ROAD TRHYP

ROAD TRAILER DESIGN - USE OF TYPE V THERMOPLASTIC TUBE WITH LIGHT COMPOSITE STRUCTURE FOR HYDROGEN TRANSPORT

Project ID	101101422
PRR 2025	Pillar 2 – H_2 storage and distribution
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Project total cost	EUR 2 642 912.59
Clean H_2 JU max. contribution	EUR 2 499 999.50
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Coordinator Beneficiary	L AIR LIQUIDE SA, FR
Beneficiaries	ENVITEST J. PACHOLSKI SPOLKA JAWNA, SEGULA SLOVENSKO S.R.O, SEGULA ENGINEERING, COVESS NV, EFECTIS FRANCE, ECOLE NATIONALE SUPERIEURE DE MECANIQUE ET D'AEROTECHNIQUE, ARKEMA FRANCE SA, POLITECHNIKA WROCLAWSKA, UNIVERSITE DE POITIERS, CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

http://https://road-trhyp.eu/

PROJECT AND GENERAL OBJECTIVES

Today, hydrogen transportation solutions use tubes with a working pressure between 200 - 300 bar. ROAD TRHYP's overall objective is to demonstrate that using a trailer made out of new thermoplastic composite tubes (Type V) is a suitable solution to maximise the quantity of hydrogen transported while satisfying end-user requirements on safety and ability to be decontaminated, and enforced regulations, with a low total cost of ownership.

Therefore, ROAD TRHYP will design a trailer capable of handling a payload of 1.5 ton of hydrogen with 700 bar tubes and a capex lower than 400 €/kg. This enables the reduction of the number of transport rotations between the hydrogen production site and the delivery site, and thus a reduction of the environmental footprint of compressed hydrogen transport, but also a downsizing of the compressor at the hydrogen refueling station. In addition, ROAD TRHYP will investigate new fire testing methodologies and safety barriers for Type V adoption.

ROAD TRHYP's overall ambition is to develop Europe's value chain of Type V cylinder technologies. Beyond the targeted commercial Type V trailer applications, the knowledge developed on composite materials could benefit main actors in the mobility sectors or the hydrogen storage for inter-seasonal energy storage. Therefore, ROAD TRHYP intends to address all manufacturers across Europe who may benefit from the project's innovative process and materials. Thus, ROAD TRHYP will contribute to the European Green Deal making hydrogen a widespread energy carrier by 2030.

NON-QUANTITATIVE OBJECTIVES

Formulation of regulatory recommendations aiming at the technology's faster deployment.

PROGRESS, MAIN ACHIEVEMENTS AND RESULTS

- Design of Type V cylinder completed.
- First tests show a gravimetric index higher than 7%.
- One licence of Type V cylinder sold by Covess.
- Certification in progress.
- Design of the trailer is finalised and lifecycle analysis of Type I and Type IV trailers are completed.

FUTURE STEPS AND PLANS

- Develop a cylinder with 700 bar working pressure based on the 300 bar design.
- Perform key tests based on the EN 17339 norm, including cycling tests, extreme temperature cycling tests and bonfire and validate the burst/leak model.
- Perform key tests according to cylinder usage such as decontamination and filling/unfilling, with the objective to identify the key parameters to optimise decontamination and validate a model to predict temperatures in the cylinder during filling/unfilling.
- Finalise the characterisation of the compartment of the material in fire.
- Manufacture the demonstration system made out of three cylinders.
- Perform filing/unfilling test and bonfire tests to validate models.
- Make recommendations to the ISO WG TC 197 for the interoperability of hydrogen trailers at a hydrogen station.
- Perform a lifecycle analysis for Type V trailers.
- Continue efforts to sell more Type V licenses and identify exploitation opportunities for the multi-element gas container.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?
Project's own objectives	Design Type V 700 bar tube	%	5.3	
	Water content in Hydrogen	ppm	<5	
	Ability of Type V tank to pass a bonfire test	-	-	
	CAPEX	€/kg H_2 stored	400	
	Formulation of regulatory recommendations aiming at faster deployment of the technology.	-	Present recommendation to WG ISO TC 197 regarding interoperability between HRS and trailers.	

Clean Hydrogen Partnership
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