HYLIGHTS

Hydrogen for Transport in Europe

Project Governance Indicators

for Large-Scale Hydrogen Road Transport Demonstration Projects

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A Coordination Action to Prepare European and Fuel Cell Demonstration Projects on Transport

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Disclaimer

This document is the result of a collaborative work between HyLights Industry and Institute partners. The results of the research were subsequently elaborated and presented in a coherent manner, which involved extensive stakeholder consultation in locations around the world as well as feedback from the “HyLights” Industry Partners.
The ideas presented in this document were reviewed by certain "HyLights" project partners to ensure broad general agreement with its principal findings and perspectives. However, while a commendable level of consensus has been achieved, this does not mean that every consulted stakeholder or "HyLights" Industry Partner necessarily endorses or agrees with every finding in the document. The producer of this document is the sole responsible for its content and recommendations.

EXECUTIVE SUMMARY

"HyLights" is a Coordination and Support Action to accelerate the commercialisation of Hydrogen and Fuel Cells (HFC) technologies in the field of transport in Europe. This report is part of Work Package 5 (WP5) of the "HyLights" project, developed and funded by the European Commission. The objective of this document is to identify the key project success factors - from a legal and project management viewpoint - for the undertaking of large scale hydrogen road transport demo projects at EU (i.e. the Joint Technology Initiative for Hydrogen and Fuel Cells) or national/regional level (i.e. the "Clean Energy Partnership" in Germany or other projects), the so-called "Lighthouse Projects" (LHPs).

The findings will be a set of "Project Governance Indicators" (PGIs) and will also be included in a Monitoring and Assessment Framework (MAF) currently under development within HyLights at both project and programme level. The MAF for project level already comprises initial Key Performance Indicators (KPIs), looking at technical and technological factors, and some "Project Governance Indicators (PGIs)" a more in-depth analysis of which is presented in this document. Additional PGIs will be included throughout the development of the MAF at programme level.

The PGIs are key factors that could positively or negatively affect the realisation of an LHP and could be key to the efficient and effective organisational success of the projects.

For purposes of analysis the PGIs have been divided according to whether they focus more on the Project Management Functions or the Legal Form that a future LHP may assume. The key functions and forms are first presented in tabular form and then analysed briefly. The analysis demonstrates the importance of each PGI and its consequences on LHPs, and is based on a survey with project partners/managers of concluded and/or on-going demonstration projects, desk-based assessment and research (subsequently validated with different project managers and other project partners/participants), FP6 project management experiences, relevant project management theory (i.e. PRINCE 2), corporate and IPR law, PPP theory, recent JTI related legislative proposals and related EU legislation.

KEY FINDINGS

The main lessons learnt were derived from past/on-going hydrogen road transport demonstration projects for the establishment of future LHPs. The feedback received from project partners/managers demonstrated that the PGIs that were useful for past and current demonstration projects might not be applicable for future LHPs. The methodology used for the analysis is explained in more detail under Chapter 1 of the full report.

The key findings from this report have been summarised in a single table, annexed to this Executive Summary in Annex 1. This table comprises of all the key PGIs that have been identified to be used in a future LHP.

The Checklist provided in Annex 2 provides the list of all the PGIs that were identified through extensive research before ratings were attached. This list particularly, will serve as a "checklist" of options to be considered by project promoters, consortia and/or the European Commission that will undertake and/or be involved in future LHPs.

Both tables of PGIs were compiled up the end of April 2008.

Table 1

Steering Group	§ Sets the direction of the project – is the decision making body § Should encourage partners to commit to the project and builds-in discipline to the project
Advisory Board	§ May be beneficial to advise/support the Steering Group § May be appointed ad personam and therefore may include external parties including NGOs, research groups etc.
Project Manager /Management Body	§ Role is to execute the project and to facilitate information exchange between those who steer the project and those on the operational level § May be a Managing Director/Team if a single legal entity is created § Overlooks budget implementation and monitors whether project activities remain within the initially identified project financial/objectives' boundaries § Responsible for daily operations and for reporting to Steering Group should change management be deemed necessary
Regional Nodes	§ May be useful in larger, cross-cultural LHPs (a) for inclusion of less developed geographical areas but with great potential to join the hydrogen economy as well as (b) development of different hydrogen production methods based on each area's local potential and (c) foster the participation of SMEs in the projects i.e. more local system and component developers § Could tailor certain operations to local needs while leaving other, broader operations more centralised and lead to the establishment of a Hydrogen Highway
PR & Training and Education	§ Aims to secure stakeholder support § Use of a professional PR company has many applicable advantages § Role is to do communication work in order to raise public awareness of the project and of hydrogen and fuel cell technology as such § The LHPs could – once well established – serve as training hubs and develop "Certification & Accreditation" programs for the technicians and all systems/component/vehicle operators/users, etc and/or collaborate with universities, standardisation bodies for such activities.
Mobility and Infrastructure Groups	§ The separation of mobility and infrastructure operations allows for partners to focus on their specific objectives with coordination when necessary § Autonomous operations need effective inter-group communication especially when common interests are involved (see also example of the EU FCH JTI and its different Committees)
RCS, Safety, Quality Assurance, Risk Mitigation and Assessment	§ There are three main ways of monitoring RCS, Safety and Quality assurance: 1) using an external body (e.g. lawyers etc.), 2) using an internal body (e.g. an ad hoc group of member organisations), 3) partners monitor their own compliance with the limited number of regulations as well as any quality control put in place by the project manager § In Europe there exists no such thing as a "European Hydrogen Directive" and in general terms regulations are not substance but application specific. In October 2007 a proposal for a type-approval for hydrogen-powered vehicles was presented to the European Parliament and the European Council. The proposal was drafted following a public consultation process § The Lighthouse Projects could and should serve as platforms for the collection of data to be contributed to the development of a solid RCS framework for hydrogen road transport technologies in Europe. This will greatly facilitate the large-scale

	commercialisation and the fast uptake of such technologies § A staged risk mitigation plan ensures safety, while RCS mapping is recommended. LHP partners should carry out the necessary assessment of the risks posed to the health & safety of those dealing with the hydrogen technology on a daily basis. § In the US, the Department of Energy (US DoE) requires the submission of safety and risk mitigation plans with each funding request § Partners should be aware of legal obligations in this regard and promote such activities through the Project Management body and/or the Steering Group
Internal Communication	§ Three key forms of improving internal communication have been identified: 1) forum, 2) technology team meetings, 3) efficiency analysis body / project coordination committees
Legal Forms of Partnership	§ Incorporated forms may offer increased longevity, while unincorporated forms may be less administrative § LHP project partners should consult with a legal specialist or an accountant to determine if a corporate structure would be best for best for the LHP
Financing	§ A Risk Sharing Financing Facility from the European Investment Bank (EIB) allows a larger volume of loans for R&D projects and the financing of projects with a higher risk profile than would otherwise be possible § If funds go to the project promoters directly (a corporate structure) funds can be allocated to very high-risk profile projects as the risk is dissociated from the project itself. § In Project financing, the EIB would base its bankability assessment on the LHP itself and its capacity to generate cash-flow as well as the proportion of equity brought in the project by the project partners
IPRs	§ Lighthouse Projects' IPRs rules, and in case of EC funding being provided, should comprise to an extent the relevant EC FP7 rules; however, a degree of flexibility is allowed § A set of clear IPR principles and ownership rules, should be included in the agreement establishing the partnership; of crucial importance is the design of an effective IPR handling framework foreseeing data collection, handling and dissemination. The latter is of high importance to build and maintain a trusting environment with the partnership
State Aid Rules	§ LHPs will need to comply with the state aid framework for Research, Development and Innovation (RDI), which has introduced a series of criteria for evaluating whether a given RDI project is in conflict or not with state aid rules § Combined Member State and FP7 funding should not exceed the maximum thresholds allowed by the appropriate state aid rules

Table 2

PROJECT MANAGEMENT FACTORS	LEGAL FACTORS
GENERAL MANAGEMENT	*LEGAL FORM*
Steering Group / Steering Committee (decision making body)	Public-Private Partnership
Project Management team vs. one person coordinator	Incorporated legal form (i.e. Ltd, unlimited, EEIG, etc.)
External Project Management company non-project partner	Public shareholder majority of shares
Managing Director vs. team (company structure)	Private shareholder majority of shares
Decision Making Board (company structure)	Unincorporated (simple collaboration, other)
Executive Expert/Consulting Group (not part of decision making process just providing opinion)	Consortium Agreement
Local/sub-management structures/nodes	Confidentiality Agreements
Local training / education body	Sub-contracting Agreements
	Vehicles/buses/infrastructure leasing agreements
	Vehicles/buses/infrastructure purchase agreements
	Fleet operator contracts
OPERATIONS	*FINANCE*
Dedicated Administrative body – Secretariat	EU Funded
Mobility/Vehicle Group	National funds
Infrastructure Group	Regional/local funds
Ad hoc Working Groups	Risk financing/Venture Capital
Safety Team	Project financing agreements
Quality assurance/efficiency body	Public Procurement
Monitoring & assessment body	Competitive Dialogue
Project Coordination Committee (between work packages and the European Commission)	Calls for tenders
Finance body (Treasurer)	Call for project proposals
Separate financial management between nodes and central budget	
RCS External Monitoring body	*SAFETY AND RISK*
RCS Intra-project Monitoring body	
RCS monitored by project partners	Risk assessment - infrastructure
Stationary Applications Body	Risk assessment - vehicles/buses
Efficiency Analysis Body	Risk mitigation plans
Technology Team meetings	Safety training
	Safety plans
	"Third party" liability OEMs
	"Third party" liability infrastructure provider
	"Third party" liability special project consortium/group provisions
	External insurance provider (infrastructure)
	External insurance provider (vehicles)
OTHER	*OTHER*
Forum (including external/non-contracted stakeholders)	State aid rules
PR bodies in nodes/local management structures	Anti-trust
PR team consisting of Project Partners	Merger control
External PR firm (subcontractor)	IPR protection rules & procedures in the contract
	Data protection provisions in consultation with

	certification/authorisation organisation
	Partnership with certification/authorisation organisation
	Memorandum of understanding (MoU) with other projects/regions

CALL FOR FUTURE RESEARCH

This report has highlighted the key PGIs and has sought to describe the importance of each function and form. Recommendations have been provided which may be used in an FP7-funded LHP. However there remains a need for information to be collected from the project partners themselves in order to fully comprehend the nature of insurance, liability, IPR problems that face them and to look for innovative ways in which collective learning may aide the future development of hydrogen transport applications.

In order to provide a most complete list and a better evaluation of the indicators, a "Weighting/Evaluating" table has been developed and this is provided to different project officers worldwide. The ultimate aim of this research would be to demonstrate which PGIs are the most important, useful and applicable for the future development of hydrogen transport in Europe. The final outcome of this exercise will be a list of concise recommendations of the do's and don'ts when applying the checklist of indicators in the future LHPs. The analysis concluded at the end of the HyLights project, i.e. December 2008.

Table of Contents

1 Introduction

"HyLights" is a Coordination and Support Action to accelerate the commercialisation of Hydrogen and Fuel Cells (HFC) technologies in the field of transport in Europe. This report is part of the Work Package 5 (WP5) of the "HyLights" project, a Coordinated Support Action funded by the European Commission. The objective of this document is to identify the key project success factors - from a legal and project management viewpoint - for the realisation of large scale hydrogen road transport demo projects at EU (i.e. the Joint Technology Initiative for Hydrogen and Fuel Cells) or national/regional level (i.e. the "Clean Energy Partnership" in Germany or other projects), the so-called "Lighthouse Projects" (LHPs).

Finally, the research on Project Management structures has been extended to Programme Management practices and the findings are included in a separate report.

1.1 What is a PGI?

In order to measure the performance of an LHP from a partnership and project management structure point of view a set of criteria must be developed in order to gauge if the project has addressed and applied all necessary elements to guarantee the best cooperation and smooth function as possible.

A "Project Governance Indicator", or PGI, is a type of Performance Indicator, which looks specifically at the governance of the project. This means that the PGIs focus on both the management of the project as well as the legal structure upon which it rests. The PGIs should be considered when evaluating the effectiveness of a future LHP.

The governance of a project is key to its success as governance is the efficient management of relationships to produce enhanced performance. Effective governance produces a structure in which trustworthy relationships are held and through which clear and effective processes are performed while respecting guidelines and objectives. An appropriate governance framework also reduces costs by ensuring that all expenditure is appropriate for the risks being tackled. Such a framework has become project management theory. This report however aims at drawing the significant pieces of such a framework that would serve the hydrogen and fuel cell industry at this particular time so that project partners manage their investments effectively and achieve their goals.

This report, using the experiences of past and on-going hydrogen demonstration projects, brings together information and lessons learnt by bringing forward those PGIs that are mostly critical to a project's success.

1.2 How has the report been undertaken?

The PGIs have been compiled on the basis of information received from the analysis of over ten different projects from across Europe, and globally (US, Canada, Japan). Desk-based assessment and research served to draw initial findings that were subsequently validated with different project officers and participants. Certain Governance Indicators were developed as a result of this research and split into two categories; project management factors and legal factors. But in order to discover which Indicators were the most important a "Matrix" (Annex I) was developed and circulated to mainly each project manager or other project officer. That person then completed the form according to his/her opinion based on a rating system (see below) and compiled. In addition, in order to better validate the results of the survey, information was collected from FP6-FP7 project management theory, PRINCE2 project management theory corporate and IPR law, PPP theory, recent JTI related legislative proposals and related EU legislation, US and European HFC demonstration projects' reports, etc.

The findings of this report are not definite. Due to continuous evolution of the HFC technology and projects as well as the changing project needs the research and analysis is on-going and updated recommendations will be provided at the last reporting period of the "HyLights" project, i.e. December 2008.

1.3 The size of the analysis

The PGI research analysed the indicators in eight projects through telephone and personal interviews with (where possible) the project officers. All forms were completed with the use of an explanatory form (see Annex II) thereby providing consistency to the interview process. The information received was cross-referenced where possible to minimise errors.

1.4 Rating the PGI factors

The interviewees/project officers were asked to "grade" each PGI with regards to three different criteria as indicated in the table below:

Criteria	Description
Importance	The factor was/is indispensable for sound project realisation and guaranteed(-s) its success.
Usefulness	The factor is a pre-requisite (more than a "nice-to-have" item) but its absence might not have an intense negative impact on the project's success.
Applicability	The factor, even if useful, due to the complexity that it entails for application could generate delays or impede project realisation altogether, thus is it an applicable factor?

1.5 Weighting

All project officers were asked to give the following rating to each of the criteria:

Description	Weighting
Very positive	7
Positive	6
Slightly positive	5
Neutral	4
Slightly negative	3
Negative	2
Very negative	1
Not applicable to the project	0

1.6 Calculation and correction of bias

In order to arrive at a final "Matrix" that shows which PGIs are the most significant, all the results from each project was compiled. For each factor three calculations of the average were undertaken; a simple summation, mean average and a median average as defined in the table below. This is done in order to reduce the degree of bias inherent in each method and due to the fact that the answer "not applicable" had to be accounted for using zero. The final result is then demonstrated with the use of colour highlighting the best scores using each method. (Please find the final matrix in Annex III.)

Method	Advantages	Disadvantages
Simple summation	Quick and simple calculation which indicates the level of response for a particular factor as well as its overall score.	Too simplistic and big scores may only indicate high level of responses. Any outlying data are included without corrective action.
Mean Average	An average of weightings reduces the impact of the numbers of results received from projects.	The mean average is easily skewed by outliers i.e. if a factor receives the following scores from a five projects (1,1,1,1,3) the average is 1.4, but a significant majority (80%) gave the factor a mark of 1.
Median Average	Quick calculation providing a figure limiting the effect of outlying values.	Does not include all values, but merely ranks them and uses the middle figure.

The PGIs identified for use in this survey came from eight hydrogen demonstration projects in the transport sector including:

ARGEMUC

CEP I

CUTE

HyFLEET: CUTE

ECTOS

HyNor

Scandinavian Hydrogen Highway Partnership

London Hydrogen Partnership

ZERO REGIO

The matrices have then been completed by project officers (where possible) from the following projects:

ARGEMUC

CEP I & II

ECTOS

HyNor

Scandinavian Hydrogen Highway Partnership

London Hydrogen Partnership

ZERO REGIO

HySOLUTIONS

Vancouver EHWUP.

Telephone interviews were also conducted for additional information from:

California Fuel Cell Partnership (to understand coordination of projects)

Canadian Hydrogen Highway

JHFC Programme

1.7 Assumptions made in the study

1.7.1 A future Lighthouse Project

It is expected that a Lighthouse Project would contain the following characteristics, and it is upon these assumptions that our recommendations are based:

Multinational – An LHP would be multinational in terms of its partnership (members coming from numerous countries), as this has been the case in nearly all previous demonstration projects. But an LHP may even be international (the project spread over two or more countries) and/or inter-regional in scale affecting numerous local authorities, and potentially several national governments too. This would have implications on financing (potentially coming from the EU, national and local authorities), legal form (different countries' incorporation rules) and of course, communication (both in public relations, and internal communication).

Large-scale – An LHP would be bigger than previous demonstration projects and may involve the use of highways (currently being seen on the Pacific Coast of North America and in Scandinavia), or regional clusters with mutual spill over effects with other hydrogen and fuel cell applications. This should not be forgotten when considering the legal structure as the structure may have to prove more flexible to extension, and input from non-member stakeholders.

Commercialisation – Previous demonstration projects were undertaken for the purposes of testing technology, demonstrating the effectiveness of the technology and proving road-worthiness. An LHP, on the other hand, is assumed to have more of a focus towards large-scale commercialisation. Thus, before a project can start, considerations as to whether certain practices have the potential to become an industry standard (in Europe or further afield) become more frequent and more important. This added pressure dictates the need for a structure which facilitates strong governance in order to first strongly engage the partners to the project's strategic direction, and have the power to take complex decisions and manage change due to evolving technical and technological breakthroughs or drawbacks. In addition, the inception of industry codes and standards (and their subsequent contribution to large scale commercialisation) increases in importance, thus requiring thorough examination before development.

The ten main characteristics of a Lighthouse Project are:[1]

1. A **long timeframe** that allows for field validation of several technology generations
2. A **large scale** that should make the project an appealing opportunity for different stakeholders to scale up their activities and prepare the market for new products in the hydrogen and fuel cell technology field.
3. A pronounced **mission to foster European industry growth**, in terms of e.g. product development, small and medium sized enterprises stimulation activities, and job growth, as well as knowledge in the field of hydrogen and fuel cells in Europe.
4. A **definite intention to sustain and extend the activities** by means of market forces during and after the project has ended.
5. A **strong commercial commitment** and **regional binding** that allows for more options to make the project extended and preferably also expanded.
6. A **high visibility level** of the technologies to different stakeholder groups by a large number of vehicles and **other hydrogen and fuel cell products**, used in many different areas, e.g. industry and residential context.
7. A **hydrogen fuel infrastructure development and expansion**. The fuel infrastructure aspect is emphasised in a Lighthouse Project. To have refuelling stations with good geographic coverage and readily available fuel for customers is a crucial issue for the acceptance of the hydrogen-based technologies.
8. A nucleus in a future hydrogen cluster. Starting small by **concentrating all efforts in a few regions**, forming hydrogen nuclei and then **gradually expanding to clusters**, will help attract business and skilful people, nurturing the business side of Lighthouse Projects.
9. A **complete value chain, i.e. production, storage, distribution, and usage**, and includes all relevant stakeholders, both private and public partners, allowing for a long-term commitment, stable

[1] Development of Hydrogen and Fuel Cell Technologies in a Large-Scale Lighthouse Project https://www.hfpeurope.org/uploads/1637/LighthouseProject_FinalReport_2006.pdf

funding, public framework, and full evaluation of the technologies.
10. A **focus on the end-user**, aiming to introduce hydrogen and fuel cell technologies with high performance and durability and acceptable cost to an early mass market.

1.7.2 Survey technique

The survey technique has at its core a key consideration; its answers are based on project officers' perceptions. In order to examine the importance, usefulness and the applicability of the PGIs were presented to the project officers for their opinions. Their opinions are, however, only one viewpoint. Yet, in this study, by speaking to the project officers, the view (and hence the data collected) come from the most ideally suited person in a project to be able to give their opinion on all aspects of the project. However, as opinions are based on many factors such as project objectives, specific context and culture, the data received is checked with supporting documentation about the projects and combined with desk research on project management and legal forms of partnerships so that the recommendations provided herein reflect both hands-on experience and theory.

2 Project Governance Indicators

In this section the PGIs are grouped into two categories; project management factors, and legal factors. Each factor is then analysed in depth in the following way

- Desk-based research
  - An analysis is given for each of the factors. Knowledge is drawn from previous demonstration projects, project management theory, best practices, and documentation outlining the specific procedures and implications of the factor with regards to legal aspects.
- Survey result
  - A colour-coded result is given for clarity as to whether the factor has scored highly in all three calculation methods.
    - **Green** is used to demonstrate the factor is significant/essential for the success of an LHP.
    - **Yellow** shows that a factor is strongly recommended for the establishment and operation of future LHPs.
    - **Orange** demonstrates that the factor is "nice-to-have" item but not necessarily a critical one to the success of the project.
    - **Red** shows that the factor has been identified of little relevance to the success of the future LHPs.
- Recommendations
  - Recommendations are given as to whether the different factors are of significant importance for a future LHP, given the assumptions made earlier on LHPs.

Note: The analysis showed that the survey/"Matrix" results were not always concurrent with the theory and best practices findings. Thus, in certain cases it was preferred to indicate and recommend the necessity of a factor despite the survey's results that might not favour the specific factor.

List of Identified Project Governance Indicators	
PROJECT MANAGEMENT FACTORS	**LEGAL FACTORS**
GENERAL MANAGEMENT	*LEGAL FORM*
Steering Group/Steering Committee (decision making body)	Public-Private Partnership
Project Management team vs. one person coordinator	Incorporated legal form (i.e. Ltd, unlimited, EEIG, etc)
External Project Management company non-project partner	Public shareholder majority of shares
Managing Director vs. team (company structure)	Private shareholder majority of shares
Decision Making Board (company structure)	Unincorporated (simple collaboration, other)
Executive Expert/Consulting Group (not part of decision making process just providing opinion)	Consortium Agreement
Local/sub-management structures/nodes	Confidentiality Agreements
Local training / education body	Sub-contracting Agreements
	Vehicles/buses/infrastructure leasing agreements
	Vehicles/buses/infrastructure purchase agreements
	Fleet operator contracts
OPERATIONS	*FINANCE*
Dedicated Administrative body – Secretariat	EU Funded
Mobility/Vehicle Group	National funds
Infrastructure Group	Regional/local funds
Ad hoc Working Groups	Risk financing/Venture Capital
Safety Team	Project financing agreements
Quality assurance/efficiency body	Public Procurement
Monitoring & assessment body	Competitive Dialogue
Project Coordination Committee (between work	Calls for tenders

packages and the European Commission)	
Finance body (Treasurer)	Call for project proposals
Separate financial management between nodes and central budget	
RCS External Monitoring body	*SAFETY AND RISK*
RCS Intra-project Monitoring body	
RCS monitored by project partners	Risk assessment - infrastructure
Stationary Applications Body	Risk assessment - vehicles/buses
Efficiency Analysis Body	Risk mitigation plans
Technology Team meetings	Safety training
	Safety plans
	"Third party" liability OEMs
	"Third party" liability Infrastructure provider
	"Third party" liability special project consortium/group provisions
	External insurance provider (infrastructure)
	External insurance provider (vehicles)
OTHER	*OTHER*
Forum (including external/non-contracted stakeholders)	State aid rules
PR bodies in nodes/local management structures	Anti-trust
PR team consisting of Project Partners	Merger control
External PR firm (subcontractor)	IPR protection rules & procedures in the contract
	Data protection provisions in
	Consultation with certification/authorisation organisation
	Partnership with certification/authorisation organisation
	Memorandum of understanding (MoU) with other projects/regions

2.1 General Management Factors

The “Management Factors” part of the current report looks essentially at the key bodies and functions of hydrogen road transport demonstration projects as identified from analysing both project management theory and similar concluded/on-going projects in Europe and worldwide.

2.1.1 General Management – Steering Group

MATRIX RESULTS - GREEN CODE

From the outset of a project, the project needs a direction-setting body. This body, the Steering Group (or Project Board in Prince2 terminology), should develop a plan deciding on aims and objectives and detailing lines on accountability, thus building-in common expectations and transparent communication channels.

The Steering Group has traditional roles within the theory of project management:

- To define, divide and develop the tasks at hand;
- To check the progress of the work and hold partners to account and manage change;
- To co-ordinate the research teams;
- To co-ordinate the preparation of the reports (technical, financial, etc.);
- To advise and direct the partners on the developments necessary for the project;

- To permit formal exchanges of information between the partners.[2]

The survey results demonstrate that this higher level is of crucial importance for engaging partners and setting the direction of the project. It should not be tied down in administrative tasks, but delegate these to specific groups/working parties.

Steering Groups "guide" a project but do not manage it on a daily basis. Therefore it should meet often enough to keep a close eye on developments but only concern itself with key decisions and check progress at key milestones. To improve the efficiency of the Steering Group meetings, it is important that the Steering Group members be kept up-to-date of issues arising in the operational level of the management structure, this often means liaising with the Project Manager. Any evaluation of the project's progress or achievements would also be carried out at the Steering Group level. Setting general discipline among partners is also a factor, which can be defined at this level, as well the dealing of serious offending practices (i.e. not attending a minimum number of meetings).

The Steering Group should be representative and it is usual to find a one person per project partner representation. This representation would ensure transparency and democracy in the decision-making process, which are, among others, signs of a healthy project governance structure.

Depending on project partners' needs and project objectives, one option could be to include representatives from non-project partners (such as think-tanks, universities…etc.) in the Steering Group. Keeping in mind the complexity as well as the sensitivities of the different issues discussed at the Steering Group level, the inclusion of third-parties/observers not directly linked to the project's activities, should be carefully weighted versus the expected contribution from such parties and their alignment with the project's outcomes.

Theory and practice have demonstrated that the non-project partners would only have an observatory role and would participate in only one meeting per year, in a General Assembly for example. Alternatively a dedicated "Advisory Board" in addition to the Steering Group is an innovative approach that would allow experts, such as university professors or public stakeholders, to provide input to the Steering Group and help the partners make better-informed decisions; the input may be in the form of technical, legal etc. advice and could even cover input on political/public acceptance aspects where high-level representatives of the government and other public authorities would be called to provide their opinion. The latter participation could prove useful especially in terms of "project profiling" and dissemination of project results and impact.

Recommendations

- A Steering Group is a decision-making body and is thus critical to the design and monitoring of the achievement of the project's strategic objectives and thus an essential function/body for an LHP.
- A Steering Group should meet at least once for each year of the project's lifetime, preferably more often to allow for prompt response should change be deemed necessary and ensure compliance with initially identified objectives.
- The Steering Group should be representative of the industry sectors involved in the LHP so that decisions include all interests and guarantee an effective and efficient project governance model.
- The Steering Group's roles should be set out in a "Project Brief" and distinctions made between its guidance of the project and the project manager's management tasks.
- The use of an "Advisory Board" would be particularly useful for LHPs located in densely populated areas (such as cities and regions) which contain relatively more institutions willing to provide their input, providing for a rich dialogue about the project.

[2] ftp://ftp.cordis.europa.eu/pub/fp7/docs/checklist_en.pdf

2.1.2 General Management – Project Management

MATRIX RESULTS - GREEN CODE

Main Role
The Project Management body (whether it be a team, project partner company or external company) sits between the Steering Group and the operational level of a project. Its main role is to carry out the project on a day-to-day basis within the boundaries laid down by the Steering Group and the project's initial strategic plan.

Composition
It is headed by a Project Manager who may be a project partner appointed by the other project partners. The manager determines the best way of structuring the work to get the most out of the team and address the issues at hand.

Should a project management team be appointed, according to "Prince 2" theory, it should contain representatives from the Steering Group (maybe on a rotating basis), heads of work packages – in case these have been identified - including a dedicated "Project Manager". While many demonstration projects had the heads of work packages report to the Project Manager, few used a "Project Assurance" person, instead entrusted this task to the Project Manager. Project assurance is related mostly to quality control and monitoring of quality and risk aspects and could encompass activities such as Risk Management.

Tasks
The Project Manager oversees the project's overall budget as well as tracks all operational developments in the project and report in a timely manner to the Steering Group. The workload on a Project Manager (or team) can therefore be significant. One practice that has been undertaken previously is to sub-contract part of the work to "non-partners" (organisations not formally part of the project); however there are limits on this activity under FP7 (see FP7 Conditions below).

Below are the key responsibilities of the Project Management Team split between the requirements from the European Commission for an EU-funded project, and other tasks identified as best practices.

EU-funded Project Requirements
Monitor project partners' compliance in accordance with their obligations
Ensure formalities for accession to the grant agreement
Receive and distribute the Community's financial contribution and distribute it in accordance to the consortium and grant agreements
Keep records and account information to be presented to the Community
Be the intermediary for sound communication between the Commission and partners including via regular reporting
Best Practices Identified
Ensure discipline between bodies and coordination of operational bodies' activities in line with the aims and objectives in the project plan laid out by the Steering Group
Ensure that the project remains on schedule by facilitating communication between bodies
Ensure the gathering and interpreting data from the operational level and ensuring its presentation to the Steering Group in a timely manner
Ensure sound internal communication to project partners

Operations
The use of a Product Breakdown Structure (PBS) approach whereby the objectives to be attained are identified and then sub-targets are added, helps to manage the information flow to the Project Manager as the heads of each work package would report only at key intervals with concise and compiled information about each package.

The Project Manager using a "Change Control" process enhances the control and quality whereby an Issue Log is kept by the Project Manager and any changes that are made with regard to objectives, deadlines et cetera are taken following analysis of the situation by the Project Manager. Such analysis

would gauge the impact of the change (impact analysis), prioritise how necessary the change is, and finally authorise the change at the right time.

In addition, a Project Manager should oversee compliance with budgetary and resource availability and report to the Steering Group in case of deviation. Another element that is very important is that the Project Manager has a very good understanding of the FCH technologies and the issues linked to the deployment of such technologies; understands the particularities of the project partners involved and their business sectors; has established contacts within the relevant public and private communities directly linked or adjacent to the FCH technology field.

FP7 Conditions
Should a future LHP in the EU be funded using FP7 funding, "core" project management functions would have to be undertaken by the project partners. Only minor services, which do not represent core elements of project work, may be subcontracted, such as "minor administrative tasks". [3] This therefore reduces the flexibility of the Project Manager's choices compared with non-EU-funded projects.

Due to the limitations on subcontracting, the Project Manager (or team) may become overburdened with administrative tasks, in which case, project theory indicates the use of a project office, which stores the project's data and provides continuity in reporting. This can be undertaken either by a partner or by an external body with related expertise as long as that body is a project partner.

Example
Should a Lighthouse Project wish to seek professional services for the Public Relations of the project (a core project management function), those services should come only from a project partner therefore requiring the PR company to become a partner, unless the engagement of an external contractor for the realisation of the PR & Marketing activities is duly justified.

Recommendations
- Each project proposal should indicate who is to be the Project Manager.
- In an LHP, a project management team is highly necessary due to the number of potential partners and the amount of tasks that will be handled by the Project Manager.
- A project management team is then to be designed and finally persons may be appointed to their designated positions.
- The drafting of a project "map", could be in the form of a GANTT chart could facilitate the compliance with timelines as it provides a solid overview of the project main activities and deliverables.

Note
Article 10 of Regulation 1906/2006 of the EC gives indirectly the possibility to project participants to form a single legal entity and apply for FP7 funding. Given such an incorporated structure the Steering Group and Project Management may be replaced by a Board and a Managing Director/team. The board would represent "shareholders" who may or may not be partners in a project while a Managing Director/team would undertake the activities of a project management team, as above.

2.1.3 General Management – Regional Nodes

MATRIX RESULTS - RED CODE

The "node" idea of project management comes from an approach used in watershed management of an area's natural resources, which realises that certain regions require specific actions. The nodal structure scored low in the PGI survey (receiving a Red code for both the "nodal" management structure and delegating PR to a local level); most probably because many projects were situated in a single site and those interviewed may not see their potential use in the future. However in the projects where nodes were used, the structure received positive scores. There are indeed significant arguments to apply such a structure especially from the hydrogen highway projects and may be very applicable for European LHPs given their future size.

[3] ftp://ftp.cordis.europa.eu/pub/ist/docs/projects/faq_en.pdf

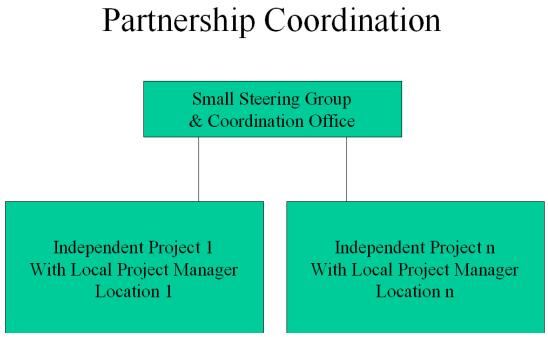
The use of regional nodes suits projects which have multiple project locations covering a wide geographical area such as “Hydrogen Highway” projects due to the significant differences (legislative, cultural, geographical, degree of technological and economic development, etc.) between the locations.

Nodes offer the advantage of tailoring certain operations to local needs while leaving other, broader tasks, such as the promotion of the project vis-à-vis public authorities, more centralised often with the Project Management Team. In view of the LHPs, nodes will become more useful as due to the greater scale of the projects especially in cross-border projects, which span two countries and/or cultures.

There are two ways of using nodes: a) partnership coordination, or b) the localised delegation of tasks.

a) Partnership Coordination

The approach adopted by the Scandinavia region (HyNor in Norway, HyFuture in Sweden and Hydrogen Link in Denmark), California and British Columbia has been to use a nodal structure. In each case an overarching partnership body is established which coordinates regional projects. A small Steering Group and a Project Coordinator decides on the objectives and the vision for the Partnership, but individual nodal projects are self-managed and self-financed by partners who may or may not be present in other locations. The advantage here is that local clusters of expertise in hydrogen and fuel cells may work locally, but be recognised outside the immediate locality, whilst being able to connect and share knowledge via the partnership.

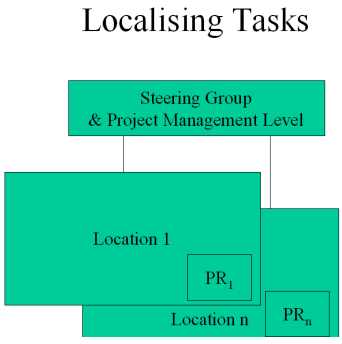


b) Localised delegation of tasks

In future large scale demonstration projects, a subsidiarity principle may be applied whereby certain tasks may be better undertaken at a lower level in the management structure due to the larger size of the project. An example here is shown of PR being done at each location to suit the needs of each region. This approach also enhances the role that Regions can play in the deployment of FCH technologies.

Some of the operational tasks which have been localised in the past are:

- Finances
  - Budgets are often provided by different sources (international, national and local authorities) thus, some finances are distributed to the central part of the structure such as the project management team, whereas local funding may be dealt with at node level.
- Public Relations
  - Different cultures and language requirements are important considerations in large demonstration projects. This may require alternative communication strategies, branding etc.



- Training and Education
  - This can be influenced by the demography of a location; younger population may require more school visits and ‘hands-on’ open days, as opposed to more informative educational techniques for an older demographic.

There are several advantages for the LHP of using a nodal structure:

- Small, local companies could only commit to one area but will receive the visibility that the Partnership coordinator provides them with, thereby increasing buy-in to the project.
- The project would make the most of regional advantages e.g. if hydrogen production is present in the region, those actors may be part of the local project helping to share information with the transportation application of hydrogen.
- SMEs can contribute their innovative ideas to the realisation of the project's objectives, gain access to information and understand the latest trends in the project, reducing their research and development costs and enticing their participation to the project.
- In Canada, industry decides which location is more commercially favourable and leads the initiative while the Partnership coordinator retains the right to ensure that any future node fulfils the Partnership's overall aims and objectives.

Recommendations

- If a project proposal states that the project will cover two or more countries, a nodal structure should be considered as a suitable management structure.
- A review of the operational tasks should be undertaken to identify which should be done both locally and centrally.

2.1.4 General Management – Public Relations & Training & Education

"Public Relations is a set of management, supervisory, and technical functions that foster an organisation's ability to strategically listen to, appreciate, and respond to those persons whose mutually beneficial relationships with the organisation are necessary if it is to achieve its missions and values." [4]

MATRIX RESULTS - MIX OF CODES

The Public Relations (PR) body of a LHP will be a key department ensuring the success and public acceptance of the technology. Its role is to secure public support to the benefit and progression of the technology towards commercialisation and ensure the communication of the project's results. External communication should be done in an understandable manner for governments, media, community members and most importantly the end-users themselves.

In terms of project management, PR was not considered crucial to the implementation of previous demonstration projects according to the survey results received, whilst in the interviews conducted nearly all project officers saw PR as very important for the future of hydrogen. However, of the options preferred, a PR team using project partners is the favourite choice compared with using an external PR firm. This is mostly due to anxieties regarding the publication of sensitive data at a crucial juncture in the technology's development and the need to maintain control of publication streams to avoid errors and misinterpretation of data.

Regarding the education and training of end-users such as the public, the PGI survey did consider this to be important enough to warrant a specialised body devoted to the task.

Looking at previous demonstration projects, four types of audiences have been identified:

- Local community, wider public;
- Government (local, national and EU);
- Media;
- Industry stakeholders

Each audience has different requirements as to the type of information they wish to have about the project. These shall first be considered before analysing how the management structure should suit the necessary functions of the project.

a) Local Community Relations

[4] Robert L. Heath, Encyclopedia of Public Relations

The success of construction projects, in general (of which infrastructure and transportation development share some similarities), is dependent on the organisation and its project management team developing and maintaining good relations with a variety of different people and organisations in the community who are affected by the work executed. Adapting to new local realities can also be difficult for local communities, which may view the project with scepticism and need to be won over. A local community may contain a wide demographic and wide-ranging concerns and opinions. An original mapping of the area in this regard is a solid base on which to build a PR campaign. This survey should identify the concerns of people situated on-site and of the relevant authorities (including local and national level) and should be regularly updated in order to gauge changing public opinion as the project continues.

The Californian Hydrogen Highway also recommended the use of a "hydrogen ombudsman"[5] to help local officials and developers satisfy local concerns. Such an established complaints procedure for stakeholders and the general public is part of the community relations role. Openness and transparency would also be ensured while helping to contribute to maintaining good community relations. The complaints procedure should also be supported by an efficient reporting line back to the head of the PR body, and if necessary to the Project Manager. Such reports may take the form of an Issue Log (as is the practice in Prince 2 theory), storing "questions, comments, concerns, errors and desirable changes" on the project and should be assessed in relation to whether to change the project's operations accordingly.[6]

Demographic Type	PR tool used
Young Children	**Comic Strip produced[7]**
Children	**School visits and presentations, supported with leaflets[8]**
Adults	**In-depth specification documents on the vehicles and the history of HFC development[9]**
Family	**Fuel Cell Park – used to showcase the technology and a supporting website[10] which includes a booking form for visits and a free FCV ride**
Local Business	**Publication of Lectures and Seminars of the project's activities[11]**
A good example of PR tools targeting different demographics from the JHFC Programme	

Looking at previous perception analyses[12] undertaken in Berlin, London, Luxembourg and Perth projects it is possible to identify several key tasks that the body should undertake:

- Information dissemination on buses via posters and brochures;
- The training and education must be in proportion to the size of the project and the population size of the project area to have a significant impact, and fall within the objectives of the Steering Group;
- Providing free journeys and open days to secure public interest, i.e. public tours, school visits, celebrating HFC vehicles' milestones i.e. mileage, etc;

[5] http://www.hydrogenhighway.ca.gov/implement/documents/specific.pdf
[6] Prince 2 recommends that entries in an Issue Log be assessed according to the priority of making a change, the impact of a change, its associated cost and the importance of the change for the project.
[7] http://www.jhfc.jp/data/pamphlet/pdf/pamphlet_fcv.pdf
[8] http://www.jhfc.jp/data/pamphlet/pdf/pamphlet_kodomo.pdf
[9] http://www.jhfc.jp/data/pamphlet/pdf/pamphlet_fcv.pdf
[10] http://www.jhfc.jp/e/park/index.html
[11] http://www.jhfc.jp/e/data/seminar_report/04/lecture.html
[12] Results taken from series of reports from www.accepth2.com/results

- Operators of vehicles and hydrogen refuelling stations need to be trained to answer public's questions and queries;
- Assure consistent, safe operations and maintenance of the site facilities and vehicles through adequate training.

Recommendations
- Include a plan for engaging with the local community
- Build in procedures to deal with critical issues for the local community
- Promote publicly accessible hydrogen stations and use by qualified users, to encourage public acceptance.

b) Government Liaison and Media Relations

Case studies, and previous hydrogen transport demonstration projects, have shown that the use of a dedicated PR body (or external PR firm) can harmonise the development of branding and allows the project to leverage its access to political stakeholders and media representatives. In addition, local authorities play a major role in removing administrative barriers for authorisation and permitting authorities. More details on this aspect are to be found further in this report under the Legal Issues analysis.

Under the FP7 structure and the expectations about future LHPs, both governments and industry would come together in partnership. Thus the relationship that the project has with government is two-fold:

1. It would like the support of the relevant authorities, and
2. It will also be working with the authorities to improve the profile of the region.

Looking at previous demonstration projects, and in particular the HyNor project, the PR tool used on point 1 was dialogue. HyNor involved NGOs in the project as these helped the process and provided regular feedback, particularly on safety issues.[13]

Media relations should be tackled specifically in order to maintain a positive message at a critical time, politically, technologically and commercially for the industry. Regular updates in the local media regarding small disruptions to local community life is one way in which community relations are solidified.

Recommendation:
- Ensure continual dialogue with relevant authorities

c) Information Services / Knowledge Management

An information service (website, leaflets etc) creates public interest and awareness that is good for local community relations. But as importantly, the information service should address industry with regular reports and learnings to be communicated effectively to key stakeholders. Information such as manuals, progress reports etc. are all types of publications which bring value to the industry and help knowledge sharing across continents.

In previous demonstration projects, the option of subcontracting the services of an external PR company to build the project's brand was an option. However, when looking towards an LHP under the FP7 framework, this option shall not be available. Under FP6-funded demonstration projects PR, alternatively titled 'Dissemination', was a work package deliverable, and therefore a key output of the project. If Dissemination is once again seen as key output in FP7, rules on subcontracting will apply, thus meaning PR activities will have to be undertaken by project partners. However this does not prevent one of the project partners being a PR agency or Communications specialist and using their advantageous knowledge and position for the benefit of the project's acceptability.

[13] The experience from having NGOs on board was positive move as they are *"supportive with clear goals. They show comparable interest as industry does, they also assist in performing workshops targeted to tackle safety concerns."*

Recommendations

- Provide good quality and accurate project updates that contain relevant information for industry stakeholders to advance knowledge in the sector.

2.2 Operations Factors

The Operations section of the Final Matrix (Annex III) highlights those tasks, which bring about the realisation of the project, of which groups and work packages essentially focus on three main areas:

1. Mobility and Infrastructure
2. Regulations, Codes and Standards, Safety and Quality Assurance
3. Internal Communication

2.2.1 Operations – Mobility & Infrastructure Groups Work Packages

MATRIX RESULTS - GREEN CODE

The use of these groups in the management structure of hydrogen demonstration projects for transport was seen as very important, very useful and also extremely applicable. Often the composition of the industry partners is such that there is enough divergence between the work packages' operations that there is a natural tendency to split the work into mobility and infrastructure groupings.

Best practices can also be drawn from Work Breakdown Structure project management theory. The theory states that the splitting up of tasks into groups focuses work towards outputs, not certain tasks. The tasks that are undertaken should have a specific scope, which do not overlap significantly with other tasks in an adjacent work package, and should be large enough to be distinctive as separate activities. Both groups have been used in all the projects analysed and have demonstrated relative autonomous operations.

The mobility group is concerned with the testing of hydrogen & fuel cell powered vehicles and brings together the different technologies of the OEM partners. The infrastructure group normally consists of oil and gas partners and aims to build a hydrogen infrastructure of refuelling stations. The partners develop harmonised approaches and goals within the mobility and infrastructure groups working largely autonomously except where common interests or concerns are discovered.

It is recommended that for both groups, based on previous large demonstration projects, that the outputs of the working group support two key needs for the development of hydrogen technology in an LHP:

- The use of already existing technologies, which have a proven track record in terms of fulfilling regulations, codes and standards would help to reduce insurance costs, help in attaining public support (both politically and financially) and thus increasing the speed in which the project can be realised.
- In view of the aims of a long-term LHP to have infrastructure which is capable of expansion and fitting into the hydrogen value chain, the infrastructure will need to be adaptable to market changes and able to expand in size as its distribution range also increases.

Common features taken from Prince 2 project management theory should be in place for all work packages including:

- A Business Case detailing for what targets and objectives the work packages exists to undertake/achieve.
- Controls, such as the use of stages, so that at the end of a stage, the Steering Group reviews the work package and states whether the activity should be continued and/or its objectives changed.
- Such controls ensure a solid internal communication programme but common interests should also be communicated to the Project Manager and the other work packages.

2.2.2 Operations – RCS, Safety and Quality Assurance Groups

MATRIX RESULTS - GREEN CODE

For any project, project management theory states that risks should be identified from the outset in a Project Brief. In addition the application of a "Risk Log" for use during the project should be created which first contains a risk analysis and then a risk management strategy. The Risk Log itself should be regularly updated and presented to the Project Manager, who when deemed necessary will inform the Steering Group. Previous demonstration projects have benefited from the use of a specific body dealing with purely Health and Safety issues that are linked to risk management. Safety is also strictly related to the development of a harmonised set of codes and standards. The latter will facilitate fuel handling and also resolution of issues related to fuelling liability and insurance, which have been identified as a barrier to large scale commercialisation of hydrogen road transport technologies. More details on this aspect are presented in the paragraphs below.

a) RCS Monitoring

Monitoring of and contribution to the development of standards in FCH technologies (international, national and local) should be undertaken within the LHPs to facilitate the large-scale commercialisation of HFC road transport technologies and public acceptance from a safety viewpoint.

There are three approaches identified in the factors for monitoring and reporting on RCS:

- Using an external body (sub-contracting the work to a legal specialist);
- Using an internal body (setting-up a working group in the management structure);
- Partners monitor, report and contribute to RCS development within and outside the project.

Using an external body provides neutrality, however it is important that if the body is a legal specialist, that it is also aware of new standards and best practices being developed in the sector and moreover has a very good understanding of the FCH technology's particularities. In the PGI survey the highest ratings for RCS monitoring was attributed to this method of monitoring.

An "internal body" would use the inside knowledge from all the project partners to monitor RCS, Safety and Quality laws and requirements, however this body would need to be able to oversee all the partners' work and activities in order to be thorough. But this may prove sensitive (with regards to the exchange of proprietary technical or technological information), and complex should the project grow or involve a wide geographic, culturally, and legally diverse area. It was the least favoured method of RCS monitoring in the PGI survey.

Partners monitoring separately their own compliance to existing norms and voluntarily contributing knowledge towards the evolution of existing codes and standards is another option. This has been identified as reducing bureaucracy within the management structure while focusing efforts on their activities and respective work packages. The PGI survey rated this method almost on par with using an external body.

Four good examples here are:

- A repository for hydrogen safety data and information implemented by the Department for the Environment in the US (DoE) allows for experiences to be shared across the DoE Hydrogen Programme.[14] A Hydrogen Safety Review Panel also visits sites and investigates with local authorities that RCSs apply in each case.[15]
- The classification of RCSs in an easy-to-read format such as that developed by DoE NREL seen in the Annex IV.
- A useful resource is the Partnership for Advancing the Transition to Hydrogen (PATH) website[16] which publishes current international standards and those under development.
- An interactive, web-based map detailing the regulations, codes and standards across the whole value-chain. Please see: http://www.hydrogen.gov/interactive_map.html

b) Identifying and managing risks

Safety is paramount to a successful project and is a by-product of good quality work. A serious accident would bring significant bad publicity for the technology. In light of which a safety plan should

[14] http://www.pnl.gov/energy/eed/policy-prog/pdf/weiner_6-20-05.pdf
[15] http://www.pnl.gov/energy/eed/policy-prog/pdf/pnnl-sa-15055.pdf
[16] http://www.hpath.org/codes-and-standards.asp

be developed to mitigate the risk of accidents. It is important therefore that safety and quality assurance is built-in to the tasks; this can be done through the use of four logs:

- Risk Logs – Perform an initial assessment of potential risks to the project and regularly update the log periodically.
- Issue Logs – Questions, comments, concerns, errors and desirable changes are recorded and held by the Project Manager for subsequent action to be taken.
- Quality Logs – Quality checks and assessments on the project's progress are reported here.
- Lessons Learnt Log – Records methods, tools mechanisms, organisation, and communication aspects so that a body of knowledge can be kept for the future.

Safety procedures and training for operators should all be part of risk mitigation plan which should include three key stages:

- § Monitoring – using Risk Logs, Issue Logs and Quality Logs to identify potential problems ex ante.
- § Reporting – using all Logs to ensuring that if a problem arises it is reported and dealt with.
- § Disseminating - using the Lessons Learnt Log to present findings to relevant stakeholders in an understandable and transparent manner.

The risk analysis should consider the risks that the implementation of such projects could impose to the health & safety of those dealing with the hydrogen technology on a daily basis for the realisation of their tasks within the LHP.

c) Risk assessment & mitigation plans

MATRIX RESULTS - GREEN CODE

Due to the relative early stages of the FCH technologies' evolution, the undertaking of risk assessment activities the design of risk mitigation plans is still necessary for improving public acceptance, both morally and financially, whilst concurrently helping to reduce insurance costs.

For a developing technology such as hydrogen, knowledge of changing legislation (i.e. vehicle technology type approval) and requirements (i.e. refuelling requirements only to be realised by specially trained personnel) can be crucial to the success of a future Lighthouse Project.

In all the projects safety and risk assessments were seen as important, useful and applicable. Whether the partners are legally required before a project, or for ensuring the well being of employees and third parties, this is a crucial element in a future LHP given the importance of the technology development.

In Europe a report by the European project "HySafe" indicates that an "explosion protection document" should be prepared and maintained. This will serve to ensure that explosion risks have been determined and assessed; that adequate measures will be taken to attain the aims of the EC Directive on ATEX[17] and that certain zones with the project space have followed the classification requirements as indicated in the Directive. With specific reference to hydrogen projects technical and/or organisational measures should be undertaken to ensure compliance towards the prevention of ATEX formation; the avoidance of ATEX ignition; and the mitigation of the detrimental effects of an explosion so as to ensure the health and safety of the persons working with hydrogen technologies within the Lighthouse Projects.

Such risk analyses should have as a goal that explosive atmospheres alongside other hazardous conditions do not occur and if they do, what would be the plan, what precautions should be undertaken so as to mitigate or contain the potential hazard, in line with the Directive. In addition, a safety plan should identify immediate (primary) potential failures as well as consequential (secondary) potential failures thus attempting to cover every possible failure, both large and small.

[17] http://ec.europa.eu/enterprise/atex/guide/index.htm

It is self-evident that once the safety concerns are addressed and utilised properly within a well-designed and focused PR and communication campaign of the Lighthouse Projects results, the outcome will be wider public outreach and increased public awareness and acceptance.

Recommendation

- When allocating funding to LHPs "Evaluation Criteria" to be included in call for tender, is a presentation of detailed outline of its Risk Mitigation Plan that would apply to the project that is based on a risk assessment analysis.

2.2.3 Operations – Intra-project and Inter-project Communication

Internal Communication is key for the Project Manager to be able to manage all partners. There are three operations which can help improve communications between operational level and Steering Group level:

- General Assembly
  - Includes project and could also involve external stakeholders who may, due to their experience offer guidance as for certain project activities to the project. .
- Technology team meetings
  - Useful for bringing together experiences from mobility and infrastructure work packages, or experiences in different nodes.
- Efficiency Analysis Body / Project Coordination Committees
  - A body dedicated to analysing the transfer of aims and objectives from the Steering Group to the operational level. Regular reporting is encouraged so that problems in communication may be dealt with rapidly.

In addition, through the use of Memoranda of Understanding (MoU), projects are able to formalise their links with other projects to increase knowledge-sharing and build the global intellectual capital further improving the effectiveness of a project.

Recommendations

- Mobility and Infrastructure Work Packages should be present in future LHPs due to their complementary nature and significantly different outputs.
- Safety, Quality Assurance and Risk Management should utilise the project management tools to effectively communicate concerns and for problems to be addressed effectively.
- As the environment of codes and standards is not yet harmonised in the field of FCH technologies, the LHPs could positively contribute to the monitoring and further development of RCS. The allocation of such tasks to an intra-project dedicated body should be weighted against the project's activities and objectives, i.e. should the project focus on R&D activities or contacts with national/international standardisation organisations then a dedicated team could be useful following consensus of all project partners. .
- A Project Brief should be drawn to facilitate work and communication lines between project partners.

3 Legal Factors

It is not the purpose of this report at this stage to provide one solution that could fit the case of future Lighthouse Projects in terms of legal forms of the partnerships. The objective is to provide an idea of different elements that make part of the PGIs legal factors´ analysis, and need to be taken into consideration when the project partners will need to choose a partnership form to better serve the needs of an LHP.

3.1 Legal – Forms of Partnership

MATRIX RESULTS - MIX OF CODES

The legal form of a project is analysed by looking at the contractual agreements signed between project partners, including relevant public authorities. This does not necessarily mean that a consortium takes on a separate legal entity, and in fact some projects see increased flexibility without having such official obligations that come with such a status.

From the projects that have been analysed in this study, as well as other HyLights research, it is apparent that there is no prescriptive legal form that may be used in LHPs. However, the favoured form is an unincorporated, informal Public Private Partnership, securing public and private funds to help in the research and development of the technology. This type of partnership is in line with the FP7 Joint Technology Initiative provisions as laid out in Article 171 of the EC Treaty.

An unincorporated form may or may not be recognised as a separate legal entity. A separate legal entity could provide more freedom with regards to the choice of its management structure and the l laws that could apply to regulate its operations (i.e. Intellectual Property, liability of partners, etc). However, this would also mean that individual partners take the liability upon themselves and agreements must be made as to ownership of outputs such as intellectual property. It is therefore common to find unincorporated consortia with their own bylaws, regulations, confidentiality agreements and IPR protection clauses. This is also in line with the findings of the survey, which demonstrated value in Consortium Agreements, Confidentiality Agreements and Data protection by receiving green ratings.

The alternative would be an incorporated form, such as the establishment of a company (seen in the HySolutions project), whereby a limited liability company (Ltd.) was formed by the project partners. When it comes to forming a company, it would appear that the advantages might far exceed the disadvantages. Some issues to be taken into consideration if an incorporated form of partnership is chosen:

1. Sole proprietorship and partnerships are subject to unlimited personal liability when it comes to business debt. Creditors of the business can hold the owners of the business personally liable for debt and can take action to seize the proprietor or partner's assets.
2. The shareholder of a corporation with a limited liability form has only the money he has put into the company to lose, and usually no more.
3. A corporation has the most enduring legal business structure versus an unincorporated partnership. If a contingency occurs with relation to one partner the project might “suffer” delays/complications or various legal entanglements. Since a corporation has a life of its own, the project may continue on regardless of what may happen to its individual project partners and/or shareholders. Also, in the case of the incorporated form, ownership of the business may be transferred, without disrupting operations, through the sale of stock.
4. Capital can be more easily raised with a corporation. This may be accomplished through the sale of stock or other equity interests. With unincorporated partnerships, investors are much harder to attract because of the personal liability issue. For example, if the investor in some forms of partnerships wants a share of the business for his capital contribution, he could become subject to a demand on his personal assets from creditors if the business becomes insolvent.
5. With unincorporated partnerships each individual general partner may bind the business to arrangements that may result in serious financial difficulty. A corporation's shareholders cannot legally commit the company by their acts simply because they have invested in it.

6. Corporations offer the advantage of allowing tax-deductible benefits depending also on the location of establishment.

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While it would appear that the argument for incorporating is strong, as mentioned it should not be considered as a panacea for Lighthouse Projects for one of the following reasons:

1. Establishing and maintaining an incorporated form of partnership requires more paperwork and record keeping than unincorporated ones. Each individual country has its own legal procedures and regulations for forming and maintaining a corporation in good standing. Also, it is usually more costly to set up a corporation than any of the other major business structures.
2. If the profit from the business is not significant there may not be enough income to take advantage of the tax and other benefits of a corporation. This might be an important consideration as Lighthouse Projects will not be revenue intensive projects.

a) FP6/FP7 rules

Up to now according to FP6 and FP7 rules, Consortium Agreements need to be signed to establish the project partnerships. According to these rules the following basic elements should be included:

"…Consortium agreement
Save where otherwise provided in the call for proposals, all legal entities wishing to participate in an indirect action shall draw up an agreement, hereinafter 'the consortium agreement', to govern the following:

a. The internal organisation of the consortium;
b. The distribution of the Community financial contribution;
c. Additional rules on dissemination and use including intellectual property rights arrangements, as appropriate;
d. The settlement of internal disputes;
e. Liability, indemnification and confidentiality arrangements between the participants…"

A Consortium Agreement may itself take the following legal forms[18]:
- An agreement or contract;
- The establishment of an association;
- An Economic Interest Grouping or European Economic Interest Grouping;
- A joint venture.

The review of the different projects realised in Europe has demonstrated up to now that most of them did not need to adopt a complicated legal form and only the signature of a Consortium Agreement suffices to establish the partnership/consortium as these were co-funded by the EC.

However, in the HySolutions' case the project was established as a Limited Liability Company (ltd.) and has proved very useful, as this form has allowed the partnership to participate in other EU co-funded projects as a separate legal entity. This was a good example of effective "legal engineering" creating a Special Purpose Vehicle (SPV) with its own legal persona while allowing the partners/shareholders to carry out other research activities at the same time when the SPV participates in a co-funded project.

In the US the practice seems to be very different as the US DoE contracts only with one party, the "Prime Recipient" by signing a "Cooperative Agreement" by entering into a PPP where 50% of project financing is provided by the US DoE and the remaining is contributed in cash or in kind. The prime recipient is responsible for sub-contracting project related activities to other parties in order to reach the goals stated in the Cooperative Agreement. The US DoE does not interact at all with the sub-contractors and financing to them is channelled through the prime recipient.

[18] http://ec.europa.eu/research/fp6/model-contract/pdf/checklist_en.pdf

Recommendations:

- Before deciding to adopt an incorporated or unincorporated form, the LHP project partners should consult with a legal specialist or an accountant to determine if a corporate structure would be best for best for the LHP, as well as the pros and cons of being incorporated in one Member State as opposed to another.
- The final decision as to the legal form that will be adopted should be made explicit in the Project Brief.

3.2 Legal – Financing – EIB RSSF

MATRIX RESULTS - MIX OF CODES

While the survey results point to the fact that national and regional funds were more useful to the realisation of the previous demonstration projects (gaining a yellow rating), the nature of future LHPs being under the FP7 programme warrant an in depth look at the types of European funding available for future LHPs.

The Risk Sharing Financing Facility (RSSF) provided by the European Investment Bank (EIB) enhances the EIB's capacity to provide debt financing for Research, Development and Innovation (RDI) – intensive promoters (companies, universities, R&D consortia, etc.) that present a high-risk financial profile, i.e. with a low/sub-investment grade profile. Such a mechanism was specifically called for by the European Council in its decision on the Financial Perspectives for 2007-2013. By sharing the risk with the EIB, this facility will allow a larger volume of loans for R&D projects and the financing of bankable projects (projects which are able to sufficiently repay the loan) with a higher risk profile than would otherwise be possible for the EIB. Partners in large projects supported by FP7, such as Joint Technology Initiatives (JTIs), collaborative projects and research infrastructures, will be automatically eligible. Eligible requests will then be examined by the EIB according to the usual banking practice.

With regard to the legal form of partnership that project promoters might consider endorsing for the Lighthouse Projects the following must be noted:

- For Lighthouse Projects to receive RSSF funds, it is not absolutely necessary that the project partners adopt an incorporated form of partnership, i.e. they could also endorse a simple consortium or collaboration agreement. Beneficiaries could range from large corporations, mid-cap and SMEs to SPVs, Universities and PPPs (JTIs).

However, it must be borne in mind that the EIB remains a financial institution and as such it needs to evaluate the bankability and creditworthiness of the transactions and of the project promoters in order to allocate the requested support under the RSSF. The projects must be technically and economically viable to be eligible to receive the funds available under the RSSF. The EIB will evaluate, among others, the capacity of the project to generate sufficient cash-flow to reimburse the funds provided. These could take the form of corporate loans, project finance, risk sharing bank facilities, as well as other funds that meet the RSFF credit profile.

For the specific case of Hydrogen road transport Lighthouse Projects, there could be two possible scenarios:

a) Corporate financing

The EIB could provide RSSF funds to the project promoters directly and they would be liable for the reimbursement of the borrowed amount. In legal terms this means that each company participating in the project would be liable for the repayment of the funds provided under the RSSF for the project realisation. This implies increased financial risk for the project partners in case of project failure.

In the case of Corporate financing the EIB will need to evaluate the bankability of the Lighthouse Project transactions based on the creditworthiness of the project partners, being the borrowers of the funds. In this case funds can be allocated to very high-risk profile projects as the risk is dissociated

from the project itself, although may be comparatively detrimental to those companies in the project who specialise in high-risk activities.

b) Project financing

The intrinsic nature of Lighthouse Projects as demonstration activities not having the capacity to generate sufficient cash flow, combined with the fact that project viability cannot be 100% guaranteed, project promoters may decide to share the high financial/project risks. One solution is to endorse an agreement establishing a legal and stand-alone (i.e. ring-fenced) project company, the so-called “Special Purpose Vehicle” [henceforth “SPV”, also known as a “Special Purpose Entity” (SPE), in Europe mostly known as "Special Purpose Vehicle"]. This is a corporate body (usually a limited company of some type or, sometimes, a limited partnership) created to fulfil narrow, specific or temporary objectives, primarily to isolate financial risk, usually bankruptcy but sometimes a specific taxation or regulatory risk. The project promoters in this case would be liable to the extent stipulated in the partnership/company agreement. However, despite the fact that the financial risk will be shared among partners and “transferred” to an extent to the SPV, the project promoters would still need to be able to provide financial guarantees (collaterals, etc) to the project through own resources so as to secure the repayment of the allocated RSSF funds.

In the case of Project financing, the EIB would base its bankability assessment on the Lighthouse Project itself and its capacity to generate free cash-flow as well as the proportion of equity brought in the project by the project partners.

If a SPV is created this would be financially and legally solitary and no or limited recourse to the project promoters would be necessary. The establishment of an SPV has also other merits linked to issues such as IPR, national regulations, competitive reasons, property investing, etc are linked with the establishment of a SPV and will be dealt with at a later point.

Some of the advantages between "conventional” loan instruments provided by banking institutions and the ones offered by the EIB are:

a. A “package” of funds can be provided combining EIB debt instruments and EC R&D grants together with private funds, in the case of JTIs;
b. RSSF funds are tailored to cover high risk profile Research, Development and Innovation projects, co-funded by FP7 grants, fitting the profile of Lighthouse Projects to be financed through JTI and FP7 funds as well;
c. Due to the EIB’s AAA rating and the non-profit motive, the allocation of RSSF funds will provide attractive terms and conditions. It might also be that commercial banking institutions do not or are not willing to finance projects such as the Lighthouse Projects;
d. The RSSF can be provided over a long-term period.

In other projects such as London, “seed capital” was used to encourage the project initiation. The seed capital came from the local authority which provided sufficient funds in order to open up a programme office from which calls for tenders were issued. Once a suitable project was identified, private industry contributes half of the costs of the project. The local authority then, upon being given proof that the partner had fulfilled its obligations in accordance with the contract (as was also the case in ARGEMUC) then paid half the industry’s costs.

<u>Recommendations</u>

- The specific circumstances, geographic location, technology evolution phase, partners’ needs and Lighthouse Project objectives should be carefully weighted before a decision is reached to endorse a specific legal partnership form that could facilitate the receipt of funds such as RSSF against other issues pertinent to the choice such as liability, IPR, tax considerations, expansion of project partnership, inclusion of partners from non-EU countries, etc.

3.3 Legal – Safety – RCS

MATRIX RESULTS - GREEN CODE

The differentiator between Regulations & Codes on the one hand and Standards (RCS) on the other is their legal status.

- **Regulations** are made by political bodies (parliaments, governments) and are legally binding. They prescribe an acceptable level of, for example, safety or emissions for the technology in question. A regulation should be abided by once enforced through national or European legislation. In this sense, regulations are intended to guarantee any potential negative that a product, system or activity might have on human safety/health or the environment.
- **Standards**, on the other hand, are voluntary "norms" and constitute a useful instrument for the industrial organisations or interest groups dealing with the technology in question. The application of a standard is not obligatory (unless a regulation makes a direct reference to the standard and even then the legal "enforcement" for the standard comes from the regulation).
- A **Code** by contrast is a collection of rules, requirements or standards that have been rendered binding and mandatory by a local or national government. **Codes** mostly correspond to US terminology and distinctions are made between a "code" with compelling power and a "**code of practice**" which has mostly the sense of a voluntary instrument.
- Within Europe the term "**harmonised standard**" is used to enable a manufacturer to demonstrate that his product conforms to European legislation. It must noted that compliance with "harmonised standards" within the EU market is voluntary but the for products to gain the standard's mark it should comply with the prescribed identified requirements. The manufacturers are free to choose any technical solution that provides compliance with the essential requirements.

The development of a harmonised system of RCS for both Hydrogen infrastructure and vehicles will play a crucial initial role in the smooth transition to a hydrogen economy as seen in the survey's results. The RCS will establish the ground rules and proper operating procedures to provide assurance of the safety of hydrogen as an energy carrier for use by industry and the general public. In Europe there exist no such thing as a European Hydrogen Directive and in general terms regulations are more focussed on broad themes that include hydrogen and fuel cells and related applications but are not specifically targeted at the sector. [19]

In the USA, by comparison, a path has been identified to develop appropriate RCS to address hydrogen safety concerns (Annex V & Annex VI). In addition, a harmonised RCS environment for hydrogen technologies, would help lift barriers generated from different national legislations and facilitate for example the transfer of equipment, vehicles, etc. from one country to another, the participation of project partners coming from different geographical areas and jurisdictions, and last but not least, a harmonised legislative environment could greatly reduce the time delays that authorisation and/permitting procedures require for hydrogen road transport technologies and could hamper in this way the realisation of a Lighthouse Project at its very beginning already.

For instance, if approval is sought for a hydrogen vehicle, emissions, fuel consumption and engine power cannot be tested according to the existing directives/ regulations. The reason is mainly the absence of a standardised reference fuel or the absence of a test procedure and the absence of corresponding EC directives respectively ECE regulations. Some other directives can be fulfilled formally, but from the technical point of view they should be revised for hydrogen vehicles. At EU level, the European Commission issued a preliminary draft proposal for a regulation for hydrogen powered motor vehicles and initiated an Impact Assessment the results of which were recently published (Annex VII). The objective of the regulation is to enact harmonised testing requirements for the type-approval of hydrogen-powered vehicles. The proposed regulation will aim to ensure the safe operation

[19] Mostly important European directives applicable to hydrogen are those related to pressure equipment i.e. the "Pressure Equipment Directive" and the "Transportable Pressure Equipment Directive". Another relevant directive is the one referring to explosive atmospheres (ATEX), 1999/92,CE, in view of improving Health & Safety conditions for workers at a hydrogen application.

of hydrogen-powered vehicles by incorporating them in the EU vehicle type-approval framework and establishing safety requirements for the vehicle's hydrogen storage systems. The proposal aims to permit the approval and commercialisation of vehicles using hydrogen and will contribute to public confidence in the new technology.

Within the EU15, each Member State has around 30 to 50 technical regulations, national standards or codes of practice which have to be applied also to hydrogen systems and components and outside the EU each country has different legal requirements. Thus a harmonised set of regulations was developed for the Approval of Hydrogen Vehicles as part of EIHP Phase 1 (1998-2000).[20] In the coming phase of LHPs the development of homologation will help to ensure the continuation and expansion of its activities. Thus the sharing of knowledge on safety, such as websites like www.h2incidents.org (promoted by the US DoE) can only help in this regard.

Recommendations

- Unlike the previous demonstration projects, an LHP will be aiming to develop homologation[21], and should use technology that has already acquired certification and other safety norms in order to speed up the advancement towards commercialisation while gaining efficiency. A viable dissemination of safety learnings should also be encouraged.
- It is difficult to develop RCS for a technical field that is new and in constant development. The Lighthouse Projects could and should serve as platforms for the collection of data to be contributed to the development of a solid RCS framework for hydrogen road transport technologies in Europe. Uniform codes and standards will reduce risks perceived by insurers of new and innovative hydrogen technologies helping to reduce the likelihood of lawsuits whilst reducing future insurance costs.

3.4 Legal – IPRs and Data Protection

MATRIX RESULTS - GREEN CODE

Overall, the rules on intellectual property should follow the general rules for the Seventh Framework Programme as laid down in Regulation 1906/2006. As the JTIs are set up under Article 171 of the EC Treaty for the efficient execution of the Community research activities and objectives and are funded by this programme, the JTIs should abide by the rules established for this programme to ensure equal treatment. However it is understandable that the specific nature of the LHPs might require certain deviations from the general rules, including in some cases their adaptation to better fit the competitive nature of the industry stakeholders and to gain the necessary confidence from all the project partners.

The nature of the FP7 programme ensures that IPR and access to collective data are included in a Consortium Agreement, including rules on dissemination. The rights covered range from copyright to patent rights. The PGI survey demonstrates that the inclusion of data protection provisions in the contract is common and a useful practice.

Should a LHPs' IPR rules deviate from those stated in the FP7 the new rules should still comply with the relevant competition rules, set out in particular in the R&D Block Exemption Regulation[22]. The latter states that all the individual parties should have access to the results of the joint R&D results for the purposes of further research or exploitation as long as they were not competing undertakings at the time that the agreement was entered into. The agreement therefore excludes the joint exploitation of joint R&D results.

When establishing a consortium for the undertaking of the LHP an important element will be the specific geographic jurisdiction and its level of legislative protection. For example, some legal systems do not allow for a formal opposition to be raised prior to the granting of a patent nor do they allow for third parties to "ally" in an argument about whether a patent should be granted or not. However, the disadvantage in such a pre-opposition case is that this can generate considerable delays if someone

[20] http://www.hyweb.de/Wissen/pdf/paris13dec2001.pdf
[21] Quote from CEP "homologation not part of demo project of past, but now yes"
[22] Commission Regulation (EC) 2659/2000 of 29 November 2000 on the application of Article 81(3) of the Treaty to categories of research and development agreements, OJ L 304 of 5.12.2000, p. 7.

seeks to attain a patent. The latter has the meaning that the patentee seeking the granting of a patent in order to pursue infringement proceedings would not have the possibility to do so in a short time frame. In some countries such as the US, the legal system of IPR protection does not provide for such pre-opposition, allowing only for re-examination of the patent by the responsible administration. In many countries, for example France, there is no provision at all for opposition and no substantive examination of the patent is carried out. This situation can be very complicated as the only possibility to annul or amend a competitor's patent would be through litigation. With regards to trademarks pre-registration opposition is possible and is some countries such as the UK such opposition is not a frequent occurrence as rigorous examination prior to trademark registration takes place whereas in Germany pre-opposition happens quite often as there is no official search against prior rights during examination. [23]

In the US DoE funded projects, a well and precisely designed IPR collection and handling framework and process is in place. This has greatly contributed to the smooth collaboration between the public and private parties and constitutes a cornerstone for the successful realisation of the demonstration projects. A data collection agreement is signed between the contracting parties. The approach and agreement is harmonised between the four demonstration projects co-funded by the US DoE. However, there is flexibility with regards to the type of information that needs to be collected and reported to the DoE by respecting the minimum requirements. The flexibility is more in terms of technology evolution and in view of the fact that larger scale commercialisation will render certain information less sensitive than this were at the point of basic R&D and demonstration.

Recommendation

- It is advisable for building trust and an efficient learning system, that a set of clear IPR principles, in line with the EC competition regulation and any other applicable legislation be stipulated the call for tender outlining boundaries in the governing rules and repeated in the text of each specific financing agreement for the Lighthouse Projects.

3.5 Legal – State aid

MATRIX RESULTS - RED CODE

State aid as defined in Article 87(1) EC Treaty is prohibited, as incompatible with the common market, unless it is authorised by the Commission. This also means that public funding that does not qualify, as state aid is not subject to Community control of state aid. This may be relevant for example for R&D projects typically carried out by research organisations such as universities. In case only a portion of project costs is covered by the FP7 contribution, Member States are free to provide any missing funding from central or local sources. State aid law does not apply in such circumstances. Indeed the survey results indicate that state aid would not be a problem for LHPs.

The situation is different with contributions provided to individual companies. In such cases, if an EU Member State intends to support a project already financed from FP7, it has to ensure that the combined Member State and FP7 funding does not exceed the maximum thresholds allowed by the appropriate state aid rules, most notably the Community framework for state aid for RDI. In practical terms, the Member State should calculate how much it would theoretically be allowed to pay to the project partner under the state aid rules if no FP7 funding was available. In a second step, the actual FP7 contribution should be subtracted from this theoretical amount. If the difference is positive, this is the additional funding that the Member State is still allowed to contribute. If the difference is negative or zero, there is no space for additional funding.

In the case of the JTI on Hydrogen and Fuel Cells, the JTI will provide significant amounts of public & private money to selected undertakings, in areas that may give them a technological edge and therefore a competitive advantage in view of the deployment of both R&D and demonstration activities within the Lighthouse Projects. Hence, it is important to ensure that the impact on competition of such

[23] http://www.wipo.int/freepublications/en/intproperty/909/wipo_pub_909.pdf

funding is taken into consideration in the selection of the beneficiaries/project promoters of the Lighthouse Projects, and the benefits of the funding outweigh any possible harm to competition.

The Lighthouse Projects will need to comply with the state aid framework for RDI, which has introduced a series of criteria for evaluating whether a given RDI project is in conflict or not with state aid rules[24]. In particular, the funds allocated to Lighthouse Projects funding should target a market failure, have an incentive effect (creating additional research) be proportional and result in limited distortions to competition and trade. This is confirmed by the PGI survey which demonstrates that state aid rules do not prohibit the effectiveness of demonstration projects. However it is important to note that the survey includes two North American results whereby there is comparatively less distortion in trade as a result of funding a project, than maybe the case in Europe with its close proximity of countries.

Nevertheless, from a procedural point of view, it seems that LHP funding will not have to strictly follow state aid procedures, and notably that no official notification to the EC would be necessary. As the contribution by Member States to LHPs is directed to and distributed by the JTI Programme Office, funding would be arriving to a project from this legal entity and not through a state's budget and thus the funding allocated to Lighthouse Projects can be considered not to constitute as state resources, and consequently not to be qualified as state aid.

Recommendations

- State aid from Europe does not appear to pose a threat to the development of LHPs due to the inherent character of the FP7 set-up. However, Member States and Regions should be cautious when providing funds to projects that do not have a separate legal form, and in which case a Special Purpose Vehicle would provide the safest option of providing funds within European state aid rules.

3.6 LEGAL – LIABILITY

a) Insurance of the project and its participants

MATRIX RESULTS - GREEN CODE

With respect to financial barriers there are a number of liability and insurance issues to consider. At this point, it is unclear how insurance firms will develop and underwrite activities of hydrogen infrastructure developers. Particularly unsure are the cost structures of these policies. There is little experience upon which to base premiums and no actuarial tables to draw upon.

The survey's results indicate that reducing liability is of utmost importance for the project partners and that this will be the case in the future. However, rarely is insurance taken out on the activities of the consortium but instead is undertaken by the individual companies themselves.

The development of the FCH technologies by SMEs, especially by those that deal with relatively risky technologies would still be considered high-risk by insurance companies. Indeed one option to evade this problem considered by the Canadian Hydrogen Highway was the use of an 'insurance pool' whereby funds are made available in order that refuelling station providers could face 'reasonable' insurance rates i.e. via a subsidy given via the project [25], however caution should be taken that moral hazard does not arise in such a situation.[26]

Insurance and liability agreements should therefore take into account the different incentives and therefore different strategies of both hydrogen energy and vehicle providers. Current recommendations from the Western Governors Association from the US may help to build more consistency in the application of insurance rates. One recommendation outlines the need for a central (state-run) "system to record and investigate safety-related incidents and offer a database of

24 C323, mainly chapter 7

25 http://www.hydrogenhighway.ca.gov/implement/pubmeetings/advisory/120804tiax.pdf

26 Moral Hazard is the economic theory that an actor behaves more carelessly once more protected by such schemes as insurance. For more see: http://en.wikipedia.org/wiki/Moral_hazard#Moral_hazard_in_insurance

experience. This database would be made available to the insurance industry to reference and use in building the necessary body of statistics needed to provide affordable insurance rates" [27]

b) Legal and Liability Considerations for Hydrogen Economy

With the number of regulations and codes that have already been developed, a future hydrogen economy will most probably face a tightly regulated environment. There are, in addition, inherent risks associated with the widespread transportation and use of any type of flammable gases and liquids (especially colourless and odourless). Considering both the anticipated regulatory environment and these liability issues, the siting and permitting of new hydrogen facilities may face important procedural hurdles, as well as public and political opposition. The novelty of hydrogen as an energy medium on a commercial scale also necessarily raises important business logistics and transactional issues such as the availability of a sufficiently skilled and trained workforce, novel supply and distribution contracting issues, the availability and appropriateness of insurance and financing, and other issues that are fundamental to the success of most businesses that will be engaged in the creation and development of a hydrogen energy sector.

In order to overcome the barriers posed by the fuelling liability aspect the following have been proposed by analysis realised in the US:

- Define a mechanism to limit the liability of all refuelling station participants (drivers, OEMs, energy companies, hydrogen suppliers) to ease station access concerns and expedite refuelling agreements (consider shared liability through a government funded limited liability pool). This would be critical for 700 bar stations as there is less experience;
- Design affordable insurance;
- Allocate government/public property to site retail-like fuelling infrastructure i.e. commercial-like refuelling at a federal, state, or city site;
- Identify government mechanisms (including funding) to incentivise communities to accept hydrogen refuelling/vehicle service sites;
- Harmonise station permitting processes at the state and local level to ensure that permitting officials/processes adhere to a common baseline to eliminate interpretation and variability (coordinate federal, state & local hydrogen permitting processes) - e.g. develop a state standard and incentivise local jurisdictions to implement (not to exceed)[28]

c) The Message and the Path Forward

Developing and publicising a clear, honest, and effective message about the safety, and the hazards of hydrogen and about the measures being undertaken to ensure hydrogen safety will be critical. Bad news or serious accidents could be extremely detrimental to the political and public support for a hydrogen economy. Compared to other developing renewable energies there are some exaggerated media and public depictions which will require good press relations, and effective representation – perhaps through a trade group or other organised body – in order to promote the safe and sustainable aspects of hydrogen.

d) New Scale, New Players, New Exposures

As a flammable, explosive, colourless, odourless, and difficult (or impossible) to odorise material, hydrogen presents unique safety considerations. Even though hydrogen may be as safe in many respects as natural gas or propane, and even safer than flammable liquids such as gasoline in many applications, its properties do pose difficulties that other fuels may not.

In moving from a world of specialised industrial uses of hydrogen at discrete, heavily-secured locations under the close watch of well-trained employees (such as in a demonstration project) to a scenario involving much broader commercial distribution and consumer use and handling of hydrogen, the

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[27] http://www.westgov.org/wga/initiatives/transfuels/reports/Hydrogen.doc

[28] Hydrogen and Fuel Cell Technical Advisory Committee (HTAC)Washington, D.C.9 January 2007Byron McCormick and Julie Beamer GM Fuel Cell Activities Hydrogen

safety issues associated with hydrogen become much more acute. In other words, as the hydrogen economy grows, so too will the opportunities for such incidents and accidents to occur and with it an increase in the number of third-parties who may be affected.

e) The Lawyer's Role

Legal issues are likely to arise in connection with the ongoing development of laws, regulations, and codes that relate to hydrogen production, transportation, distribution, and use. Legal considerations are relevant to proper comment on proposed rules and are, of course, critical to effective legal challenges to such regulations. Such tools may be essential to achieve an overall body of regulation and codes that assures safety without being too heavy or inflexible that they would depress hydrogen development. Indeed, concerns that extraordinary interpretations of legal liability will be developed may restrict the willingness of the manufacturers and fuel providers to expand beyond the currently planned small demonstrations.

Legal thinking can also help address the liability issues associated with hydrogen, both in responding to situations and claims that may arise out of hydrogen-related incidents, but also in a preventative mode in which counsel may help companies identify mechanisms and measures to, among other things, better demonstrate "due care" that can serve as a defence to potential future negligence claims. Further, legal talent will be necessary to help effectively lay the groundwork for, and push through siting and permitting activities, which themselves may involve legal proceedings and legal challenges. Finally, the application of legal skills will be necessary in arranging critical business logistics including, among others, negotiations and contracting for financing, insurance, leases, and the like. Companies engaged in hydrogen energy-related businesses will benefit from the early and effective involvement of knowledgeable counsel.

Recommendations

- Use only tested and safe technologies for fuelling stations and require that users of hydrogen fuelling stations be properly trained and authorised
- Provide regulatory guidance to the insurance industry to encourage the availability of reasonably priced insurance for vehicle operators and fuel providers.
- Organising a potent strategic communications effort that develops and effectively deploys a persuasive and realistic message on hydrogen's benefits and risks will be a critical step in overcoming unfortunate media and public perceptions about hydrogen.
- And finally, careful assessment of and participation in statutory, regulatory, and code developments, preventative thinking about potential incidents and other contingencies, and thoughtful preparation for contractual and other business and public interactions on hydrogen with the advice of well-informed counsel will go a long way towards developing legislation to provide an acceptable level of liability for all partners concerned.

4 Conclusions and Recommendations

This report has highlighted the key PGIs based on a series of interviews and desk research. The findings have revealed the most essential factors for the successful implementation of the LHPs. These comprise the following:

- Steering Group
- Project Manager
- Mobility & Infrastructure Groups
- Quality Assurance Group
- Consortium Agreement
- Confidentiality Agreement
- Risk assessments on both infrastructure and vehicles
- Risk mitigation plans
- Safety training
- Third party liability coverage for infrastructure providers
- Data protection provisions in a contract

Summarising the analysis, we draw the below conclusions:

Management Factors

1. Steering Group
    - Decision-making body and thus critical to the direction of the project and therefore an essential element for an LHP – backed up by the survey's results.
    - Should meet at least once for each year of the project, preferably more often.
    - Should be representative of the industry sectors involved in the LHP so that decisions include all interests.
    - Its role should be set out in a Project Brief to prevent overlap of responsibilities with the Project Manager.
2. Advisory Board
    - An option to help increase the input of experts and public stakeholders, to provide input (e.g. technical, legal advice) to the Steering Group to help partners make better-informed decisions.
3. Project Management Team
    - Each project proposal should indicate who is to be the Project Manager.
    - In an LHP, a project management team seems highly necessary due to the number of potential partners and the amount of information that will be handled by the Project Manager.
    - A project management team is then to be designed and finally persons may be appointed to their designated positions.
4. Project Reporting
    - A draft layout of the reporting schedule and series of deliverables should also be presented in the proposal so that one may evaluate whether the project is going to be managed well, and to provide updates as to whether it is behind or ahead of schedule.
5. Nodes
    - If a project proposal states that the project will cover two or more countries, a nodal structure should be considered as a suitable management structure.
6. Communications & PR
    - PR should be done both locally, and by the Partnership's coordinator using the same branding but not necessarily the same message
    - Include a plan for engaging with the local community
    - Ensure continual dialogue with relevant authorities and other stakeholders
    - Build in procedures to deal with critical community
    - Promote publicly accessible hydrogen stations and use by qualified users, to encourage public acceptance.
    - Organising a potent strategic communications effort that develops and effectively deploys a persuasive and realistic message on hydrogen's benefits and risks will be a critical step in overcoming unfortunate media and public perceptions about hydrogen.

7. "Business Case"
    - A Business Case detailing for what targets and objectives the work packages exist to undertake or achieve that could also attract additional funding for the project from financiers such as venture capitalists or other risk financing institutions.
8. Project Controls
    - Controls, such as the use of "stages", so that at the end of a stage, the work package is reviewed by the Steering Group and it states the activity should be continued or its objectives changed.
    - Such controls ensure a solid internal communication programme but common interests should also be communicated to the Project Manager and the other work packages.
    - When allocating funding to LHPs "Evaluation Criteria" should be included in call for tender, as detailed outline of its Risk Mitigation Plan that would apply to the project, based on a risk assessment analysis.
9. Working Groups/Task Forces
    - Mobility and Infrastructure Work Packages should be present in future LHPs due to their complementary nature and significantly different outputs.
    - Safety and Quality Assurance should utilise the project management tools to effectively communicate concerns and for problems to be ironed out effectively.
10. RCS WG
    - RCS follow up and contribution to development of RCS is equally well done by an external monitoring body, or by partners themselves. A specific internal body (such as a dedicated work package) seems to have no added-value.
11. Intra-Project Communication
    - Communication both within and between projects can be improved in numerous ways, all of which should be considered in the Project Brief.
12. Other factors
    - The specific circumstances, geographic location, technology evolution phase, partners' needs and Lighthouse Project objectives should be carefully weighted before a decision is reached to endorse a specific legal partnership form that could facilitate the receipt of funds such as RSSF against other issues pertinent to the choice such as liability, IPR, tax considerations, expansion of project partnership, inclusion of partners from non-EU countries, etc.

Legal Factors

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1. RCS
    - It is difficult to develop RCS for a technical field that is new and in constant development. The Lighthouse Projects could and should serve as platforms for the collection of data to be contributed to the development of a solid RCS framework for hydrogen road transport technologies in Europe. Uniform codes and standards will reduce risks perceived by insurers of new and innovative hydrogen technologies helping to reduce the likelihood of lawsuits whilst reducing future insurance costs.
    - As LHPs will be aiming to develop harmonisation of standards, the use of technology that has already acquired certification would help to speed up the advancement towards commercialisation.
2. IPR
    - It is advisable for building trust and an efficient learning system, that a set of clear IPR principles, in line with the EC competition regulation and any other applicable legislation be stipulated the call for tender outlining boundaries in the governing rules and repeated in the text of each specific financing agreement for the Lighthouse Projects.
3. State Aid
    - State aid from Europe does not appear to pose a threat to the development of LHPs due to the inherent character of the FP7 set-up. However, Member States and Regions should be cautious when providing funds to projects that do not have a separate legal form, and in which case a Special Purpose Vehicle would provide the safest option of providing funds within European state aid rules.
4. Liability/Safety/Insurance
    - Use only tested and safe technologies for fuelling stations and require that users of hydrogen fuelling stations be properly trained and authorised

- Provide regulatory guidance to the insurance industry to encourage the availability of reasonably priced insurance for vehicle operators and fuel providers.

5 Annexes

5.1 Annex I – Matrix Template

		PROJECT GOVERNANCE INDICATORS			
		Weighting/Evaluation (right) Factors (below)	*Importance*	*Usefulness*	*Applicability*
			Project Name		
PROJECT MANAGEMENT FACTORS	GENERAL MANAGEMENT	Steering Group/Steering Committee (decision making body)			
		Project Management team			
		One person coordinator			
		External Project Management company non-project partner			
		Managing Director (company structure)			
		Managing team (company structure)			
		Decision Making Board (company structure)			
		Executive Expert/Consulting Group (not part of decision making process just providing opinion)			
		Local/sub-management structures/nodes			
		Local training / education body			
	OPERATIONS	Dedicated Administrative body - Secretariat			
		Mobility/Vehicle Group			
		Infrastructure Group			
		Ad hoc Working Groups			
		Safety Team			
		Quality assurance/efficiency body			
		Monitoring & assesment body			
		Project Coordination Committee (between work packages and the European Commisstion)			
		Finance body (Treasurer)			
		Separate financial management between nodes and central budget			
		RCS External Monitoring body			
		RCS Intra-project Monitoring body			
		RCS monitored by project partners			
		Stationary Applications Body			
		Efficiency Analysis Body			
		Technology Team meetings			
	OTHER	Forum (including external/non-contracted stakeholders)			
		PR bodies in nodes/local management structures			
		PR team consisting of Project Partners			
		External PR firm (subcontractor)			

		PROJECT GOVERNANCE INDICATORS			
		Weighting/Evaluation (right)	***Importance***	***Usefulness***	***Applicability***
		Factors (below)			
LEGAL FACTORS	**LEGAL FORM**	PPP			
		Incorporated legal form (i.e. Ltd, unlimited, EEIG, etc)			
		Public shareholder majority of shares			
		Private shareholder majority of shares			
		Unincorporated (simple collaboration, other)			
		Consortium Agreement			
		Confidentiality Agreements			
		Sub-contracting Agreements			
		Vehicles/buses/infrastructure leasing agreements			
		Vehicles/buses/infrastructure purchase agreements			
		Fleet operator contracts			
	FINANCE	EU Funded			
		National funds			
		Regional/local funds			
		Risk financing/Venture Capital			
		Project financing agreements			
		Public Procurement			
		Competititve Dialogue			
		Calls for tenders			
		Call for project proposals			
	SAFETY & RISK	Risk assesment - infrastructure			
		Risk assesment - vehicles/buses			
		Risk mitigation plans			
		Safety training			
		Safety plans			
		"Third party" liability OEMs			
		"Third party" liability Infrastructure provider			
		"Third party" liability special project consortium/group provisions			
		External insurance provider (infrastructure)			
		External insurance provider (vehicles)			
	OTHER	State aid rules			
		Anti-trust			
		Merger control			
		IPR protection rules & procedures in the contract			
		Data protection provisions in			
		Consultation with certification/authorisation organisation			
		Partnership with certification/authorisation organisation			
		Memorandum of understanding (MoU) with other projects/regions			

5.2 Annex II – Criteria Explanations

EXPLANATION OF FACTORS USED IN THE DEVELOPMENT OF PROJECT GOVERNANCE INDICATORS

This study centres on the development of Project Governance Indicators (PGIs). These PGIs are management and legal factors which have been developed through desk research and interviews with various demonstration project participants in Europe, US, Canada, Japan and Australia.

This exercise collects information from numerous hydrogen demonstration projects, and the information provided will be combined with other responses to provide a picture of which different legal forms of partnership and project management structures have proved successful and which may be used in large-scale hydrogen demonstration projects in the future.

How to use these guidelines

This explanatory document lists the factors in the table below on the left-hand side. The right-hand side offers a description of the factors to provide the user of the better understanding of the terminology used. This document is to be used in conjunction with a PGI matrix (on Excel) whereby the user is asked to complete the matrix using the following scale.

7 = very positive

6 = positive

5 = slightly positive

4 = neutral

3 = slightly negative

2 = negative

1 = very negative

0 = not applicable to your project

The user is asked to grade each factor according to three criteria:

Importance means whether the factor was essential for the project to undertake its operations.
Usefulness means something that was useful to have but not necessarily of crucial importance for the project to succeed

Applicability means that this factor should be used again in the future for large-scale demonstration projects.

PROJECT MANAGEMENT FACTORS	
Factor	*Description*
For Projects with partners under a temporary contract for the duration of the project: • Steering Group / Project Board For Projects undertaken by a single company with partners as shareholders: • Decision Making Board	Ensures smooth progression of the project works and is responsible for the continuous and undisrupted commitment of resources (financial & human) to the project.
For Projects with partners under a temporary contract for the duration of the project: • Project Management Team, a One-person Coordinator or the use of an External Project Management company (i.e. a non-project partner) For Projects undertaken by a single company with partners as shareholders: • A Managing Team, or a Managing Director	Ensures the production of deliverables is met given project's constraints and the demands of the Board.
Executive Expert / Consulting Group	An external Consulting Group / expert may provide valuable input and oversight of the project and may be called upon by the Project Manager or the Board. It/they does/do not have voting rights or any other claims vis-à-vis the project partners except for its remuneration for the undertaking of the specific tasks assigned unto them.
Local / sub-management structures / nodes	A 'node' structure involves using a different management approach in local areas; a type of sub-management level. Mainly useful in large multi-location projects. It can useful especially if different types of technologies of hydrogen production, delivery or storage as well as different applications are tested and demonstrated within the scope of a large-scale LHP.

Local training / education body	A team of dedicated personnel dealing with the training of persons using equipment and/or educating the locality about the project, not for PR reasons, but for safety and awareness purposes.
Dedicated Administrative body / Secretariat	This project support may range from administrative tasks to secretarial services; may often be incorporated by the Project Management Team.
Mobility / Vehicle Group	A body containing personnel from the partners which would represent the OEMs as project partners of the technology that is being tested / demonstrated. Ranging from planners to engineers, analysts, etc.
Infrastructure Group	A body containing personnel from the partners which represent the infrastructure industry (refuelling stations, industrial gas, etc.) that is being tested / demonstrated. Ranging from planners to engineers, analysts etc.
Ad Hoc Working Groups	Was body set up within the project management structure to deal with unique, often short-term issues before perhaps being disbanded? E.g. An initial team could be formed for preliminary training purposes.
Safety Team	A specified team which undertakes checks and inspections ensuring safety of equipment and demonstration sites, including roads.
Quality Assurance / Efficiency Body	This body analyses the quality and efficiency of the project in terms of alignment of the project's activities towards planned deliverables. It can be responsible as well for adapting the project's deliverables according to changing circumstances (change management control). This may be done by the project manager using specific tools or as an ad hoc body.
Project Coordination Committee (inter-Work Package and / or between partners and the European Commission or other public body)	This committee may contain project partners ranging from Managers, supervisors to engineers who address overlapping issues and/or commonalities between Work Packages. The committee may also coordinate directly with a public body in charge of the project to give direct feedback on actual experiences versus planned actions.

Finance Body (Treasurer)	This task may be performed by a dedicated body or by a specified treasurer. Tasks include: management of the inflow of the funds to the project from the a funding organisation, and the subsequent distribution to the other project partners.
Separate Financial Management between nodes and central budget	For large multi-location projects, if the financial management is split up so that a central budget is managed locally.
Regulations, Codes and Standards • Monitored externally • Monitored through intra-project body • Monitored by project partners individually	RCS can be monitored by (a) legal professional(s) not necessarily a partner to the project to check compliance of the project to relevant RCS. Alternatively this could be done 'in-house' via a specific body looking at the whole project's compliance; the body would contain partners' legal experts. Or thirdly, each partner monitors its own operations with respect to RCS and reports to the project manager individually. The existence of such a Work Group/Committee is deemed necessary, as RCS is an existing barrier to large-scale commercialisation of hydrogen road transport technologies. This Working Group/Committee would also liaise with the local authorities to facilitate authorisation and permit procedures.
Technology Team Meetings	Regular meetings between partners to discuss technical progress being made and offering an opportunity to react to common technical problems being encountered and sharing knowledge and best practices.
Forum (including external/non-contracted stakeholders)	Fora allow partners to meet non-partners who are external to the project and offer an opportunity for feedback; this also includes web-based fora. Participants to such fora could be NGOs, or other stakeholders that could contribute to the wider dissemination and visibility of the LHP's results.
PR bodies in nodes / local management	A non-centralised approach to PR whereby messages are targeted in relation to the geo- and demo-graphic peculiarities of a location.

PR team consisting of Project Partners versus using an External PR firm (subcontracted)	Has the project developed its PR strategy internally or has had the work subcontracted.

LEGAL FACTORS	
Factor	*Description*
Public Private Partnership (PPP)	A form of collaboration that would implicate both public and private stakeholders. Main advantage is risk management as this could be transferred to the public authority as well as the provision of additional funds. However, the bureaucracy prevailing in the public sector might constitutive a relative barrier to the quick evolution of a project and in the decision making process. On the other hand PPPs can also provide a step stone for private stakeholders into potential early markets.
Incorporated legal form (i.e. Ltd. plc.) • Public shareholder majority • Private shareholder majority	The partnership that will/has undertaken the project has adopted a 'company' / corporate legal form with the partners -private or public- holding shares in the company.
Unincorporated Legal form (i.e. a simple collaboration) • Consortium Agreement	The partners do not form a new legal structure but come together collaboratively. This may mean signing a Consortium Agreement setting out the guidelines and rules of the collaboration. This has been the practice mostly up to now as far as EU-funded projects are concerned.
Confidentiality Agreements	Rules by which partners are able to sign up to and are in place to foster a spirit of trust and good collaboration.
Sub-contracting Agreements	Agreements by which to sub-contract specific tasks, e.g. Legal compliance
Vehicles/buses/infrastructure leasing and purchasing agreements	Agreements for leasing and purchasing of vehicles and infrastructure.
Fleet Operator Contracts	Used when the operator of the vehicles is different from the local authority.
EU / National / Regional / Local Funding	From which source does funding for the demonstration project come? You may answer in multiple.
Risk Financing / Venture Capital	The use of capital designed to cover high-risk profile projects such as the future LHPs.

Project Financing Agreements	Specific agreements between partners and funding bodies (national / local authorities) as to contributions and project's budget.
Joint Public Procurement	A public authority buying any of the demonstration infrastructure, vehicles, refuelling stations, etc. This practice has a positive impact mostly in terms of prices of the purchased technology as it can drive prices downwards.
Competitive Dialogue new Procurement Procedures (EU only)	The use of the procedure as described here.
Calls for tenders	Were calls for tenders issued? Are they necessary? (e.g. A call for tender would be published to sub-contract partial PR or Marketing work)
Calls for proposals	Were calls for proposals issued? Are they necessary? (e.g. A call for proposal would be published by an authority for the undertaking of a project)
Risk assessment – Infrastructure and Vehicles	Has a risk assessment carried out on the demonstration project i.e. on the infrastructure and vehicles?
Risk mitigation plans	Following on from a risk assessment, were any plans put in place to mitigate risk?
Safety training and Safety plans	Training – Applies to operators and project partners only. Safety Plans also includes procedures.
Third Party liability for OEMs, infrastructure providers and for the consortium/group in general	Was there third party liability insurance covering each OEMs, infrastructure providers and for the consortium/group in general?
External insurance provider (infrastructure and vehicles)	Was an external provider insuring the infrastructure and vehicles?
State-aid rules	Did these impact the project and were they important to the outcome of the project, useful for the project (by limiting competition and/or increasing government funding), and would you foresee them being important in future large-scale demonstration projects?

Anti-trust	Were anti-trust rules applied to the project and were they useful in the development of a successful project?
IPR protection rules and procedures	Was there a system protecting IPR? Was this important to get partners joining, and working together? Are these necessary in all future projects?
Data Protection Provisions	Were there any provisions regarding generic data (not intellectual property)
Use of a certification / authorisation organisation either as a partner or for consulting purposes.	Were such organisations used to check standards, procedures etc.?
Memorandum of Understanding	Was a MoU signed at any stage during the project? Was it and important step, useful and hence an applicable tool for future large-scale demonstration projects?

5.3 Annex III – Final Matrix

PROJECT GOVERNANCE INDICATORS						
		Weighting/Evaluation ?	***Mean***	***Summation***	***Median***	
		Factors ?				
			Compiled data			Final Colour
PROJECT MANAGEMENT FACTORS	GENERAL MANAGEMENT	Steering Group/Steering Committee (decision making body)	6.0	47.7	6.7	A
		Project Management team	5.3	42.0	7.0	A
		One person coordinator	4.0	32.3	4.9	B
		External Project Management company non-project partner	2.9	23.3	2.6	C
		Managing Director (company structure)	2.5	20.3	1.0	C
		Managing team (company structure)	2.5	20.3	1.0	C
		Decision Making Board (company structure)	1.8	14.3	0.7	D
		Executive Expert/Consulting Group (not part of decision making process just providing opinion)	2.7	21.7	2.3	C
		Local/sub-management structures/nodes	0.8	6.7	0.0	D
		Local training / education body	4.2	33.7	5.2	B
	OPERATIONS	Dedicated Administrative body - Secretariat	4.3	34.3	5.8	B
		Mobility/Vehicle Group	6.0	48.0	6.8	A
		Infrastructure Group	6.0	48.3	7.0	A
		Ad hoc Working Groups	3.2	25.3	3.2	C
		Safety Team	5.1	40.7	7.0	B
		Quality assurance/efficiency body	5.5	44.3	6.7	A
		Monitoring & assesment body	5.0	40.0	6.2	B
		Project Coordination Committee (between work packages and the European Commisstion)	3.6	29.0	4.3	B
		Finance body (Treasurer)	4.0	32.0	5.2	B
		Separate financial management between nodes and central budget	2.1	17.0	1.8	C
		RCS External Monitoring body	3.0	23.7	1.0	C
		RCS Intra-project Monitoring body	0.4	3.0	0.0	D
		RCS monitored by project partners	2.7	21.3	1.5	C
		Stationary Applications Body	1.1	8.7	0.0	D
		Efficiency Analysis Body	0.0	0.0	0.0	D
		Technology Team meetings	4.9	39.0	6.0	B
	OTHER	Forum (including external/non-contracted stakeholders)	3.7	29.3	4.3	B
		PR bodies in nodes/local management structures	1.6	12.7	0.7	D
		PR team consisting of Project Partners	4.6	36.7	5.3	B
		External PR firm (subcontractor)	3.3	26.7	3.8	C

			Compiled data			Final Colour
LEGAL FACTORS	LEGAL FORM	PPP	4.3	34.3	6.0	B
		Incorporated legal form (i.e. Ltd, unlimited, EEIG, etc)	1.3	10.7	0.0	D
		Public shareholder majority of shares	0.9	7.0	0.0	D
		Private shareholder majority of shares	0.6	5.0	0.0	D
		Unincorporated (simple collaboration, other)	2.8	22.7	1.8	C
		Consortium Agreement	5.7	45.3	7.0	A
		Confidentiality Agreements	5.4	43.3	6.3	A
		Sub-contracting Agreements	4.7	37.7	5.8	B
		Vehicles/buses/infrastructure leasing agreements	4.5	36.3	6.7	B
		Vehicles/buses/infrastructure purchase agreements	3.3	26.3	3.0	C
		Fleet operator contracts	3.0	24.0	2.2	C
	FINANCE	EU Funded	3.4	27.3	3.2	C
		National funds	4.9	39.3	7.0	B
		Regional/local funds	4.5	35.7	5.2	B
		Risk financing/Venture Capital	2.0	16.3	0.7	C
		Project financing agreements	3.2	25.7	3.0	C
		Public Procurement	2.3	18.3	0.8	C
		Competititve Dialogue	2.0	16.0	0.0	C
		Calls for tenders	3.1	25.0	3.0	C
		Call for project proposals	3.2	25.3	3.2	C
	SAFETY & RISK	Risk assesment - infrastructure	6.4	51.0	7.0	A
		Risk assesment - vehicles/buses	6.0	48.3	7.0	A
		Risk mitigation plans	6.0	48.3	7.0	A
		Safety training	6.3	50.7	7.0	A
		Safety plans	5.5	44.3	7.0	A
		"Third party" liability OEMs	4.8	38.7	7.0	B
		"Third party" liability Infrastructure provider	5.8	46.7	7.0	A
		"Third party" liability special project consortium/group provisions	2.3	18.3	0.7	C
		External insurance provider (infrastructure)	4.0	31.7	4.8	B
		External insurance provider (vehicles)	4.1	33.0	4.8	B
	OTHER	State aid rules	1.4	11.3	0.0	D
		Anti-trust	1.5	11.7	0.0	D
		Merger control	0.6	4.7	0.0	D
		IPR protection rules & procedures in the contract	4.5	36.3	6.7	B
		Data protection provisions in contract	5.9	47.3	6.8	A
		Consultation with certification/authorisation organisation	5.2	41.7	6.5	B
		Partnership with certification/authorisation organisation	2.9	23.0	2.0	C
		Memorandum of understanding (MoU) with other projects/regions	3.7	29.7	4.7	B

5.4 Annex IV – DoE-NREL RCS Table

The European Integrated Hydrogen Project (EIHP)29 has identified persons at risk from a hydrogen and fuel cell demonstration activity, for which it is advised that different criteria should be used to evaluate their associated risk:

- **Hydrogen refuelling station and vehicle personnel (first party)**
  This includes personnel involved in operation, inspection and maintenance of the hydrogen and/or the conventional refuelling station and/or vehicle. Generally, a higher risk level will be considered acceptable for this group than for Third party. An individual risk criterion, setting limits to the risk of each individual working at the station, is the most relevant.
- **Refuelling station and vehicle customers (second party)**
  This will assess people visiting the refuelling station area to use the facilities. These people will be exposed to the risks at the refuelling station or in the vehicle for a limited period of time, while visiting the facilities or using the transportation. Therefore, the risk contribution to each individual will be very low. However, it would be unreasonable to use this as an argument for not considering this risk.
- **Third party**
  Third party risk considers how events on the refuelling station or on the vehicle can affect areas outside the refuelling station boundaries or a vehicle's perimeter and includes people living and working in the vicinity of the refuelling station or visiting/travelling through the neighbourhood. Both societal and individual (or geographical) risk measures should be considered.

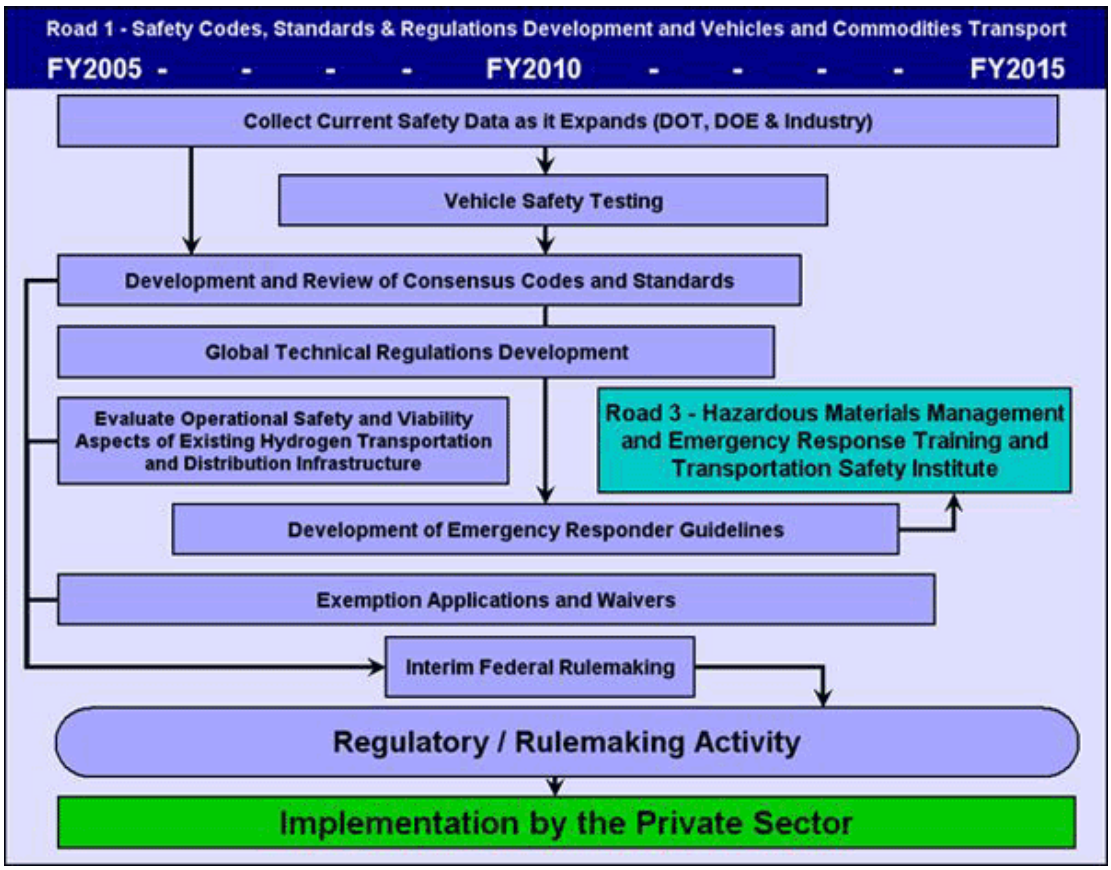
DOE-NREL National Standards, Codes, & Regulations Harmonization Template

General Area	Controlling Authority	Functional Area	Lead SDO	Assisting Organizations
Vehicles	NHTSA	Crashworthiness	DOT	SAE
	EPA	Emissions	DOT	SAE
FC Vehicle Systems		Vehicles	SAE FC Standards Comm.	
		Containers	CSA	SAE
Fueling, Service, Parking facilities	State and local governments	Zoning and building permits	ICC, NFPA	DOE
		Stationary storage tanks	ASME	CSA, CGA, NFPA, API
		Piping standards	ASME	CSA, CGA, NFPA
		H2 Dispensers	CSA	UL, NFPA
		On-site H2 production	CSA	UL, CGA, API
Fuel Delivery and Storage	RSPA (DOT)	H2 pipelines and fuel delivery equipment	ASME	API, CGA, AGA
		Composite container standards	ASME	CSA, AGA, NFPA
		Fuel transfer standards	NFPA	API
Interface		Fuel specifications	SAE	ASTM, API
		Weights and Measures	NIST	ASME, API
		Fueling/defueling,	SAE	API, CSA
		Fueling connectors and communications	SAE	UL, CSA, API, IEEE
		Sensors/detectors	UL	NFPA, SAE, CSA

http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/merit03/69_nrel_ohi.pdf

[29] http://www.eihp.org/public/Reports/Final_Report/Sub-Task_Reports/ST5.2/EHEC%20paper_final.pdf

5.5 Annex V - US DoT- Wide Activities Supporting Road 1



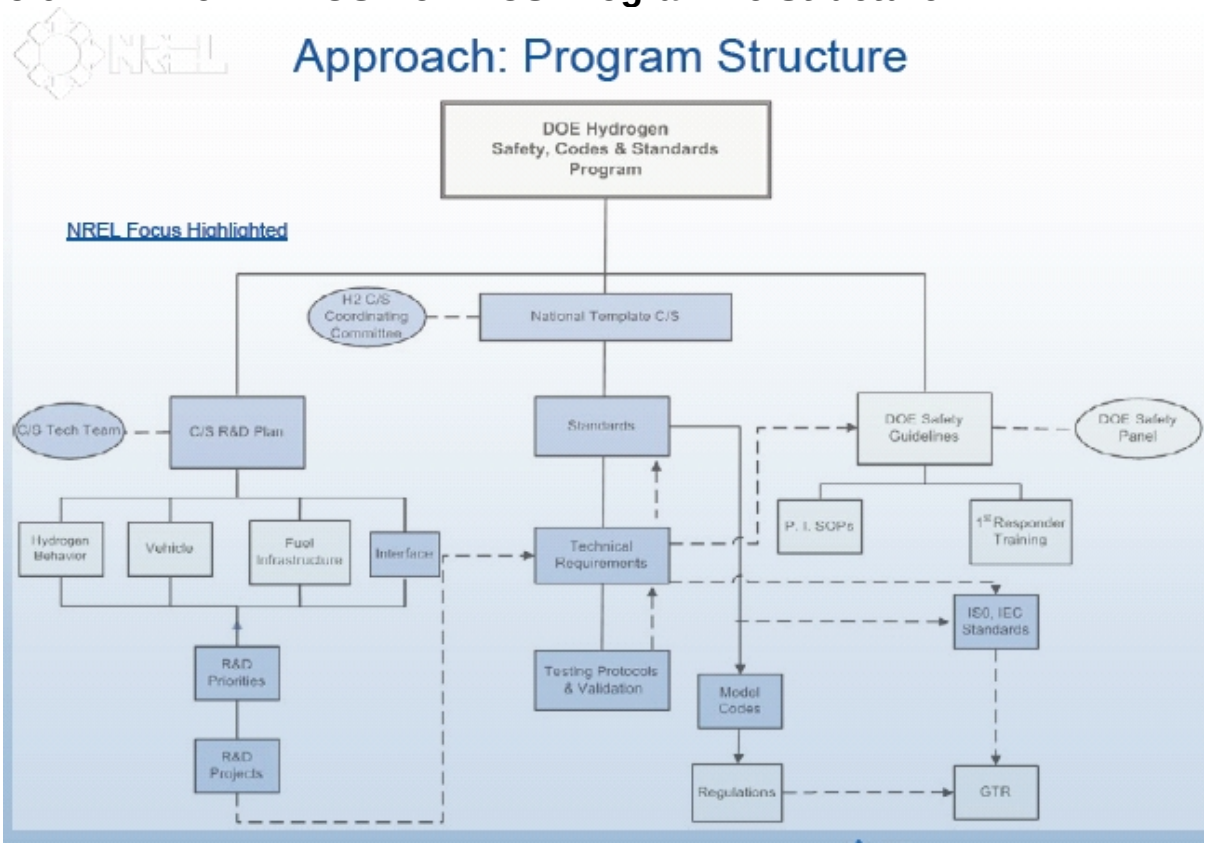
Road 1 describes the issues and processes that DOT is using to enable the private sector to transition to a hydrogen economy while maintaining the current high standard of safety, reliability, and public confidence in the transportation system. It describes the process for developing and promulgating voluntary and government-imposed codes, standards, and regulations for the use and transport of hydrogen.

The long-term outcome for Road 1 is the establishment of procedures and standards for the safe use and transport of hydrogen in transportation. It includes the promulgation of performance-based regulations and industry consensus codes and standards. It encompasses DOT-regulated vehicles, containers, and hydrogen transmission through pipelines. New codes and standards should be performance-based and systems-oriented. They should apply to general product applications as opposed to the European method of prescriptive, type-specific regulations for each application. These codes and standards should also be based on sound scientific knowledge of hydrogen effects on material properties and behaviour. Finally, they must address both the design and operation of transportation systems, subsystems, components, and consumer devices.

The three major independent activities in this roadmap are the collection of safety data, the evaluation of the operational safety and viability of existing hydrogen transportation and distribution infrastructure, and exemption applications and waivers. All other activities either support or complement these three primary activities. For example, safety data collection will be a continuing effort; it will feed into the development and review of consensus codes and standards, as well as DOT regulations. Similarly, the consensus codes will lead to the development of emergency responder guidelines, Global Technical Regulation (GTR) development, and Interim Federal Rulemaking.

Source: Research and Innovative Technology Administration, U.S. Department of Transportation

5.6 Annex VI – US DoE RCS Programme Structure



Source: 2006 DOE Hydrogen Program Annual Merit Review Hydrogen Codes and Standards Jim Ohi National Renewable Energy Laboratory May 19, 2006

5.7 Annex VII – EU Type approval for hydrogen powered motor vehicles

The EC presented in July 2006 a proposal that specifies technical requirements to be applied for the type-approval of hydrogen of hydrogen components (containers and components other than containers) included in the hydrogen system. In addition, it includes requirements for the installation of these components or systems in vehicles.
The regulation will apply to:

a. Hydrogen powered vehicles of categories M and hydrogen-powered vehicles of categories M and N;
b. Hydrogen systems for motor vehicles of hydrogen systems for motor vehicles of categories M and N;
c. Hydrogen components integrated in the hydrogen system of motor vehicles of categories M and N categories.

Possibility of approval of L vehicles on the basis of the requirements is kept open.

The common EU type-approval framework of hydrogen vehicles should be provided in order to ensure:

a. Functioning of the EU internal market functioning;
b. Supporting the deployment of hydrogen technology, thus ensuring environmental and safety benefits for the society.

The proposal will:

a. Aid the approval and placing on the market of vehicles aid the approval and placing on the market of vehicles using hydrogen using hydrogen;
b. Bring environmental benefits sooner bring environmental benefits sooner;

c. Contribute to the confidence in the new technology for contribute to the confidence in the new technology for potential users and the public at large.

The adoption of the type approval is expected to take place in September or October 2007.

More detailed information on the consultation process and the results of the Impact Assessment can be found under:
http://ec.europa.eu/enterprise/automotive/pagesbackground/hydrogen/consultation/call.htm

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