



Hydrogen Mobility Europe

Six Monthly Summary Technical Report Presenting Project Data to December 2023 – D5.42



Authored by	Peter Speers, Victor Lejona and Chapa Chandrasekara
Approved by	Steve Carroll
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Contact Details	peter.speers@cenex.co.uk Cenex, Holywell Building, Holywell Park, Ashby Road, Loughborough, Leicestershire, LE11 3UZ, UK

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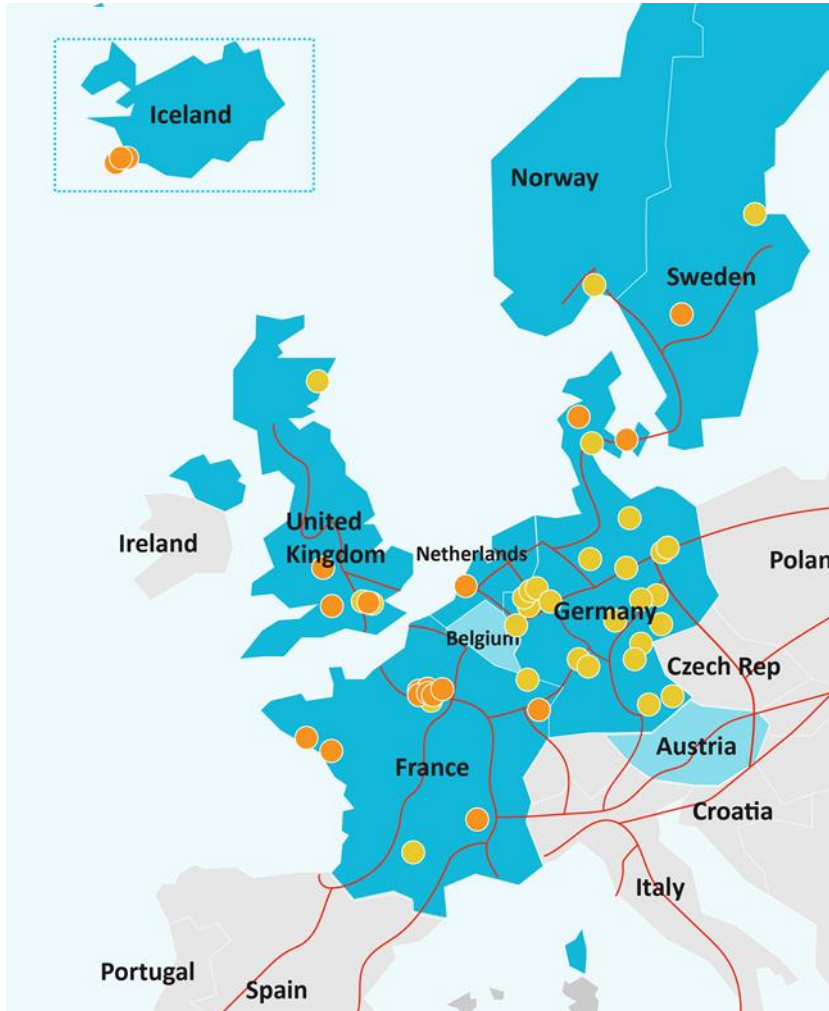


Abbreviations

A-M		N-Z	
B2B	Back-to-Back (Refuelling)	NEDC	New European Driving Cycle
BEV	Battery Electric Vehicle	NREL	National Renewable Energy Laboratory
FCEV	Fuel Cell Electric Vehicle	OEM	Original Equipment Manufacturer
FCH2 JU	Fuel Cells and Hydrogen Joint Undertaking	PEM	Proton Exchange Membrane
FC REEV	Fuel Cell Range Extended Electric Vehicle	PHEV	Plug-in Hybrid Electric Vehicle
FE	Fuel Efficiency	SOC	State of Charge
H ₂	Hydrogen	TCO	Total Cost of Ownership
H2ME	Hydrogen Mobility Europe	US DOE	US Department of Energy
HRS	Hydrogen Refuelling Station	WLTP	Worldwide Harmonised Test Procedure
HyTEC	Hydrogen Transport in European Cities	WTW	Well-to-wheel
MDBRE	Mean Distance Between Refuelling Events	ZEFER	Zero-Emission Fleet vehicles for European Rollout
MPS	Metropolitan Police Service (London, UK)		

The Purpose of this Report

- ❑ Hydrogen Mobility Europe (H2ME, <https://h2me.eu/>, 2015-2023, which comprised sub-projects H2ME-1 and H2ME-2) was the largest passenger and light duty hydrogen vehicle and hydrogen refuelling station (HRS) demonstration initiative co-funded by the Clean Hydrogen Partnership (CHP).
- ❑ Supported by €67m of CHP funding, the €170m H2ME project deployed more than 1 400 vehicles and 49 HRS in eight countries by the end of 2023.
- ❑ This is the tenth and final of a series of reports began in 2019 providing brief summaries of H2ME data.
- ❑ This version presents data that was available to Cenex by the end of the project in December 2023.
- ❑ Metrics reported include:
 - Numbers of vehicles and hydrogen refuelling stations (HRS) deployed
 - Distance driven by the project vehicles
 - Hydrogen dispensed by the project HRS.
- ❑ Additional information on, and analysis of, the performance of H2ME vehicles and refuelling stations can be found in the *H2ME Annual Technical Performance Reports* cited as sources on each slide.



New hydrogen refuelling stations:

- ❑ 20 - 700bar HRS in Germany
- ❑ 11 - 350bar and 700bar HRS in France
- ❑ 11 - 700bar HRS in Scandinavia
- ❑ 6 – 350bar and 700bar HRS in the UK
- ❑ 1 - 700bar HRS in NL

Fuel cell vehicles:

- ❑ 500 OEM (Original Equipment Manufacturer) FCEVs
- ❑ 900 fuel cell FC REEV vans

Hydrogen rollout areas:

- ❑ Scandinavia, Germany, France, UK, The Netherlands

Observer coalitions:









- ❑ Belgium, Luxembourg, and Italy

Industry observer partners:

- ❑ Audi, BMW, Nissan, Renault, Renault Trucks, AGA, OMV

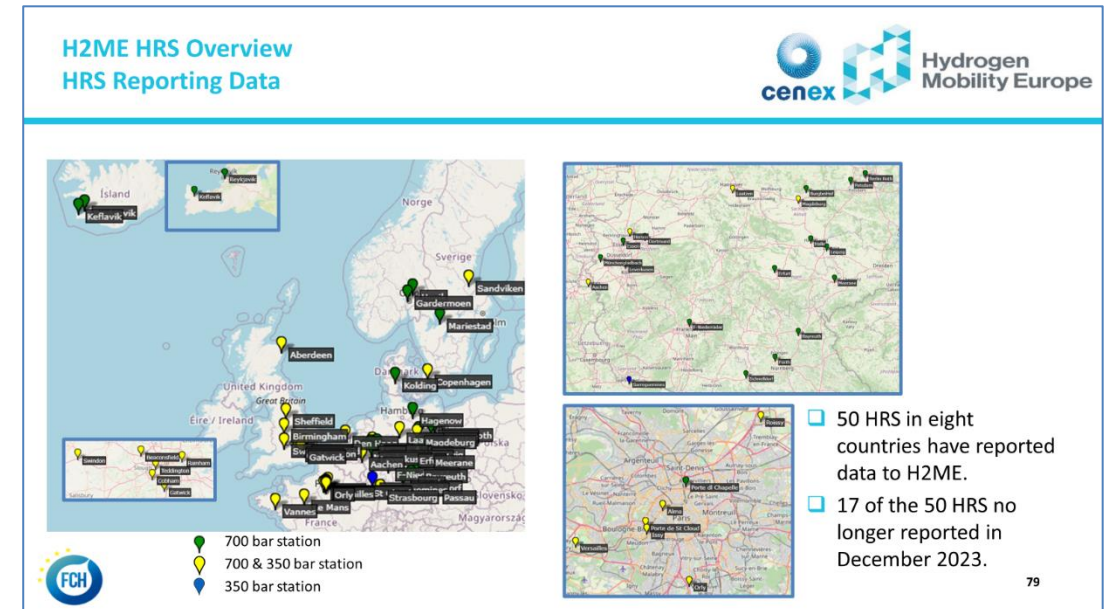
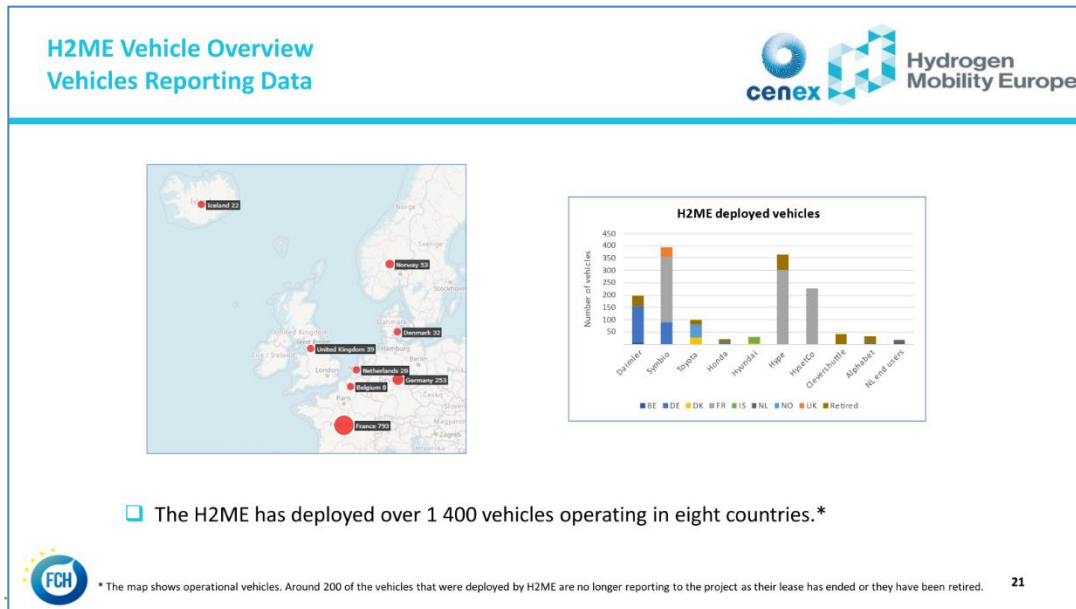
H2ME Project Overview

Vehicles Reporting Data to H2ME

	Daimler B-Class F-CELL FCEV	Daimler GLC F-CELL FCEV/PHEV	Honda Clarity FCEV	Hyundai ix35 FCEV	Hyundai Nexo FCEV	Toyota Mirai FCEV	Symbio ZE H2 FC REEV	Stellantis Pro One FC REEV
								
Project and dates reporting data	H2ME-1 2015-2018 (retired)	H2ME-1 & 2 2019-	H2ME-2 2017-	H2ME-2 2017-	H2ME-2 2019-	H2ME-1 & 2 2017-	H2ME-1 & 2 2015-	H2ME-2 2023-
H2ME use-cases	Passenger and fleet car	Passenger and fleet car	Passenger and fleet car	Passenger and fleet car, taxi	Passenger and fleet car, taxi	Passenger and fleet car, police car, taxi	Light van in company fleets	Light van in company fleets, taxi
Manufacturers' reported range	380 km	478 km	650 km	590 km	756 km	605 km Gen 1 647 km Gen 2	300 km	400 km
H₂ tank capacity and pressure	3.7 kg (700 bar)	4.4 kg (700 bar)	5.5 kg (700 bar)	5.6 kg (700 bar)	6.3 kg (700 bar)	5.0 kg (Gen 1) 5.6 kg (Gen 2) (700 bar)	1.8 kg (350 bar version)	4.4 kg (700 bar)
Battery capacity	1.4 kWh	13.5 kWh (9.3kWh usable)	1.7 kWh	0.95 kWh	1.6 kWh	1.6 kWh (Gen 1) 1.2 kWh (Gen 2)	22 kWh	10.5 kWh

H2ME Vehicle and HRS Numbers

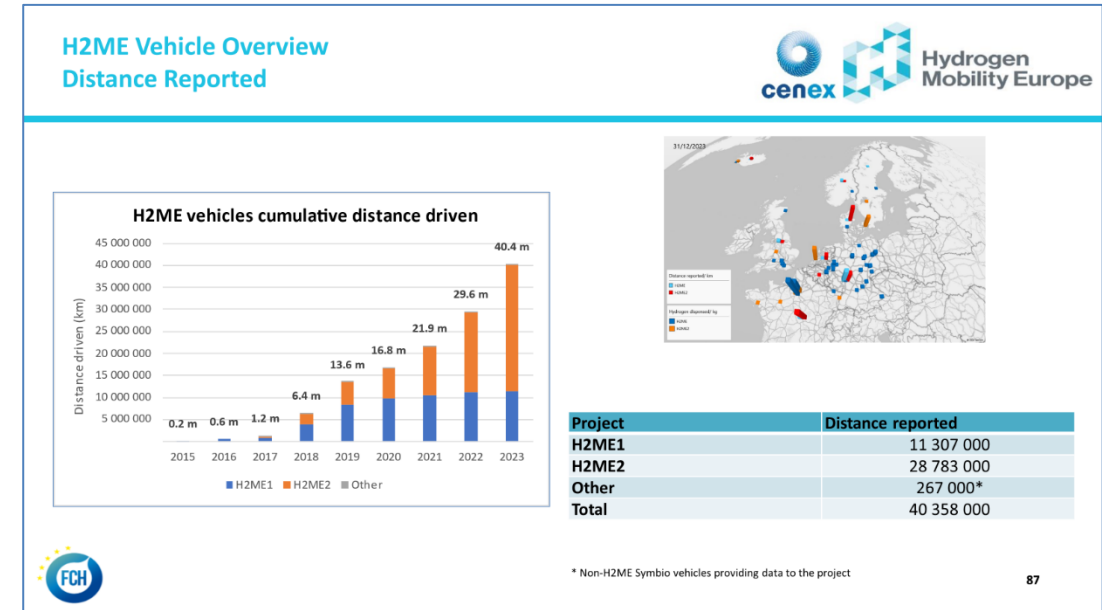
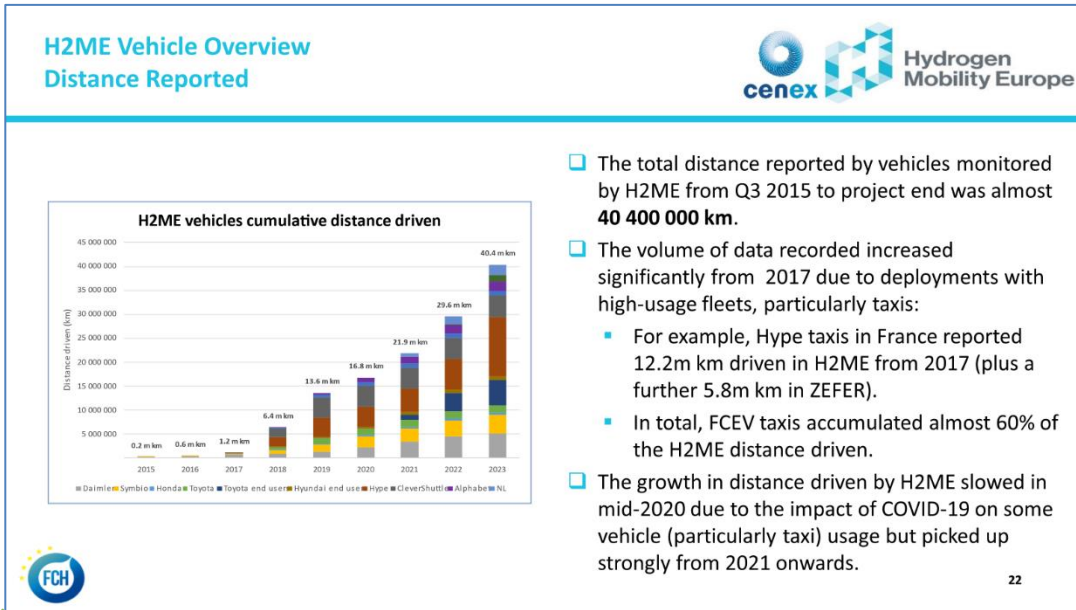
- Vehicles and stations deployed by, and/or reporting to data to, H2ME to the end of 2023 comprise:
 - 1 029 FCEVs and 395 FC REEVs and
 - 50 HRS.



Source: H2ME-2 Vehicle and Infrastructure Performance Report 5 (2015-2023)

By the end of the project:

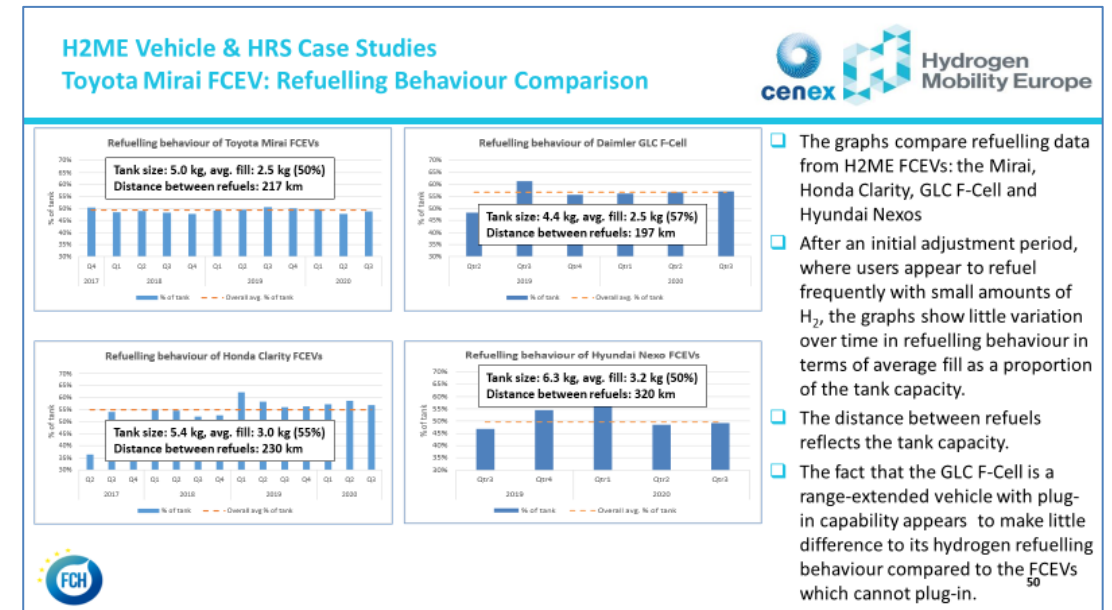
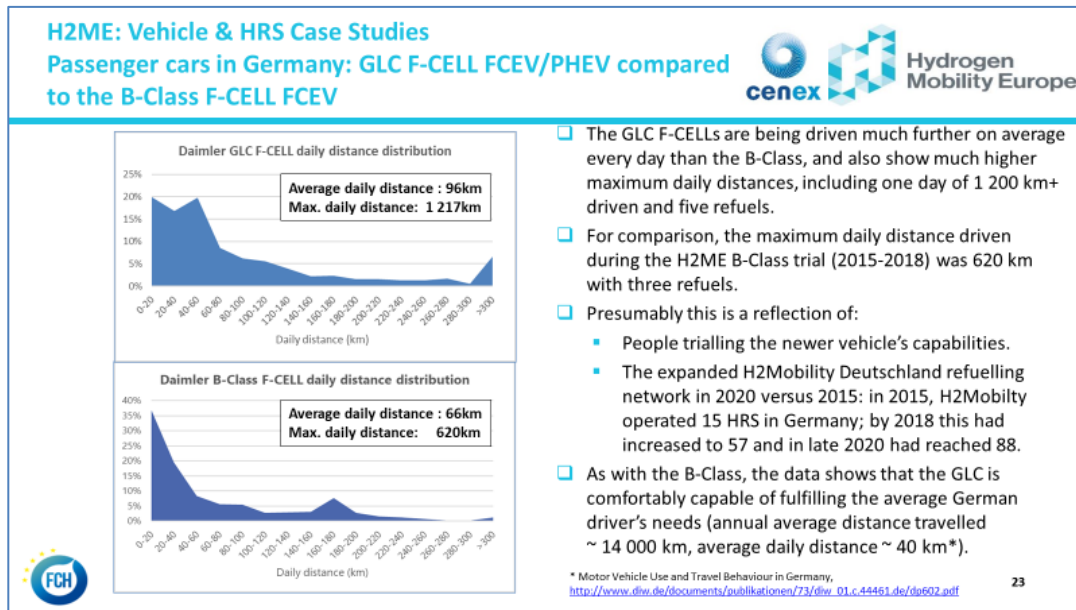
- H2ME FCEVs and FC REEVs reported over **40m million km** driven (2022 Q4 value: 29.3m km).
- Urban taxi deployments formed the largest part of the H2ME vehicle dataset, as evidenced by the data volumes received from fleets stationed in Denmark, France, Germany and the Netherlands.



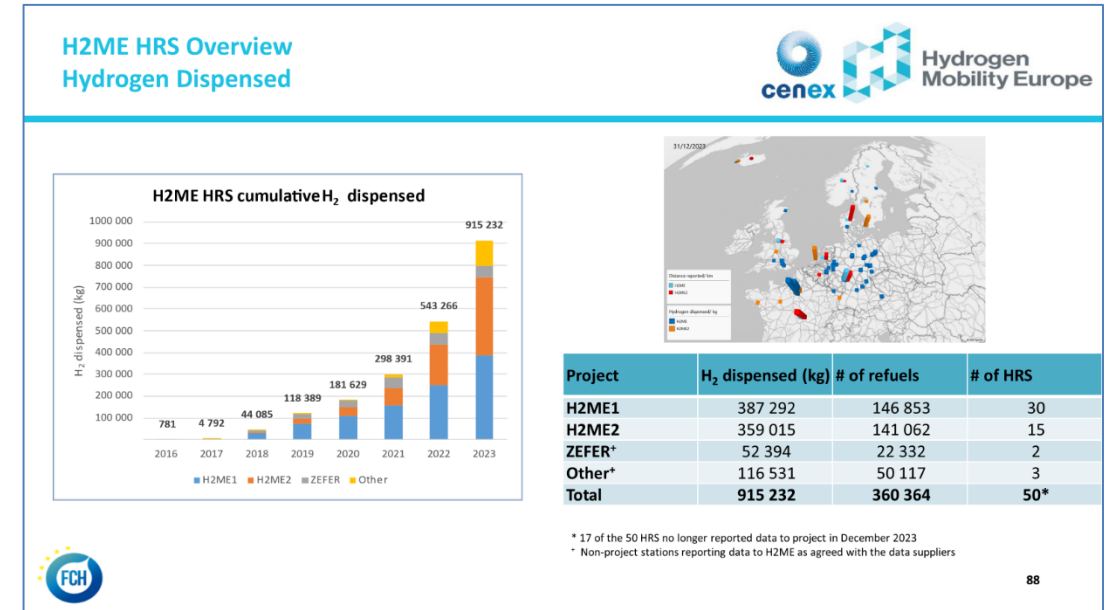
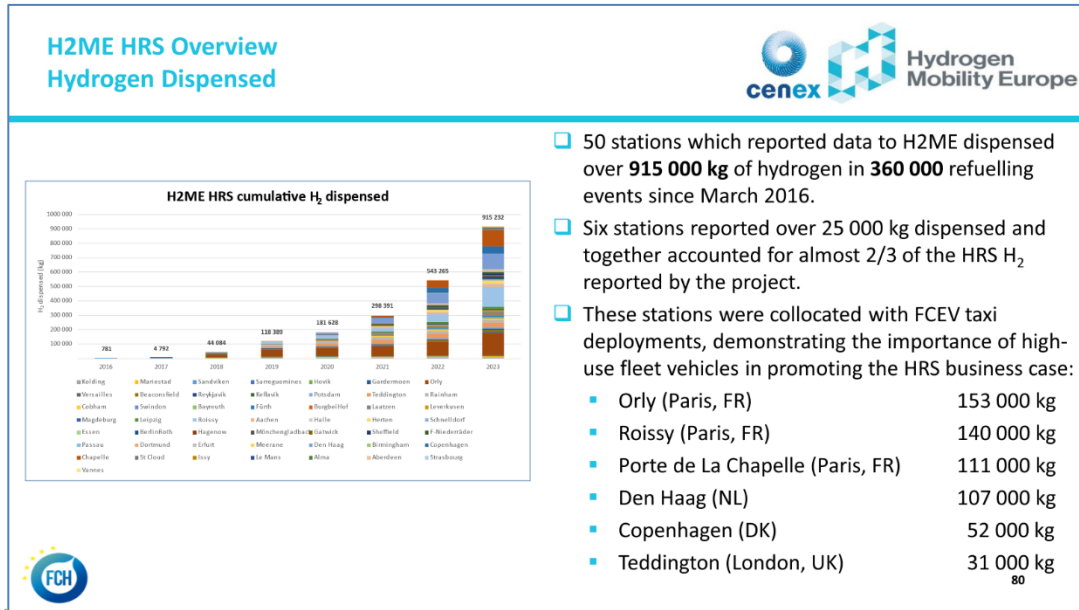
Source: H2ME-2 Vehicle and Infrastructure Performance Report 5 (2015-2023)

H2ME How Vehicles are Used and Refuelled

- ❑ H2ME vehicles averaged between 19 km and 128 km of driving per day. In some cases, they drove over 1 000 km in a single day. The distance driven depended on the vehicle use case and deployment location.
- ❑ The average refuelling amount for each FCEV type deployed varied from 50% to 57% of the tank capacity.
- ❑ In all countries and use cases, the FCEVs proved that they were able to fulfil the driver's daily and annual needs.

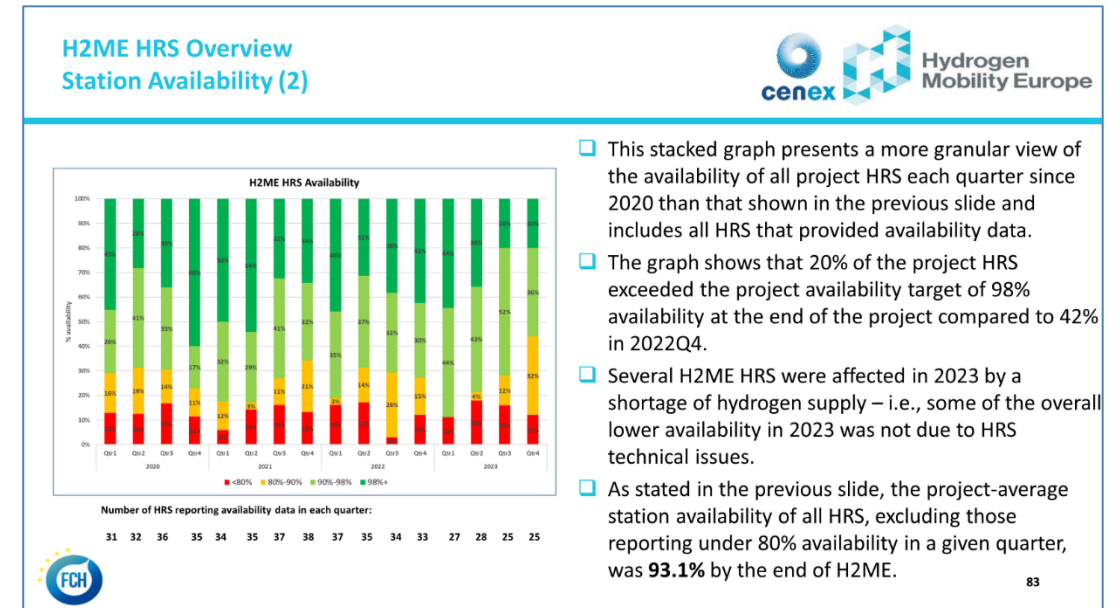
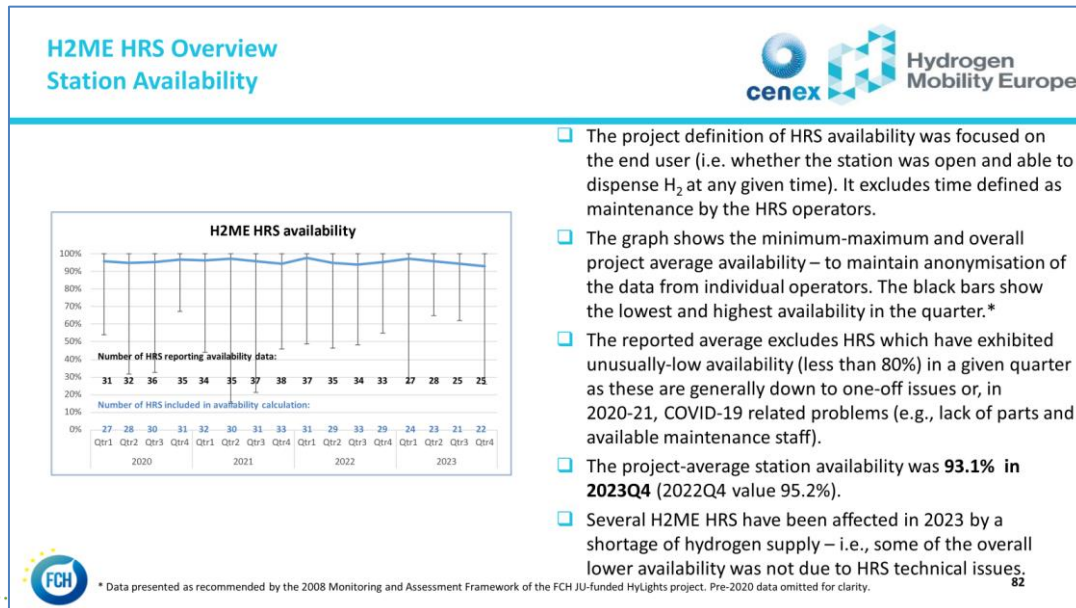


- To the end of the project in December 2023:
 - The 50 HRS that have reported to H2ME dispensed over **915 000 kg** of hydrogen in **360 000** refuelling events (2022 Q4 values: 484 000 kg of hydrogen and 196 000 refuels).
 - HRS deployed in locations where taxis operate continue to provide the bulk of H2ME usage, with six of the HRS dispensing over 25 000 kg and accounting for almost 2/3 of the overall refuelling amount.



Source: H2ME-2 Vehicle and Infrastructure Performance Report 5 (2015-2023)

- ❑ The average reported availability of H2ME HRS at the end of 2023 was 93.1% (2022 Q4 value: 95.8%). Several H2ME HRS have been affected in 2023 by hydrogen supply issues – i.e., some of the overall lower availability seen in 2023 was not due to technical problems at the HRS.
- ❑ By project end, 20% of project HRS exceeded the H2ME-2 availability target of 98% (2022 Q4 value: 42%).
- ❑ 12% of HRS were less than 80% available at the end of 2023, unchanged from the 2022 Q4 figure.



Source: H2ME-2 Vehicle and Infrastructure Performance Report 5 (2015-2023)



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