HarmonHy Pre-normative Research Traffic Light Survey (WP2)
Project Questionnaire

Guidelines

The European Commission Project **HarmonHy** (SES6-513542 - *Harmonization of Standards and Regulations for a Sustainable Hydrogen and Fuel Cell technology*) aims at:

- Make an assessment of the activities on hydrogen and fuel cell related regulations and standards on a worldwide level
- Identify the needs for standards as perceived by the industry (pre-normative aspects)
- Defining specific international collaborations
- Identify gaps or conflicts and make propositions to solve fragmentation.

In particular, this Questionnaire is part of the activities planned for the Work Package 2 (WP2) "*State-of-the-Art of Pre-normative Research*", in which pre-normative research activities are surveyed in most significant programmes/projects. The meaning of pre-normative research used in the HarmonHy Project is: *the preliminary phase of experimental research aimed at better characterising the novel technologies and evaluating the related safety aspects by applying well established procedures and methodologies(whose development is part of the pre-normative activities).* This Survey will be instrumental in recommending to the EC topics/activities in the next 7th Framework Programme on RCS pre-normative research.

This Questionnaire is mainly aimed at collecting information and data to monitor the past and ongoing research activities, mainly in publicly-funded programmes/projects (in USA, Japan, European Union and other relevant countries), in support of the development of regulations, codes and standards (RCS). The data collection is most based on a semi-qualitative "Traffic Light Analysis" in which the research activities can be classified according to the following Table.

Table 1. Traffic Light Analysis Definitions for pre-normative research.

Symbol	Meaning	Definition	Examples
🔴	No RCS	The research work does not address any specific RCS activity.	No way to use project results for RCS.
🟡	Indirect RCS	There are some activities potentially useful for RCS development.	Test results in Demo Projects able to specify testing profiles for materials, components & systems
🟢	Direct RCS	The project is a source of results and activities addressing RCS development.	The specific characterization of materials & components, development of test procedures, risk and safety analysis of operating conditions, extreme condition testing.

The next step of the Survey will be the collection of more quantitative information on some specific projects more relevant for RCS pre-normative research, screened from the present survey.

The data collection addresses two specific technologies (Hydrogen and Fuel Cells) and two major applications (Transport and Stationary) and *will take between 10-15 minutes per project*.

The Questionnaire is divided in four parts.

Part 1 contains a short project description with starting date and duration, the major application, a short summary of the project contents and an approximate budget (with an indication of the public funding if any).

Part 2 regards the Traffic Light Analysis. Two sections, one for Hydrogen and the other for Fuel Cells, present a list of major items/issues of interest for RCS pre-normative research. One of the 3 lights has to be "switched on" for each item. Some free fields are made available for introducing new topics/items considered in the described project.

Part 3 requires some more details and a limited description (very few lines) on up to three topics on which the described project has experimental pre-normative research (e.g. sensor development, experimental or mathematical analysis of safety aspects, testing methods and so on). The description should include details of the topic (e.g. which experimental work, one or two key achievements)

Part 4 contains references (mainly publicly available, such as, publications, presentations, website pages, papers) and the indications of the person filling in the Questionnaire and, possibly, contact persons involved in the presented project.

The results of the survey will be made available on the HarmonHy website, www.harmonhy.com, after a preliminary analysis and aggregation.

Instructions

When a Word file is used you have to follow this procedure:

1. Open the file "HarmonHy WP2 Questionnaire Template".
2. Deactivate the Design Mode.
3. Fill in the Questionnaire.
4. "Save as" the file giving the name of the presented project.

HarmonHy Pre-normative Research Traffic Light Survey

Project Questionnaire

Part 1. Project description

Project Name:

Project Start: Project Duration:

Project Description

Overall Budget in € or $: Public Funding in € or $:

Reference Programme:

Application area:

Part 2. Traffic Light Analysis

Part 2.1 Hydrogen Technologies

	Topics/Issues/Items	Red	Yellow	Green
General	Fuel Quality	☐	☐	☐
	H_2 Sensors	☐	☐	☐
	Materials Compatibility*	☐	☐	☐
	Safety (in all the phases)	☐	☐	☐
H_2 Prod.	Comparing production processes	☐	☐	☐
	Well-to-tank analysis	☐	☐	☐
H_2 Distribution and Storage	Materials design and test methods	☐	☐	☐
	Smart sensors	☐	☐	☐
	Materials compatibility for pipelines*	☐	☐	☐
	Testing procedures for characterization of storage systems	☐	☐	☐
	Safety issues for storage systems (high pressure, liquid tanks)	☐	☐	☐
H_2 end use	Fuel infrastructure	☐	☐	☐
	Fuel-vehicle interface	☐	☐	☐
	Refuelling Stations	☐	☐	☐
	Parking areas, garages, tunnels	☐	☐	☐
	H2 ICE Engine/ Vehicle	☐	☐	☐

*** Technical Reference for Hydrogen Compatibility of Materials from www.ca.sandia.gov/matlsTechRef/** A materials guide is a necessary resource to develop codes and standards for stationary hydrogen use, hydrogen vehicles, refuelling stations, and hydrogen transportation. Materials data is needed on deformation, fracture, fatigue, and impact loading of metals in environments relevant to the hydrogen economy infrastructure. The identification

of hydrogen-affected material properties such as yield and tensile strengths, fracture toughness and threshold stress-intensity factors, fatigue crack growth rates and fatigue thresholds, and impact energy are considered high priorities to ensure the safe design of load-bearing structures. Sandia National Lab. in USA is conducting an extensive review of reports and journal publications to gather existing materials data for inclusion in the Technical Reference for Hydrogen Compatibility of Materials.

Other topics or comments

Part 2. Traffic Light Analysis

Part 2.2 Fuel Cell Technologies

	Topics/Issues/Items	Red	Yellow	Green
General	Fuel Quality	☐	☐	☐
	Safety (in all the phases)	☐	☐	☐
FC components	Materials compatibility	☐	☐	☐
	MEA characterization	☐	☐	☐
FC Stacks	Materials compatibility	☐	☐	☐
	Characterization procedures	☐	☐	☐
	Environmental tests: vibration and extreme conditions (e.g. saline atmosphere)	☐	☐	☐
H_2 end use	Balance of plant (electronics, thermal management) testing	☐	☐	☐
	Fuel processor testing procedures	☐	☐	☐
	Environmental tests: vibration and extreme conditions (e.g. saline atmosphere)	☐	☐	☐
	EMC (EMI) tests	☐	☐	☐
FC Applications	Vehicle operations	☐	☐	☐
	Emission measurements	☐	☐	☐
	Fuel consumption measurements	☐	☐	☐
	Materials compatibility	☐	☐	☐
	Testing profiles	☐	☐	☐
	Refuelling interface	☐	☐	☐
	H_2 sensors	☐	☐	☐
	EMC (EMI) tests	☐	☐	☐

Other topics or comments

Part 3. Short description of key pre-normative research activities in the Project

Topic 1:

Topic 1 Description

Topic 2:

Topic 2 Description

Topic 3:

Topic 3 Description

Part 4. Project References and Key Contact Persons

Reference 1:

Type of reference

Source Reference 1:

Reference 2:

Type of reference

Source Reference 2:

Reference 3:

Type of reference

Source Reference 3:

Key Project Contact Person (name and address):

E-mail Address:

This Questionnaire has been filled in by:

Contact Person (name and address):

E-mail Address:

Optional

Comments/Suggestions: