

Deliverable I2.1.1

-Report with design specifications of the mobile hydrogen refuelling station-

Project Information	
Interreg NWE project nr./name	NWE368 / H2Share
Title	Hydrogen Solutions for Heavy duty transport Aimed at Reduction of Emissions in North West Europe
Program priority objective	SO4: To facilitate the implementation of transnational low-carbon solutions in transport systems to reduce GHG emissions in NWE
Duration	16 March 2017– 15 March 2020

Deliverable Information	
WP N° & title	I2: Design, build and demonstrate one low energy mobile refueler (market facilitator)
Del. N° & title	I2.1.1: Report with design specifications mobile hydrogen refueling station
Responsible	Wystrach
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Status	Final
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1. General

Evidence from the logistics sector shows a strong growing interest in reducing environmental impact through the use of zero-emission vehicles. This is particularly the case for the EU, where the logistics sector contributes 25% of total transport sector CO2 emissions. While battery electric trucks can operate efficiently in urban areas, hydrogen technology has a key role to play in zero-emission logistics over longer distances. Heavy-duty vehicles with a fuel cell range extender - while not yet commercially available in the EU - have huge potential. While opening a new market, it can also contribute to green transport solutions by reducing carbon emissions and improving air quality.

The project H2-Share aims to unlock this potential and will join forces beginning with four front-runner NWE regions in three member states (BE, NL, DE) experienced in hydrogen technology. (H2-Share stands for 'Hydrogen Solutions for Heavy-duty transport Aimed at Reduction of Emissions in North-West Europe'.) Based on the project partners' experiences and contacts with innovative end-users, one 28 ton rigid truck run on hydrogen and one flexible low energy mobile refueler will be built and tested.

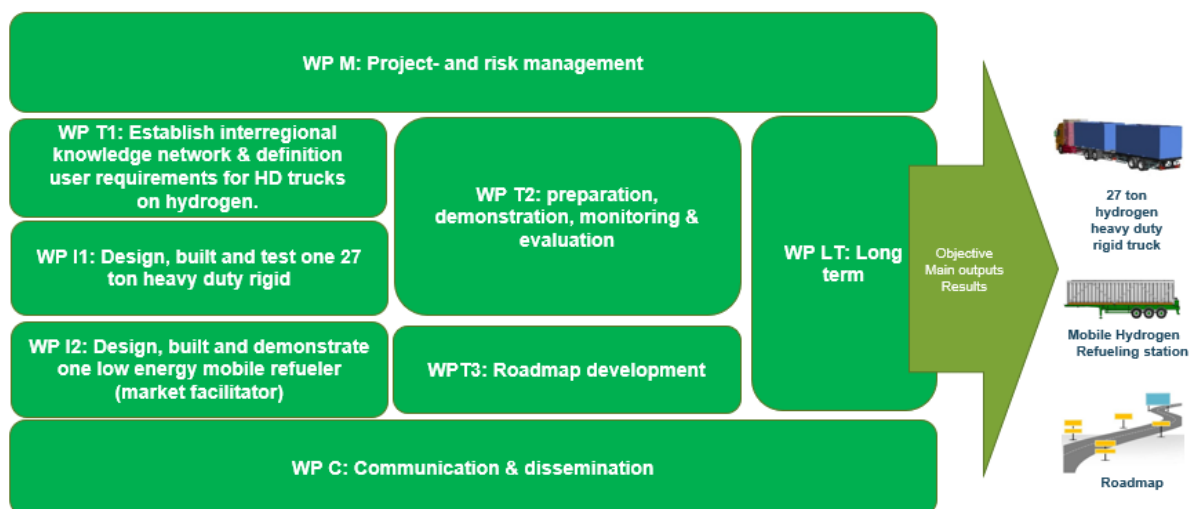
These will be developed in collaboration with important end-users involved in different regions. A demo plan will be created through the joint effort of sectoral agencies to ensure maximum involvement of regions, end-users, associations and other stakeholders. These demonstrations will build strong visibility, joint experiences and public awareness around hydrogen solutions in heavy-duty transport. They will also develop a joint roadmap for NWE.

The goal is to facilitate wider implementation of transnational low-carbon transport solutions. By activating this market, North West Europe will become a leader in Europe for zero-emission heavy-duty transport.

More information on the H2-Share project can be found on the website:

<http://www.nweurope.eu/projects/project-search/h2share-hydrogen-solutions-for-heavy-duty-transport/>

The H2-Share project is structured around different workpackages which is shown in the picture.



This deliverable is part of workpackage I2 of the H2-Share project. This workpackage is about the design, building and demonstration of a hydrogen mobile refueler which serves as a market facilitator.

This deliverable is a short report describing the specifications and the design of the mobile refueler and is part of activity I2.1 where user specifications are set up with VDL (truck integration) and end-users of equipment (legal). User specs are translated into functional specifications for equipment to be build.

Other deliverables in this workpackage are:

I2.2.1	An event where the mobile refueler will be presented
I2.2.2	Test report of the refueller
I2.3.1	Document with demonstration location requirements
I2.3.2	Service and maintenance plan with user
I2.3.3	User manual
I2.4.1	Information and documentation package for permits
I2.4.2	Permits

2. Technical specifications mobile hydrogen refuelling station

In Table 1, the general specifications of the mobile hydrogen refuelling station (Foto 1) are presented. This is based on the official product data sheet of project partner Wystrach GmbH (October 2018). It shows some general specifications but also specifications which are more related to the two units/containers which have their own function as a hydrogen storage (tank container) and refuelling station (refueller container). The specific specifications of the two units are also presented in Table 2 and Table 3.

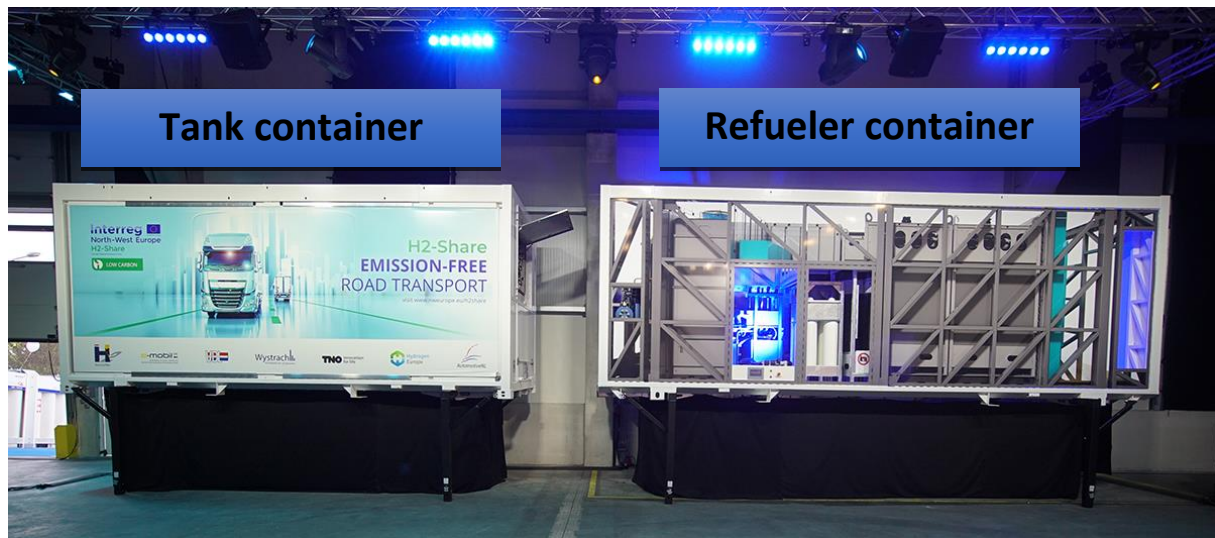


Foto 1: Mobile Hydrogen Refuelling Station.

WyRefueller 350/120: the mobile hydrogen filling station	
General specifications	Clarification
Standalone tank system for 350 bar refuelling	A pressure of 350 bar is necessary to fill up the storage tank of the demonstration truck. Vehicles which use hydrogen are normally equipped with 350 or 700 bar storage tanks.
Discharging capacity of 120 kg/day	The system can refuel 120 kg/day. For example, if one truck uses 30 kg/day, the system can deliver hydrogen for 4 trucks/day.
Available 24/7	The mobile refueller can be used 24 hours per day, 7 days per week.
Smart control	The system is a stand alone refueling station which is smart controlled.
For mobile refueling of H2 tank systems (e.g. trucks and buses)	
Transportable	The two containers are transportable with ADR trailers which can transport swap bodies. The tankcontainer has a standardized length of 20ft., round 6m. The refuelling container has a length of a swap body, round 7,40 m.
24/7 remote control possible, realized by Wystrach service	The mobile refueller can be checked via remote control. This means that Wystrachs service staff is able to log into the control system at any time to check the parameters.
Mobile as BDF swap body (ADR)	The refuelling station is mobile, built as ADR BDF swap bodies, one as tank container and another one as refueller container.
Power requirement	The Power requirement is 3x400VAC/63A

Requested footprint 21 x 6,7 meters	This is the area the mobile refueler need to function properly according to the usability and safety requirements.
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Table 1: General specifications of the WyRefueler 350/120

Tankcontainer specifications	Clarification
54 type IV cylinders á 350 liter at 300 bar	Different hydrogen storage cylinders exist, in this case, Type IV cylinders are composite tanks such of carbon fiber with a polymer liner (thermoplastic).
300 kg usable amount of hydrogen	This is the amount of hydrogen which can be used for refueling activities.
Control unit	The control unit takes up pressure and temperature data and controls the tank container valves.
ADR approved	The container is approved for the transport of dangerous goods.

Table 2: Technical specifications tankcontainer.

Refueler container specifications	Clarification
Hydrogen compressor	To reach the appropriate pressure in the storage tanks, a hydrogen compressor is used.
Control and regulation technology, independent operation	Due to the use of a control and regulation technology, the mobile refuelling station is able to be used in unmanned operation.
100 kg buffer at 500 bar	
Automatic pressure control for optimum refueling	The control system always runs a process optimization, so that there is always the best useable hydrogen pressure available for refuelling.

Table 3: Technical specifications refueler container.

3. How does the mobile refueler work?

The mobile refuelling station is designed to be as flexible as possible and serves as a market facilitator, making sure the end-user of the fuel cell electric truck can use the truck and refuel it at their own premises for the H2-Share project demonstration.

The two units (tank- and refuelling container) will be transported to the location where the end-user wants to refuel the truck. The tank container will be used to transport hydrogen between a location with a hydrogen source and the location of the demonstration at the end-user premises (or nearby). The refueller container stays at the end-user premises and uses the hydrogen from the tank container to refuel the truck.

The mobile refueler can be installed in a short time at the place where it is used. After the device is connected, the control system checks the equipment and improves the hydrogen pressure sections. The refueler is ready to use in a short time, so that a first truck, or bus can be filled up with hydrogen. The filling time is about 15 minutes, depending on how big the remaining amount of hydrogen in the truck or bus is. After filling, the bus or truck can be used directly again. The mobile refueler improves the hydrogen pressure sections again, so that a second truck or bus can be filled right after the other. An amount of four trucks or buses can be filled per day in that way. After filling about 10 trucks or buses, the tank container has to be refueled, for which it is driven away with a trailer. During the time the tankcontainer is away for new hydrogen, the mobile refueler is still able to fill up three trucks or buses with hydrogen, coming from a storage. When the tank container is back, it will be connected again to the refueler container and after a short time of improvement, the mobile refueling station is ready to use again.

Figure 1 shows the station with its dimensions in a setup with a truck.

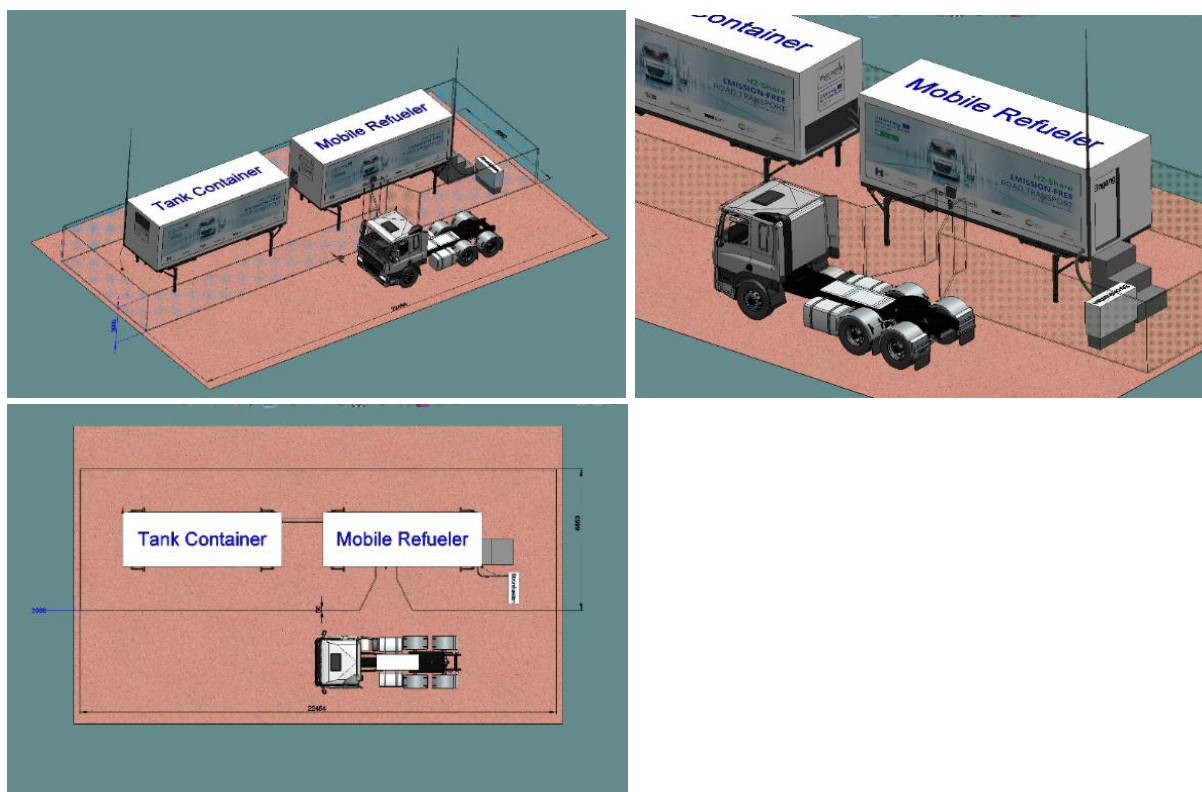


Figure 1: Artist impression of the mobile refueler with its dimensions

More info?

This report is a deliverable of the H2-Share project funded by Interreg North West Europe.

About the mobile hydrogen refueler?

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About the project H2-Share?

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