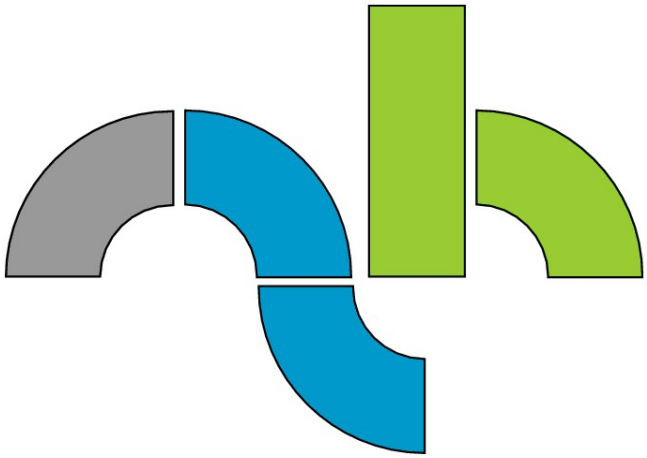

Roads2HyCom

www.roads2hy.com

Roads2HyCom Hydrogen and Fuel Cell Wiki
http://www.ika.rwth-aachen.de/r2h

Liquid Hydrogen Transport by Rail

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About Roads2HyCom

Roads2HyCom is a project supported by the European Commission's Framework Six program. Its purpose is to assess and monitor hydrogen and fuel cell technologies for stationary and mobile energy applications.This is done by considering what the technology is capable of, relative to current and future hydrogen infrastructures and energy resources, and the needs of communities that may be early adopters of the technology.By doing this, the project will support the Commission and stakeholders in planning future research activities. Project main website: http://www.roads2hy.com

HyLights, Roads2HyCom and the Hydrogen and Fuel Cells Technology Platform (HFP)

The European Commission is supporting the Coordination Action "HyLights" and the Integrated Project "Roads2HyCom" in the field of Hydrogen and Fuel Cells. The two projects support the Commission in the monitoring and coordination of ongoing activities of the HFP, and provide input to the HFP for the planning and preparation of future research and demonstration activities within an integrated EU strategy.

The two projects are complementary and are working in close coordination. HyLights focuses on the preparation of the large scale demonstration for transport applications, while Roads2Hycom focuses on identifying opportunities for research activities relative to the needs of industrial stakeholders and Hydrogen Communities that could contribute to the early adoption of hydrogen as a universal energy vector.

Further information on HyLights is available on the project web-site at http://www.hylights.org.

Contents

Introduction

Cylindrical cryogenic tanks such as those used for trucking, can be adopted for railway transport and are used for distributing a small amount of the hydrogen used today in the industrial markets. They can typically carry up to 9100 kg of hydrogen, with boil-off rates estimated at 0.2% per day.

This method of distribution is typically used for long distances of up to 1000 miles and therefore is used more in North America than in Europe, where distribution distances tend to be shorter.

State of the Art

The production and storage of liquid can be compared to that discussed for liquid road distribution in Section 9.3. This method of distribution is not typically used in Europe.

Metric Table

METRIC	SUB METRIC	DATA / RATING	UNITS	Liquid Rail
Technology Accessibility	Compatibility with existing technologies	Rating	0-4	2[1]
	Number of Transportation providers	Data	no.	4?[2]
	Joint transportation with other fuels ?	Rating	0-4	?[3]

Global Environmental Impact	GHG emissions associated with fuel transport	Data	gCO2 eq/kg fuel	
	CO2 emissions associated with fuel transport	Data	gCO2/kg fuel	
Local Environmental Impact	Air quality impact (consider NOx, PM, CO, NMHC)	Rating	0-4	
	Noise or perception of noise from transport systems (SPL, loudness,...)	Data / Rating	dB(A), sone	
	Land use / damage to nature (e.g. pipelines)	Rating	0-4	
Efficiency	Transport leakage	Data	% (kg) loss / km	Boil off rate 0.2-0.6% per day[4]
	Energy efficiency (e.g. truck energy consumption + leakage)	Data	%	
Capacity & Availability	Measured capacity of distribution infrastructure	Data	kg fuel / year	
	Lifetime of technology	Data	years	
Cost (click here for more datails)	Capital investment for fuel transport facilitites	Data	¤/capacity	N/A
	Operational / maintenance costs	Data	¤/year	N/A
	Decommissioning Cost	Data	¤/capacity	N/A
	Transportation Costs	Data	¤/kg/km	N/A
Safety	No. of transport interruptions	Data	no. / year	
	Severity of failure	Rating	0-4	

References

- Air Products
- Castello, Tzimas, Moretto and Peteves
  Techno-economic Hydrogen Transmission and Distribution Systems in Europe in the Medium and Long Term
  Report EUR 21586EN, March 2005
- *National Hydrogen Energy Roadmap, Hydrogen Posture Plan*
  US DOE
- *Costs of Storing and Transporting Hydrogen*
  Amos, National Energy Research Lab

Notes

1. ? Rail transport would only be compatible for applications near to existing rail distribution networks. This is not a typical distribution method for the current European industrial market
2. ? ?Four? refers to the major global industrial gas companies; Air Liquide, Linde Group (inc. BOC), Air Products and Praxair. I am not sure to what extent these companies use this method of distribution
3. ? I?m not sure what this means
4. ? Amos, National Energy Research Lab, Costs of Storing and Transporting Hydrogen

Hydrogen Transport

Hydrogen Transport by Tube Trailer | Hydrogen Transport by Pipeline | Liquid Hydrogen Transport by Truck | **Liquid Hydrogen Transport by Rail** | Liquid Hydrogen Maritime Transport

Technology Assessment

Hydrogen Production | Hydrogen Transport | Energy Storage | Energy Converter

Hydrogen and Fuel Cell Technologies

Socio-economic Assessment | Safety and Security Assessment | Technology Assessment | Mapping of R&D Activities | Hydrogen and Fuel Cell Technology Watch