch of the TDT.

8 Best practices for permitting of hydrogen in residential sector

The following section provides information about the best practices identified and the requirements and barriers for the implementation of hydrogen technologies in the residential sector, i.e.:

- Reversible fuel cells;
- Fuel cell-based CHP with on -site production via electrolysis
- Boilers with on -site production via electrolysis.

Through the section, applications using H2-ready heating systems (with combustion) as alternatives to FC-based systems are considered expressing the potential perception from public authorities of these technologies for power and heating supply. These evidences relate to small applications, which are often below the radar of the safety authorities, so it is not possible to identify consistently lessons learnt or winning approaches.

8.1 ITALY: Reversible SOFC

ENVI directly participated in REFLEX project (GA No779577), a European demonstrative project where a **reversible solid oxide fuel cell, capable of operating both for the production of hydrogen and for the production of electricity, was installed and tested in a real environment**. Specifically, it was a compact system that also integrated the hydrogen storage system and batteries. For this application, the main permitting requirements were the ones set by fire fighters due to the presence of hydrogen stored and on-site hydrogen production. The following information reflects what is described in detail in the Deliverable 2.1.

The project followed a prescriptive approach to safety as the HAZOP risk analysis regarding the safety of the technologies used for compression, storage and piping **was intended only as a support instrument for the safety evaluation process of the Fire Brigade**. This choice was given to the specific plant features below certain threshold values and thus out of the scope of Fire Fighters competence. Moreover, the regulations applied (described in Appendix) are not specific to hydrogen and hydrogen technologies but derive from the regulatory framework typical of the residential sector and conventional fuels such as natural gas. This more convenient choice was therefore dictated by a regulatory gap present at the time of the project where the only technical rule in Italy available was the one for HRS. In fact, the technical rule for electrolysers was only published on 7 July 2023 (less than a year before the publication of this deliverable and after the end of the REFLEX project).

In this project, two European directives for safety were considered: the Seveso Directive and the ATEX Directive. The Seveso Directive did not apply because the quantities of hydrogen stored were less than 5 tons, while, due to the presence of hydrogen, there was a certain probability of forming explosive atmospheres, and therefore the ATEX Directive was considered for the classification of the aforementioned areas into zones.

The regulations chosen have been:

- Decree of the Ministry of the Interior February 3, 2016, "Approval of the technical fire prevention rule for the design, construction, and operation of natural gas deposits with a density not exceeding 0.8 and of biogas deposits, even with a density above 0.8".

In this case, **the most relevant parameter for safety was the geometric capacity of the storage system**. The installation of the hydrogen storage system thus becomes subject to the evaluation of the Fire Brigade if the geometric capacity is greater than 0.75 m^3. Given certain geometric and pressure characteristics, the designed hydrogen storage system fell exactly within category 4 (the less restrictive in terms of safety requirements). **Despite that, in the design phase it was not possible to consider a containment structure for protection from risks of explosion. This brought the final configuration to be the stricter in terms of safety requirements (4th category storage system with no safety degrees).**

The general approach is: the greater the safety conditions, the shorter the distances but the higher the economic commitments (more details about the regulations applied in Deliverable 2.1).

Table 15 Safety distances for storage systems with safety degree 1

Storage capacity	Protection distance	Internal safety distance	External safety distance
4th category	5 m	\	10 m
3rd category	5 m	\	20 m
2nd category	5 m	\	25 m
1st category	5 m	\	30 m

Table 16 Safety distances for storage systems with safety degree 2

Storage capacity	Protection distance	Internal safety distance	External safety distance
4th category	5 m	7,5 m	15 m
3rd category	10 m	10 m	20 m
2nd category	10 m	15 m	25 m
1st category	10 m	15 m	30 m

Table 17 Safety distances for storage systems of 4th category with no safety degree

Storage capacity	Protection distance	Internal safety distance	External safety distance
4th category	20 m	20 m	30 m

- Regarding the **cogeneration system to be used in the residential context**, a technical fire prevention rule for cogeneration groups powered by natural gas was also applied in this case (Ministerial Decree July 13, 2011). In the case of the reversible fuel cell to be installed in this project, **the technical fire prevention rule did not require evaluation by the Fire Brigade Command because the net power produced was less than 25 kW, and therefore the provisions of the decree were considered to comply with standard safety conditions but without the obligation of project evaluation.** The additional provisions in this case concern the assumption of responsibility that passes to the installer.

8.2 BULGARIA: hydrogen CHP

Regarding Bulgaria, hydrogen has been recognised as an area to be further developed under the Energy and Climate Integrated Plan. However, **the regulatory framework for hydrogen in Bulgaria is yet not very defined**. Hydrogen is first legally considered as a part of green energy in the February 2021 revision of the Bulgarian Energy Act. **In the majority of the cases, the existing legislation for the production of other gases and general construction is adopted.**

One example of the procedure to develop a hydrogen project can be seen in the **hydrogen valley which is expected to be built in Chelopech Municipality**. This project aims to meet the energy needs of the municipality (which is one of the largest gold and precious metals mines on the Balkan Peninsula), businesses and citizens, as well as the future construction of an industrial zone on the territory of the municipality of Chelopech. The leading companies in the world mining industry operating in the municipality are Aurubis and Dundee.

Even if Bulgaria lacks a specific hydrogen permitting framework, significant efforts have been carried out. Indeed, the steps followed from the beginning of the hydrogen valley project to achieve compliancy from a legislative point of view as well as from the techno-economic point of view are described as follows:

1. Conversations between the Balkan Hydrogen Cluster and Chelopech Municipality. Chelopech energy needs, as well as the hydrogen and oxygen needs for business and the public sector are significant. For this reason, talks for a **feasibility study, technical design and construction of a valley for green hydrogen production have been started.**
2. The Municipality of Chelopech and the companies formed a **public private partnership.** The consortium aims to initiate a feasibility study to precede the technical design and construction of the hydrogen valley.
3. **A full analysis and study of the municipality of Chelopech** was carried out, on the possibilities for integration and use of green hydrogen, for both business, public sector and citizens.
4. The Municipality of Chelopech launched a procedure to **secure 50,000 square meters of land** on which to install the required plants.
5. **A technical analysis and a business plan** for the infrastructure and operation of the hydrogen valley were presented.
6. A **feasibility study procedure** was launched, where the following documents were submitted:
   - Permit document to issue the design start-up document to the Regional Environmental and Water Inspectorate
   - A document to the State Agency for National Security, as the hydrogen valley falls within the critical energy infrastructure
   - Document for the permit to start technical design.

   These steps have been taken and completed to date in order to comply with the permitting requirements in Bulgaria.
7. Once the above documents are issued, **the technical design process** of the hydrogen valley is planned to begin, along with the valley's process design. The process ends with a cost-quantification. The designed capacities and equipment correspond to the envisaged business plan.

8. The **construction of the hydrogen valley** is planned to start. The project includes the construction of:
    - a 5 MW photovoltaic plant to provide a portion of the green electricity for green hydrogen production. The remainder of the green electricity is expected to come from an electricity supplier;
    - a borehole to provide a water source for the production of green hydrogen;
    - 5 kW electrolysers for public building supply;
    - Equipment to store the green hydrogen produced;
    - Compressors to pump the produced hydrogen into the storage vessels;
    - Fuel cells.
9. **Commissioning** of the hydrogen valley.

The process is required to observe the available legal requirements:

- The Law on Spatial Planning: the main document, which defines the norms and requirements of the entire construction process;
- The Directive on the production and storage of pressurised gases;
- Fire safety standards for industrial complexes;
- The requirements of the State Agency for National Security;
- The requirements of the State Meteorological and Technical Supervision Agency;
- The requirements of the District Inspectorate of Environment and Water of Sofia Region;
- The standards of the Labour Inspectorate, for the stipulated norms for the work process.

8.3 POLAND: hydrogen boilers

Regarding existing projects**, a prototype of a 0.5 MW hydrogen-oxygen boiler has been developed by SES Hydrogen Energy (part of the Sescom Group) and is intended to be used to heat apartments in the housing estate in Śrem**. The company has completed the functional tests, which took place in conditions that simulated the work on a real installation. The commercial implementation of the device is planned for the turn of 2024/2025. The project is at the certification stage.

The planned hydrogen boiler plant will be part of a diversified heating system supplying heat to 195 apartments under construction at the Śrem TBS housing estate. It will serve to provide **central heating and central water** for the buildings. The entire system envisages the installation of a hydrogen boiler room based on the combustion of hydrogen and oxygen, as well as a heating system including ground-based brine-to-water heat pumps. The focal point of the boiler plant will be **a hydrogen-oxygen boiler with gas preparation systems**. In addition, the infrastructure will include: **a hydrogen and oxygen generation** module using electrolysers, an electrolysis **water preparation** system, a **hydrogen and oxygen storage** module, and power and control systems for technological processes and heat exchange

The parties involved are SES Hydrogen Energy and the Śrem Social Housing Society (TBS), the Municipality of Śrem and Con-Project. The regulations that have been used for the project can be seen in the Appendix 2.

9 Conclusions

The analysis conducted so far highlighted several hot spots related to permitting and approaches from the different countries considered.

Many countries do not have as yet a permitting framework that takes into account the peculiarities of hydrogen installations. And yet, in the recent yeas EU legislations and related proposals have started the path towards the adoption of a regulatory framework that can enable the deployment of renewable hydrogen. Nevertheless, significant differences at member state level have been identified. Indeed, fast transposition of the EU legislation can boost the transition also at national level giving the opportunity to convert the lack of knowledge about new sectors into a well-established and shared permitting approach at EU level.

Some difficulties might however derive from the current EU permitting framework (like Industrial emission directive, environmental impact assessment, etc..), which show some gaps in the full applicability to hydrogen projects. Hydrogen facilities are considered chemical plants under EU legislation (like IED directive), hence they can be qualified as industrial thus bringing about some complexity even for simpler plants.

Protection of the environment is one of the main aspects considered in the permitting procedures but there is evidence of some Countries not distinguishing yet type of production technology (reforming vs electrolysis) nor differentiating between large scale and small-scale projects. There is often no distinction in permitting procedures for a HRS with on-site production and electrolysis for industrial applications, and this can significantly slow down the deployment of small-scale hydrogen projects in sectors other than the industrial.

Permitting involves very often local authorities. There is evidence that, within a same Country, similar installations had different permitting requirements and different procedure outputs. Decisions are taken case by case by single or group of local authorities without any exchange of information within geographical jurisdictions or acceptance of “previous art”. This approach can slow down replicability of projects creating inefficiencies.

It can be concluded that a general lack of clarity of the permitting process might be hindering the development of hydrogen projects. When information has been shared amongst different stakeholders (e.g. different public authorities, manufacturers and adopters of hydrogen technologies), a quicker implementation of hydrogen plants can be seen. Even in the case of lack of specific permitting references to hydrogen, the existence of guidelines seems to promote the implementation of projects, e.g. in Germany, Switzerland and South of Spain (*Andalucía* region). These documents are a useful tool that can represent a clear position of stakeholders (authorities involved in the permitting phases) and can facilitate the first approach by adopters of hydrogen technologies.

One of the objectives of HYPOP project is the development of common guidelines that can bring the experience of different countries to be known at European level thus speeding up the implementation of hydrogen projects. This will be the final outcome of the project.

10 Appendix I: Technical analysis of Regulatory Framework for Permitting in HYPOP countries: requirements and barriers

The following Section shows the common operating procedures and protocols, the variety of authorities involved for different topics, the main elements characterizing innovations introduced at country/local level (if present) to support hydrogen projects implementation and highlights gaps in the regulatory framework representing potential barriers in HYPOP countries. Table 3 to Table 5 can be used as guide to read through the following information.

10.1 HYPOP COUNTRIES - BELGIUM: permitting framework for hydrogen implementation in industry and mobility

As mentioned in WP1, Belgium has several technology champions, production projects and excellent research and development programs. Belgian stakeholders need to submit different environmental and safety permits in different fields (refuelling station, hydrogen storage, production unit of green hydrogen, ...).

10.1.1 Hydrogen production and storage for industrial applications

The permitting process for the development and operation of a hydrogen production plant is different in the Belgian regions. In Flanders there is one "environmental permit" that unifies urban planning and environmental permits. In Wallonia and Brussels there are different permits to handle the spatial and environmental aspects.

Environmental permits are a regional competence in Belgium. The three Belgian Regions delegate the responsibility for spatial planning to the regional governments or administrations, the provincial authorities and the municipal authorities. In Flanders the province is playing a role **in land use planning and permitting**, with specific spatial plans and the responsibility for permitting for Class I installations; in Wallonia and Brussels the municipal authorities hold the full responsibility.

The classification of the different hydrogen technologies depends on the expected environmental burden. If there is hydrogen stored within the installation or a hydrogen distribution system, it is always Class I. Class I and II need a permit, for class III a notification is sufficient.

The classification is different for each region and the rules are depicted in the 3 following tables:

Table 18. Different classes for Walloon region

Equipment or activity	Condition	Permit class	IPPC/IED ref.
H_2 production	1000 ton/year < Rate < 100 000 ton/year	2	24.11.01.01
H_2 production	< 100 Nm3/h	2	40.20.01.01
H_2 production	> 100 Nm3/h	1	40.20.01.02
H_2 storage	< 250 kg	3	63.12.08.04.01
H_2 storage	> 250 kg	2	63.12.08.04.02
Compressor	2 kW < power < 30 kW	3	40.20.03.02.01
Compressor	> 30 kW	2	40.20.03.02.02

Table 19. Different classes for Brussels region

Equipment or activity	Condition	Permit class	Section ref.
H_2 production	1 Nm3/h < rate < 1000 Nm3/h	1B	73-A
H_2 production	> 1000 Nm3/h	1A	73-B
H_2 storage	300 l < volume < 3000 l	2	72-1A or 74-1A
H_2 storage	3000 l < volume < 1000000 l	1B	72-1B or 74-1A
Compressor	Not air compressor	1B	71-C

Table 20. Different classes for Flanders region

Equipment or activity	Condition	Permit class	Section ref.
H_2 storage	300 l < volume < 1000 l	3	17.1.2
H_2 storage	1000 l < volume < 10000 l	2	17.1.2

In Flanders, land use plans exist on different levels i.e., the region, province, municipality.

In principle**, there are no general exclusions for hydrogen installations** in the regional land use plans. They can be built in **industrial, commercial or even residential areas**. Safety is the most critical parameter to decide on the possible location: the QRA ("Quantified Risk Analysis") that is mandatory to obtain the environmental permit is used to decide **how many and how close industrial installations can be installed** in the different area types. Another requirement is that the function of the installation should be **compatible with or related to the other functions in the area**, as indicated in the Royal Decree on the organization and the implementation of regional spatial plans (28/12/1972).

In other words, **hydrogen production and storage as such are restricted to industrial areas**; if they are part of a hydrogen refuelling station they can be built in a residential area. The criteria to assess the compatibility with the other functions in the area are described in the Flemish spatial planning codex.

Also, in industrial areas compatibility with the functions in the area is required; hydrogen installations are accepted only if they are useful for surrounding companies or functions.

10.1.2 Hydrogen refuelling stations in Belgium

A hydrogen refuelling station is a facility where different hydrogen technologies, like electrolysers for hydrogen production, storage systems, compressors etc are integrated. For this reason, the environmental permitting requirements as well as the different land use requirements at regional and local level for hydrogen production and storage technologies can be applied as well to HRS.

Compared to other sectors, an additional element that is critical when locating a hydrogen refuelling station in a residential area is the regulation regarding noise. In a residential area (without industry nearby) the allowed noise levels are very low and difficult to comply with for a compressor installation. This is currently also an issue with the installation of service stations with compressed natural gas (this information comes from a stakeholder, DATS24).

The typical throughput time of the environmental permitting procedure on itself is limited in time - in Flanders this is 5 months after submission of the request, in Brussels this is 160 days - but the preparation of the request is a very time consuming and costly process because of the lack of specific legislation and available procedures for hydrogen refuelling stations.

There is no quick procedure foreseen for temporary or test installations, e.g., mobile refuellers. The same lengthy procedure to obtain an environmental permit is required as for a large-scale fixed installation and this is mandatory for each single location on which the mobile refueller is to be used.

A clear framework and specific requirements for hydrogen installations is missing and **hydrogen is considered as a "dangerous gas"** (see e.g., in the "VLAREM" legislation in Flanders). An ad hoc safety study has to be done by an accredited external expert for each HRS to be built. This is inefficient, costly and the outcome is dependent on the consulted expert. Since there are no specific rules for hydrogen concerning e.g., safety distances, a mix is used from rules for dangerous gases (VLAREM) and the Dutch procedure for hydrogen stations PGS35. **The risk in this approach is that the authorities involved will "combine" both the permitting process of conventional refuelling stations as well as the regulations applicable for H_2 storage and H_2 production**. This method of working might generate unreasonably severe requirements, well beyond those applicable to conventional stations. The permitting process carries also "regulatory risks" for the operator, as the interpretation and demands from the regional administrative authority can be different from one region to another.

Having a specific procedure for Belgium will make this ad hoc safety assessment redundant or at least much less complex. A uniform assessment of the risks and a procedure to deal with these risks would create unambiguity towards the different instances that are involved in the permitting procedures: province, municipalities, fire brigade etc.

Concerning permitting of other hydrogen technologies in the **residential sector,** there is **no information** about this specific topic since **the Belgian strategy consider that the residential sector should be the last application to use hydrogen.**

10.2 HYPOP COUNTRIES - ITALY: regulatory framework for permitting of hydrogen technologies in industry, mobility and residential sectors

In Italy, the regulatory framework for **permitting** mainly refers to **three main pillars: environment, urban planning/building, and health/safety.** The results of this research activity focused on electrolysers, fuel cells, storage systems, and hydrogen refuelling stations (HRS), and the use in new application areas of renewable hydrogen has been taken into account: industry, mobility, and residential. In this complex framework, the analysis developed aims to provide a general overview of each permitting pillar and the expected legislative and regulatory developments in Italy.

The construction and operation of a plant require the acquisition of a "permitting package" through the activation of the related procedures. **Not all of these authorizations are specific to hydrogen** but may concern general aspects, such as construction permits for technical buildings, connections to utility networks and landscape impact, among others. Even if not directly related to hydrogen, these are procedures that can influence the timing of permits acquisition.

10.2.1 Permitting of Hydrogen Technologies in Industrial Sector

To date, the use of hydrogen and hydrogen technologies in Italy has been mainly linked to chemical processes and to the oil & gas industry but only negligibly to energy use or other end uses sectors. **Even if the current regulatory framework described in this section for permitting reflects this prevalent chemical-industrial use,** general regulations described for industry sector are also valid for the mobility and residential sectors.

In order to meet the different permitting needs for emerging hydrogen applications, within the **Italian "Next Generation EU" Plan, some reforms to the environmental, urban planning, safety, and electrical and gas network services authorization framework have been introduced.** In particular, **Reform 3.1 "Administrative Simplification and Reduction of Regulatory Barriers to the Diffusion of Hydrogen**" will include updates to:

- Technical safety regulations for production, transport (technical and regulatory criteria for hydrogen in the natural gas network), storage, and use of hydrogen;
- Authorization procedures for small-scale hydrogen production plants for electrolysis plants with a capacity of between 1 and 5 MW;
- Regulation of the participation of hydrogen production plants in electrical and gas network services with a specific measure for hydrogen;
- The initiation of a system of guarantees of origin for renewable hydrogen;
- Procedures and/or design and operation criteria for refuelling stations along the TEN-T corridors, highways, logistic hubs, and railway lines;
- A ten-year development plan for national gas transmission networks, adopting common Union standards for the transport of hydrogen through existing pipelines or dedicated conduits.

To date, the state of implementation includes:

- **The proposal to amend the current technical standard (Ministerial Decree 18 May 2018 "Technical rule on the chemical-physical characteristics and the presence of other components in combustible gas**") submitted to the European Commission on January 26, 2022, along with the accompanying technical report and then issued by the MiTE (now MASE) decree on June 3, 2022. **This legislation is relevant in all application sectors as it introduces the possibility of having a blend of up to 2% hydrogen by volume in the natural gas network.**

- **Safety provisions related to production (already implemented through the Technical Rule for Fire Prevention 07/07/2023), transport, and storage of hydrogen** (yet to be implemented for cases outside the perimeters of refuelling stations and industrial-scale hydrogen production plants through electrolysis);

- In collaboration with SNAM S.p.A. (TSO - National Transport System Operator), **are under examination the action plan and the identification of structures where to start preparatory experiments to amend the Ministerial Decree of April 17, 2008, and the Ministerial Decree of April 16, 2008, on technical rules for hydrogen transport in the gas network.** The directive to SNAM regarding the use of shared standards for hydrogen transport is being prepared.

- **Article 38 of Legislative Decree November 8, 2021, n. 199 introduced simplifications for the construction and operation of electrolysers smaller than 10 MW, or installed in industrial areas or as stand-alone units.**

A part from these updates, the permitting approach in Italy for hydrogen technologies, which can be valid for different sectors, is described below. The main regulations and directives, the authorities involved in the permitting process and the specific references to hydrogen and hydrogen technologies are provided.

<u>Environmental permitting</u>

In Italy, the main national reference for environmental matters is Legislative Decree April 3, 2006, no.152 and subsequent amendments (Environmental Code). Various constraints of a landscape, acoustic, archaeological, and hydrogeological nature stemming from regional and local urban planning regulations should be considered as well.

The environmental permitting procedures, deriving from the European framework, such as the **Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), and Integrated Environmental Authorization (IEA),** and their respective suitability assessments are managed by public authorities operating at the national, regional, or local level:

- According to article 7-bis, paragraph 4, of Legislative Decree no. 152/2006, at the national level, **the competent authority for the activities related to the EIA process is the Ministry for the Environment and Energy Security**, which can work in collaboration with the Ministry of Culture;
- **At the regional level**, according to article 7-bis, paragraph 5, **the competent authority for the activities related to the EIA process is the public entity identified according to the provisions of regional laws or the autonomous provinces**. In some cases, individual regions can also delegate the role of competent public entity for environmental authorization procedures to Metropolitan Cities (or Provinces). For projects subject to regional EIA, it is necessary to analyze the regional and local laws on environmental, urban planning/building, and health/safety matters. These may have points in common and are generally specific to the characteristics of the territory in which the project is implemented. **In general, for cases where the projects under study fall partly within state competence and partly within regional competence, the state procedure prevails.**

To determine whether a project that includes hydrogen technologies needs to undergo an EIA, a suitability check is necessary. In other cases, the EIA is mandatory from the beginning. **The following bullet list is a guidance inside the Italian Environmental Code (Part II):**

- **State-level EIA suitability check (Annex II-bis);**
- **Regional EIA suitability check (Annex IV);**
- **State-level EIA (Annex II);**
- **Regional EIA (Annex III).**

Facilities for the production of hydrogen through electrolysis for industrial uses, mobility, and residential can be subject to national authority, according to the aforementioned Annex II of the Environmental Code. This regulatory reference defines hydrogen plants as “integrated chemical plants”, i.e., facilities for industrial-scale production through chemical transformation processes of substances, where various production units functionally connected to each other are juxtaposed for the manufacturing of basic inorganic chemical products, with an annual total production capacity per product class, expressed in millions of kilograms, exceeding the thresholds mentioned therein. It should be noted that the thresholds in the table refer to the sum of the production capacities related to the individual compounds listed in the following table.

Table 21. Production threshold.

Product Class	Threshold (Gg/year)
j) gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulfur compounds, nitrogen oxides, hydrogen, sulfur dioxide, carbonyl dichloride	100

According to this definition and classification, it might be assumed that hydrogen production plants, as well as hydrogen refuelling stations with onsite production, where the overall annual production capacity per product class (hydrogen plus other substances present in the Product Class) exceeds the threshold of 100 Gg/year (millions of kilograms) and the plant components are functionally integrated, are subject to the state-level Environmental Impact Assessment (EIA). **For these categories of plant, whose annual production capacity does not exceed the threshold of 100 Gg/year, the responsibility for the related projects is, instead, delegated to the Regions or Autonomous Provinces as reported in Annex III.**

Regarding the **Integrated Environmental Authorization (IEA), the European Directive on Industrial Emissions (IED) 2010/75/EU**, which repealed and replaced the IPPC directive, was transposed by Italy through Legislative Decree no. 46/2014. It extends the types of industrial activities that must submit the IEA, including hydrogen production plants defined as facilities manufacturing inorganic chemical products. This definition is mentioned in Annex I, point 4.2 of the IED directive and in point 4.2 of article 26 of the Italian transposing document (Legislative Decree no. 46/2014). The threshold values mentioned in both documents generally refer to production capacity or yield. Plants producing hydrogen not strictly for industrial purposes but for applications such as mobility, where hydrogen is used as fuel, must follow the European IED directive, which defines the necessary authorizations to reduce emissions from industrial plants.

The competent authority involved in granting the IEA for the operation of a hydrogen plant can be national or regional. In particular:

- According to article 7, paragraphs 4-bis and 4-ter, **projects listed in Annex XII with product class capacity higher than 100 Gg/year** are subject to the national IEA procedure. **The competent authority issuing the IEA is the Ministry of the Environment and Energy Safety**;
- **Projects listed in Annex VIII that are not also included in Annex XII** of the decree and their significant modifications are subject to IEA according to regional and provincial laws. **The competent authorities are the Regions and Provinces.**

These public authorities, both at the national and regional levels, actively collaborate with two entities responsible for ensuring compliance with the objectives of integrated pollution prevention and reduction of productive activities that have been granted the IEA, as regulated by the European IPPC directive. These public entities are: the Higher Institute for Environmental Protection and Research (ISPRA) for projects of national competence and the Regional Agency for Environmental Protection (ARPA)/Provincial Agency for Environmental Protection (APPA) respectively for projects under the competence of Regions and Provinces.

Legislative Decree 13/2023, through Article 41 "Simplification for the development of green and renewable hydrogen," further amended Annex II Part II, Legislative Decree 152/2006 by introducing paragraph 6-bis. This paragraph integrates the concept of green or renewable hydrogen by including among the facilities subject to state-level environmental impact assessment (state-level EIA) also the "integrated chemical plants" for the production of green or renewable hydrogen, namely plants for industrial-scale production through chemical transformation processes of green or renewable hydrogen, where various production units functionally connected to each other are juxtaposed. **Unlike the previous case, however, environmental legislation does not define threshold values, excluding the possibility that projects for the production of green or renewable hydrogen fall under regional competence.**

The Ministry of the Environment and Energy Safety, in response to an inquiry, clarified the definition of integrated chemical plant for the manufacturing of inorganic chemical products. **Here are the key points to define the cases in which hydrogen projects, according to the Ministry, fall outside this definition and thus fall among the plants subject to regional EIA:**

- A hydrogen production plant falls within the **definition of a chemical plant** as there occurs an electrochemical reaction of the water molecule into hydrogen and oxygen;
- The **definition of integrated chemical plant** was taken from the guidelines "Interpretation of definitions of project categories of annex I and II of the EIA Directive" and adds, besides chemical conversion, also the **need for a functional connection and a physical juxtaposition among the different components of the plant**;
- **The functional connection is present when hydrogen is used to produce intermediate** products to the plant's process or as an input material for other units in order to contribute to the final production of a finished product;
- There can be an **infrastructural connection for energy purposes**, but this alone is not sufficient to be considered functional, as **the chemical conversion component must always be present;**
- **Having physically juxtaposed units is not generally considered as a necessary and sufficient condition for "functional connection"**, as even units far from each other can be connected through pipes and contribute to the production of an intermediate product. **A simple hydrogen production plant through electrolysis that supplies downstream uses of the plant such as ovens, road distributors, engines, and turbines does not qualify as an integrated chemical plant for the production of green or renewable hydrogen** (paragraph 6-bis of Annex II Part II, Legislative Decree 152/2006) as it does not meet the condition of functional connection with other units of the plant.

Within the implementation of the Italian National Recovery and Resilience Plan (NRRP), for those projects considered functional to achieve its objectives**, the EIA is assessed at the state level by the PNIEC-PNRR technical commission. Recent updates indicate the following hydrogen projects as a high priority, especially in the EIA phase (Annex I-bis of Legislative Decree 152/2006):**

- 1.2.3 Production of sustainable fuels: biofuels and advanced biofuels, biomethane and advanced biomethane (including biogas upgrading and BioLNG production from biomethane), syngas, non-biological renewable fuels (hydrogen, e-fuels), recycled carbon fuels;
- 1.3.1 **Hydrogen production plants**;

- 1.3.2 Power-to-X plants;
- 1.3.3 **Hydrogen transport infrastructure**;
- 1.3.4 **Hydrogen storage infrastructure**;
- 1.4.1 Construction of alternative fuel refuelling stations (for road, air, and naval transport), as well as total or partial renovation of existing facilities including the attached storage, for: a) Electric recharging; b) **Hydrogen refuelling (for use with Fuel cells, internal combustion engines, and derived carriers, such as ammonia**);
- 2.3 High-Efficiency Cogeneration Plants (CAR);
- 3.3.1 Interventions for the conversion of existing refineries and new plants for the production of energy products derived from renewable sources, residues, and waste, as well as the modernization and expansion of existing capacity also aimed at the production of non-biological renewable fuels (hydrogen, e-fuels), recycled carbon fuels.

For all the other hydrogen related facilities, the previous rules are still valid.

Construction aspects

To achieve the objectives of the NRRP, particularly concerning hydrogen, an initial simplification regulation was adopted in 2021 **by article 38 of Legislative Decree no. 199/2021, which simplified and regulated the authorization procedures for the construction and operation of hydrogen production plants from electrolysers. After that, article 23** "Provisions concerning the production and consumption of hydrogen from renewable sources, concessions for irrigation use, acceleration of basin plan approval procedures" **of the Decree Law April 30, 2022, no.36, in paragraph 5-bis, also included the infrastructure connected to the electrolyser, like compressors and storage and any connection infrastructures to distribution and transport networks, among those authorized according to the procedures indicated below and specified in article 38**.

Article 38 of Legislative Decree 199/2021 provides **four alternative permitting procedures** for the construction of electrolysers for hydrogen production and the related infrastructure, including compressors and storage and any connection infrastructures to distribution and transport networks.

1) Electrolysers with a power equal to or less than 10 MW located anywhere.

The construction of electrolysers with a power equal to or below the threshold of 10 MW, located anywhere even if connected to existing renewable source plants, authorized or under authorization, constitutes free building activity. Therefore, the issuance of a specific enabling title is not required, except for the acquisition of assent acts, opinions, authorizations, and no objections from territorially competent bodies concerning landscape, environmental, safety, fire prevention, and connection to the electric grid or natural gas network.

In this case, the installation is considered as a free building activity, meaning that interventions can be carried out without any enabling title but the prescriptions of municipal urban planning tools and other sector regulations on seismic safety, safety, fire prevention, hygiene, energy efficiency, and protection from hydrogeological risk must be taken into account as well.

2) Electrolysers and related infrastructure located within industrial areas or where industrial plants are located.

The construction of electrolysers and connected structures is approved through a Simplified Authorization Procedure (PAS) according to article 6 of Legislative Decree no. 28/2011 if they are located within industrial areas or areas where industrial plants are located, even those plants for the production of energy from renewable sources, whether no longer operational or in the process of decommissioning, whose construction does not involve the occupation in extension of the same areas, nor an increase in the volumes in height compared to the existing situation and that do not require a variant to the urban planning instruments adopted;

3) **Stand-alone electrolysers and related infrastructure that do not fall into the previous cases 1) and 2).**

They are authorized through a Single Authorization (AU) issued:

I. **by the Ministry of Ecological Transition (now Ministry of Environment and Energy Safety, MASE) through the Single Environmental Procedure (PUA) according to article 27 of Legislative Decree no. 152/2006 when the projects are subject to a state-level EIA** based on the thresholds set out in Annex II to the second part of Legislative Decree no. 152/2006;

II. **by the Regions or Autonomous Provinces in all other cases;**

4) **Electrolysers and related infrastructure to be built in connection with electrical energy production plants from RES**

They are authorized through a Single Authorization (AU) according to article 12 of Legislative Decree no. 387/2003. **This AU is issued:**

I. by the Ministry of Ecological Transition (now MASE) if functional to plants with a capacity greater than 300 MW thermal or to offshore electric energy production plants;
II. by the territorially competent Regions or Autonomous Provinces in cases other than those mentioned in point I. It is important to mention that hydrogen is considered renewable according to the European definition only if the electrolyser producing it is connected to a RES plant. Furthermore, the RES plant must be authorized and become operational within a maximum time limit relative to the connection with the electrolyser. Therefore, within the authorization timelines, this aspect must be taken into account.

Based on the current situation in Italy regarding electrolysers, fuel cells, storage systems, and refuelling stations, a general distinction of the different environmental authorization procedures (also linked to urban planning aspects) required for the construction and operation of a plant for industry, mobility, and residential use can be provided:

- **Single Environmental Measure (PUA)** regulated under Article 27, Legislative Decree 152/2006 and subsequent modifications and integrations;
- **Single Regional Authorization Measure (PAUR)** regulated under Article 27-bis, Legislative Decree 152/2006 and subsequent modifications and integrations;
- **Single Accelerated Regional Authorization Procedure for sectors of strategic importance (PAUAR)** regulated under Article 27-ter, Legislative Decree 152/2006 and subsequent modifications and integrations;

- **Simplified Authorization Procedure (PAS)** regulated under Article 6, paragraphs 1 to 10, of Legislative Decree 28/2011;
- **Single Authorization (AU)** regulated under Article 5 of Legislative Decree 28/2011.

The first two authorization measures have similar requirements as they collect in a single decree, in addition to EIA and IEA, also:

- an authorization regarding the regulation of discharges into the subsoil and groundwater as per Article 104 of Legislative Decree 152/2006;
- an authorization concerning the regulation of sea dumping of material resulting from excavation activities and the laying of cables and pipelines at sea as per Article 109 of Legislative Decree 152/2006;
- a landscape authorization according to Article 146 of the Cultural Heritage and Landscape Code as per Legislative Decree 22 January 2004, no. 42;
- a cultural authorization as per Article 21 of the Cultural Heritage and Landscape Code as per Legislative Decree 22 January 2004, no. 42;
- an authorization regarding the hydrogeological constraint as per Royal Decree 30 December 1923, no. 3267, and the decree of the President of the Republic 24 July 1977, no. 616;
- a feasibility clearance as per Article 17, paragraph 2, of Legislative Decree 26 June 2015, no. 105 (Activities at risk of major accidents – "Seveso III" Directive);
- a seismic authorization as per Article 94 of the decree of the President of the Republic 6 June 2001, no. 380.

The **Single Environmental Measure (PUA)** was introduced following Legislative Decree 16 June 2017 no. 104, in implementation of Directive 2014/52/EU, and **the competent authority at the national level is the Ministry of the Environment and Energy Safety (MASE). The single measure becomes the Single Regional Authorization Measure (PAUR) when the projects to be evaluated fall under the competence of the Regions and Provinces.** When the project falls within regional competence, it is still important to review the authorization framework and the urban planning instruments of the territory where the plant is to be located, which may present additional requirements.

Both these authorization measures (PUA and PAUR) allow for the acquisition of environmental authorizations in a single procedure. From the early stages of the authorization procedures, it is necessary to prepare detailed project documentation. The evaluation of information, both at the national and regional and provincial levels, is therefore not uniform across the territory.

In specific cases, where it is possible to demonstrate the strategic national interest of the project and if the investments foreseen, both private and public, exceed the amount of 400,000,000 euros, it is possible to follow an authorization procedure involving the territorially competent Region called the Single Accelerated Regional Authorization Procedure (PAUAR).

The Simplified Authorization Procedure (PAS) has only recently been associated to hydrogen technologies, in particular electrolysers and connected infrastructures (storage, compressors, and any connection infrastructures to distribution and transport networks). Generally, this authorization procedure applies to the construction and operation of plants powered by renewable sources. It was adopted pursuant to Article 12, paragraph 10 of Legislative Decree 29 December 2003, no. 387, and integrated, for the specific case of electrolysers and connected infrastructures, by Article 6,

paragraphs 1 to 10 of Legislative Decree no. 28/2011. **In this case, it is the territorially competent Municipality to which the project must be submitted and evaluated**. The project proposal must contain a detailed technical report and appropriate design documents, also attesting to the project's compatibility with the urban planning instruments and building regulations in force, as well as compliance with safety and health and hygiene standards.

The last relevant environmental authorization measure for hydrogen technologies is the Single Authorization (AU). This authorization measure was also introduced to simplify and promote the use of renewable sources, as regulated under Article 5 of Legislative Decree no. 28/2011 (Directive for the promotion of energy use from renewable sources). **The AU authorization is issued by the Region or by Provinces delegated by the Region.** In certain cases, where specific thresholds are exceeded, the competent authority shifts to the State. Specifically, the Ministry of the Environment and Energy Security, in concert with the Ministry of Infrastructure, is responsible at the national level for issuing this authorization.

The Single Authorization refers both to environmental and urban/building aspects as:

- It includes environmental assessments under Title III of Part Two of Legislative Decree 152/2006 (i.e assessment of suitability for EIA and Environmental Impact Assessment EIA);
- It constitutes, where necessary, a variation to the urban planning tool;
- It can be requested together with the declaration of public utility and the imposition of the constraint preordained to expropriation.

<u>Urban planning</u>

Along with the environmental authorization framework, there is the urban planning framework. In Italy, planning and protection of the territory fall under national and regional competence and can cover aspects related to building, landscape protection, cultural heritage, and urban planning tools for territory governance.

For the approval of a hydrogen project, various potentially existing environmental constraints together with the urban plans, specific to each area of interest, and aimed at protecting and controlling the use of a territory, should also be consulted.

The urban planning authorizations required for the building of any facility, including those for hydrogen even if not directly mentioned in programmatic documents, depend on territorial regulatory plans, municipal regulatory plans, and building activity norms.

In Italy, Regions and Municipalities have competence in terms of territory governance. This role was conferred by Article 117 of the Constitution of the Italian Republic. This means that Regions have the power to legislate and establish rules for territory governance at the regional level, within a framework of general principles set by the State. Municipalities develop municipal regulatory plans and related technical implementation norms that must incorporate the norms and over-local plans.

Generally, the authorization measures necessary to ensure compliance of a project that includes hydrogen technologies are issued by the offices of the territorially competent Municipality. Urban planning and building authorizations result from an evaluation of the project to ascertain its compliance with the contents of the Municipal Regulatory Plan and current regulations.

The main national regulatory references that concern urban planning and building aspects are:

- **Urban Planning Law**, Law August 17, 1942, no. 1150 (and subsequent integrations). This regulatory reference provides general indications on the activities of **Municipalities** in defining the General Regulatory Plan (PRG) and zoning of areas, identification of specific urban standards that report limit values for territory organization;
- **Building Law, Consolidated Building Act (TUE)**, Presidential Decree 380/2001, which includes rules, norms, and authorization procedures that must be followed for the realization of building interventions. This is then connected to multiple regional laws and local regulations that have operational character on the specific territory;
- **Legislative Decree 42/2004, Cultural Heritage and Landscape Code**. This regulatory reference for landscape protection is a state competence.

At the local level, Municipalities must respect these laws when they draft urban planning instruments and related technical norms.

Below are **some of the main urban planning instruments** that show how in Italy the normative references for urban planning have a hierarchical structure that goes from the broader dimension (regional) to the more local (municipal):

- **Regional Territorial Plan (PTR)** is a regional planning instrument that establishes guidelines for territory development and defines objectives, strategies, and guidelines related to land use, environment, transportation, etc. **It is a regional document from which Territorial Coordination Plans derive**;
- **Territorial Coordination Plan (PCT)** is an urban planning instrument **that can be at the regional (PTRC) and provincial (PTCP) level. These plans concretely translate the strategic and high-level provisions of the PTR which can further detail and be specific at the provincial and municipal level.** Specifically, the Regional Territorial Coordination Plan (PTRC) operationalizes the provisions of the PTR among the provinces, while the Provincial Territorial Coordination Plan (PTCP) is the local counterpart and aims to coordinate and integrate urban and territorial planning within individual municipalities that are part of the province.

The PTCP, together with PTR and PTRC, contributes to ensuring coordinated and sustainable territorial planning, promoting the harmonious development of different areas and municipalities within a province. It should be noted that the organization and specificities of territorial plans can vary among different regions and provinces in Italy. These Territorial Coordination Plans may also include Specific Plans for metropolitan areas (PTM). The Metropolitan Territorial Plan (PTM) is an evolution of territorial coordination plans and is designed to manage the specific challenges and opportunities of metropolitan areas (local entities established with the 2001 constitutional reform, Article 114).

- **General Regulatory Plan (PRG) also known as Municipal Urban Plan (PUC).** This is the main urban planning instrument at the municipal level that includes and implements the previous plans. It defines urban planning and building regulations to be observed within the municipal territory for land use, area destination, and infrastructures. In some cases, this plan can be supplemented by a further detailed instrument that applies only to specific areas within the municipal territory named Detailed Plan (PP). **This document is crucial for the installation of**

hydrogen related plants, which must then comply with the criteria defined for these zones in terms of building density, height, distance between buildings, as well as maximum ratios between spaces designated for residential and productive settlements and public spaces, etc.

Once the zones of interest for the construction of a hydrogen plant are identified within the Municipality's PRG, the technical implementation norms containing the specific building and urban planning constraints for that zone and the territory of that Municipality are sought.

A link between safety authorizations and urban planning ones is provided by the Seveso Directive for the risk of significant accidents. The European directive was transposed in Italy by Legislative Decree June 26, 2015, and Article 22 defines the provisions that the Municipality affected by the Seveso establishment must follow for its territorial planning and control activities. The competent offices of the Municipality where Seveso establishments are located collaborates with the facility manager to consider and assess potential risks functional to the update of the General Regulatory Plan (PRG).

The PRG has a ten-year duration, but it can be modified through an urban planning variation, i.e., a modification that may concern, for example, the use destination of the area/zone of specific interest and the urban planning regulations. These procedures are also applicable to hydrogen projects where an urban variation is needed. Among the urban planning variation procedures, it is possible to indicate:

- the general urban planning variation procedure in which the process involves the submission of an application for variation of the Municipality's PRG, which evaluates the proposal and the feasibility of the variation based on regional and municipal laws through its designated offices;
- the urban planning variation procedure through SUAP (Single Desk for Productive Activities), a desk that offers integrated services to simplify procedures related to productive activities. This procedure is often adopted to simplify the process, reducing times and facilitating the authorization process, especially for projects related to productive activities.

However, it's important to note that modes and details may vary based on regional and local laws. For this reason, it is advisable to engage with the Municipality in a preventative manner or obtain an informal opinion to ensure that the construction proposal complies with local regulations and needs.

10.2.2 Permitting for Hydrogen refuelling stations

In the phase of verifying the authorizations necessary for the construction of a **hydrogen refuelling station, it is necessary to consider any potential urban planning constraints present in the documents of the Region, Province, or Municipality concerned by the project. The installation and operation of fuel distribution facilities are authorized by the territorially competent Municipality** according to the provisions of Legislative Decree 32/1998 "Rationalization of the fuel distribution system, pursuant to Article 4, paragraph 4, letter c) of Law March 15, 1997, no. 59," at Article 1 "Norms for liberalizing fuel distribution." **There are, therefore, potential permitting constraints linked to the urban planning instruments** of various local entities that, with the Regulatory Plan, and in particular the Fuel Plan regulation, communicate those areas where fuel distribution stations can be located. **The provisions given by the mentioned Plans also apply in the case of private distribution facilities exclusively used by manufacturing and service companies**. To install a hydrogen refuelling station in Italy, it is therefore necessary to understand, on a case-by-case basis, whether the identified

area is compatible with the land use designation defined by the Municipality. In some cases, such local entities may require the mandatory presence of refuelling stations with different fuels. Generally, the location can also constitute a modification of the Regulatory Plan unless the area concerned is subject to particular landscape, environmental, or monumental constraints and is not included in the homogeneous territorial zones A (historic centers). Once the compatibility with the Municipal Urban Planning Tool (Regulatory Plan) is assured, the authorization is then subject to verification of compliance with provisions concerning health, environmental, and road safety, provisions for the protection of historical and artistic assets, as well as regional policy guidelines. **Along with the authorization, the Municipality also issues the necessary building permits.**

For the hydrogen-based mobility, in Italy there are some regulatory references for road mobility capable of providing guidance for the evaluation procedures of hydrogen-fueled vehicles. Instead, in the railway sector there is still no such well-defined authorization framework. It is possible, therefore, to refer partly to national requirements valid for the road mobility sector and partly to an international regulatory approach. Below there are the main authorizing references for the use of hydrogen on railways and for hydrogen-fueled vehicles:

- Legislative Decree January 27, 2010, no. 35, "Implementation of Directive 2008/68/EC on the inland transport of dangerous goods" (RID);
- Ministry of Infrastructure and Transport Decree January 23, 2023, "Transposition of Commission Directive 2022/2407/EU amending the annexes to Directive 2008/68/EC of the European Parliament and of the Council on the inland transport of dangerous goods";
- Directive 2014/68/EU of the European Parliament and of the Council of May 15, 2014, on the "harmonization of the laws of the Member States relating to the making available on the market of pressure equipment";
- Ministerial Decree October 23, 2005, "Safety in Railway Tunnels."

For the hydrogen road mobility sector, the following list includes the main regulatory references in Italy that need to be considered for the transport of hydrogen on roads:

- Legislative Decree April 30, 1992, no. 285, "New Highway Code," and the decree of the President of the Republic December 16, 1992, no. 495, "Regulation for the implementation and execution of the New Highway Code";
- Legislative Decree January 27, 2010, no. 35, "Implementation of Directive 2008/68/EC on the inland transport of dangerous goods" (ADR);
- Legislative Decree June 12, 2012, no. 78, "Implementation of Directive 2010/35/EU on transportable pressure equipment, repealing Directives 76/767/EEC, 84/525/EEC, 84/526/EEC, 84/527/EEC, and 1999/36/EC" (TPED);
- Ministry of Infrastructure and Transport Decree January 23, 2023, "Transposition of Commission Directive 2022/2407/EU amending the annexes to Directive 2008/68/EC of the European Parliament and of the Council on the inland transport of dangerous goods."

10.2.3 Permitting requirements for hydrogen technologies in residential sectors

In Italy, the use of hydrogen in the residential sector represents a novelty. In this context, it is possible to mention the main requirements related to network services and the respective connection of hydrogen technologies, which generally also apply to the industrial and mobility sectors described

earlier. **The Italian regulatory reference for the connection to the electrical grid is the ARG/elt 99/08 (Integrated Text of Active Connections - TICA).**

There are no specific laws or regulations in Italy for Power to Gas plants that take energy from the electrical grid, and therefore, they are considered like any other industrial plant. Specifically, hydrogen production plants via electrolysis are passive users of the electrical grid and must follow the normal authorization process involving the following public entities:

- the Manager of Energy Services (GSE) tasked with promoting and developing RES and energy efficiency;
- local electric grid distributors;
- the Customs Agency responsible for applying tariffs on energy products and electricity. In the case of connection to the gas transport network, the process is analogous and involves the involvement of the territorially responsible local Distributor.

A technology that can provide clean energy in residential field are the fuel cells (FC). Such devices, when used stationarily, can function as cogenerators (micro-CHP), meeting the demand for electricity and secondarily the thermal energy demand of a building.

FCs fall within the classification of micro-CHP. These systems are regulated in Italy by Legislative Decree February 8, 2007, no. 20, implementing the European directive 2004/8/EC on the "promotion of cogeneration based on a useful heat demand in the internal energy market," which defines, respectively, "**micro cogeneration" units as cogeneration units with a maximum generation capacity of less than 50 kWe** and "high-efficiency cogeneration" as cogeneration with characteristics conforming to the criteria indicated in Annex III of the same legislative decree. To date, FCs in cogenerative mode for stationary applications have operated mainly with traditional fuels such as methane gas.

Stationary fuel cells to operate as micro-CHP and perform their functions must be connected to the building's electric grid, the national electric grid, and the gas network or an autonomous gas tank. Therefore, various authorization procedures involving operators and managers of the electric and gas networks are necessary.

To obtain the approval for the installation of a fuel cell micro-CHP in a residential context, the first phase is the connection to the building's electric grid. This is a straightforward procedure since hydrogen technologies like FCs are not considered differently from other electrical systems connected to the rest of the building. **The competent authority to interact with is the local electric energy distributor responsible for the connection procedure**. The installation of hydrogen devices is carried out by a certified and trained technician installer as stipulated by the Ministerial Decree of March 12, 2008, no. 37.

The connection to the gas network is another procedure that does not need specific requirements. Italy has a gas network distributed over most of the national territory, directly reaching the domestic users of buildings. Therefore, if a gas connection already exists, there are no specific requirements. **The requirements for connecting micro-CHP fuel cell units to the gas network are set by the gas operators of the local distribution network with whom a connection request must be made, and an agreement must be signed**. For the connection of the system to the electric grid, it is necessary:

- A connection agreement with the local network manager;
- An operational agreement with the Customs Agency, called "electric workshop regulation";
- An agreement with the electric network operator.

For the connection to the local electrical distribution network, documentation must be provided, as stipulated by the Integrated Text of Active Connections (TICA), and technical information about the plant must be shared through the system for managing data of production plants and their units (Gaudì System).

The technical and economic conditions for connecting electricity production plants to the electric grids are defined by ARG/elt 99/08 (Integrated Text of Active Connections - TICA). According to this regulation, connection requests:

- concerning a requested injection power less than 10,000 kW, must be submitted to the competent distribution company within the territorial area;
- concerning a requested injection power equal to or greater than 10,000 kW, must be submitted to Terna (the independent Italian operator of electricity transmission networks).

The current regulations define energy production systems where the producer coincides with the end-user as SSPC (Simple Systems of Production and Consumption). Specifically, micro-cogeneration systems are therefore categorized under the type of other simple production and consumption systems SSP-B.

The Decree of the Ministry of Economic Development dated March 16, 2017, subsequently regulated the simplification of procedures to construct and operate high-efficiency micro-cogeneration plants (as defined by Legislative Decree 2007, no. 20) and micro-cogeneration plants powered by renewable sources, through the use of unified models. These allow an exchange of information among all stakeholders involved in the different procedures of realization, connection, and operation of a micro-cogeneration plant: Municipalities, network operators, and the Energy Services Manager S.p.A. (GSE), and time required for a network connection agreement is about two months.

In terms of using hydrogen through FC micro-cogeneration systems, an additional authorization process for the electricity produced and exchanged with the grid must also be considered. **Micro-cogeneration units, within which fuel cells fall, can be installed after obtaining authorization from the local office of the Customs Agency**. The proposing subject must notify the competent authority by presenting a document called "Notification of activation of a micro-cogeneration workshop" as regulated by the reference legislative text on fiscal and administrative compliance, Legislative Decree October 26, 1995, no. 504 (Article 53, paragraph 4), subsequently updated by the Decree of October 27, 2011 "Simplifications for high-efficiency micro-cogeneration plants" which introduced a series of simplifications to the fiscal and procedural obligations for electrical workshops equipped with a high-efficiency micro-cogeneration plant (CAR) having a total electric power not exceeding 50 kW. The regulation also lists the different fuels that can power the system, including diesel, LPG, and natural gas, but hydrogen is not considered. In the authorization process are needed information related to the thermal, electrical components, and average consumption. In the case of diesel and LPG, the location of the fuel storage tanks serving the electrical workshop must also be indicated along with the "notification." Once the competent office verifies the plant's compliance with regulatory requirements and the fulfillment of fiscal obligations, it proceeds to issue the operating license and a

company code. Based on the electrical power of the micro-cogeneration plant and the operating hours of the electrical workshop, an agreement is made between the competent Office and the owner of the plant.

10.2.4 Permitting procedures for Safety of hydrogen technologies in Italy

In this section, the main authorization procedures related to safety aspects in Italy are described (details about safety requirements in the Deliverable 2.1 "Report on safety requirements"). They can be generally considered applicable for industry, mobility and residential sectors.

In Italy, safety-related authorization procedures are entrusted to the territorially competent Fire Brigade. Thus, projects employing hydrogen technologies are also included. The safety regulations in Italy are generally prescriptive type and the specific provisions are included in documents called "**Technical fire prevention rules**" (for further details, see Deliverable 2.1 "Report on safety requirements"). **For more complex cases**, where exemptions from the provisions of the current regulations applicable for fire prevention are required (regulated by the Decree of the Ministry of the Interior dated May 9, 2007), **the regional or inter-regional Directorate of the fire brigade and, in some cases, the Regional Technical Committee (CTR), established by the Ministry of the Interior for fire prevention, are also involved.** The CTR consists of various entities competent in safety, environment, and urban planning matters, including, as an example, the relevant Region, the local Health Agency (ASL), the Regional Agency for Environmental Protection (ARPA), and the order of engineers (as regulated by Article 22 of Legislative Decree March 8, 2006, no. 139).

The territorially competent Fire Brigade becomes the authority responsible for assessing and controlling the compliance with the minimum safety requirements of productive activities as stipulated by Presidential Decree August 1, 2011, no.151 (DPR 01/08/2011, no. 151). This authority follows an authorization process that varies in terms of content and timing depending on the specific classification of the productive activity.

According to DPR 01/08/2011, no. 151, productive activities can be classified into A, B, C depending on the size and production complexity of the project under analysis. Productive activities may then be regulated by specific technical rules for fire prevention or not.

Regardless of the activity class, all applicants must submit, to the Single Desk for Productive Activities (SUAP) of the Municipality where the plant is to be built, before the start of productive activities, an application to the Command consisting of a Certified Notification of Start of Activity (SCIA) accompanied by the documentation required by the Decree of the Ministry of the Interior August 7, 2012.

The authorization procedure consists of the following steps:

1. **Submission of the application (SCIA and attached documentation necessary for evaluation)**

The documentation to be attached to the SCIA, which is the subject of evaluation by the Command, especially in cases that generally fall under projects with hydrogen technologies (productive activities classified as B or C), **consists of**:

- **Technical documentation**: technical report plus drawings. If the project fully complies with the provisions of the fire prevention technical rule that the Fire Brigade requires to apply,

even if not specific for hydrogen, the technical report is very simple as it only consists of demonstrating full observance of the specific provisions of the standard.

- Certificate of payment made in favor of the State Treasury – Provincial office.

Timing: within 30 days the Fire Brigade may request any integrations; within 60 days from the submission of the complete application the Fire Brigade provides the Fire Prevention Certificate

2. **Control (inspection)**

In the case of category B activities, the Fire Brigade's control occurs on a sampling basis (as for category A activities) while the inspection occurs obligatorily only in the case of type C productive activities.

Timing: the control occurs within 60 days from the submission of the application plus 45 days of time that the applicant has to remedy any shortcomings with respect to the minimum safety requirements.

Activities classified as A follow an ordinary process where the submission of an SCIA application consists only of general information, a technical report, and drawings signed by a qualified technician. This ordinary procedure also applies in the case of B and C activities that fully observe the prescriptive provisions of the current regulations.

In the case of a request for exemption, the engineering approach to safety can be applied where the technical report also includes a risk assessment and must be signed by a fire safety professional (registered in the professional registry and listed in the specific lists of the Ministry of the Interior) who takes the responsibility for the study of accidental events and the choice of compensatory safety measures.

To accelerate the authorization process for B and C activity cases, it is possible to submit in advance an application for a "Feasibility No-Objection" procedure. This allows for a preliminary feasibility review of particularly complex projects by the Provincial Fire Brigade to avoid potential subsequent complications. However, this last procedure does not exclude possible barriers of various kinds.

The Fire Brigade considers the Directive 2012/18/EU (Seveso Directive), which mandatorily requires a risk assessment, valid for evaluating the safety aspects of a project. The authorities involved are the same as those for the technical fire prevention rules. In the transition from a lower threshold establishment (>5 tons of hydrogen) to an upper threshold establishment (>50 tons of hydrogen), the project evaluation moves from the Provincial Fire Brigade to the CTR chaired by the regional directorate of the Fire Brigade.

Below is the list of productive activities defined within DPR 01/08/2011, no. 151, for the assessment of the suitability for evaluation and control of projects with hydrogen technologies by the territorially competent Fire Brigade. For an in-depth look at some of the fire prevention technical rules analyzed during the project and associated with productive activities, refer to Deliverable 2.1 "Report on safety requirements."

Table 22. Productive activities defined within DPR 01/08/2011, no. 151

Annex I Activities Presidential Decree 151/2011		Hydrogen technology	Technical fire prevention rule (reference D2.1)
1 C	Facilities and plants where flammable and/or oxidizing gases are produced and/or used with total quantities in the cycle exceeding 25 cubic meters per hour	Electrolysers	DM 07/07/2023: Technical fire prevention rule for the identification of methodologies for risk analysis and fire safety measures to be adopted for the design, construction, and operation of hydrogen production plants by electrolysis and related storage systems; DM 03/02/2016: Approval of the technical fire prevention rule for the design, construction, and operation of natural gas storage facilities with a density not exceeding 0.8 and biogas storage facilities, even if their density is above 0.8.
2 B	Compression or decompression plants for flammable and/or oxidizing gases with a capacity > 50 Nm^3/h and up to 2.4 MPa	Compressors	DM 07/07/2023 (see 1 C); DM 16/04/2008: Technical regulation for the design, construction, testing, operation, and monitoring of works and systems for the distribution and direct lines of natural gas with a density not exceeding 0.8; DM 17/04/2008: Technical regulation for the design, construction, testing, operation, and monitoring of works and plants for the transportation of natural gas with a density not exceeding 0.8.
2 C	Compression or decompression plants for flammable and/or oxidizing gases with a capacity > 50 Nm^3/h		
3 B (Considered only compressed gaseous H2)	Storage of compressed flammable gases in mobile containers with an overall geometric capacity from 0.75 to 10 cubic meters	Bundles, tube trailers	DM 07/07/2023 (see 1 C); DM 03/02/2016 (see 1 C).

Annex I Activities Presidential Decree 151/2011		Hydrogen technology	Technical fire prevention rule (reference D2.1)
3 C (Considered only compressed gaseous H2)	Storage of compressed flammable gases in mobile containers with an overall geometric capacity greater than 10 cubic meters		
3 C (Considered only compressed gaseous H2)	Facilities for filling compressed flammable gases into mobile containers with a total geometric capacity greater than 0.75 cubic meters	Filling of bundles or tube trailers	DM 07/07/2023 (see 1 C); DM 03/02/2016 (see 1 C).
4 B (Considered only compressed gaseous H2)	Storage of compressed flammable gases, in fixed tanks with a total geometric capacity from 0.75 to 2 cubic meters	Buffer tank	DM 07/07/2023 (see 1 C); DM 03/02/2016 (see 1 C).
4 C (Considered only compressed gaseous H2)	Storage of compressed flammable gases, in fixed tanks with a total geometric capacity greater than 2 cubic meters	Storage	DM 07/07/2023 (see 1C); DM 03/02/2016 (see 1C).
6 A	Transport and distribution networks for flammable gases, including those of petroleum or chemical origin, with a relative density < 0.8 and pressure from 0.5 to 2.4 Mpa	Hydrogen pipelines or blending into the methane gas network	DM 07/07/2023 (see 1 C); DM 16/04/2008 (see 2B and 2C); DM 17/04/2008 (see 2B and 2C).
6 B	Transport and distribution networks for flammable gases, including those of petroleum or chemical origin, with pressure > 2.4 Mpa		

Annex I Activities Presidential Decree 151/2011		Hydrogen technology	Technical fire prevention rule (reference D2.1)
13 C	Fixed distribution plants for gaseous fuels and mixed type (liquid and gaseous)	Hydrogen refuelling station (HRS)	DM 23/10/2018: Regola tecnica di prevenzione incendi per la progettazione, costruzione ed esercizio degli impianti di distribuzione di idrogeno per autotrazione; DM 24/05/2002 e decreti associati: Distributori di gas naturali; DM 30/04/2012: Distributori a carica lenta di gas naturale; DM 30/06/2021, Autotrazione GNL: Distributori di Gas Naturale Liquefatto (GNL) e Gas Naturale Compresso (GNC).
49 A	Groups for the production of auxiliary electric power with internal combustion engines and cogeneration plants of total power between 25 kW and 350 kW	Fuel cells	DM 13/07/2011: Technical rule for fire prevention for the installation of internal combustion engines coupled with electric generators or other operating machines and cogeneration units serving civil, industrial, agricultural, artisanal, commercial, and service activities.
49 B	Groups for the production of auxiliary electric power with internal combustion engines and cogeneration plants of total power between 350 kW e 700 kW		
49 C	Groups for the production of auxiliary electric power with internal combustion engines and cogeneration plants of total power > 700 kW		
74 A	Plants for heat production fuelled by solid, liquid, or gaseous fuel with a capacity greater than 116 kW and up to 350 kW		DM 08/11/2019: Technical fire prevention rule for the design, construction, and operation of heat production plants fueled by gaseous fuels.
74 B	Plants for heat production fuelled by solid, liquid, or gaseous fuel with a capacity greater than 350 kW and up to 700 kW		
74 C	Plants for heat production fuelled by solid, liquid, or gaseous fuel with a capacity greater than 700 kW		

10.3 HYPOP COUNTRIES - SPAIN: permitting framework for hydrogen technologies

Spain is advancing towards the implementation of technologies producing hydrogen through electrolysis from renewable energies (such as solar and wind) in various sectors as part of its engagement to environmental sustainability and reducing greenhouse gas emissions. Renewable gaseous hydrogen produced by feeding renewable electricity into an electrolyser is considered a renewable fuel of non-biological origin.

A serious problem hindering the expansion of hydrogen as a renewable fuel is the existence of regulatory barriers and gaps in different aspects, such as production, storage, hydrogen refuelling stations, transport, domestic cogeneration, and its injection into the current gas network.

Regarding legislation, Spain contemplates four levels of hierarchy:

- European legislation, which includes all the directives and legislation set by the EU, common to all the European countries
- Spanish legislation, set by the national government in the form of Royal Decrees and other laws. Many of these pieces of legislation consist of the transposition of European directives.
- Regional legislation. Since Spain is divided in 17 autonomous communities and 2 autonomous cities, many aspects of the legislation are delegated to the autonomous government. Many of the autonomous communities are also divided in smaller regions (provinces), which may also have particular legislation.
- Local legislation, which covers the different regulations set for a specific municipality by the corresponding local council (mayoralty and councillorship).

Thus, the same project can face different situations depending on the region of Spain (or even the town) where it would be located. In this section a more general view will be adopted, considering only national legislation. More specific cases will be mentioned in the document.

10.3.1 General permitting procedures

Regardless of the stage or stages of the hydrogen supply chain that a project covers, some procedures must be followed in order to set this project. They are listed here and illustrated with some examples in the following section.

Land use

Project facilities usually have to be located in land designated as industrial. This designation is carried out by **Spatial Development Plans (regional)** and **General Urban Development Plans (at municipal level).**

Environmental processing

The **Environmental Impact Assessment (EIA)** is applied to evaluate the environmental repercussions of public and private projects that may have significant environmental impacts. It consists of the following steps:

- Preparation of the environmental impact study by the promoter;
- Submission of the project and the environmental impact study to public information;
- Consultations with the Public Administrations concerned and interested people;
- Technical analysis of the file by the environmental body;
- Formulation of the environmental impact statement by the environmental body;
- Integration of the content of the environmental impact statement into the project authorization by the substantive body.

The **Strategic Environmental Assessment (SEA)** aims to evaluate the environmental impact of the implementation of plans and programs. The procedure consists of the following steps

- Initiation request;
- Prior consultations and determination of the scope of the strategic environmental study;
- Preparation of the strategic environmental study;
- Public information and consultations with affected public administrations and stakeholders;
- Technical analysis of the file;
- Strategic environmental declaration.

Apart from that, another procedure that the industrial facilities (chemical industry, combustion industry, metal industry, etc.) have to contend with in Spain is the **Integrated Environmental Authorisation (IEA)**, currently regulated by **Royal Decree 1/2016**. **This permit is given by the autonomous communities.** As a consequence, each region has different time estimations, responsible organisms or even regional legislation regulating this process, reinforcing the problem of geographical heterogeneity. **The steps needed to get this authorisation are the following**:

- Basic project, which describes the initial situation of the location where the industrial activity will take place, as well as:
    - Description of activities, facilities, processes and type of product.
    - Documentation for the control of the safety, health of people or the environment.
    - Report on the environmental status of the site and expected impacts.
    - Raw materials, substances and energy generated or used in the facility.
    - Identification of the sources generating emissions: type and quantities, as well as their effects on the environment.
    - Technologies or techniques foreseen to prevent, avoid or reduce emissions.
    - Waste prevention and management measures.
    - Emission control measures
    - The authorisation application must be presented to the organism responsible for environment of the corresponding autonomous community.
- Urbanistic report, that must be issued by the local council.
- In case there is water being discharged to continental waters or to the sea, water and coast legislation must be followed, attaching the corresponding document. In general, documentation required by legislation for the authorisation of discharges must be presented.

- Information about confidential data, and compulsory deposits and insurances must be given.
- If there are relevant dangerous substances produced or emitted, a base report must be produced indicating the soil and groundwater state previous to the facilities exploitation of the authorisation update.
- Non-technical summary for the public information procedure.

Once the documentation is presented, a public information period (minimum 30 days) will be opened.

10.3.2 Permitting requirements for Industry

In industry, applications are being explored to use hydrogen as an alternative fuel in production processes that require high temperatures or generate significant carbon emissions.

Production

There is a lack of specific legislation regarding hydrogen production in Spain. Hydrogen production is considered an industrial activity, classified as a chemical industry for inorganic gas production, regardless of the production method, storage capacity, quantity produced, real production uses, or emissions generated. Therefore, according to the Royal Legislative Decree 7/2015, of 30 October, approving the revised text of the Law on Land and Urban Rehabilitation, **hydrogen production can only be carried out on land designated as industrial.**

Current legislation **does not differentiate between hydrogen production through electrolysis and methane reforming**, which are radically different in terms of operation and emissions generation. It also **does not distinguish between small-scale and industrial-scale** hydrogen production. This situation discourages the development of environmentally friendly production methods and exacerbates the problems of lack of economies of scale faced by smaller units.

This means that small-scale hydrogen production through electrolysis is subject to the same requirements as industrial processes. The absence of clear thresholds distinguishing production quantities hinders the development of small projects and plants, such as on-site hydrogen production refuelling stations and self-consumption systems in the domestic sector. In addition, the permit process is lengthy, costly, and its outcome is uncertain. The **Industrial Emissions Directive (IED)** requires a series of environmental obligations, as well as the implementation of Environmental Impact Assessments under the EIA and SEA directives, which are left to the interpretation of the authorities that transpose and implement them.

The IED applies to defined industrial activities that give rise to pollution. It shall not apply to research, development or experimentation of new products and processes. It requires the implementation of environmental assessments under the EIA and SEA Directives.

A **hydrogen production threshold is needed to simplify small-scale production**, and with specific regulations, hydrogen production from electrolysis in small quantities may be exempt from Integrated Environmental Authorization and all associated projects, also being excluded from environmental assessment.

Storage

As there is no specific regulatory framework for hydrogen, it is considered from a legal and administrative point of view as **a flammable and dangerous chemical product**. There is also no distinction in the actual uses of hydrogen technologies. Energy use, such as fuel cells, is not differentiated from industrial use, nor is small-scale storage differentiated from industrial-scale storage. Due to this issue, disproportionate requirements and complex procedures related to industrial activity are applied. Specific regulation defining quantitative thresholds for hydrogen storage for several end uses like residential or mobility is necessary. Indeed, storage required for each of these applications can be different.

Hydrogen storage is subject to risk assessments through the SEVESO and ATEX Directives, and environmental impact assessments according to the EIA and SEA Directives, resulting in a disproportionate administrative burden for project developers and stakeholders wishing to bring hydrogen applications to market (e.g., hydrogen refuelling stations and micro-cogeneration). This process imposes high costs on operators and further delays the commercial deployment of these applications.

The authorities in charge of **certifying electric installations under ATEX normative** are the **certifying bodies.**

10.3.3 Permitting requirements for Mobility

One of the most developed applications for hydrogen in Spain is mobility. Investments are being made in the installation of hydrogen refuelling stations, and in the promotion of hydrogen-powered vehicles, mainly passenger cars and heavy-duty vehicles, allowing for the deployment of captive fleets (vehicles with predictable driving and refuelling patterns which tend to spend regular periods of time in a depot).

Hydrogen Refuelling Stations

For a long time, legislation regarding the design, permits, construction, and operation of hydrogen refuelling stations had not yet been developed in Spain. This constituted one of the difficulties for a potential hydrogen refuelling station operator. **RD 919/2006 of 28 July 2006, approving the technical regulation on the distribution and use of gaseous fuels and its complementary technical instructions ICG 01 to 11** only mentioned hydrogen at the annex 1 about the minimum knowledge required to obtain gas installer certification.

Nevertheless, this was modified with **RD 542/2020 of 26 May amending and repealing various provisions on industrial quality and safety**. With this change, hydrogen is included as a fuel in the Supplementary Technical Instruction **ITC-ICG 05 on filling stations for gas-fuelled vehicles.**

Transport

Specific service and maintenance requirements and procedures for hydrogen-powered vehicles are defined in guidelines published by manufacturers. Additionally, a limited number of national instructions are issued on this matter. There **is a lack of specialized training and maintenance skills among personnel, affecting the service, maintenance, and inspections of hydrogen-powered vehicles**. The homologation of FCEVs as cars and vans does not present major difficulties. However, other types of vehicles such as trucks or trains will require a review of the homologation bases due to the previous non-existence of these types of vehicles.

There is a regulatory gap regarding the design and homologation of ships and vessels, as there is little experience in this field, and regarding landing and bunkering, as no specific regulation that includes hydrogen storage and use as fuel on board ships has been identified. General rules derived from hydrogen storage are likely to be applied for now. Due to the large amounts of hydrogen required on ships, hydrogen storage facilities are likely to be subject to significant obligations and requirements (e.g., SEVESO).

10.3.4 Permitting requirements for Residential

Applications are being explored for the use of hydrogen fuel cells in residential cogeneration systems. Apart from this, blending and injection in the natural gas grid shows up as another way to decarbonise the residential sector.

Injection

In Spain, pure hydrogen injection is not allowed, only a molar concentration of 5% hydrogen injection into the grid is permitted if it comes from non-conventional sources according to **PD-01 "Measurement, quality, and odorization of gas."** Some demonstrative projects have investigated power-to-gas applications, but there is no acknowledgment of a specific legal status, leading to a severe lack of regulation.

Cogeneration

There is **no specific procedure for connecting a domestic fuel cell in Spain**, implying that the procedure to follow will be the same as for a normal appliance. Due to the lack of experience in this area, delays in the legalization period of these installations may occur. However, connecting fuel cells is equivalent to connecting a conventional boiler. This equivalence should avoid new unnecessary legal and administrative procedures for domestic fuel cells, while also facilitating the work of technicians responsible for their installation.

The problem is that **fuel cells are not considered cogeneration equipment in the new Royal Decree 413/2014**, which eliminates this concept from the already repealed Royal Decree 661/2007, which did consider it.

Overall, installations can be carried out by professionals with appropriate qualifications for working with electrical appliances. Connections to gas networks must also be made by trained and qualified

installers, and requirements for connecting micro-CHP fuel cells to gas networks are usually stipulated by distribution network operators. In this context, the legislation applied to gas boilers in dwellings (**Royal Decree 178/2021, of 23 March, amending Royal Decree 1027/2007, of 20 July, approving the Regulation on Thermal Installations in Buildings** and **Royal Decree 809/2021 of 21 September, approving the Pressure Equipment Regulation and its complementary technical instructions**) could be considered.

10.3.5 Regional best practices: Hydrogen guidelines in Andalucía

As it has been said before, guidelines are playing a significant role for hydrogen technologies deployment. As in other countries where they have been published by official public entities, also in Spain these types of tools are intended for supporting stakeholders and facilitating the permitting procedures. The following is an example of **existing guidelines in Spain providing evidence of how permitting requirements can be fulfilled for hydrogen projects by stakeholders.** Some of the information related to permitting of the different hydrogen technologies could be valid also at national level.

The regional government of Andalucía (Junta de Andalucía) has published a public guide "*Guide for hydrogen installation applications in Andalucía*". This document is of high interest for HYPOP project: it shows a will to promote hydrogen technologies in Andalusia and it also compiles the basic concepts in terms of regulation for hydrogen projects.

These guidelines are organised according to the **type** of the different stages of the hydrogen value chain (**electric input, hydrogen distribution, end-uses of hydrogen**). Furthermore, the applicable legislation and procedures are studied for the following cases:

- **Renewable electricity generation;**
- **Connection to the electricity grid;**
- **Water supply;**
- **Hydrogen production (electrolysers);**
- **injection into the natural gas transmission and distribution network;**
- **Isolated pipelines for industrial consumption, service stations or others;**
- **Hydrogen storage;**
- **Hydrogen transport.**

Renewable electricity generation

Hydrogen is considered "green" or "renewable" when the source of electricity used in the electrolysis process comes from Renewable Energy Sources (RES) such as photovoltaic plants or wind farms. Renewable electricity generation plants have **Prior Administrative Authorisation (AAP or *Autorización Administrativa Previa)*** from the State or the Autonomous Community **depending on the nominal power of the plant** in accordance with article 53 of Law 24/2013, of 26 December, on the Electricity Sector (LSE) and Title VII of RD 1955/2000, of 1 December.

It is common for the installation to have a local renewable electricity supply and also to be connected to the electricity grid, thus being considered within the scope of **self-consumption**. The processing of these installations has been studied by the General Secretariat for Energy of the Andalusian Regional Government and is described in the **Manual for the administrative processing of self-consumption installations in the Autonomous Community of Andalusia** (Self-consumption Manual).

Regarding urban planning, renewable energy production infrastructures are considered ordinary actions on rural land, in accordance with **Law 7/2021, of 1 December, on the promotion of territorial sustainability in Andalusia (LISTA)** and the General Regulations of the LISTA, approved by Decree 550/2022, of 29 November. In this case, it **is not necessary to obtain authorisation prior to the municipal licence** that qualifies the land on which they intend to establish themselves, **with the exception of actions with an implication for spatial planning.** For that actions, a mandatory and binding report from the competent Regional Ministry for Spatial Planning and Town Planning will be required. This will be delivered within a period of two months. If a response is not obtained within the statutory two months, it means that permission has not been granted.

Connection to the electricity grid

The procedure for access and connection to the electricity grid is regulated by **Royal Decree 1955/2000, of 1 December**, which establishes the general conditions for access and connection to the electricity transmission and distribution networks with the modifications established in **Royal Decree 1183/2020, of 29 December,** on access and connection to the electricity transmission and distribution networks.

An electrolyser acts as a consumer and the connection is processed in the same way as for other end-user connections. The main steps for the **access and connection to the electricity grid** are as follows:

1. Request for access and connection to the network.
2. Provide the financial guarantee of 40 €/kW for both generation and consumption (for installations connected to the grid >36 kV according to RDL 8/2023, of 27 December) required depending on the power requested.
3. Feasibility study.
4. Technical and economic offer.
5. Acceptance of the offer.
6. Execution of the works.
7. Inspection and commissioning.

The actual procedure **may vary depending on the type of installation, producer or consumer, the required connection capacity and other specific factors**. It is necessary to **consult directly with the relevant grid operator** for detailed information on the requirements and the specific process in each case.

Water supply

The **Hydrographic Confederations** are the administrative bodies that grant water concessions. They are autonomous bodies attached to the MITECO.

The administrative process for the concession of water for hydrogen production in Andalusia is regulated in the revised text of the **Water Law (RDL 1/2001)**. The water concession is the administrative authorisation required for the private use of water, and is granted taking into account the rational joint exploitation of surface and underground resources. This process is detailed in **Chapter III 'authorisations and concessions'** of the aforementioned law.

Article 60 of RDL 1/2001 assesses that **concessions shall take into account the order of preference established in the Hydrological Plan** of the corresponding river basin district. In the absence of this order of preference, the following shall apply in general:

1. **Water supply for the population**, including industries with low water consumption located in population centres and connected to the municipal network;
2. **Irrigation and agricultural uses;**
3. **Hydraulic storage** of energy;
4. **Industrial uses** for the production of electricity;
5. **Other industrial uses** not included in the previous sections;
6. **Other uses.**

According to Royal Legislative Decree 1/2016, on integrated pollution prevention and control, the discharge authorisation is granted by means of the Integrated Environmental Authorisation.

Hydrogen production (electrolysers)

Installations for the production of combustible gases such as biomethane or hydrogen, even in cases where these gases are intended for final supply to consumers through pipelines, are **not subject to administrative authorisation according to the Hydrocarbons Sector Law (LSH).**

If the action is located on **rural land**, it is an **extraordinary action from the urban planning point of view** because it is an industrial use (Law 7/2021, of 1 December, for the promotion of territorial sustainability in Andalusia (LISTA) and General Regulation of the LISTA, approved by Decree 550/2022, of 29 November). In this case, **an authorisation qualifying the land intended for the project implementation** is required before the municipal licence. This prior authorisation corresponds to the City Council and its procedure is regulated in Article 32 of the General Regulations of the LISTA.

The following items are required for an electrolysis plant:

1. **Feasibility Study.**
2. **Securing the Land** through valid titles ensuring the availability of the land necessary for the construction and operation of the projects throughout their useful life.
    - If publicly owned property may be affected, the corresponding legal titles necessary for occupation may be needed
    - If this happens to public domain property (e.g. watercourses, catalogued mountains, livestock trails, railways, roads, mines, etc.), the corresponding administrative concessions or authorisations that may be necessary should be presented.

3. Preparation of the **technical project**, including design and configuration, selection of technologies, sizing of the different systems, definition of necessary resources and inclusion of the List of Assets and Rights Affected (*Relación de Bienes y Derechos Afectados* or RBDA).
4. **Urban development compatibility report**: the urban planning qualification is issued by the competent municipal or regional body in matters of urban and regional planning. The Urban Planning Compatibility Certificate (CCU) is necessary to check whether the activity to be developed is compatible with the urban planning in the selected location, and the measures or conditions that, if applicable, must be implemented. The Municipal Action Plan or the Special Plan may be needed for evaluating specific aspects and studying specific areas.
5. **Access and connection to the transmission or distribution grid, if necessary**.
6. **Water supply authorisation,** which may include the concession of the public water domain, authorisation for works/works in the public water domain or the authorisation for water discharge.
7. **Environmental impact study**: the scope may vary depending on the technology, size and location of the Project. The body responsible in this case is the Regional Government of Andalusia (Department of Sustainability, Environment and Blue Economy).
8. **Integrated Environmental Authorisation**, responsibility of the Territorial Delegation of Sustainability, Environment and Blue Economy of the province where the facility is located. In the case of facilities covering more than one province, the Directorate General for Environmental Sustainability and Climate Change should be referred to.
9. **Municipal licenses**:
    - **Construction Licence**. Legal requirement that authorises the execution of the Project and the necessary connection infrastructures, in compliance with town planning, safety, environmental and quality regulations. It includes the payment of the Construction, Installations and Works Tax (*Impuesto de Construcciones, Instalaciones y Obras* or ICIO).
    - **Activity Licence**. A licence that authorises the start-up and operation of a business or commercial activity in a specific location, necessary to ensure that the activity is carried out in compliance with current town planning, safety, environmental and health regulations, and includes payment of the corresponding fee.
10. **Emergency Plans**. Preventive and control conditions necessary for serious accidents, if applicable due to the amount of hydrogen stored.
11. **Commissioning of the different installations** subject to Industrial Safety through the "PUES" processing system in Andalusia.

Regarding commissioning, industrial security must be also considered through Low and High voltage regulations, Pressure equipment law, fire protection procedures, etc. Urban planning procedures (Authorisation prior to the building permit), regulated regionally by the Decree No 550/2022 of 29 November should be also met.

Injection into the natural gas transmission and distribution network

Royal Decree Law 6/2022 of 29 March amended, among others, Article 78 of Law 34/1998 of 7 October 1998 on the Hydrocarbons Sector (LSH), which refers to direct lines, introducing into the

definition of direct lines the pipelines for the injection of renewable gases from a production centre to the natural gas transmission and distribution network.

In Andalusia, **no administrative authorisation is required** and direct injection lines may be commissioned on presentation of the previously established documentation, **being in any case mandatory a binding technical report from the Technical System Manager.**

RD-Law 18/2022, of 18 October, also introduced that direct lines will be declared to be of public utility for the purposes of compulsory expropriation and the exercise of a right of way.

These lines are owned by the hydrogen producer.

The **modifications** to the transmission and distribution network required for the connection of these pipelines are subject to administrative authorisation under the LSH, which should be requested by the carrier or the distributor owning the position. Modifications to the network that do not involve alterations to the basic technical and safety characteristics and do not require a specific declaration of public utility will be processed in accordance with the provisions of Article 70.3 of Royal Decree 1434/2002, of 27 December, i.e., they will only require Administrative Authorisation for Operation, but not Prior Administrative Authorisation (*Autorización Administrativa Previa* or AAP) or Construction Authorisation (*Autorización Administrativa de Construcción* or AAC).

Gas service stations

The construction of gas service stations does **not require administrative authorisation, only notification prior to commissioning.**

In Andalusia they are processed through the PUES application, completing the descriptive technical file for gas installations, vehicle service stations:

- Technical documentation drawn up by a competent technician;
- Works management certificate signed by a competent technician;
- Maintenance contract or plan;
- Certificate of installation by gas installation company;
- Certificate of initial inspection by the Authorised Control Body.

The existing standards that apply to the **design** of these installations are the filling protocols (J2601A) and the tests according to ISO 19880-1, ISO 19880-2 or ISO 19880-3 depending on the type of vehicle, HDV (Heavy-Duty Vehicle), LDV (Light-Duty Vehicle) or forklift.

Hydrogen storage

When hydrogen is **stored in the production site**, industrial safety conditions (Pressure Vessels regulations, Chemical Products Storage, complementary technical instructions, etc.) should be fulfilled. However, **particular technical instructions for hydrogen should be stablished according to its own specifications and particularities (leakage capacity or flammability).**

In the other hand, when it is stored in the distribution site (HRS), the following exceptions may be encountered:

- For **vehicle service stations**, Technical Regulations for the Distribution and Use of Gaseous Fuels, approved by Royal Decree 919/2006 of 28 July 2006 should be followed.
- For **residential or tertiary use,** hydrogen is usually devoted to electricity or heating demand. There is currently no specific regulation for the storage of hydrogen in this type of facility. Whether through the Technical Regulation on the Distribution and Use of Gaseous Fuels or another standard, this development can be based on standard UNE-EN 17533:2021 Gaseous hydrogen. Cylinders and tubes for stationary storage.

Hydrogen transport

In the case of road and rail transport, there are European agreements that regulate the documentation and requirements that must be met for **transporting dangerous goods** internationally. These are the European Agreement concerning the International Carriage of Dangerous Goods by Road, and the International Regulations concerning the International Carriage of Dangerous Goods by Rail. **No particularities have been identified for Andalusia.**

For maritime transport, hydrogen shipment is also regulated by the agreements on the transport of dangerous goods.

10.4 HYPOP and EU13 COUNTRIES - BULGARIA: regulatory framework for permitting of hydrogen

Bulgaria does not have a defined process guideline (such as what documents are needed, how long the process takes, or which authorities are actually involved) so they rely on other gases or CNG. However, although there is no such guidance, there is an ordinance for the operator to see the requirements to be fulfilled when designing the station. It is known as the **specific ordinance for HRS RSHV- Conditions and Procedures for Design, Construction, Commissioning and Control of Refuelling Stations for Hydrogen Vehicles (No. RD-02-20-2 of 28 September 2020)**.[3]

The ordinance contains specific requirements for the design, construction and operation of refuelling stations for hydrogen-powered vehicles. In addition to the control of the refuelling stations with regard to the minimum safety characteristics in these requirements.

The ordinance is **applicable to hydrogen in a gaseous state, whether it is generated at the refuelling point itself or outside the refuelling point** and received by truck transport in a compressed state between pressures of 16.55 and 21.37 MPa. It is not applicable to hydrogen refuelling stations where:

- The supply of gaseous hydrogen is made through pipelines,
- Hydrogen is delivered and stored (on-site) in liquid form,
- On-site hydrogen generators of other fuel types (such as natural gas or biogas) are used,

[3] https://multhyfuel.eu/images/event-documents/deliverables/MHYF_WP1_D12_Permitting_requirements_and_risk_assessment_methodologies_20210930_03.pdf

- The hydrogen refuelling station is mobile, with a trailer or truck with compressed hydrogen containers containing dispensers.

Refuelling stations may be constructed in such a way that they are either integrated within the area of an existing or newly constructed filling station or not. They must comply with **Regulation (EC) No 79/2009 of the European Parliament and of the Council on type-approval of hydrogen powered motor vehicles (OJ L 122, 18.05.2010)** and **Regulation No 134 of the United Nations Economic Commission for Europe (UNECE) - Uniform provisions concerning the approval of motor vehicles and their components** with regard to the safety characteristics of hydrogen powered vehicles.

10.5 HYPOP and EU13 COUNTRIES - POLAND: Regulatory Framework for permitting of Hydrogen Refuelling Stations

Poland is striving to develop a green hydrogen economy, but faces numerous legislative obstacles. Currently, **no evidence of a robust comprehensive legislative framework for renewable hydrogen is in place**, but many discussions are ongoing. The draft law No. UD 382 seeks to amend the current Energy Law introducing specific regulations for hydrogen, but it is not yet definitive. Factors such as inadequate funding, the high cost of hydrogen technologies and the lack of basic legal norms impede development. Poland aims to take advantage of the cooperation with the other Western European countries to achieve a sound and developed internal legal framework for hydrogen technologies.

Although there are some **regulations related to renewable hydrogen production and refuelling stations**, they do not form a solid foundation for the hydrogen market and are only a fragment of the needed legislation, which should include a comprehensive and effective legal framework for stakeholders.

A key challenge is **defining hydrogen in a legal context, with different definitions used depending on the market area, such as transportation or energy**. Existing definitions in Polish law, including those adopted in the Law on Renewable Energy Sources (RES), the Law on Electromobility and Alternative Fuels and the Law on the System for Monitoring and Controlling Fuel Quality, need to be clearly defined and possibly harmonized.

In Polish law, hydrogen has been treated as a separate category of fuel, alongside other gaseous and hazardous fuels, which is taken into account in the amendment to **the Act on the System for Monitoring and Controlling Fuel Quality.** However, there is a lack of consistent regulation of hydrogen in the Law on Renewable Energy Sources, which clearly shows the need to fill the legislative gap in order to actually implement the goals of the Polish Hydrogen Strategy until 2030.

In Poland, in the context of hydrogen regulations and strategies, a key document is the Polish Hydrogen Strategy. The January 11, 2018 Law on Electromobility and Alternative Fuels, amended on May 24, 2020, treats hydrogen as an alternative fuel and provides incentives for hydrogen-powered vehicles, including the ability to enter Clean Transportation Zones and excise tax exemption. The Council of Ministers on October 17, 2019, by circulation, also adopted an updated "National Policy Framework for Alternative Fuel Infrastructure," defining, among other things, technical specifications for hydrogen refuelling infrastructure.

In Poland, the permitting procedure for fuelling stations includes environmental, urban planning and safety requirements. It requires coordination between local urban planning authorities,

environmental inspection and fire departments. The procedure begins with an environmental impact assessment, obtaining development conditions and then a construction permit. Key laws include the Environmental Protection Law, the Construction Law and local safety regulations. Consultation with relevant authorities and approval for connection to existing municipal infrastructure are also required.

The **Electromobility Law** defines basic terms such as hydrogen station operator, hydrogen refuelling point, hydrogen station or hydrogen vehicle. The law contains extensive legal norms that define the rules for operating hydrogen stations, conducting technical tests of the stations or inspecting them.

Detailed technical requirements for hydrogen stations are provided for in the **Decree of the Minister of Climate and Environment of October 7, 2022**, which includes technical requirements for the safe operation, repair and modernization of hydrogen stations, as well as descriptions of the types of technical tests of hydrogen stations conducted by the Office of Technical Inspection and the Transport Technical Inspection at specific times. The system for monitoring and controlling the quality of hydrogen used in vehicles, combustion plants, inland waterway vessels and selected fleets is regulated by the Law on Fuel Quality. Inspection of hydrogen quality at entrepreneurs producing, storing, marketing, storing hydrogen in company stations, and operating hydrogen wholesalers is carried out once every quarter of the calendar year. The Fuel Quality Law contains a precisely regulated process for testing hydrogen quality, including the procedure for taking samples for testing.

Despite the existence of a legislative basis, it is felt that the Polish hydrogen market still requires a comprehensive and effective legal framework that would support the development of hydrogen technologies and their applications in various sectors, including industry, energy and mobility.

Permitting requirements considered for HRS are as follows:

First of all, **Article 5 of the Law of July 7, 1994. - The Construction Law** (Journal of Laws of 2020, item 1333, as amended) indicates that a construction object, as a whole and its individual parts, together with related construction equipment, should, taking into account the expected period of use, be **designed and built in the manner specified in the regulations**, including technical and construction regulations, and in accordance with the principles of technical knowledge.

In addition, **the proposed law on amending the Law on Electromobility and Alternative Fuels will soon introduce a definition of a hydrogen station and basic requirements for its construction and operation**.

A hydrogen refuelling station is a construction object that constitutes a utility-functional whole. Accordingly, its design, construction, release for operation and operating rules are regulated by numerous normative acts on construction, technical, safety or environmental aspects. In addition to generally applicable regulations, there are technical standards - national and international, which systematize the available technical knowledge on an ongoing basis and set the highest standards for the construction of such facilities. Therefore, **the lack of national regulation on a given issue does not prevent the construction of hydrogen stations.** It only means that in this regard, the investor has a certain discretion limited by other regulations and the obligation to exercise due diligence and appropriate standards, which suggests, for example, the use of the above-mentioned technical standards.

Accordingly, in the design, construction and operation of hydrogen refuelling stations, in particular, the provisions of the following legislation should be applied. It is suggested to use the indicated technical standards, which are exemplary and should be used on a voluntary basis.

- **The Decree of the Minister of Climate and Environment dated October 7, 2022 introduces detailed technical requirements for hydrogen stations**. These include rules for safe operation, repair and modernization, based on ISO 19880-1 and PN-EN 17127 standards. Stations must also comply with ISO 19880-2 and PN-EN ISO 17268 standards, especially for refuelling dispensers.
- A hydrogen station should have **technical documentation, operating instructions in Polish, installation diagrams and an explosion hazard assessment**. Also important are regular technical inspections, including examinations by the Office of Technical Inspection and Transport Technical Inspection, documented by protocols. Fees for issuing opinions and carrying out tests are 20% of the average monthly salary in the economy for the initial examination and up to 20% for the operational examination.

The regulation also requires that **two independent power sources or a generator are provided**. The station should be equipped with equipment to measure the amount of hydrogen refuelling and be protected against unauthorized access, leaks, collisions and fire hazards.

Regarding the **construction and design of hydrogen refuelling stations**, the applicable legal acts are as follows:

1. the Act of July 7, 1994. - Construction Law (Journal of Laws of 2020, item 1333, as amended);
2. the Act of October 3, 2008 on providing information about the environment and its protection, public participation in environmental protection and environmental impact assessments (Journal of Laws of 2021, item 247);
3. the Law of March 27, 2003 on spatial planning and development (Dz.U.of 2021, item 741);
4. the Law of December 21, 2000 on technical supervision (Journal of Laws of 2021, item 272, i.e.);
5. the Law of August 19, 2011 on the transportation of dangerous goods (Journal of Laws 2021, item 756);
6. the Regulation of the Minister of Infrastructure of April 12, 2002 on the technical conditions to be met by buildings and their location (Journal of Laws 2019, item 1065, as amended);
7. the Regulation of the Minister of Transport and Maritime Economy of March 2, 1999 on the technical conditions to be met by public roads and their location (Dz.U. of 2016, item 124, as amended);
8. the Regulation of the Minister of Infrastructure of January 16, 2002 on technical and construction regulations for toll highways (Journal of Laws 2019, item 1644);
9. regulation of the Minister of Economy, Labor and Social Policy of July 9, 2003 on the technical conditions of technical supervision in the operation of certain pressure equipment (Journal of Laws 2003 No. 135 item 1269);
10. the Regulation of the Minister of Development dated July 11, 2016 on requirements for pressure equipment and pressure equipment assemblies (Journal of Laws 2016 item 1036);
11. the Ordinance of the Council of Ministers of December 7, 2012 on the types of technical equipment subject to technical supervision (Journal of Laws 2012, item 1468);

In terms of **fire protection,** hydrogen refuelling stations should, taking into account their expected period of use, be designed, built, maintained and operated in a manner specified in the regulations, including technical and construction and fire safety regulations, and in accordance with the principles of technical knowledge, ensuring compliance with the basic requirements of fire safety.

For the **use of hydrogen infrastructure**, the following regulations and standards should be considered:

1. the Act of December 21, 2000 on technical supervision (Journal of Laws 2021, item 272, i.e.);

2. the Act of August 19, 2011 on the transportation of dangerous goods (Journal of Laws 2021, item 756);

3. the Regulation of the Minister of Economy, Labor and Social Policy of July 9, 2003 on the technical conditions of technical supervision in the operation of certain pressure equipment (Journal of Laws 2019, item 211);

4. the Regulation of the Minister of Development of July 11, 2016 on requirements for pressure equipment and pressure equipment assemblies (Journal of Laws of 2016, item 1036);

5. the Ordinance of the Council of Ministers of December 7, 2012 on types of technical equipment subject to technical supervision (Journal of Laws of 2012, item 1468);

6. the Order of the Minister of Entrepreneurship and Technology of May 21, 2019 on the manner and procedure for verifying qualifications required for operation and maintenance of technical devices, and the manner and procedure for extending the validity period of qualification certificates (Journal of Laws of 2019, item 1008).

10.6 EU13 COUNTRIES - Croatia

The Croatian Hydrogen Strategy provides a framework for the production and use of hydrogen, focusing on renewable hydrogen as a substitute for fossil fuels and on increasing the stability of the electrical system based on renewable energy sources for energy self-sufficiency, transitioning to clean energy, and sustainable mobility.

Recent legislative revisions to the RES Act in 2023 have designated the Croatian Hydrogen Agency as the National Coordinating Body for Hydrogen[4]. The scope of the agency's activities can be divided into eight groups as follows: (i) programming and implementation of strategic planning, (ii) preparing complex and innovative projects of national interest, (iii) stakeholder mapping following technical verification of capacities, potentials and seriousness of project proposals, (iv) implementing projects in relevant funds, (v) coordinating the implementation process in complex and innovative projects of national interest, (vi) communicating with other member states regarding project positioning, negotiation in the context of project complementarity, etc., (vii) identifying and activating financial sources and (viii) reporting obligations.

[4] https://www.wolftheiss.com/app/uploads/2024/05/RES-guide-croatia.pdf

In Croatia, **no specific permitting requirements** related to hydrogen have been found. However, general safety regulations, such as those related to environmental impact assessments and construction permits, may still apply depending on the nature of the project.

Croatia is part of the **North Adriatic Hydrogen Valley (NAHV),** a project involving Croatia, Slovenia, and Italy. Launched in September 2023, it includes 17 pilot projects aimed at producing over 5,000 tonnes of renewable hydrogen annually. The initiative focuses on using renewable energy sources to produce, store, distribute, and utilize hydrogen across various sectors, including industry, land transport, and maritime transport.

Croatia has a national law relating to equipment and protective systems intended for use in potentially explosive atmospheres, as well as the market availability of pressure equipment: **"Law 126/2021 on Amendments to the Law on Technical Requirements for Products and Conformity Assessment".**

With respect to the assessment of the effects of certain public and private projects on the environment, the relevant act in Croatia is **"Law 118/2018, of December 14, on Amendments to the Law on Environmental Protection".**

In addition, there is a by-law related to the Energy Law: "Rules on Permits for Performing Energy Activities and Maintaining the Register of Issued and Revoked Permits for Performing Energy Activities".[5]

Apart from this, one law of the Republic of Croatia that regulate the possibilities of hydrogen use is **"The Act on Amendments to the Biofuels for Transport Act (Official Gazette, No. 52/21)".** This Act envisages the introduction of hydrogen into the Croatian market. According to this Act, the obliged entity for placing biofuels or RES on the market in transport is obliged to report on the use of hydrogen as an alternative fuel on the market. In addition, **"The Alternative Fuels Infrastructure Act (Official Gazette, No. 120/16)"** defines technical specifications for hydrogen refuelling points for vehicles.[6]

10.7 EU13 COUNTRIES - Estonia: gaps in the permitting framework for hydrogen implementation

Estonia is developing policies to support the hydrogen economy, including incentives for hydrogen production and infrastructure development (Government Energy Policies). Apart from this, it is involved in different projects, such as:

- **Tallinn Hydrogen Refuelling Stations:** Estonia's capital is setting up its first hydrogen refuelling stations to support the introduction of hydrogen vehicles in public and private transport [EREF][7];
- **Estonian Hydrogen Valley:** A comprehensive project aimed at creating a full hydrogen supply chain from production to consumption, including industrial applications ([Energy Sector Innovations]);

[5] https://www.azu.hr/media/201nx0by/hr-h2-strategy-implementation_summary-study_final.pdf
[6] From HYDROGEN STRATEGY OF THE REPUBLIC OF CROATIA UNTIL 2050
[7] https://www.eref-europe.org/

- **Hydrogen Buses in Tartu:** Integration of hydrogen buses into the public transport fleet to test and optimize hydrogen fuel technology in real-world conditions ([Local Transport Authority Announcements]).

10.8 EU13 COUNTRIES - Hungary

To implement the Hungary's National Hydrogen Strategy, there are 6 comprehensive projects, called prioritized projects, which aim to achieve the main goals of the Strategy and should be launched as soon as possible:

1) **Green Truck Programme** for making freight traffic more sustainable.

2) **Green Bus Programme Plus** to make local public transportation services more sustainable.

3) **Establishment of hydrogen valleys** in Hungary to promote the establishment of interconnected networks of the hydrogen value chains within the given geographical regions.

4) **Hydrogen Highway Project** for creating a foundation for carbon-free hydrogen production, transportation and energy storage.

5) **Blue Hydrogen Project** for reducing the carbon footprint of industrial hydrogen usage.

6) **Research, development and innovation** in service of the establishment of a hydrogen economy.

Hungary plans to establish **two hydrogen valleys** by 2030, which will act as a demonstration of a complete hydrogen ecosystem in a region, as a portfolio of interconnected projects:

- **Hydrogen Ecosystem of Transdanubia:** This region hosts large-scale industries like ammonia production and refineries and several sectors that could potentially become new hydrogen users, such as iron and steel works and cement production. The Paks nuclear power plant could supply significant amounts of carbon-free electricity to support the hydrogen value chain's development.

- **North-Eastern Hydrogen Valley:** This region is home to a well-developed industrial area with a robust chemical and petrochemical industry that already has significant hydrogen usage. The area has a concentrated demand for hydrogen, and the inclusion of the Mátra Power Plant and its surroundings should also be considered for the project.

The permitting process for the construction of a hydrogen production plant depends on the project duration. Well defined timescale in the reality cannot be given, because there many parameters determining the real timeframes in a negotiated case, e.g.: how many special authorities must be involved in the permitting process, how much times and how extensive complementary information are required from the investor (design consultancy) for the permit application, etc. Besides there is no lower limit given in the domestic IPPC legislation (Gov.Dec. 314/2005.), so theoretically the same permitting procedure should be conducted, from environmental point of view, for small hydrogen production installations as for the huge ones. There is legislation that guides the permitting process:

- **Gov.Decree 314/2005. on Environmental Impact Assessment and Integrated Pollution Prevention and Control (IPPC) procedures.**
- **Gov.Dec 31/2014 on the administration rules of building procedures of certain special industrial installations.**

- **Gov.Decree 219/2011 on protection against serious accidents using dangerous materials.**
- **National Fire Regulations** (Decree of Ministry of Interior 54/2014).
- **Decree of Ministry for National Economy No. 35/2016** on examination and certification of equipment, and protective systems intended to use in potential explosive area.
- **NGM Decree 2/2016** on technical safety supervision of pressure equipment, refuelling equipment.

As there are usually no special hydrogen production permitting requirements, unique modelling and/or other unique calculations can be necessary to determine e.g. protective zones, safety distances, etc., which create uncertainty and increase the time frames.

As with production, there are generally no special permitting requirements for **hydrogen storage**. Typically, hydrogen storage is subject to risk assessments in accordance with the **SEVESO and ATEX Directives**, as well as environmental impact assessment procedures as outlined by the **SEA and EIA Directives**.

By definition, permitting a **hydrogen refuelling station** is covered by Min. Decree 2/2016 NGM. However, this legislation was primarily developed for permitting CNG/LNG refuelling stations, which is likely why there is very little specific information on hydrogen. Risk assessment for a hydrogen refuelling station is mandatory for all Member States and in most countries, it is a requirement to obtain a permit. In Hungary, it is not, but safety measures and zone planning are required for the construction permit. It is worth mentioning that in Hungary the risk assessment concerning hydrogen delivery and supply is the responsibility of the fuel supplier and not the HRS operator[8]. The national legislation are as follows:

- **Ministerial Decree 2/2016.** NGM on pressure equipment, fuelling equipment, and technical safety supervision of compressed gas fuelling equipment, furthermore periodic inspection of autogas containers.
- **Ministry for National Development** (2016): National Policy Framework document (determined by Alternative Fuel Infrastructure Directive).
- **National Fire Regulations** (Decree of Ministry of Interior 54/2014).

It is necessary to improve legislation related to hydrogen and hydrogen technologies, with the aim of creating realistic and holistic European and national regulatory frameworks, developing a regulatory framework that enhances all elements of the value chain, partly through a revision of current EU and national regulations, and partly through the introduction of new regulatory elements.

10.9 EU13 COUNTRIES - Latvia: regulatory framework for permitting in industry, mobility and residential

Among the EU 13-countries, Latvia is implementing policies for alternative fuels, including hydrogen. Up to date, current knowledge about hydrogen reflects in permitting issues, especially for the transport and energy fields in Latvia. **Public authorities involved in the different permitting procedures are the Municipal authorities for the building and operation permits of a plant.**

[8] https://multhyfuel.eu/images/event-documents/deliverables/MHYF_WP1_D12_Permitting_requirements_and_risk_assessment_methodologies_20210930_03.pdf

Moreover, technical support can be given at higher level from a national authority, Valsts vides dienests, which is the State environmental service for the pollutant emissions.

The overall permitting requirements are the building (planning), operation and environmental ones, dealt with by municipal and local authorities and the State Environmental service.

A hydrogen project is considered as set of facilities and for this reason each technology should follow individual procedures with their own durations. All the procedures are uniform at national level and issued by municipal/local authorities. Local authorities involved in the different permitting procedures can be engaged to provide the specific laws and regulations needed for the project.

The main reference legislation is the Construction Law which disciplines the building and operation permits. Before that, environmental requirements must be fulfilled and for this reason the project owner has to assess if it is needed to perform initial environmental permitting or a "full" environmental impact assessment procedure. For example, in the case of Hydrogen refuelling station it is necessary to obtain an initial environmental impact assessment as the facility is associated to a chemical industry where chemical substances and intermediate products are produced. **In Latvian legislation, building permits are linked to the land use (planning) permitting. Land Use Plan is the main legislative reference that can forbid the building of a hydrogen production facility.** Linked to the building permit there is also the operation permit which come from authorities at local level. **There are not specific limits for a hydrogen production plant to be built but, as it is considered as a chemical production facility, it must be located only in a zone where the destination is industrial. There are no references to threshold limits for quantities of hydrogen produced and stored but local/municipal authorities have the right to ask for specific clarifications and a risk assessment if needed**. Documentation needed by the building authority must contain information related to graphical, technical data and calculations and the compliance of projects conception and features to the spatial plans and land use of the municipality involved in the project proposal. **Once achieved the approval for building, the operation permits must consider the compliance to the fire safety requirements**.

As mentioned, environmental permits, mainly related to pollutant emission, are also required. **In Latvia, hydrogen production facilities and related storage systems need to be classified according to categories A, B, C** ("Regulation for the procedure by Which Polluting Activities of Category A, B and C Shall Be Declared and Permits for the Performance of Category A and B Polluting Activities Shall Be Issued"). This categorization depends on the quantities of pollutants that can be produced during the facility operation phase and are mainly related to polluting activities where conventional fuels like oil are consumed or flammable, explosive and extremely flammable gas and liquids are stored. **This environmental categorization is granted by the State environment service and can be used for both hydrogen production facilities, storage systems and HRS.**

C category permit is the lower in terms of pollutant emission. The HRS always needs a C category permit (also with in situ hydrogen production). The legislation does not mention hydrogen produced by other production mechanisms different from steam methane reforming. Categorization is based on **rated thermal input** of the plant:

- If the rated thermal input is from 0,2 to 5 MW the category is C;
- If the rated thermal input is from 5 to 50 MW, the category is B.

The storage units with more than 2,5 m^3 can be built if the Ministry of the Environmental Protection and regional Development of the Republic of Latvia assesses that the minimum safety requirements for works with dangerous goods and mixtures are respected. As in the case of hydrogen production facilities and HRS, also for the **individual storage units** the pollutant emission legislation needs to be applied and the consequent categorization. Despite of hydrogen production and HRS, hydrogen storage units face **prohibitions based on quantities**, as follows:

- B category if the liquid or gas stored is above 1 ton or more;
- Above 1 ton of chemical substances stored the category is A.

There have been evidences of hydrogen deployment in transport sector since 2018 when the first public hydrogen refuelling station was installed in Riga. After that time, no other HRS appear to be operating in the country. At the moment, it is not possible to distinguish between conventional and hydrogen refuelling stations and for this reason there are limited zones where HRS could be located, basically on industrial areas. Regarding environmental requirements, prohibitions can increase when a hydrogen production unit is foreseen into the HRS plant perimeter because it is considered as a chemical facility for the production of substances or group of substances under EU law. **Regarding the pollutant emission permits, there is no distinction between different production processes that can vary significantly in terms of pollutant emissions.** In the case of hydrogen produced by electrolysis pollutant emission cannot be compared to conventional fuel production. Moreover, in the process of obtaining environmental permits, the lack of differences implies the need of environmental impact study. Public administrations would evaluate HRS projects case by case. In the case of public HRS, ISO/TS 19880-1:2018 is considered as applicable instead the connection phase between the FCEV and the dispensing unit can be done according ISO 17268:2012.

In Latvia, there are not specific requirements for the connection of electrolysers to the electrical grid. It is considered as a common consumer and specific requirements may exist if the power exceeds certain values which could have an impact to the balancing of the electrical network. The authority is the Distribution Network Operator. **Also, for fuel cells, connection is managed by the Distribution Network operator and electricity can be sold in the electrical market but there are not specific barriers as it is considered as a micro-CHP system.**

10.10 EU13 COUNTRIES - Lithuania

Lithuania aims to phase out fossil fuels and develop a supportive legal and regulatory framework for hydrogen, as there is currently **no specific legislation** in place. This framework will help guide the development of the hydrogen sector and ensure its integration into the broader energy transition strategy.

Lithuania is focusing on creating a legal framework for the decarbonization of hydrogen and gas markets. The Hydrogen and Gas Markets Decarbonisation Package, published in December 2021, emphasizes the re-use of natural gas infrastructure and allows for the inclusion of blue hydrogen. This package aligns with the EU Green Deal and complements the revised **RED II directives and ETS regulations**, supporting Lithuania's transition to a low-carbon energy system.

There is a national law relating to equipment and protective systems intended for use in potentially explosive atmospheres, as well as the market availability of pressure equipment: "**Law N°. 596, 28th July 2021**, on the decision of the Government of the Republic of Lithuania of 27th December 1999

Nº. 1482 amendment "On appointment of authorities authorized to approve mandatory product safety requirements and determine conformity assessment requirements".

With respect to the assessment of the effects of certain public and private projects on the environment, the relevant act in Lithuania is: **"Law Nº. XIV-1560, of 24th November 2022, on Environmental Impact Assessment of Planned Economic Activities Nº. I-1495 Amendment Act".** Finally, relating of deployment of alternative fuels infrastructure: **Resolution Nº. 87, 1th February 2017, regarding 2014/94/EU on the implementation of the deployment of alternative fuel infrastructure".**

10.11 EU13 COUNTRIES - Malta: gaps in the permitting framework for hydrogen implementation

In Malta **no comprehensive legal framework regulating hydrogen deployment has been identified**. So far, hydrogen has only been considered within the scope of the National Transport Strategy. However, electric mobility currently takes priority over the installation of a hydrogen refuelling network. According to Malta's National Contact Point for Climate, Energy and Mobility, this country is currently developing two hydrogen projects: **Melita TransGas Pipeline (MTGP)**, connecting Delimara (Malta) and Gela (Italy), and **HydroGenEration**, a project carried out by the university of Malta and FLASC B.V. which is seeking to investigate various technical aspects to enable the coupling of offshore wind generation and a co-located Hydrogen production plant.
Regarding the former one, the following milestones have been set (Source: https://melitatransgas.com.mt/):

1. The project was identified as a **Project of Common Interest (PCI)** in the priority corridor 'North-South gas interconnections in Western Europe' in the first list of PCIs (in accordance with Trans-European Networks for Energy (TEN-E) Regulation UE/347/2013) and subsequently reconfirmed in the second, third and fourth list of PCIs;
2. The Project Developer carried out a **Technical and Economic Feasibility Study** co-financed by TEN-E, the results of which confirmed the technical and economic feasibility of the project;
3. The **basic design studies co-funded by the Connecting Europe Facility (CEF)** were completed, including route identification and preparatory activities for the permitting process;
4. The **permitting procedure was formally launched** with the recognition of the Italian and Maltese competent authorities, which indicated that the project is sufficiently mature;
5. Publication of three **tenders** required for the next phase of the project:
    - Consultancy services for permitting procedures, preliminary marine route survey and front-end engineering design.
    - Services related to promotion and publicity.
    - Financial engineering of the project.
6. The project was awarded a **CEF grant of €3.68 million for studies related to the last phase of Melita TransGas Pipeline development**: Financial Engineering, Preliminary Marine Route Studies, Front-End Engineering Design and Environmental Impact Assessment in Italy and Malta.
7. In accordance with Article 9(4) of the TEN-E Regulation and as part of the pre-application procedure, the first round of **public consultations** was held in Gela, Palermo, Rome and Malta, and the positive results have been an important input for the permitting activities.
8. A **non-binding market test** was carried out to prepare the financial and economic modelling and the investment application.

9. **Melita TransGas Company Limited (MTG Co.) was established as a public company** to succeed the obligations of the Ministry of Energy and Water Management.
10. Commencement of MCE (Marine Surveyors) co-funded activities related to **marine surveys, front-end engineering design (FEED) and environmental impact assessment** following tenders:
    - Marine survey of the route off and near the coast of Gela and Malta. Contractor: Lighthouse SpA.
    - Front-end engineering design studies (FEED) and preparation of Engineering, Procurement and Construction (EPC) tenders. Contractor: Techfem/SPS JV.
    - Permitting/EIA studies. Contractor: (AIS, CESI and VDP) Malta-Italia Transgas Joint Venture (MT-IT JV).
11. Following the Preliminary Marine Route Survey (PMRS) and FEED surveys, the route was further optimised taking into account all the constraints encountered: physical, environmental, social, bathymetric and legislative.
12. The Cross-Border Cost Allocation Procedure (CBCA) investment application/proposal was submitted to the national regulatory authorities of Malta and Italy.
13. CBCA decision issued by the national regulatory authorities.
14. Preliminary sea route survey completed and Post Survey Assessment (PSA) issued. During the campaign, 4 different types of data (Multi-Beam Echosounder, Sub-Bottom Profiler, Magnetometer, Side-Scan Sonar) were collected for the entire 159 km route. In addition, 2,000 km Remotely Operated Vehicle (ROV) transects were filmed.
15. Completed environmental studies that are part of the ongoing EIA (Metocean Study, Noise Assessment, Ecological Studies, Site Soil Investigations).
16. Completion of the front-end engineering design and submission of the Environmental Impact Assessment to the competent authority in Malta.
17. Following the submission of the EIA, Environment and Resources Authority (ERA) opened a public consultation process for members of the public to provide feedback on the proposed application.
18. Launch of the 60-day ESPOO consultation period of the Maltese EIA in Italy.
19. Submission of the Italian EIA to Ministry of the Environment and of the Territory and Sea Protection (MATTM).
20. Conduct of a Public Consultation on the Reference Price Methodology.
21. Submission of the Autorizzazione Unica (AU) to the Ministero della Transizione Ecologica (MITE) and initiation of the statutory procedure in Italy.
22. Submission of all screening requirements to the Planning Authority and initiation of the legal procedure in Malta.
23. ERA initiated the 45-day ESPOO consultation period for the Maltese public in relation to the Italian EIA.
24. The ERA Board unanimously approved the EIA submitted by the project promoter for the construction of the Malta-Italy gas pipeline.
25. The Board of the Planning Authority unanimously decided in favour of the proposal and approved the Full Development Permit for the Maltese side for the construction of the Malta-Italy gas pipeline.
26. Update of the design and financial engineering studies to upgrade the CIP to a hydrogen-ready pipeline.
27. The EIA assessment in Italy was completed with a positive outcome by the Italian Ministry of Ecological Transition (MiTE).

28. The Italian Ministero dell'Ambiente e della Sicurezza Energetica concluded the Autorizzazione Unica procedure with a positive outcome.
29. Next steps:
    - Planned start of construction.
    - Planned commissioning.

10.12 EU13 COUNTRIES - Slovenia: gaps in the regulatory framework for hydrogen implementation

Within HYPOP research activity an interview has been carried out with the KSSENA organization. As an Energy agency for national affairs in Slovenia, it supported HYPOP to identify the legislative framework and the implementation of hydrogen technologies in Slovenia up to date. According to this stakeholder, **Slovenia is lagging behind in the implementation of the national hydrogen strategy** which is going to be included in the next National energy and climate plan. This delay likely comes from the present **gap of hydrogen demand and offer** in Slovenia. Existing framework of pilot projects for hydrogen production and distribution follow **permitting procedures not specifically related to Hydrogen but mainly to natural gas.**

Hydrogen is mentioned mainly in strategic document for transport, as reported by H2MA project leaded by KSSENA organization,

The following are the projects which could in the future support the creation of a solid permitting framework for hydrogen technologies in Slovenia:

- **North Adriatic Hydrogen valley (NAHV)** coordinated by a state-owned power generation company, Holding Slovenske elektrarne (HSE);
- at the moment there is only one **Power to Gas plant at pilot scale in Slovenia**. Green hydrogen is produced to fuel the internal needs of a glass industry (Steklarna Hrastnik glassworks company);
- There are **3 pilot Hydrogen refuelling stations in Slovenia**. One of these HRS is located at Salonit Anhovo and its purpose is to refuel a cement factory. At the moment the HRSs are not operational and designed only for internal uses.

10.13 FRONTRUNNERS - France: permitting framework for industry and mobility

For France, the competent authority is the **local state representative (*Préfecture de Département*)**. The administrative service which is in charge of the technical instruction of the permitting process, is the **DREAL (Regional Administration of the French Environment & Energy Ministry)**. The local building administration (municipality level) is in charge of the building permit.

Hydrogen is recognized in France as a potential way to enhance the national economy. As a consequence, its legal framework is quite developed in comparison to other European countries.

A remarkable milestone is the publication on 18 February 2021 of **the Law-Decree No 2021-167 of 17 February 2021 relating to hydrogen**, which implies the following changes:

1. Definitions of the different types of hydrogen:

- "**renewable hydrogen**" is produced with electricity generated from renewable energy, such as wind or solar, below a specified threshold of CO_2 per kilogram; it can be produced with an electrolyser.
- "**low-carbon hydrogen**" is defined as hydrogen produced from other energy sources below a threshold, like nuclear energy, with the threshold defined by a ministerial order.
- "**carbon-based hydrogen**" corresponds to the gas currently used in industry.

2. **Self-consumption of hydrogen**: to be self-consumed, hydrogen must be produced and consumed on the same site by one or more producers and one or more consumers who are linked together within a single legal entity. The hydrogen produced can be consumed either immediately or after a period of storage on the same site.
3. The mechanisms of **guarantees and traceability** for the production of renewable and low-carbon hydrogen: The Law-Decree establishes two traceability systems for hydrogen, ensuring the low-carbon or renewable nature of the hydrogen bought or informing the buyer that the purchase of a guarantee constitutes a support for green energy. A traceability mechanism and a guarantee of origin system have been put in place; in both cases, one guarantee is issued for each megawatt-hour of energy.
4. The system of **guarantees of origin** is inspired by the existing mechanisms for electricity from renewable energy sources and biogas. A guarantee of origin is issued for each megawatt-hour produced to certify the origin of the renewable or low-carbon hydrogen. This applies either when it is likely that it will be mixed with another type of hydrogen or gas, or if the guarantee issued at the time of its production is likely to be sold independently from the hydrogen produced. The guarantee proves that one megawatt-hour of hydrogen with this character has been produced.
5. A **traceability guarantee** proves that one megawatt-hour of hydrogen with a low-carbon or renewable character, not mixed with another type of hydrogen or gas, has been physically delivered to the buyer or final consumer. A traceability guarantee cannot be sold independently from the corresponding hydrogen.
6. **Guarantees of origin of renewable and low-carbon hydrogen from other Member States** may be assimilated to French guarantees of origin provided they meet a similar level of requirements. These special provisions for guarantees of origin from other Member States have been applicable since 30 June 2021.
7. The public support mechanism for hydrogen production: The cost of low-carbon or renewable hydrogen production, notably by electrolysis, is higher than that for carbon-based hydrogen. The Government has therefore established a **support mechanism for green hydrogen production**. This mechanism takes the form of either an operating aid, or a combination of financial aid to investment and operating aid.
8. Hydrogen **injection into natural gas networks**: The hydrogen produced can be transported via new infrastructures dedicated to the transport and storage of hydrogen or by being injected into the existing natural gas networks. The Law-Decree amended articles L. 431-6-4 and L. 432-14 of the Energy Code to extend the obligations of natural gas network operators regarding hydrogen transportation. In this respect, the operators will have to ensure the safety conditions of goods and people, in addition to the proper functioning and balancing of the networks.

Many of these changes are reflected in the Energy Code (**Code de l'énergie**), in the "**LIVRE VIII : LES DISPOSITIONS RELATIVES À L'HYDROGÈNE (Articles L811-1 à L851-2)**". Apart from this legislation, there are other decrees which also affect hydrogen projects. That is the case of **Decree**

2013-375 of 2 May 2013 amending the nomenclature of classified installations, applicable to the authorisation process for localised and centralised hydrogen production and hydrogen refuelling stations (HRS).

On the other side, the **Decree 2014-285 of 3 April 2014 amending the classification numbers of facilities classified for environmental protection** shows that if the amount of hydrogen present in the installation is greater than 1 tonne, the authorisation procedure applies, and if it is between 100 kg and 1 tonne, the simplified procedure should be presented. For installations containing more than one tonne of hydrogen, a full environmental assessment is required. This is of special interest for **storage** applications.

In the case of HRS, the legal approval procedure can be a mix between the approval procedure for a hydrogen production unit and hydrogen storage unit depending on the technical characteristics of the HRS (HRS with on–site production or HRS only with delivered hydrogen).

For the permitting procedure, the first step is to send a formal operating demand at the *Préfecture de Département*. In parallel, a building permit demand has to be sent to the local building administration. For HRS you can have 2 cases:

1. **The hydrogen is only delivered and stored on the HRS – There can be a simplified procedure**, depending on the hydrogen quantity stored on–site (if the quantity is less than 1 ton). If the quantity stored is over 1 ton, an environmental permit will be needed;

2. **The hydrogen is produced on–site. - The procedure will depend on a case-by-case decision from the administration**, depending on the environmental impact of the hydrogen production unit. If the environmental impact is considered as "relevant", an environmental permit will be needed.

France is also one of the rare European countries that has validated a **specific regulation for hydrogen refuelling station: order of the 22th October 2018**. This order makes it possible to regulate HRS, by means of general rules, so that the development of this energy is not hindered by insufficient risk control. It affects the process and authorisation requirements of hydrogen refuelling stations. This order also describes specific safety distances according to the flow rate of the HRS (see Deliverable 2.1)

There is also the order of 8 December 2017, regulation of the characteristics of hydrogen as an energy source for road transport. This order sets out the requirements for hydrogen as an alternative fuel, the technical characteristics of hydrogen as a transport energy source, the standards for hydrogen quality (ISO 14687:2018) and some general safety standards for hydrogen refuelling stations (ISO/TS 19880-1:2016). The quality assurance rules for the hydrogen supplied must be in accordance with ISO 19880 – 8. It also affects the certification of origin and quality requirements of hydrogen.

In order to help the companies to launch hydrogen activities, France Hydrogen and INERIS have written a **complete guide to evaluate the conformity and check the hydrogen standards (*Guide pour l'évaluation de la conformité et la certification des systèmes a hydrogène***, July 2021). This guide recalls the safety issues of hydrogen systems and the technical components essential to the hydrogen sector (compressor, storage unit, distribution, etc.). Then, this document brings together the regulatory and normative framework which is in force today: technical documentation, CE marking, EU declaration

of conformity, etc. The different requirements are then described (ATEX directive, pressure equipment directive, machine directive, etc.). And finally, the guide specifies different regulations which apply to different uses of hydrogen: regulations relating to road vehicles, transport of dangerous materials and new mobility applications (railway, inland navigation, international maritime navigation).

10.14 FRONTRUNNERS - GERMANY: permitting approach for industry, mobility and residential

Hydrogen is recognised as an alternative fuel in Germany under the Alternative Fuel Infrastructure Directive. Several steps are being taken for the expansion of hydrogen production and the accompanying infrastructure network for its transportation, distribution, and usage.

At the national level, some pieces of legislation that are of general interest for hydrogen projects are the following:

- **Building Code**, which affects the land use planning in hydrogen production, storage and refuelling stations. Article 249 bis shows the special regime for hydrogen production or storage projects from renewable energies;
- **Federal Land Use Ordinance:** It provides that, in areas referred to in Article 11(2), for installations using radiant solar energy, installations for the production or storage of hydrogen are permitted if the conditions set out in Article 249a(4) are met. It affects the land use planning in hydrogen production, storage and refuelling stations;
- **Protection from the Harmful Effects of Air Pollution, Noise, Vibration and Similar Processes on the Environment Act (Federal Emissions Control Act).** It defines the eligibility criteria for hydrogen from biogenic sources, and in particular:

  (a) the method of calculating greenhouse gas emissions;

  (b) the verification procedure and the transferability of evidence; and

  (c) the requirements for renewable energy sources for the production of hydrogen.

  It affects the process and requirements for authorisation of hydrogen production, storage and refuelling stations, certification of origin and road planning.
- **Ordinance on Permitting Facilities,** which displays information related to hydrogen. It affects the authorisation process for hydrogen production, storage and refuelling stations and road planning.
- **Environmental Impact Assessment Act.** Annex 1 provides a list of projects subject to the Environmental Impact Assessment, including hydrogen. It affects the process and authorisation and safety requirements for hydrogen production and storage.
- **Dangerous Incidents Ordinance.** Section 2 sets out the Regulations for operational areas. It affects the process and requirements for production and safety and HRS.

In a more specific way, **hydrogen vehicles** are also affected by the **German Traffic Ordinance**, which contemplates hydrogen in the section 41a"Compressed gas systems and pressure vessels". Adding to this, "**BGI 5108 Hydrogen Safety in Motor Vehicle Repair Shops** - Tram, Subway, and Rail Professional Association Instructions" contains safety requirements and provides some exemplary

explanations and solutions for operators of motor vehicle repair shops where hydrogen vehicles are kept.

Hydrogen networks, on the other hand, are regulated by Energy Industry Law, Combined Heat and Power Production Act, DVGW rulebook and Renewable Energy Law.

- **Energy Industry Law** affects the connection of the electrolyser to the power grid, the situation of Power to Gas plants and the requirements for the connection and injection of hydrogen into the gas network. It contains sections 3b "Regulation of hydrogen networks" and 3c "Regulations on the core hydrogen network", as well as the parts “10b. Hydrogen network operators”, “43l. Regulations for the development and expansion of hydrogen networks”, “112b. Reports from the Federal Ministry for Economic Affairs and Climate Action and the Federal Network Agency on the evaluation of the regulation of hydrogen networks” and “113a. Assignment of rights of way to hydrogen pipelines.”
- In the Section 2 of **Combined Heat and Power Production Act,** surcharge payments for cogeneration electricity are set.
- In DVGW rulebook (issued by the German Association for Water and Gas Supply), the **worksheets DVGW G 260 (Gas Quality)** and **262 (Use of Gases from Renewable Sources in Public Gas Supply)** provide the general requirements for gases in public supply networks. Up to 10% vol. of hydrogen is allowed, if sensitive devices are not connected to the downstream network. The worksheet **DVGW 265-3 (Installations for Hydrogen Injection into Gas Supply Networks – Planning, Manufacture, Assembly, Testing, Commissioning and Operation),** lays down the technical requirements for hydrogen injection plants into the gas supply network. In general, this rulebook affects hydrogen connection, injection, safety and quality requirements.
- **Renewable Energy Law** affects the certification of origin and the status of Power to Gas plants and CHP systems. It contains several hydrogen-related articles:
    - 28f. Auction volume and bidding deadlinesfor innovative concepts with hydrogen-based electricity storage.
    - 28g. Auction volume and bidding deadlines of plants for the generation of electricity from green hydrogen.
    - 39th. Tenders for innovative concepts with hydrogen-based electricity storage.
    - 39p. Tender for power generation plants from green hydrogen.
    - 39q. Special payment provisions for plants producing electricity from green hydrogen.
    - 88e. Authorization to issue ordinances on tenders for innovative concepts with hydrogen-based electricity storage.
    - 88f. Authorization to issue ordinances on tenders for plants for the production of electricity from green hydrogen.
    - 93. Authorization to issue ordinances on requirements for green hydrogen.

Finally, Hydrogen Refuelling Stations are nationally affected by the standard “**CMS 70 Regulation (Version 1/2020). Generation of green hydrogen“**, which defines the requirements for the production (generation) of green hydrogen for energy or substance applications. Hydrogen certified in accordance with this standard will be referred to as "Green Hydrogen". Apart from this, previously mentioned regulations are also applicable.

For Germany, there is an excellent approval guide for **hydrogen refuelling stations** which can be transposed to other hydrogen industrial facilities. This guide has been written by NOW GmbH (National Organization of Hydrogen and fuel cells) and a deeper description is provided as a best practice in the previous section.

For the **residential sector (micro-CHP),** the previoulsy mentioned **Combined Heat and Power Production Act** and **Renewable Energy Law** can be applied.

10.15 FRONTRUNNERS - The Netherlands: permitting framework for industry and mobility

For The Netherland, the responsible authority is the **local authority (municipality) or provincial authority depending on where a facility is being build**. In the open environment the local authority is responsible and when building on an industrial premises the province is responsible.

For the permitting procedure, the steps must be executed according to the **WABO (Wet Algemene Bepalingen Omgevingsrecht which is the General Provisions for Environmental Law Act**). The procedure to grant an integrated permit for building, construction and operation consists of preparation, request, assessment and decision and in some cases public participation. During the process, questions can arise due to public participation, and these must be answered before granting permission.

A dedicated procedure has been written by the Dutch public authorities, the **PSG 35 - Hydrogen installations for delivering hydrogen to vehicles** and **tools - guideline for the occupationally safe, environmentally safe and fire-safe application of installations** for delivering hydrogen to vehicles and tools. The last update was in 2021. This guideline is quite technical, it explains how to proceed with the construction of the hydrogen delivery installation, how to perform the delivery operation and the maintenance of the installation. In this document, there are also descriptions of safety measures. All relevant legislations and regulations are described in the annex of this document (environmental licensing act, ATEX directive, pressure equipment decree, ...).

10.16 FRONTRUNNERS - Switzerland: permitting framework for industry and mobility

Stakeholders' engagement activities (H2Mobiliteit and the Federal office of Energy) allowed to provide a **comprehensive overview** of the procedures that can be followed in Switzerland **to obtain approval for the construction and operation of a hydrogen production plant through electrolysis, which includes the associated compression, storage, and distribution systems**.

Permitting of a Hydrogen production plant falls under the definition of industrial activities, influencing the location of these plants. Some guidelines have been published in this topic by the Swiss Hydrogen Producers Association. It does not analyze the regulations necessary for the transport of hydrogen through pipelines and tank cars, which are regulated by other national regulations and international law for the transport of dangerous goods. As the administrative structure of Switzerland comprises of a federal government, cantons, and municipalities, the permitting requirements necessary for the approval of a hydrogen production plant can therefore be of federal, cantonal, and municipal nature, or a combination of these. More complex cases, such as those of an electrolysis plant, may require the involvement of multiple authorities of different natures. **In Switzerland, a procedure is applied to simplify interactions between authorities and the exchange**

of information. This procedure involves the identification of a leading authority that, for regulatory aspects beyond its competence, coordinates with the relevant authorities to issue a single authorization.

In the case of hydrogen production plants, the main authorization procedure is the building permit, as the building structures and hydrogen technology components represent the majority of the plant. The building authorization procedures are in charge of the territorially competent canton, which therefore represents the leading authority that coordinates with the other federal and municipal authorities. **The building procedure is the main authorization process, which concludes with obtaining a cantonal construction license. Together with the building requirements, there are also authorizations related to electrical installations granted by the ESTI, the federal supervisory authority for electrical installations.** The ESTI ensures that such installations are planned, built, and maintained safely and in an environmentally friendly manner. These installations include high-voltage installations, low-voltage installations, and weak-current installations.

Once the building and electrical requirements are satisfied, it is possible to issue a construction license according to the federal labor law PGV-ArG by the Municipality and of the construction license for electrical installations PGV-ESTI, which applies to H_2 production plants.

Both from a construction and electrical standpoint, the plant project must be compatible with the PGV, i.e., the General Zoning Plan. It is a territorial planning tool used at the municipal or cantonal level to define the use of land and the zones into which the territory can be subdivided, such as residential, commercial, industrial, agricultural, or natural protection zones. This plan integrates into the broader framework of Swiss territorial planning, which includes various levels of detail, from the general orientation provided by cantonal master plans to detailed utilization plans (municipal building regulations, zoning plans, etc.) specifying the building regulations applicable in individual parcels or areas. The issuance of the construction permit depends, therefore, on how the use of the zone where the plant is to be located conforms with constraints related, for example, to proximity to public buildings and/or sensitive uses, transport infrastructure, and power lines. At the local level, there may be additional laws with further constraints. **The building procedure also includes environmental authorizations to be attached to the documentation**. The simplest case involves producing an environmental note. **However, if the characteristics of the plant are such that certain thresholds reported in the legislation are exceeded, then it is necessary to follow an Environmental Impact Assessment (EIA) procedure** governed by Chapter 3 of the Environmental Protection Act and the ordinance on environmental impact assessment**.**

An EIA is necessary if:

- The storage of gas exceeds 50,000 m^3 or in the case of liquid storage if it exceeds 5,000 m^3;
- The operational area of the plant exceeds 5,000 m^2 or if chemical products are synthesized beyond 1,000 tons per year.

An EIA may also be necessary due to the transport through pipelines if certain threshold values of pressure, diameter, and spatial extension of the pipelines are exceeded. The designer must therefore develop an environmental impact report that describes in detail the effects a project can have on the environment, including impacts on air, water, soil, flora, fauna, humans, and the landscape in general. **In the case of hydrogen production plants**, the building procedure is the main authorization process,

and therefore **the evaluation of the information contained within an environmental report (UVB) is carried out by the cantonal environmental protection department**. If the evaluation of the environmental report fell under federal competence, then the responsible authority would be the Federal Office for the Environment (FOEN), operating under the supervision of the Federal Department of Environment, Transport, Energy, and Communications (DETEC).

In addition to environmental aspects, **obtaining the construction license goes through compliance with a series of safety requirements. The normative reference for safety aspects is the ordinance for safety against major accidents (StFV) if, as reported in Annex 1.1 Nos. 3 and 27, more than 5,000 kg of hydrogen are produced.** In this case, it is necessary to produce a report that ensures compliance with the provisions for public safety outside the plant. If the competent authority for surveillance aspects, FOEN, did not consider the information sufficient, then a proper risk assessment would be necessary. The risk assessment is a document that is part of the PGV-ArG, in turn integrated into the building procedure. The legal foundations are the labor law and its regulations and the fire prevention ordinance. The latter contains the fire prevention prescriptions that must be respected within the fire report. The **fire prevention prescriptions VKF of the Association of Cantonal Fire Insurance Companies constitute harmonized standards at the intercantonal level for the preventive protection** against the dangers and effects of fires and explosions in buildings and installations. However, cantonal fire protection norms, which in turn refer to VKF fire protection norms or may issue their own or more extensive prescriptions, are fundamental. **The fire report must demonstrate the quality assurance of the project**, previously defined through discussions with the fire brigade. In the case of a hydrogen production plant, it is necessary to ensure a quality of the system at least equal to 2 but more likely to be equal to 3 given the complexity of the plant. **The cantonal safety evaluation authority can be the fire brigade or the cantonal building insurance.** In accordance with the required level of quality assurance, a recognized VKF fire protection specialist must be called as responsible, who will support the project engineer in the planning phase with organizational fire protection measures. **For installations with pressure equipment, the legislation on the safety and health protection of workers during the use of pressure equipment must also be respected**. In the case of potentially explosive atmospheres, as in the case of hydrogen production plants, the legal reference is the VUV, which refers to the ATEX 1999/92/EC operating directive. Once all the documentation necessary for the approval of the construction and electrical installation license, PGV-ESTI, has been provided, the plant can be built.

After the construction phase, it is necessary to request an operational license for the operation of the hydrogen production plant from the cantonal labor inspectorate. The cantonal authority conducts:

- A building inspection for fire prevention purposes by the fire brigade;
- A notification to the ESTI, which must declare the electrical installations compliant;
- An inspection according to PGV-ArG through the labor inspectorate;

A notification to the Swiss Accident Insurance Institute (Suva) to demonstrate compliance of the systems and its components with safety requirements, especially for pressure equipment. The design engineer then requires proof of system compliance from the H_2 production system manufacturer or performs a conformity test of the system according to the product safety law himself and has it certified by a conformity assessment body. Pressure devices must be reported to Suva. The

"Market Surveillance of Pressure Equipment", a specialized agency of the Swiss Association for Technical Inspections (SVTI), is the control body for monitoring pressure equipment. It can verify the documentation and compliance of the system randomly and if defects are suspected.

11 Appendix II. Regulations used in Śrem project (Poland).

Table 23. Regulations used in the project.

L.p.	Type of act	Name of regulation	Official Gazette	Reference to website	Comment
1	Law	Law of April 10, 1997. - Energy Law	Journal of Laws. 1997 No. 54 item 348	LINK	Planned changes under bill UD382 governing the addition of hydrogen
2	Law	Law of February 20, 2015 on renewable energy sources	Journal of Laws. 2015 item 478	LINK	Planned changes under UC99 bill regulating energy sources for hydrogen creation
3	Law	Law of March 27, 2003 on spatial planning and development	Journal of Laws. 2003 No. 80 item 717	LINK	Planned changes under bill UD369 - getting to hydrogen
4	Law	Law of July 7, 1994. - Construction Law	Journal of Laws. 1994 No. 89 item 414	LINK	The requirement to adapt to the use of hydrogen in construction
5	Law	Law of June 9, 2011. - Geological and mining law	Journal of Laws. 2011 No. 163 item 981	LINK	Planned changes under bill UD280 - hydrogen adjustment
6	Law	Law of July 20, 2017. - Water Law	Journal of Laws. 2017 item 1566	LINK	Adaptation to hydrogen use and water treatment for hydrogen production
7	Law	Act of August 25, 2006 on the system of monitoring and controlling fuel quality	Journal of Laws. 2006 No. 169 item 1200	LINK	Adding hydrogen as a fuel and the principles of its monitoring and control
8	Law	Act of December 21, 2000 on technical supervision	Journal of Laws. 2000 No. 122 item 1321	LINK	supervision of hydrogen systems
9	Law	Act of August 25, 2006 on biocomponents and liquid biofuels	Journal of Laws. 2006 No. 169 item 1199	LINK	Planned changes under UC110 bill - addition of hydrogen
10	Law	Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments	Journal of Laws. 2008 No. 199 item 1227	LINK	Adding information about environmental rules at hydrogen
11	Law	Law of August 24, 1991 on fire protection	Journal of Laws. 1991 No. 81 item 351	LINK	hydrogen safety rules
12	Law	Law of April 27, 2001. Environmental Protection Law	Journal of Laws. 2001 No. 62 item 627	LINK	principles of environmental protection at hydrogen
13	Law	Law of May 11, 2001. Law on Measures	Journal of Laws. 2001 No. 63 item 636	LINK	actulization by hydrogen
18	Regulation	Ordinance of the Minister of Energy of March 15, 2018 on detailed rules for shaping and calculating tariffs and settlements in gas fuel trade	Journal of Laws. 2018 item 640	LINK	recognition that hydrogen is also a gaseous fuel

L.p.	Type of act	Name of regulation	Official Gazette	Reference to website	Comment
19	Regulation	Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment	Journal of Laws. 2019 item 1839	LINK	principles of environmental protection at hydrogen
20	Regulation	Ordinance of the Minister of Development of January 29, 2016 on the types and quantities of hazardous substances present at a plant, determining the classification of the plant as a plant with an increased or high risk of a major industrial accident	Journal of Laws. 2016 item 138	LINK	atex hydrogen
21	Regulation	Ordinance of the Minister of Entrepreneurship and Technology of May 21, 2019 on the manner and procedure for verifying qualifications required for operation and maintenance of technical equipment, and the manner and procedure for extending the validity of qualification certificates	Journal of Laws. 2019 item 1008	LINK	principles of working with hydrogen
22	Regulation	Ordinance of the Minister of Transport of October 20, 2006 on the technical conditions of technical supervision in the design, manufacture, operation, repair and modernization of specialized pressure equipment	Journal of Laws. 2006 No. 199 item 1469	LINK	as above
23	Regulation	Ordinance of the Minister of Climate and Environment of July 4, 2022 on the methodology for calculating greenhouse gas emissions, determining their emission factors and the calorific value for individual fuels and the energy value of electricity	OJ. 2022 item 1494	LINK	calculation of hydrogen emissivity and its energy values
24	Project	Draft regulation of the Minister of Climate and Environment on quality requirements for hydrogen (list no.: 918)	----	LINK	principles of hydrogen quality as a fuel
25	Regulation	Ordinance of the Minister of Agriculture and Rural Development of January 13, 2023 on the technical conditions to be met by agricultural structures and their location	Journal of Laws. 2023 item 297	LINK	hydrogen extension
26	Regulation	Announcement by the Minister of Development and Technology of April 15, 2022 on the announcement of the unified text of the Regulation of the Minister of Infrastructure on the technical conditions to be met by buildings and their location	OJ. 2022 item 1225	LINK	hydrogen extension
27	Regulation	Announcement by the Minister of the Interior and Administration on March 21, 2023 on the announcement of the consolidated text of the Decree of the Minister of Internal Affairs and Administration on fire protection of buildings, other buildings and grounds	OJ. 2023 item 822	LINK	hydrogen extension
28	Regulation	Decree of the Minister of Infrastructure of June 24, 2022 on technical and construction regulations for public roads	OJ. 2022 item 1518	LINK	hydrogen extension

L.p.	Type of act	Name of regulation	Official Gazette	Reference to website	Comment
29	Regulation	Ordinance of the Minister of Internal Affairs and Administration of September 17, 2021 on reconciliation of the project of development of a plot or land, architectural and construction project, technical project and the project of fire-fighting equipment in terms of compliance with the requirements of fire protection	OJ. 2021 item 1722	LINK	hydrogen extension
30	Law	Announcement by the Speaker of the Sejm of the Republic of Poland of July 21, 2021 on the announcement of the consolidated text of the Act on facilitations in the preparation and implementation of housing investments and accompanying investments	OJ. 2021 item 1538	LINK	Hydrogen extension in construction
31	Regulation	Ordinance of the Minister of Infrastructure of August 7, 2008 on the requirements for distances and conditions allowing the location of trees and shrubs, acoustic protection elements and execution of earthworks in the vicinity of the railroad line, as well as the method of arranging and maintaining snow screens and fire protection strips	Journal of Laws. 2008 No. 153 item 955	LINK	hydrogen extension
32	Law	Announcement of the Speaker of the Sejm of the Republic of Poland of March 10, 2022 on the announcement of the uniform text of the Law on Forests	OJ. 2022 item 672	LINK	hydrogen extension
33	Law	Law of December 14, 2012 on waste	Journal of Laws. 2013 item 21	LINK	extension to waste from electrolysis process

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