HyLaw - EU-level activities, conclusions and European Framework.

HyLAW
Hydrogen law

Alexandru Floristean

November 2018

HyLaw National Workshop – Stockholm, SE

The HyLAW project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 737977. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe Research

Grant Agreement No 737977

Hydrogen Europe and the Fuel Cell & Hydrogen Joint Undertaking

Hydrogen Europe
Industry

European Union represented by the European Commission

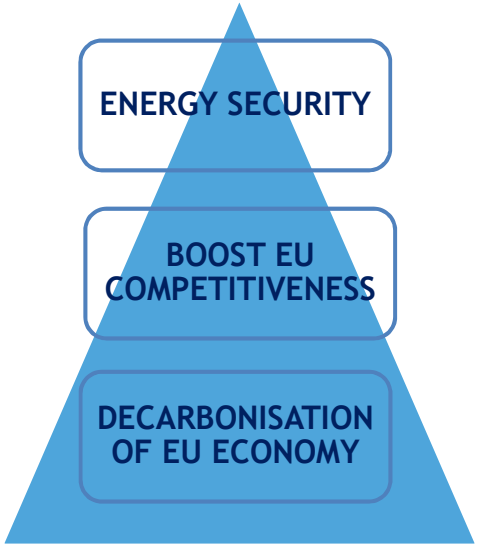
Hydrogen Europe
Research

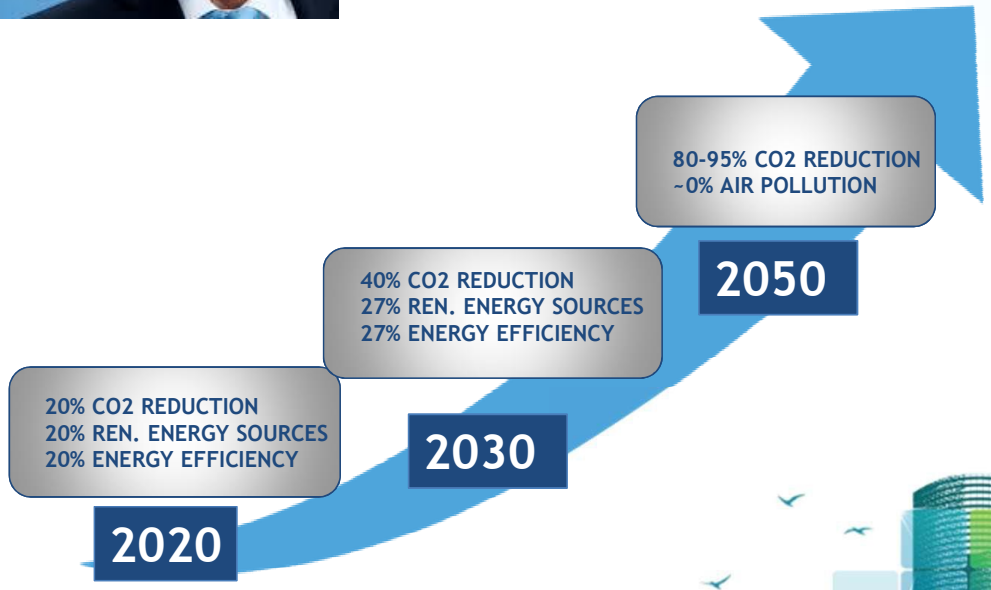
A portfolio of clean, efficient and competitive solutions based on fuel cells and hydrogen technologies in **energy** and **transport**

The Challenge

EU CLIMATE AND ENERGY FRAMEWORK

"I want to reform and reorganise Europe's energy policy in a new European Energy Union."

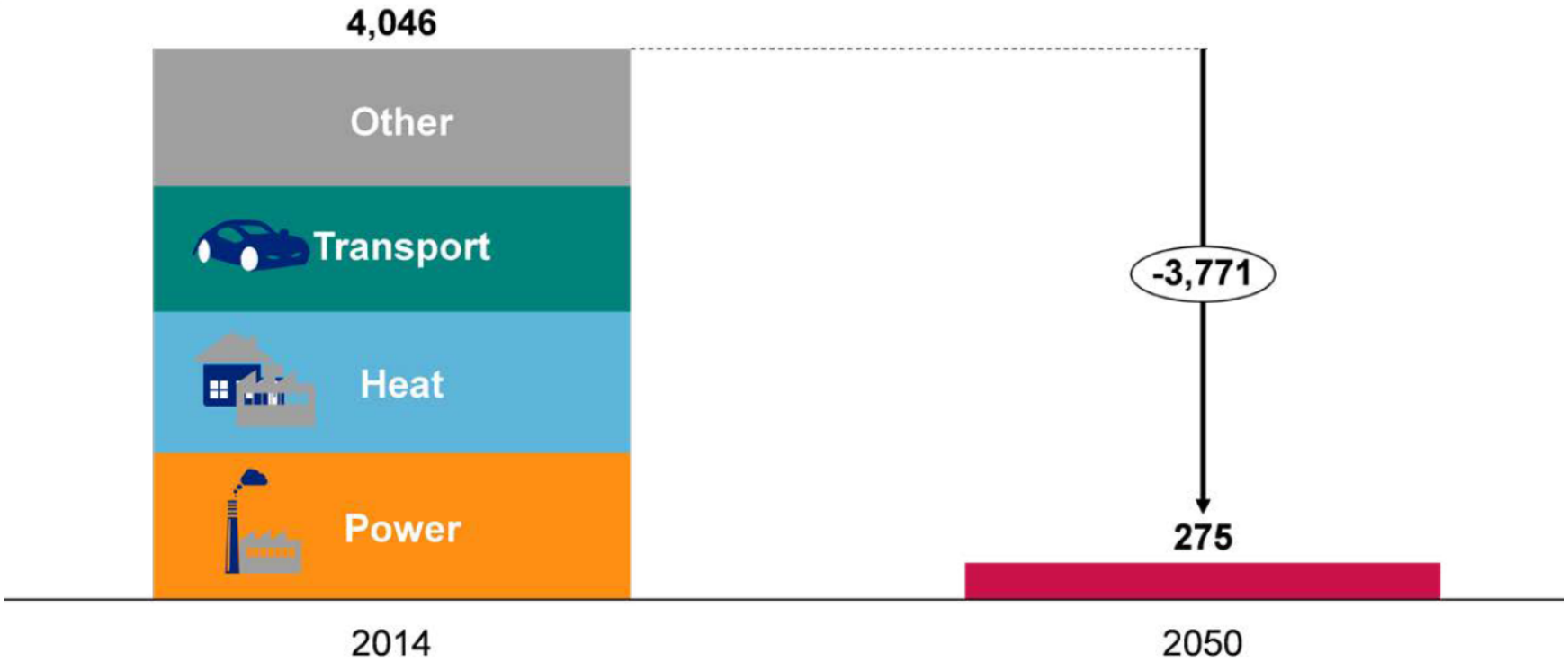




Source: European Commission

The Problem

FIGURE 1 – THE SCALE OF EUROPE'S DECARBONISATION PROBLEM ($MtCO_2e$)



Source: 2016 National Inventory Submissions (Common Reporting Format) for EU, Norway and Switzerland.

The Solution

Enable the renewable energy system → Decarbonize end uses

Enable **large-scale renewables integration** and **power generation**

Distribute energy across sectors and regions

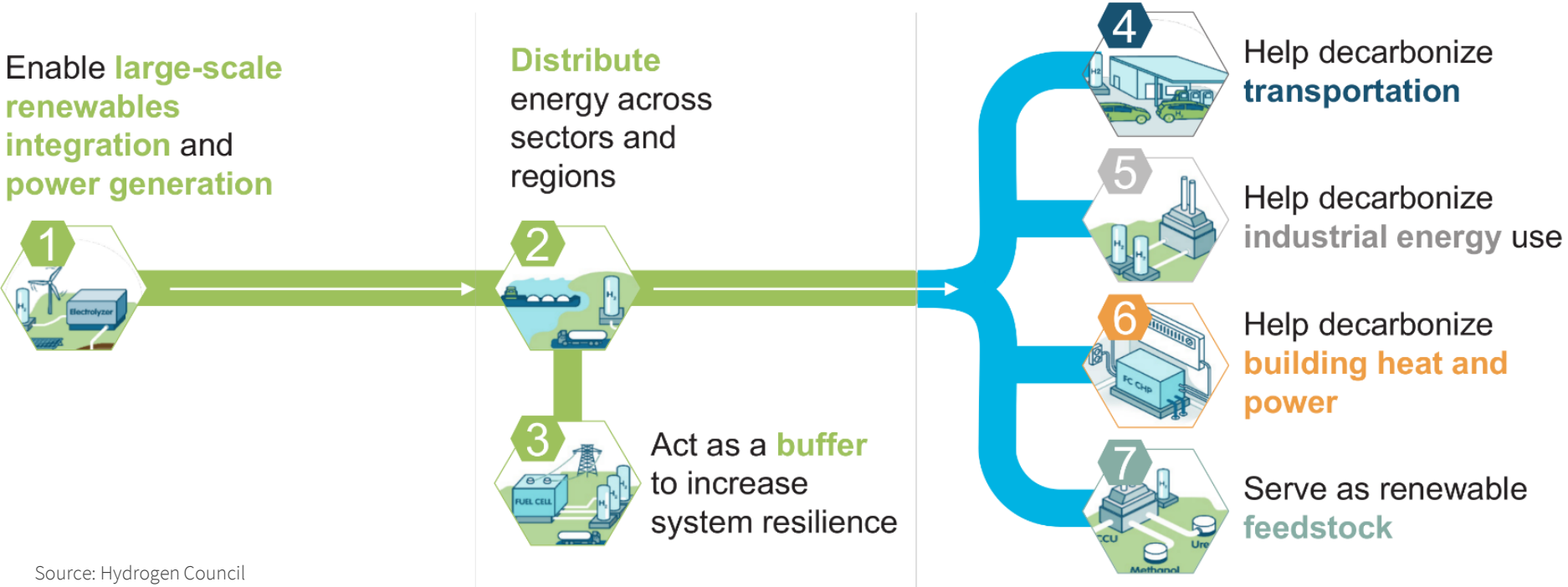
Act as a **buffer** to increase system resilience

Help decarbonize **transportation**

Help decarbonize **industrial energy** use

Help decarbonize **building heat and power**

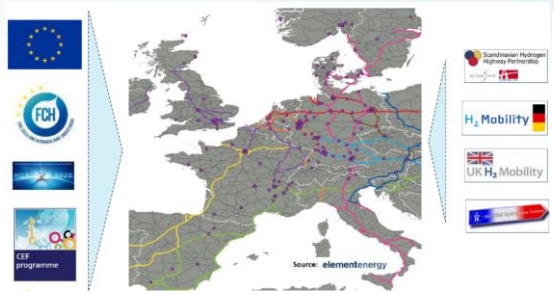
Serve as renewable **feedstock**

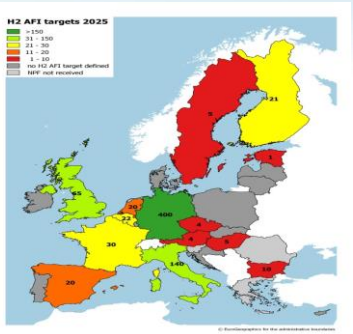


Source: Hydrogen Council

Hydrogen for the Transport sector: Cars & LDVs

May 2018: ZEFER fleet of 180 taxis and police





2017: National plans for HRS deployment towards 2025

June 2018: ENGIE fleet of 50 hydrogen-powered Renault Kangoo Z.E. utility vehicles

H2ME: 1400 FCEVs for customers with the further deployment of 45 HRS

Hydrogen for the Transport sector: Buses

EU-funded projects

CHIC
(36 buses, plus 20 in Canada)
- ✓ Aargau, CH;
- ✓ Bolzano, IT; London, UK; Milan, IT; Oslo, NO; Cologne, DE*; Hamburg, DE*

High V.LO-City
(14 buses)
- ✓ Antwerp, BE; Aberdeen, UK; Groningen, NL; San Remo, IT

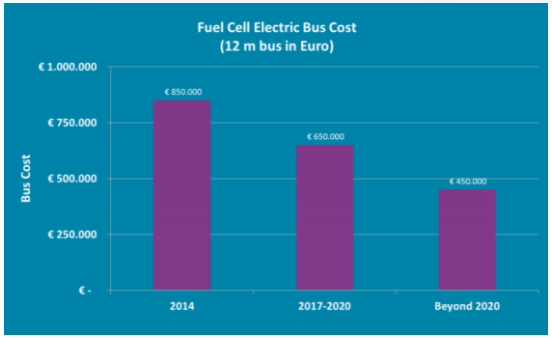
HyTransit
(6 buses)
- ✓ Aberdeen, UK

3Emotion
(21 buses)
- ✓ London, UK
- ✓ Aalborg, DK; Pau, FR; Rome, IT; South Rotterdam, NL; South Holland; Versailles, FR

National/regional-funded projects
- ✓ Karlsruhe, DE; Stuttgart, DE; Frankfurt, DE;
- ✓ Arnhem, NL; North Brabant, NL; Artois Gohelle, FR

JIVE
(139 buses)
- ✓ Aberdeen, UK – 10 FC buses
- ✓ Birmingham – 20 FC buses
- ✓ Bolzano, IT – 12 FC buses
- ✓ Cologne region, DE – 30 FC buses
- ✓ Herning, DK – 10 buses
- ✓ London, UK – 26 FC buses
- ✓ Rhein-Main region, DE – 11 FC buses
- ✓ Riga, LV – 10 FC buses
- ✓ Wuppertal, DE – 10 buses

JIVE 2
(152 buses)
- ✓ UK – 20 buses
- ✓ Dundee, UK – 12 buses
- ✓ Groningen, NL – 20 buses
- ✓ North Brabant, NL – 10 buses
- ✓ South Holland, NL – 20 buses
- ✓ Auxerre, FR – 5 buses
- ✓ Pau, FR – 5 buses
- ✓ Toulouse, FR – 5 buses
- ✓ Cologne region, DE – 15 buses
- ✓ Germany – 15 buses
- ✓ Iceland – 10 buses
- ✓ Sweden – 5 buses
- ✓ Akershus, NO – 10 buses



Source: JIVE/JIVE2

Last update: April 2018

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Join us at the ZEB!

2018 EUROPEAN
ZERO EMISSION BUS
CONFERENCE

Cologne • November 27th & 28th

Organised under the patronage of Stadt Köln

Technology and policy experts will lead a two-day conference to drive forward the realisation of zero emission public transport for Europe.

Agenda overview

- Technological readiness
- Zero emission bus deployment
- Lessons learned
- New business and financing models
- Scaling up – going from small bus fleets to complete zero emission bus fleets

DETAILS & REGISTRATION: zebconference.com/eu

ZERO EMISSION

Hydrogen Europe

elementenergy

FCH

In partnership with EnergieAgentur.NRW & ElektroMobilität NRW

@EUZEBconference #ZEB2018

Hydrogen for the Transport sector: HDV

FCH-JU H2ME project Batt+RE

Location	France
Manufacturer	Symbio Renault
Autonomy	Tbc
Tank cap.	Tbc
Capacity	Tbc
Filling time	Tbc

ESORO COOP

Location	Switzerland
Manufacturer	ESORO
Autonomy	400 KM
Tank capacity	31 KG
Capacity	34'000 KG
Filling time	10 min

ASKO-SCANIA

Location	Norway
Manufacturer	SCANIA
Deployment	2018
Autonomy	500 km
Transport Capacity	27'000 KG

VDL - COLRUYT

Location	Belgium
Manufacturer	VDL Group
Deployment	2018
Transport Capacity	37'000 KG

FCH-JU started with FC in trucks by researching APU's (3 projects) then Range Extenders in H2ME, by end 2017 about 15 garbage trucks expect to be funded

Nicola Trucks

Toyota Truck @LA port

Kenworth FC drayage truck

Partners planning 2,000 commercial vehicles on the road in next 3 years.

Toyota and 7-eleven study to use FC

9

Switzerland orders 1000 hydrogen trucks

AGROLA AVIA coop coop mineraloel fenaco MIGROL MIGROS

Suddenly in the news all over the globe

World premiere: Alstom's hydrogen trains enter passenger service in Lower Saxony

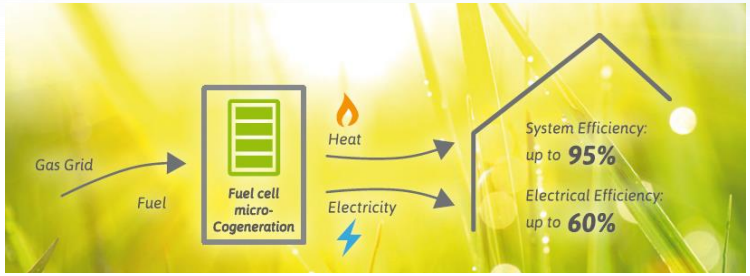
„This is a revolution for @Alstom and for the #FutureOfMobility.

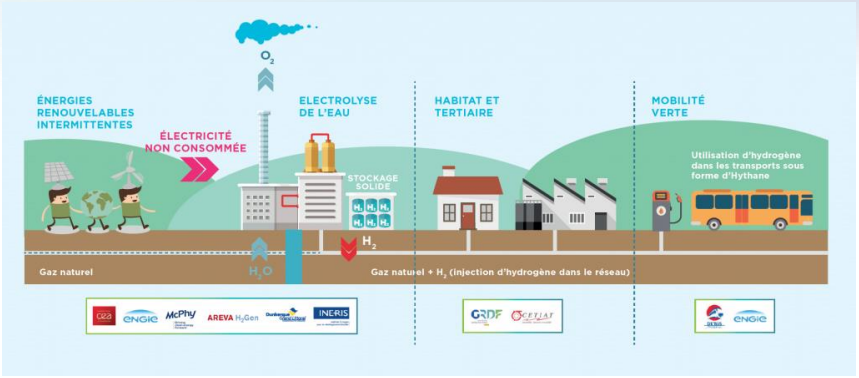
The world's first #hydrogen #fuelcell train is entering passenger service and is ready for serial production"

Henri Poupart-Lafarge, Chairman & CEO of Alstom

16 September 2018

Hydrogen for the Gas sector

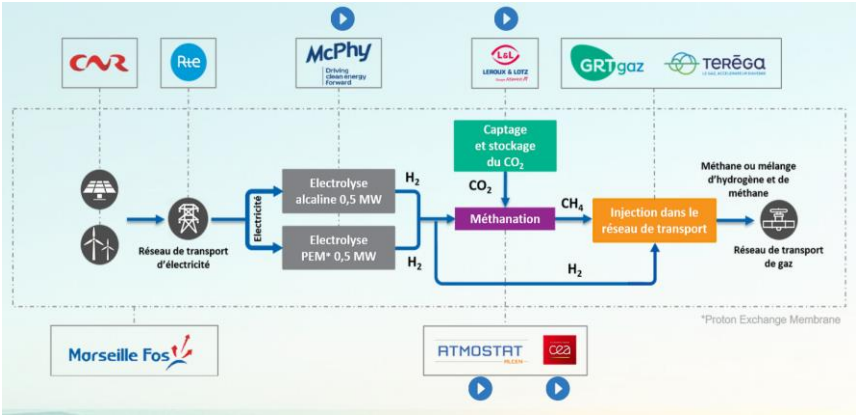




2018: Grhyd (FR)

2018: Jupiter1000 (FR)

Leeds (UK)
100% H2 by 2035
85TWh
17-18M tCO2/yr



Hydrogen for the Refining sector

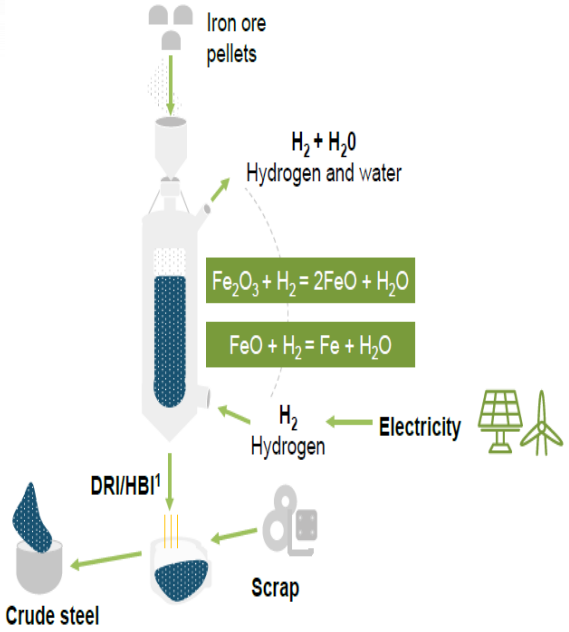
REFHYNE
CLEAN REFINERY HYDROGEN FOR EUROPE

One of the largest hydrogen electrolysis plant at Rhineland refinery, Germany.

4 t H2/day (1% of demand)

With a peak capacity of 10 megawatts the hydrogen will be used for the processing and upgrading of products at the refinery's Wesseling site as well as testing the technology and exploring application in other sectors.

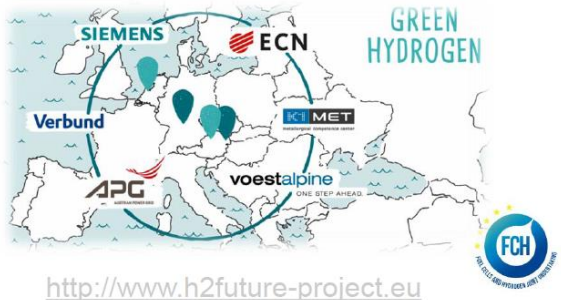
Hydrogen for the Steel sector



H2FUTURE Project: Green Hydrogen for Steel Industry

H2FUTURE
Green Hydrogen

- **6 MW Siemens PEM electrolyser system** at the voestalpine steel plant in Linz, Austria
- **Industrial integration of renewable hydrogen production** in the steelmaking process
- **26-month demonstration** of the electrolyser system, in particular
  - Prequalification for power reserve markets (primary, secondary and tertiary control)
  - Integration of the electrolyser system into the steelworks operation
  - Commercial operation on the power reserve and spot markets
  - Quasi-commercial operation with revenue streams from both hydrogen and power
- **Accompanying analysis** of different operation modes, impact in the steel and fertilizer industries



http://www.h2future-project.eu

see also:

HYBRIT: SSAB & others (Sweden)

SALCOS: Salzgitter & others (Germany)

Market through legislation – Example:

Renewable Energy Directive 2021-2030:

- Mandatory targets:
  - RED II: Gross final consumption 32% renewable by 2030
  - RED II: Transport sector 14% renewable by 2030

*"Renewable liquid and gaseous transport fuels of non-biological origin shall also be taken into account when these are used as **intermediate product** for the production of conventional fuels."*

- 10 GW of electrolysis (8760 h) ~27 GW (3000 h)

Shell's Rhineland Refinery, REFHYNE project

Sources: Morgan Stanley, Global Hydrogen – A US$2.5 trillion industry? (July 2018)
LBST/Hinico, Short term and long term opportunities to leverage synergies between the electricity and transport sectors through power-to-hydrogen (2016).

EU Legislative framework for Hydrogen

A positive regulatory framework for hydrogen requires 2 elements

1. Positive legislation which acknowledges and supports the role of hydrogen
   ➡ Hydrogen Europe's advocacy work

2. Removing barriers that will hinder the deployment
   ➡ HyLAW project

Legal & administrative processes hamper the uptake of FCH technologies

Today: Increasing deployment and appetite for fuel cells and hydrogen (FCH) technologies across Europe: more products better performance, reduced cost.

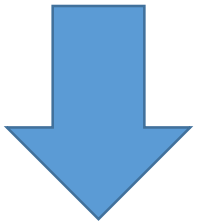
BUT :

- Existing regulatory legal framework e.g. planning, safety, installation, operation – often only reflect conventional technology and is therefore insufficient
  - Non adapted measures - additional costs and time, resource intensive…
    - For ex. lengthy and costly permitting requirements to install a hydrogen refuelling station in most European countries

This represents a barrier to scale up fuel cell and hydrogen deployment

HyLaw Objectives

Policy	Market
Identify regulatory barriers (and best practices) and advocate for better regulation to support the uptake of fuel cell and hydrogen technologies	**Describe legal and administrative processes** which apply when deploying key Hydrogen technologies (coherent, user friendly, online database)



Analytical documents
Policy Papers (Recommendations)

User friendly database

Scope

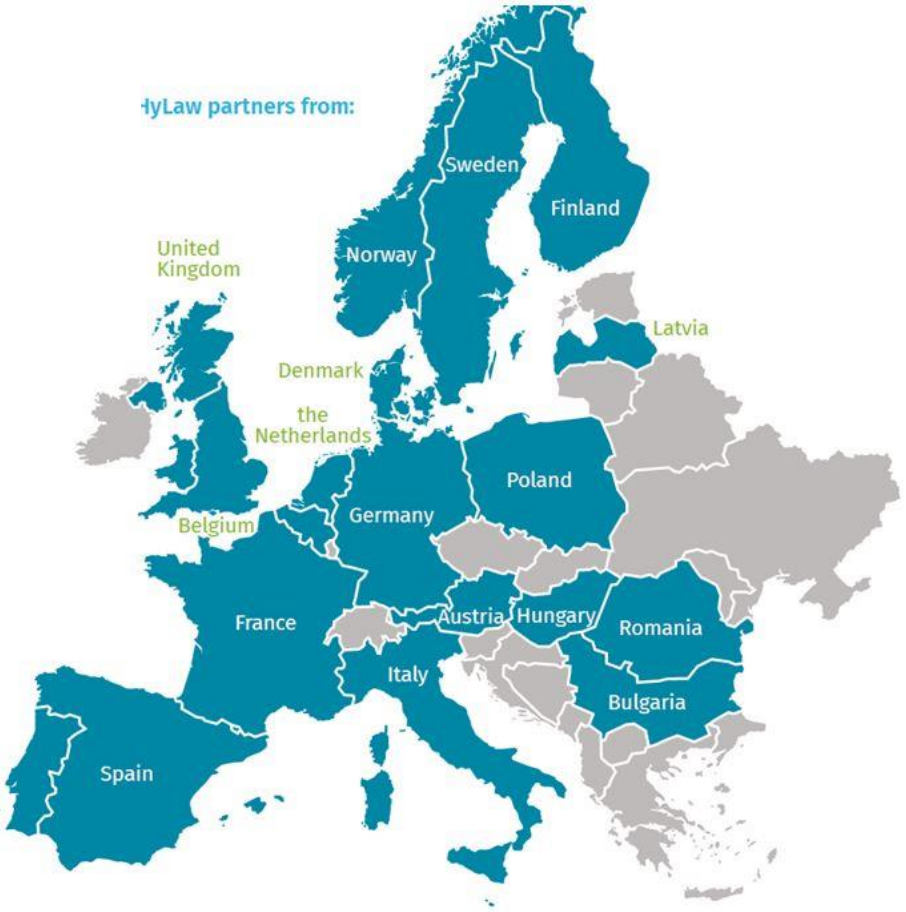
- 55 Legal and administrative processes
- 20 hydrogen applications
- 8 categories

Categories of applications
1. Production of hydrogen
2. Storage of hydrogen
3. Transport and distribution of hydrogen
4. Hydrogen as a fuel and refueling infrastructure for mobility purposes
5. Vehicles
6. Electricity grid issues
7. Gas grid issues
8. Stationary power; fuel cells (other issues than gas grid and electricity)

Geographical coverage

- HyLaw's covered 17 EU Countries + Norway.

- 23 Partners contributed to the work, providing details on the legal and administrative processes applicable in their countries



HyLaw – Online Database preview

- Database is online on www.hylaw.eu/database

HyLAW Online Database

Home | About HyLAW | Info Centre | Database | Events | Partners | Contact | Search

Home / Database

Database

Production of hydrogen | Centralised (Electrolysis, Steam-Meth | Please select a LAP

Database | Compare LAPs | Legislation

The HyLaw database is structured along the nine categories which can be seen below. Within each category, a number of relevant hydrogen applications and different legal and administrative processes (LAP's) are covered. These can be selected from the drop-down menu found below. Once selecting the category, application, legal and administrative process (LAP) and the country you are interested in, you will be directed to a page displaying the data collected in the course of the project.

Production of hydrogen

Centralised (Electrolysis, Steam-Methane reforming, and H2 liquification)

This application concerns the production of hydrogen at one location, in quantities to cover the needs of hydrogen over a relatively large geographic area for a relatively large number of points of use, implying hydrogen transportation

- Land use plan (zone prohibition)
- Permitting process (include former LAP: emission regulation)
- Permtting requirements (include LAP: safety-distances)

Localised (Electrolysis, Steam-Methane reforming, and H2 liquification)

Stationary Storage

Transport and distribution of hydrogen

Hydrogen as a fuel and refueling infrastructure for mobility purposes

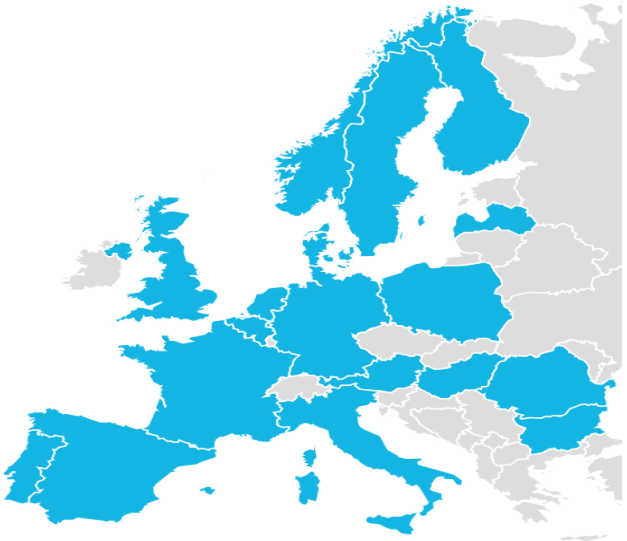
Vehicles

Electricity grid issues for electrolysers

Gas grid issues

Stationary power: fuel cells

Introduction of green hydrogen in Industry



HyLaw – Online Database preview

HyLAW Online Database

Home | About HyLAW | Info Centre | Database | Events | Partners | Contact | Search

Home / Database / Production of hydrogen / Centralised (Electrolysis, Steam-Methane reforming, and H2 liquification) / Land use plan (zone prohibition)

Land use plan (zone prohibition)

Production of hydrogen | Centralised (Electrolysis, Steam-Meth | Land use plan (zone prohibition)

Database | Compare LAPs | Legislation

Land use plan (zone prohibition)

This LAP refers to the land use plan and analyses the legal requirements for building a centralised hydrogen production facility (including potential zone prohibition), identifies the authority responsible for delivering the land use permit, gives an estimate of the time needed to change the land use plan, and finally highlights if the permit process is uniform throughout the country.

Germany

Expand all answers

a - What are the main regulations/requirements regarding land use plans for building a hydrogen production facility (e.g. permitting regime, agreement)?

b - Are there specific requirements or zone prohibitions for building a hydrogen production facility in the land use plans?

Which is the authority responsible for delivering the land use permit ?

The preparatory and legally binding land use plans are developed and adopted by the municipalities in the framework of national legislation.)

Is there a uniform permit process at local level throughout a country? (uniform interpretation?)

If needed, what is required and how much time does it take to change the land use plan?

Is it a barrier?	No
Assessment Severity	0
Assessment	The LAP is important for identifying the types of land use plans and their requirements resp. prohibitions for building of an industrial hydrogen production plant.

Show National legislation

Show EU legislation

Show Glossary

Show Pan-European Assessment

View Legislation Table

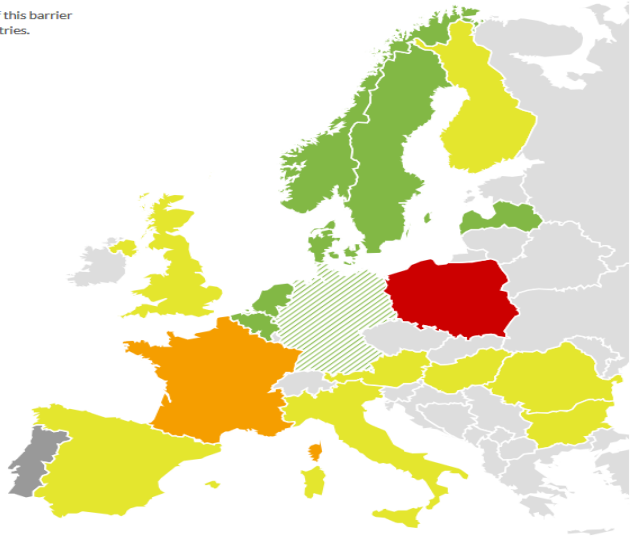
PDF Export | Excel Export

The information is correct | There are errors ...

Submit a suggestion for improvements

This map depicts the severity of this barrier across the HyLaw Partner countries.

- No barrier
- Low
- Medium
- High
- Data not available
- Selected countries



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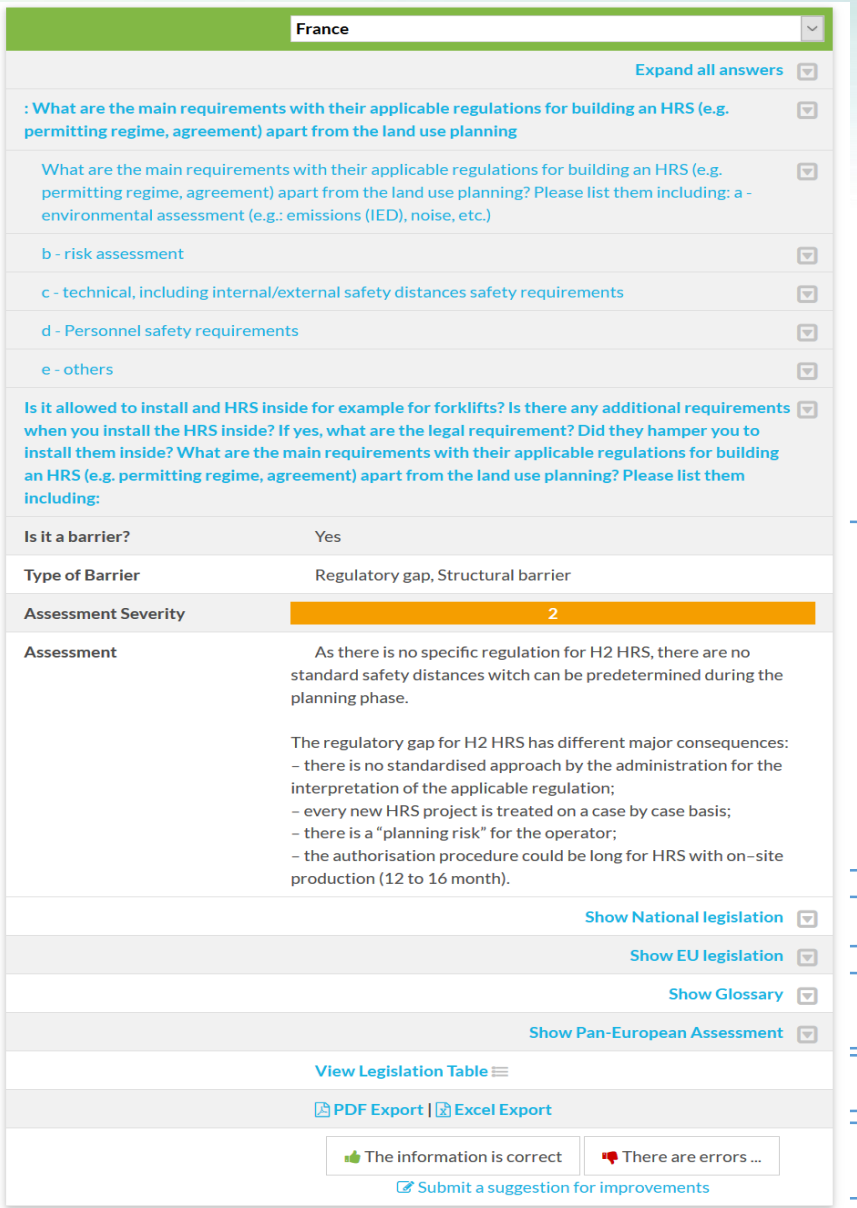


Questions and Answers:

- A starting point to understand the process and requirements
- Future work (possible follow-up) could go deeper or answer additional questions

Assessment:

- Project partners *tried* to assess whether the process represents a barrier for industry
- Somewhat subjective, but reasoning is explained for each country and on pan-European level (see below)

Applicable Legislation (National and EU, incl. standards) as well as links to the legal acts where available

Glossary (to explain terms used) and **Pan European Assessment** (to explain the severity of assessment)

Export and other display functionalities

Stakeholder feedback (multiple functionalities, including editing)

HyLAW: Analytical Reports

- D4.1: Detailed **cross-country analysis:** For each process
    - Presentation of the problem
    - Assessment of root causes
    - Recommendations
- D 4.2: **List of legal barriers**, prioritized by degree of severity (Estimated December)
- D 4.4. **List of the most relevant EU legislation**

www.hylaw.eu/info-centre

D4.1 - Cross-country analysis - examples

Table 9: Comparative list of incentives on hydrogen cars / buses in the partner countries

	Access to specific lanes	Free/ reduced fee parking	Tax incentives	Registration fee reduction	Toll charges exemption	Public proc. Rules	Others
Austria	✗	✗	✓	✗	✗	✗	✗
Belgium	✗	✗	✓	✓	✓	✗	✓
Bulgaria	✓	✓	✓	✓	✗	✓	✗ (✓)
Denmark	✗	✓	✓	✓	✗	✓	✗
Finland	✗	✓	✗ (✓)	✗	✗	✗	✗
France	✓	✓	✓	✓	✓	✓	✗
Germany	✓	✓	✓	✗	✗	✓	✓
Hungary	✗	✗	✗	✗	✗	✗	✗
Italy	✗	✗	✗	✗	✗	✗	✗
Latvia	✓	✓	✓	✓	✗	✗	✗
Netherlands	✗	✗	✓	✗	✗	✗	✗
Norway	✓	✓	✓	✓	✓	✗ (✓)	✓
Poland	✗	✗	✗	✗	✗	✗	✗
Portugal	✗	✓	✓	✗	✗	✗	✗
Romania	✗	✗	✗	✗	✗	✓	✗ (✓)
Spain	✓	✗ (✓)	✓	✓	✓	✗	✓
Sweden	✗	✗	✓	✗	✗	✗	✓
UK	✗ (✓)	✗ (✓)	?	✓	✓	✓	✓

D4.1 - Cross-country analysis - examples

When considering the process of permitting the construction and operation of a HRS, there are very few countries where the regulations are specifically designed to regulate HRSs, the most advanced being Germany, Denmark, the UK and the Netherlands. Specific Regulations (AMPG) in France are also under development

Where explicit requirements exist, they invariably require a risk assessment to be carried out covering safety risks associated with fire and explosion, health risks and environmental risks. The risk assessments should also identify the control measures to be put in place to provide an adequate level of public safety for the proposed installations. The risk assessment should include an assessment of major accident hazards presented by the delivery, storage and dispensing of hydrogen at the site and identify controls and contingency plans.

Where specific regulations for hydrogen fuelling stations don't exist, it is expected that authorities will draw on both the permitting process of conventional refuelling stations as well as the regulations applicable for (industrial) H2 storage and for H2 production. This method of working generates requirements well beyond those applicable to conventional stations and the permitting process carries some "regulatory risks" for the operator, as the interpretation and demands from the regional administrative authority can be different from one region to another. By contrast, the requirements for conventional fuel storage at refuelling station are very similar in all EU countries. The lack of experience for potential HRS operators as well as public authorities coupled with the lack of guidelines and instructions for local authorities can cause delays and extra costs and may lead to divergent interpretations from case-to-case, further complicating the obligations of HRS operators.

Recommendations:

Recommendation: Develop approval guidelines for HRS
Justification: When considering the process for permitting the construction and operation of a HRS, there are very few countries where there is a specific administrative guidance detailing the process to be followed. Without much experience and guidance, local authorities are left to interpret which requirements apply and which would not when considering permitting a HRS on a case-by-case basis. This causes extra work and delays for both operators and for authorities and carries regulatory risks for the HRS operator. The lack of experience of both operators as well as public authorities on building up HRS infrastructure, coupled with the lack of guidelines and instructions for local authorities cause delays and extra costs and may lead divergent interpretations from case-to-case, further complicating the obligations of the HRS operators.
Description: Approval guidelines for HRSs should be developed to support smooth procedural implementation by both local authorities as well as HRS operators. They should be developed in close cooperation (and endorsed by) competent authorities. From a procedural point of view, the approval guidelines for HRSs should present the step-by-step processes which should be followed by HRS operators to get all the necessary permits and approvals. From a substantive point of view, the approval guidelines should clarify which legal obligations (e.g. permits, requirements, etc.) apply to HRSs where storage of hydrogen is below certain applicable thresholds (varying across countries) and which apply to those with on-site production (e.g. via electrolysis)
Who: National / Regional and Local authorities

HyLAW: Policy Papers

- **Policy papers:** Key messages and recommendations
  - National Policy Papers for each country
  - Horizontal (for each application) policy papers (estimated December)
  - EU Policy paper (Estimated December)

The HyLaw consortium has analysed the applicable legal and administrative processes in all the countries covered and has produced a set of analytical reports which seek to shed more light on the sources of regulatory barriers and the impact they have on the timely delivery of hydrogen technologies. We are happy to make them publicly available below:

National policy papers

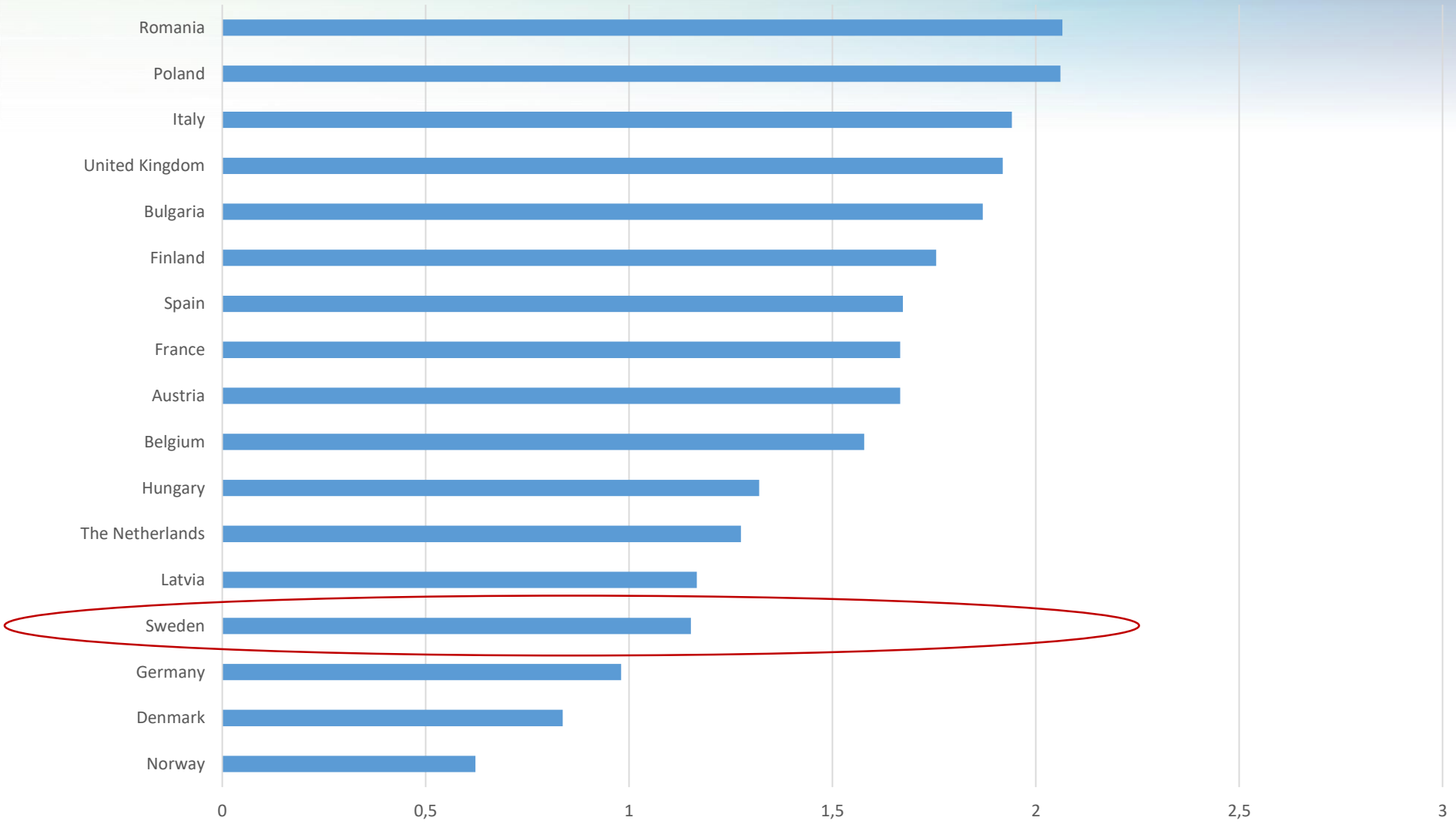
Building on the content of the database, National policy present the state of play of the Hydrogen Regulatory environment in each country and detail country specific recommendations.

Austria	Germany	Poland
Belgium	Hungary (HU)	Portugal
Bulgaria	Italy	Romania
Denmark (EN) (DK)	Latvia	Spain (EN) (ES)
Finland	Netherlands	Sweden
France	Norway	United Kingdom

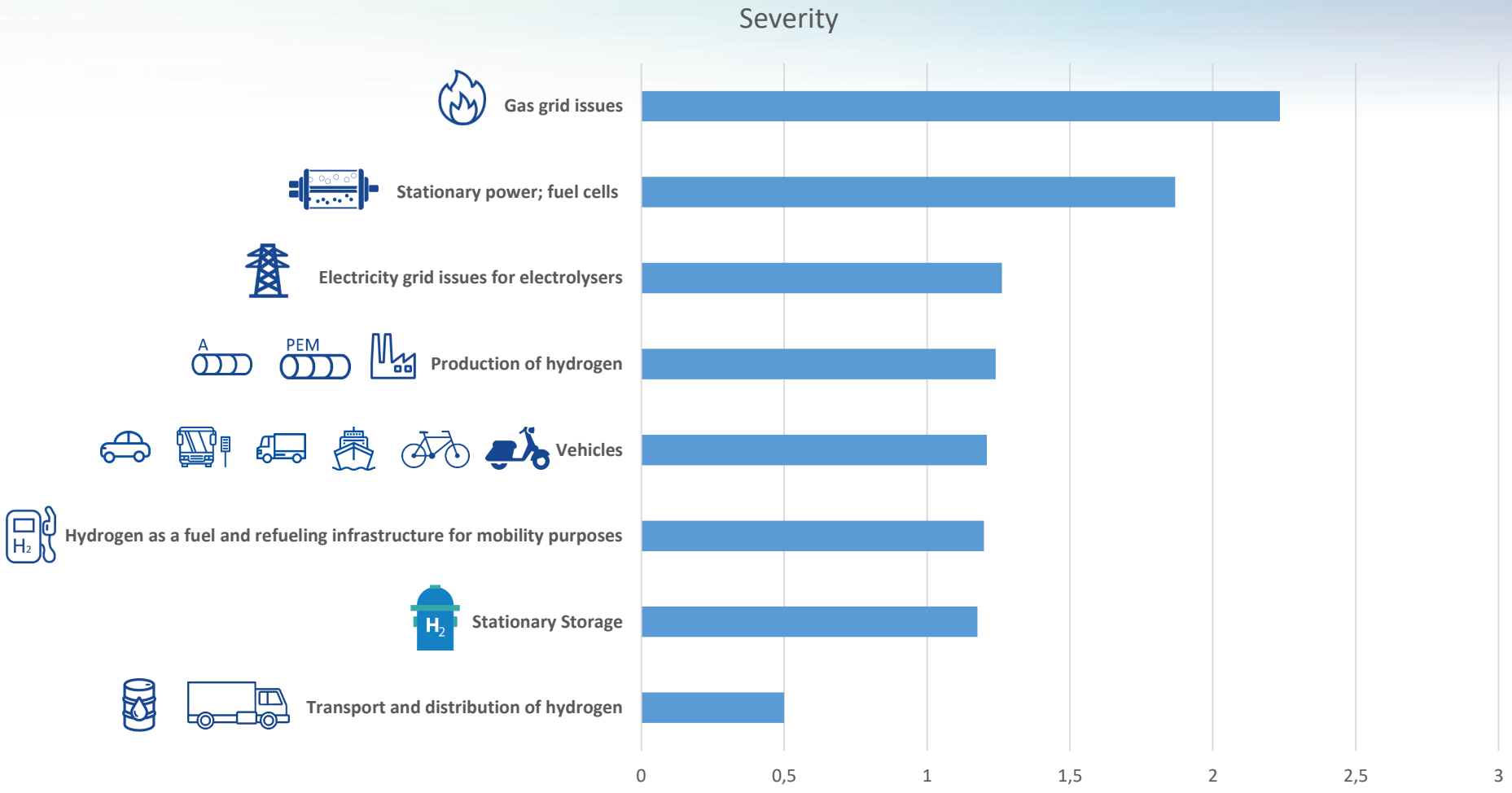
EU policy paper

Analytical reports and other deliverables

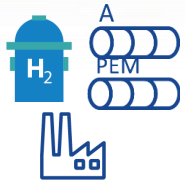
Overall assessment across countries



Severity of barriers in each category



HyLaw: Horizontal Findings – an overview



Directives designed to regulate large scale emitting chemical processes end up applying also to small scale, non-emitting processes / national permitting processes

Standards for compressed hydrogen receptacles (e.g. trailers) would need to be adapted to world with a higher demand for Hydrogen

- A guarantee of origin system for green and low carbon hydrogen at European level is essential;
- Infrastructure development encouraged at EU level / Common standards and definitions;
- Consumption of hydrogen (as a fuel) encouraged at EU level

Type approval and registration of hydrogen road vehicles appears to be quite clear and well regulated

HyLaw: General Findings

There is no clear and unequivocal legal position for P2G facilities recognized across both e-grid and gas grid networks

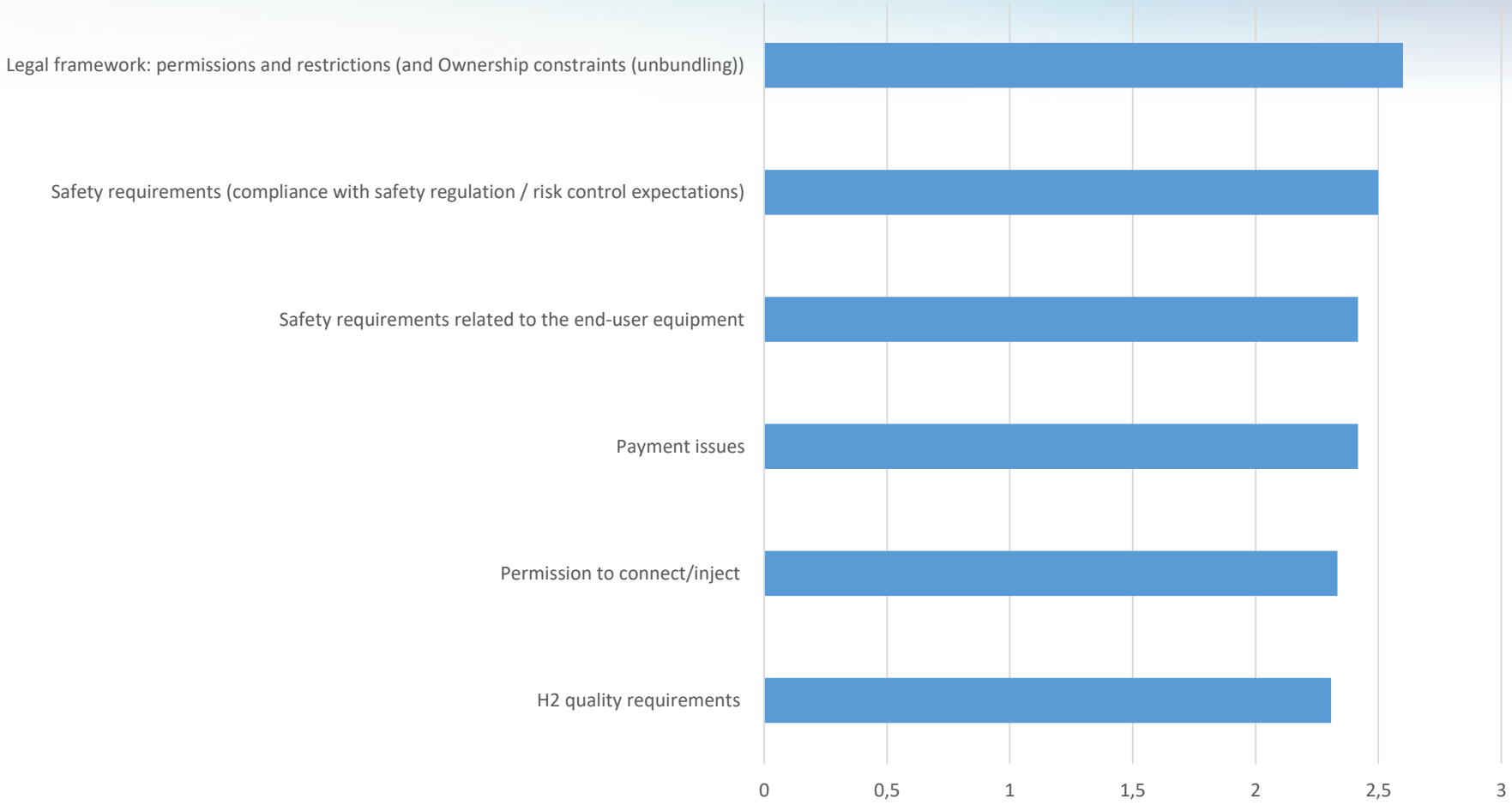
There are fundamental barriers severely constrain or prevent H2 injection in EU Gas Grids

The framework for permitting Power to Gas (P2G) plant and grid connection / injection requirements between the hydrogen supplier and the gas grid operators **should be included within relevant EU regulatory frameworks** to ensure comparable treatment across the EU.

There is no common EU framework for installation of FC micro-CHP units, however, no significant operational barriers were identified

Large Scale (industrial) stationary power fuel cells not covered by HyLaw, however, would the EU ETS apply to Solid Oxide Fuel Cells producing over 20 MW of power?

Gas Grid Issues
Severity of barriers



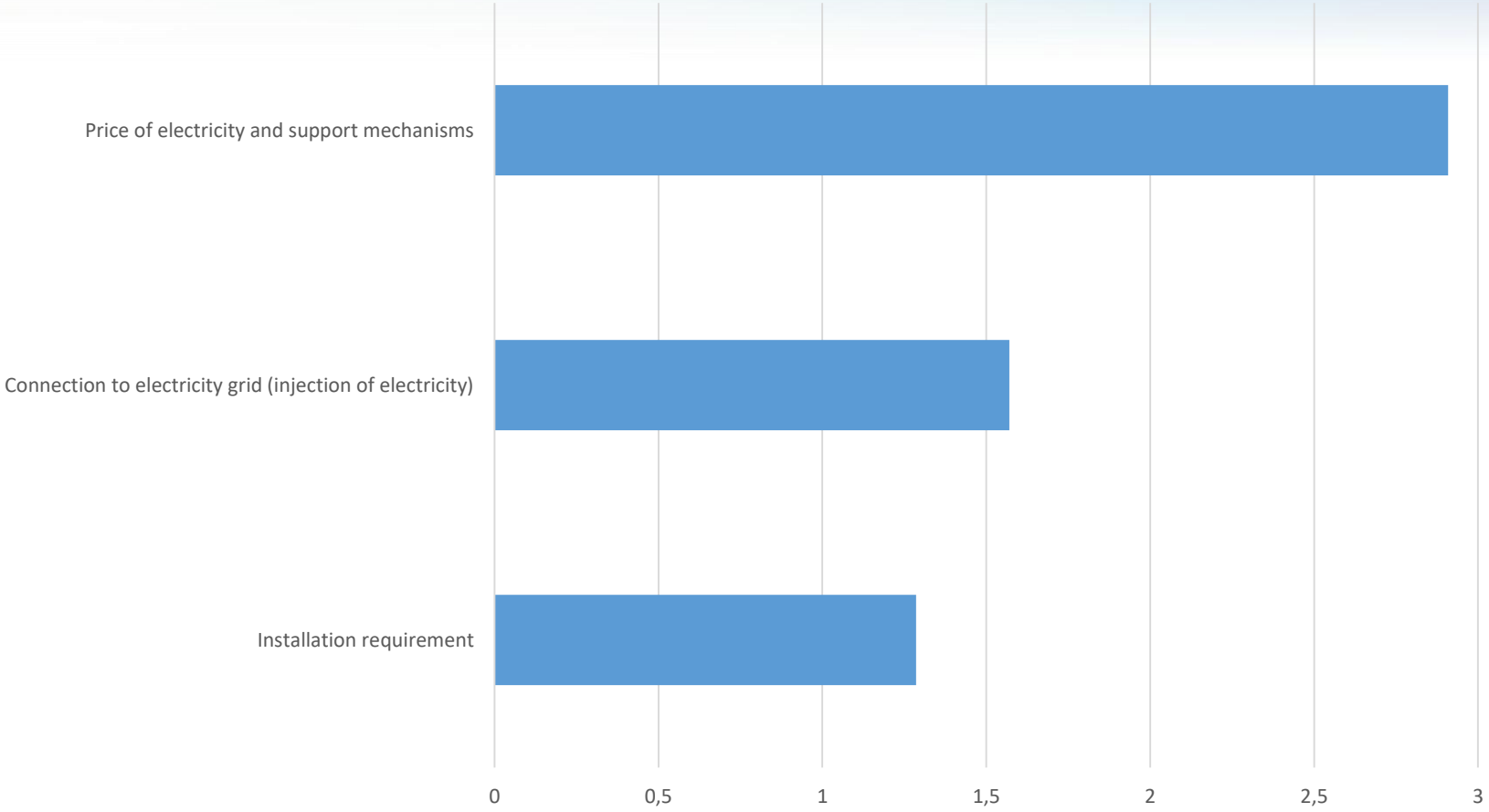
Gas Grid Issues
EU level Considerations

There are fundamental legal barriers which severely constrain or prevent H2 injection in EU Gas Grids

- Diverging H2 concentration levels in the gas grid
- Diverging H2 concentration levels at injection level (pre-mixing or not)
- Arrangements based on calorific value / Wobbe Index
- No remuneration / payment frameworks

The framework for permitting Power to Gas (P2G) plant and grid connection / injection requirements between the hydrogen supplier and the gas grid operators **should be included within relevant EU regulatory frameworks** to ensure comparable treatment across the EU.

Stationary Power
Severity of barriers

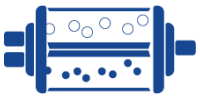


Stationary Power
EU level Considerations

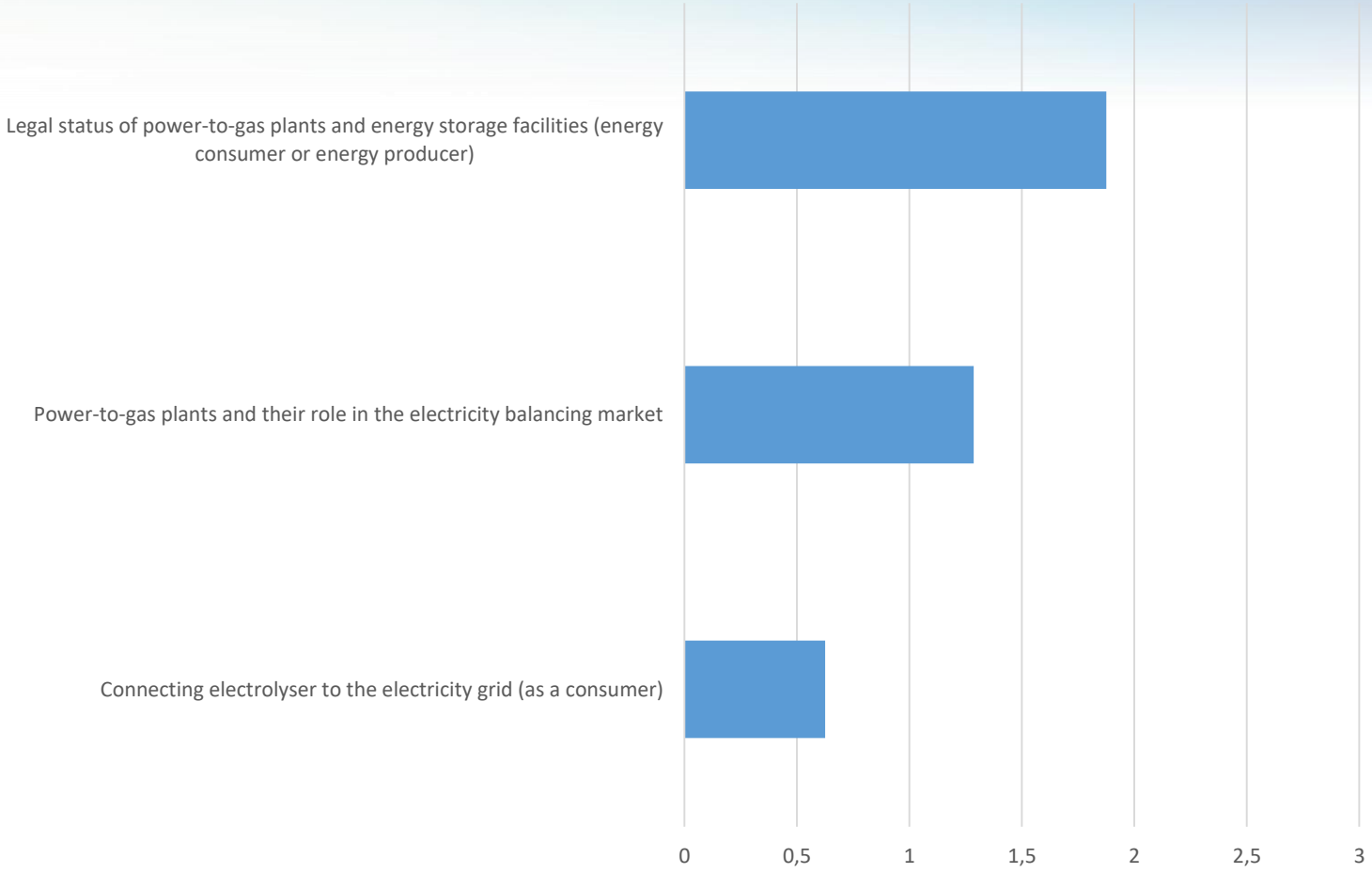
There is no common EU framework for installation of FC micro-CHP units, however, no significant legal barriers were identified

- Stationary fuel cells enjoy the same treatment as any other heating appliances working on gas in regards to gas network connection.
  - Regulation (EU) 2016/426
- Large Scale (industrial) stationary power fuel cells not covered by HyLaw, however, would the EU ETS apply to Solid Oxide Fuel Cells producing over 20 MW of power?

Very few support mechanisms for FC-micro CHP systems. Existing measures unlikely to contribute substantially to mass deployment



Electricity Grid for Electrolizers and P2G facilities
Severity of barriers



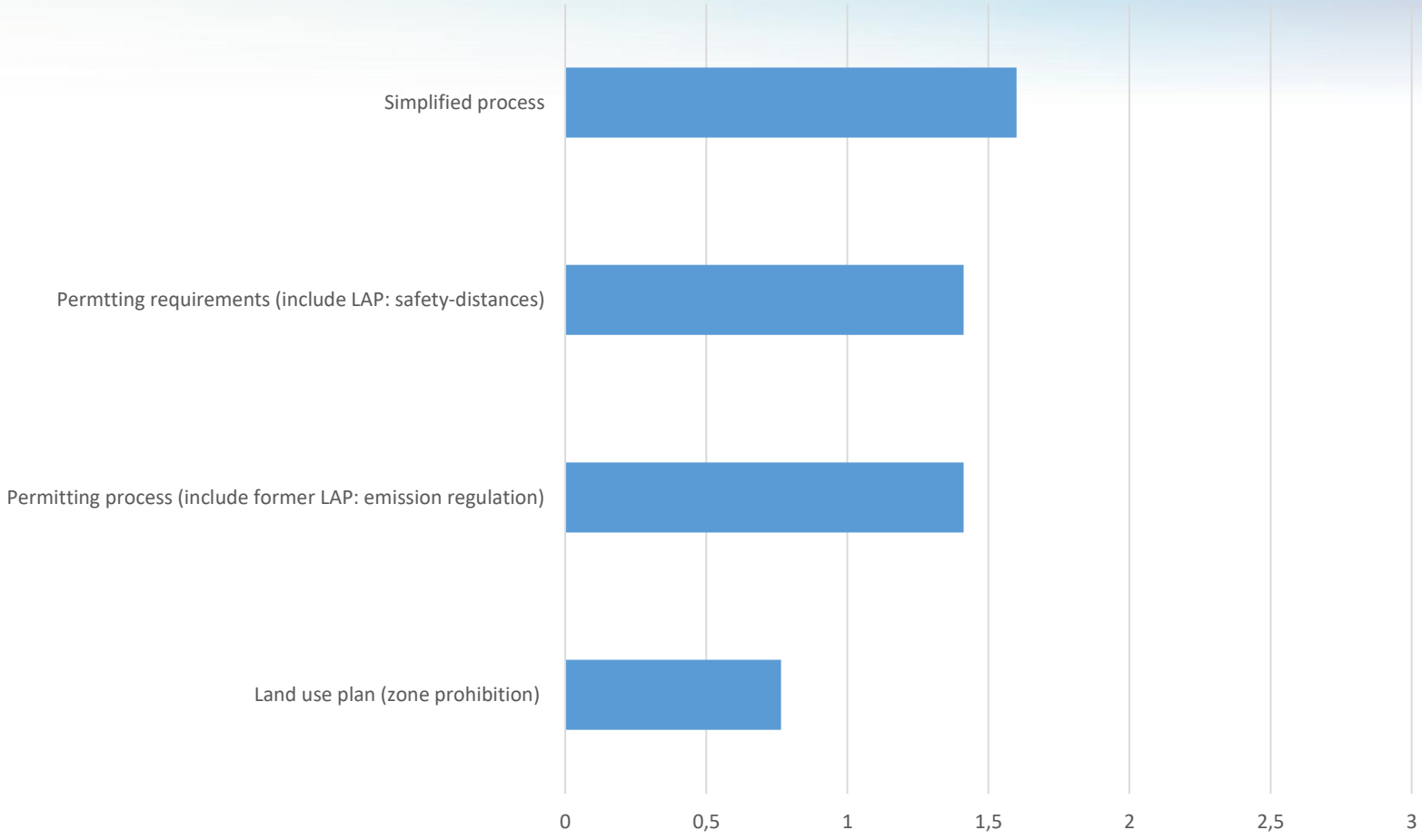
Electricity Grid for Electrolizers and P2G facilities
EU level Considerations

There is no clear and unequivocal legal position for P2G facilities recognized across both e-grid and gas grid networks

The **electricity grid** regulatory framework is generally supportive of hydrogen production from grid connected electrolyser systems*

- However, no provision for P2G systems under either e-grid or gas grid common rules. No MS has an established and coherent regulatory approach to P2G systems.
- P2G operate 'by exception' or under a delineated / time specified demonstration programme (unique set of arrangements and negotiations across multiple regulatory and safety agencies

Production and Storage of Hydrogen
Severity of barriers



Production and Storage of Hydrogen
EU level Considerations (1)

- Production and Storage of Hydrogen – obligations set by **EU legislation**:
  - Risk Assessments (SEVESO Directive).
  - Health and Safety requirements and conformity assessment procedures, (ATEX Directive).
  - Integrated Environmental obligations, (IED)
  - Environmental Impact Assessment procedures, (SEA and EIA Directives).
  - Others
- Transposed into national law.
  - Large room for discretion in application (do they apply or not / under what conditions)
  - Differences in efficiency of procedures.

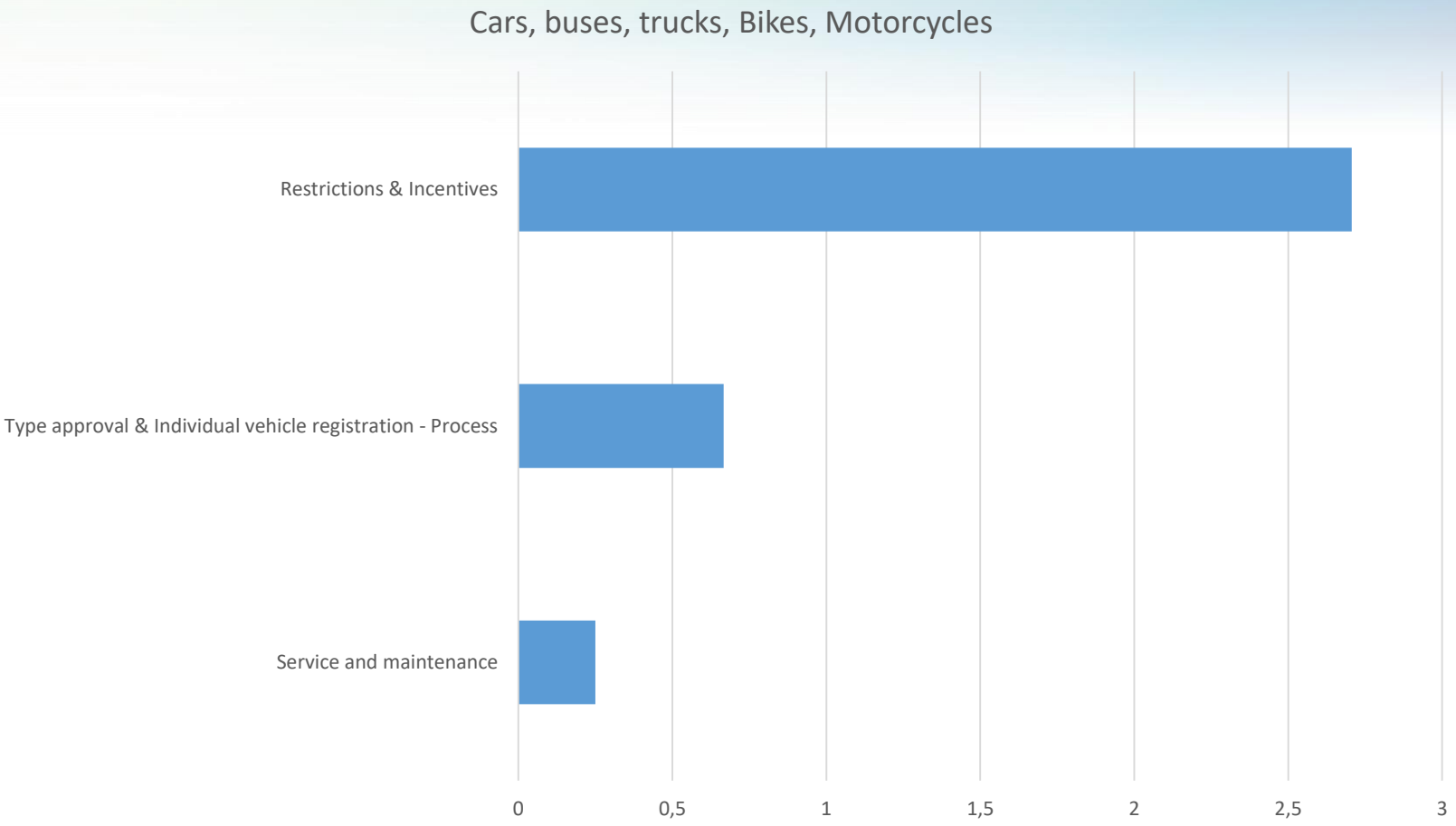
Production and Storage of Hydrogen
EU level Considerations (2)

- Horizontal (EU) problem:
  - Hydrogen production: same obligations irrespective of production method
  - SEA/EIA and IED obligations – (interpretation of industrial scale) – possible effect on small scale production (is it relevant?)

Directives designed to regulate large scale, chemical, emission emitting industrial processes but end up applying also to small scale, non-emitting processes.

- National level problem (each MS):
  - Permitting process is long, costly and its outcome is uncertain

Hydrogen Vehicles
Severity of barriers



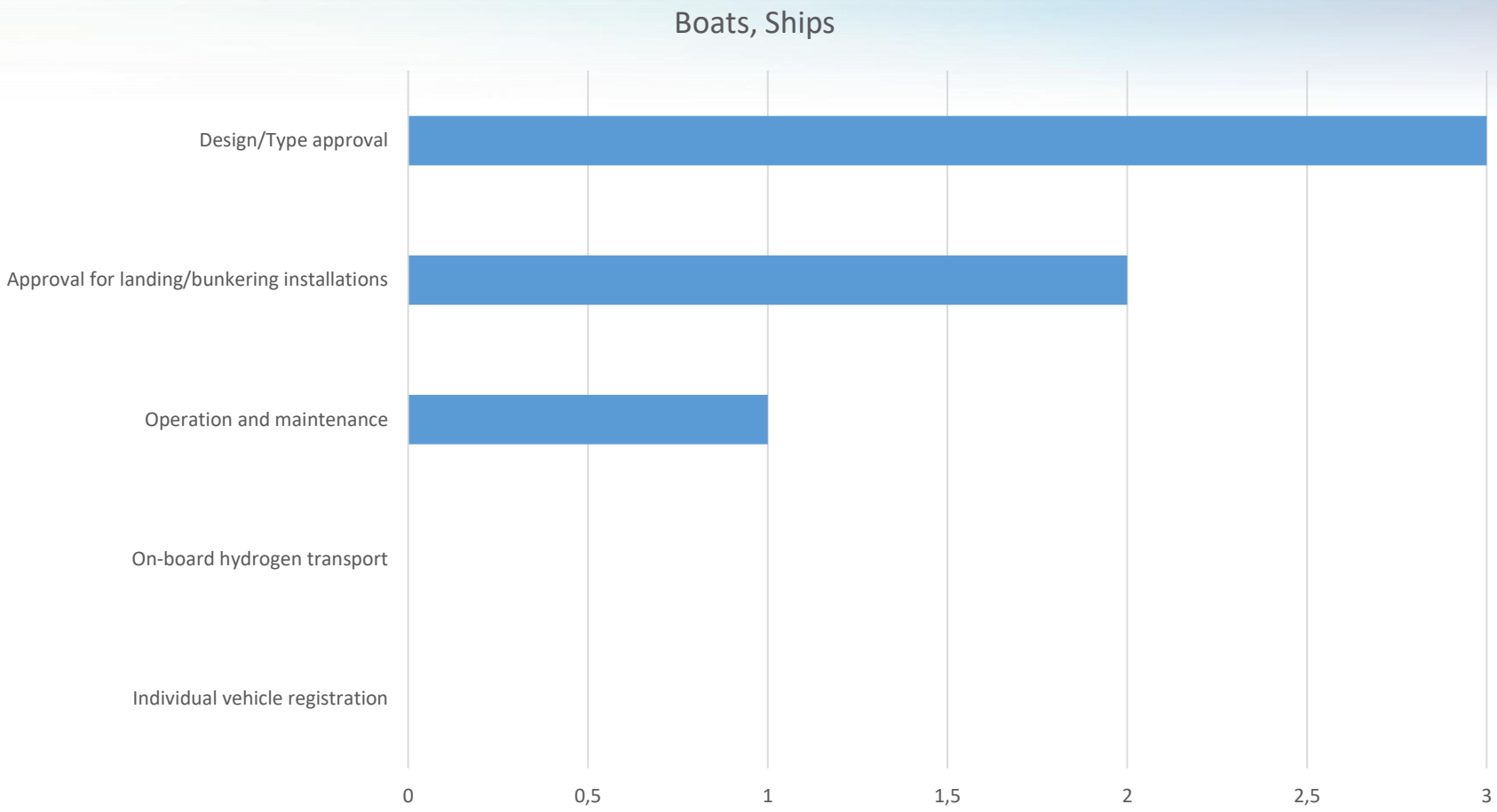
Hydrogen Vehicles
EU level Considerations

Type approval and registration of hydrogen road vehicles appears to be quite clear and well regulated

- Classes M (passenger cars and busses), N (trucks), O (trailers),
  - Type approval:
    - Directive 2007/46 (Framework Directive)
    - Regulation 79/2009 (Harmonized safety requirements for hydrogen-powered vehicles)
    - Regulation 692 / 2008 revised by Regulation 630/2012
    - Regulation (EU) No 406/2010 (technical specifications and test procedures);
  - Registration
    - Directive 1999/37/EC on the registration documents of vehicles, amended by Directive 2003/127/EC

Support mechanisms insufficient and sometimes favor other zero / low emissions alternatives

Hydrogen Vehicles
Severity of barriers

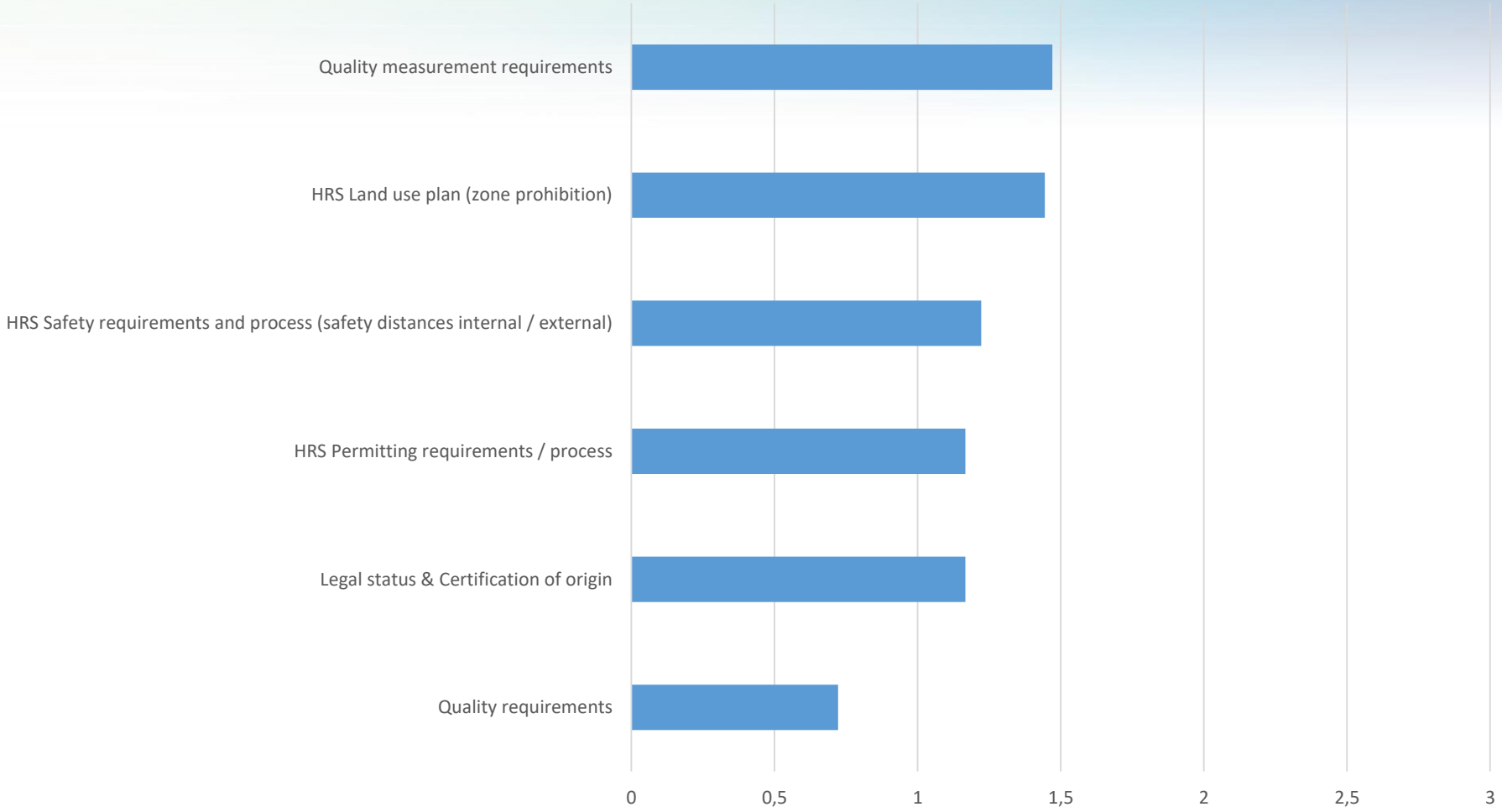


Hydrogen Vehicles
Horizontal (International) considerations

"Type approval" of Hydrogen fuel cell vessels is highly complicated due to the absence of rules

- Maritime (sea-going) vessels
  - International code for safety of ships using gases or other low-flash point fuels (**IGF Code)**
  - Type approval based on Alternative Design Assessment regulated by the convention of life at Sea (SOLAS II)
- Inland Vessels:
  - Directive 2016/1629/EU empowers CESNI (Comité Européen pour l'Élaboration de Standards dans le Domaine de Navigation Intérieure – CESNI) to develop standards in the field of inland navigation

Hydrogen as Fuel and HRS
Severity of Barriers



Hydrogen as Fuel and HRS
EU level Considerations (1)

A guarantee of origin system for green and low carbon hydrogen at European level is essential

- CertifHy : EU-wide guarantee of origin (GoO) scheme for low-carbon and renewable (green) hydrogen.
  - Separate the renewable character of the hydrogen (proven by the GoO) from the movement of the actual molecules
    - Allowed under the RED II subject to conditions

Hydrogen as Fuel and HRS
EU level Considerations (2)

Infrastructure development encouraged at EU level
Common standards and definitions under development

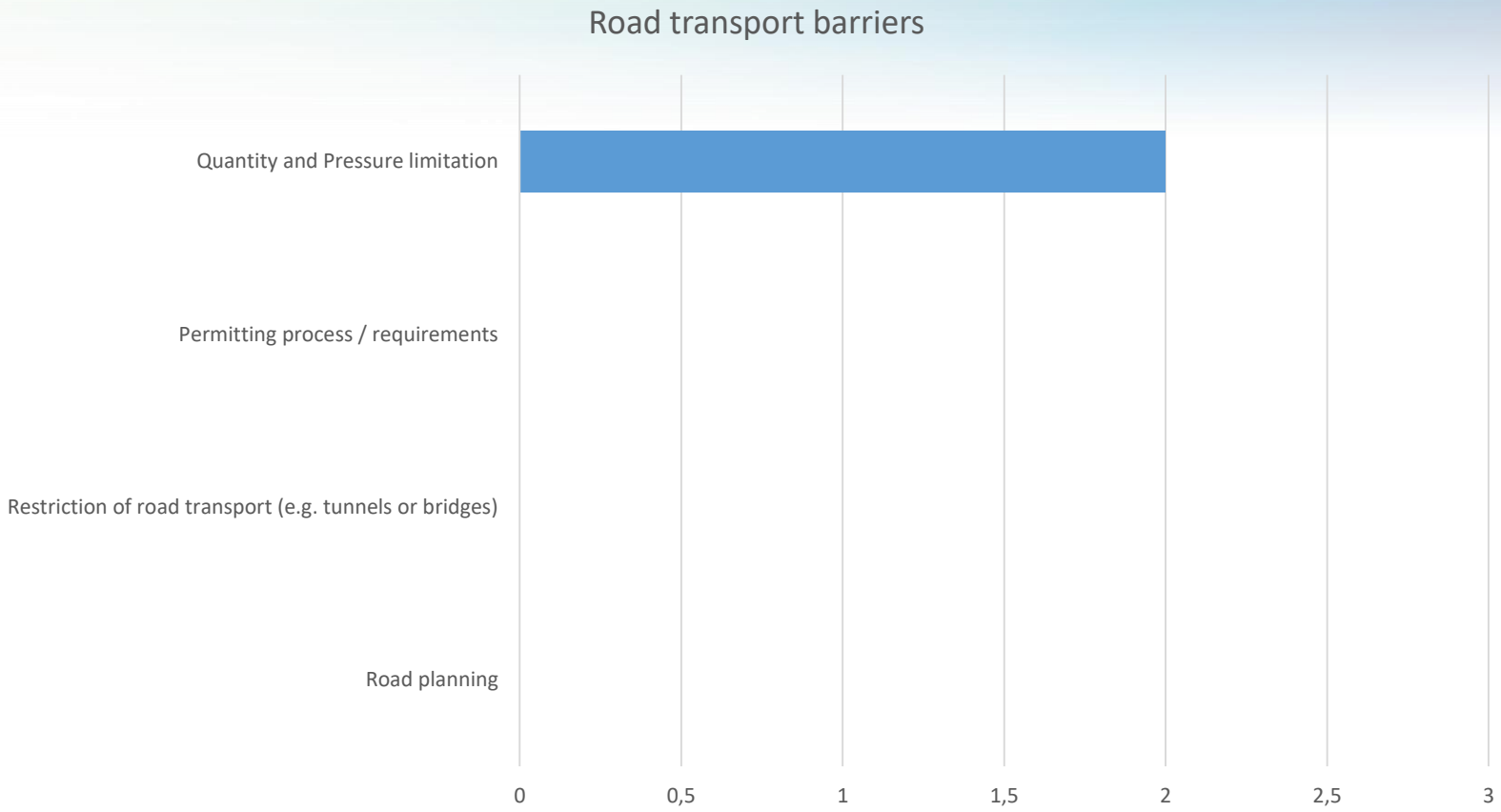
- Alternative Fuels Directive (Directive 2014/94/EU)
  - Minimum requirements for the building-up of alternative fuels infrastructure (HRS are optional for MS)
    - Mandatory in AFID 2?
  - Technical specifications for hydrogen refuelling points
    - Reference to existing standards
      - ISO/TS 20100 - Gaseous Hydrogen Fuelling
      - ISO 14687-2 – Hydrogen Fuel
      - ISO/DIS 17268 - Gaseous hydrogen motor vehicle refuelling connection devices
- Fuels Quality Directive
  - Defines renewable transport fuels (Definition also in RED II)

Hydrogen as Fuel and HRS
EU level Considerations (3)

Consumption of hydrogen (as a fuel) encouraged at EU level

- Mandatory targets for the overall share of energy from renewable sources: Renewable Energy Directive (RED)
  - RED II: Gross final consumption 32% renewable by 2030
  - RED II: Transport sector 14% renewable by 2030
    - Renewable liquid and gaseous transport fuels of non-biological origin (RFNBO) **taken into account when used as intermediate product for the production of conventional fuels.**
    - Additionality: new (renewable) hydrogen production capacity needed for calculating the target under conditions

Transport and Distribution of Hydrogen
Severity of Barriers



Transport and Distribution of Hydrogen
EU level Considerations

Apart from some local restrictions, no major, EU wide issues

Relevant Legislation:

- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
  - Directive 2008/68/EC on the inland transport of dangerous goods.
- Directive 2010/35/EU of 16 June 2010 on transportable pressure equipment
- REACH Regulation (Regulation (EU) No 453/2010)

But… standards for compressed hydrogen receptacles would need to be adapted to world with a higher demand for Hydrogen

Thank you for your attention

Questions?

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HyLAW
Hydrogen law

Grant Agreement No 737977