Wasserstoff im Alltag

Praxiserfahrungen aus dem Kundenbetrieb mit dem Hyundai XCIENT Fuel Cell Truck

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Hydrogen Logistics in everyday life

Practical experience from customer operations with the Hyundai XCIENT Fuel Cell Truck

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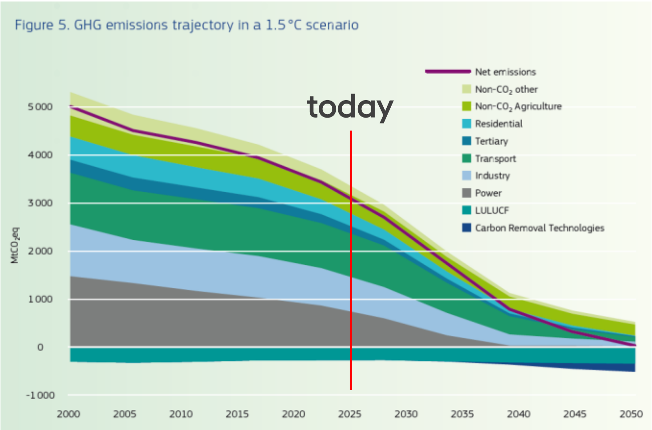
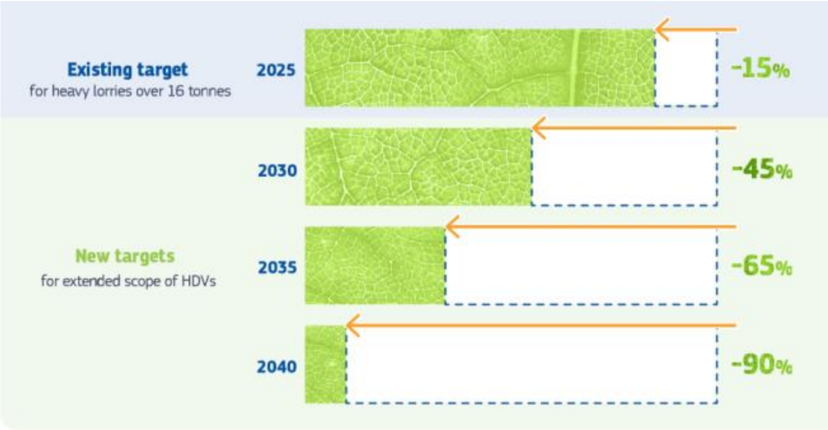
Why Hydrogen Now?

- EU CO2 Reduction -55 % by 2030 (vs. 2019)
- EU wide transport sector contribution to the total CO2 emissions today ~20%
- Goals for new HD trucks: ~-15 % by 2025, -45 % by 2030 and -65 % by 2035
- To prevent OEM HDV penalties by 2030: 400.000 ZEV HDV



Source: European Commission



Source: European Commission

CO2 TARGETS: ZERO-EMISSION VEHICLES AND INFRASTRUCTURE NEEDED

CO2 targets			-30%	-40%	-50%
Zero-emission vehicles needed in operation on EU roads (minimum)			280,000	390,000	465,000
	Battery electric vehicles (BEVs)		230,000	320,000	380,000
	Fuel-cell electric vehicles (FCEVs)		50,000	70,000	85,000
Infrastructure					
	Charging points	Total	34,000–42,000	48,000–59,000	53,000–65,000
		of which MCS chargers (>800 kW)	20,000–25,000	28,000–35,000	31,000–39,000
	H2 refueling stations	6 tons/day, or	500	650	700
		2 tons/day	1,500	2,000	2,200

Source: ACEA

Hyundai is ready now - Real-World Customer Operation with H2

AGENDA

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XCIENT FC Truck Technology

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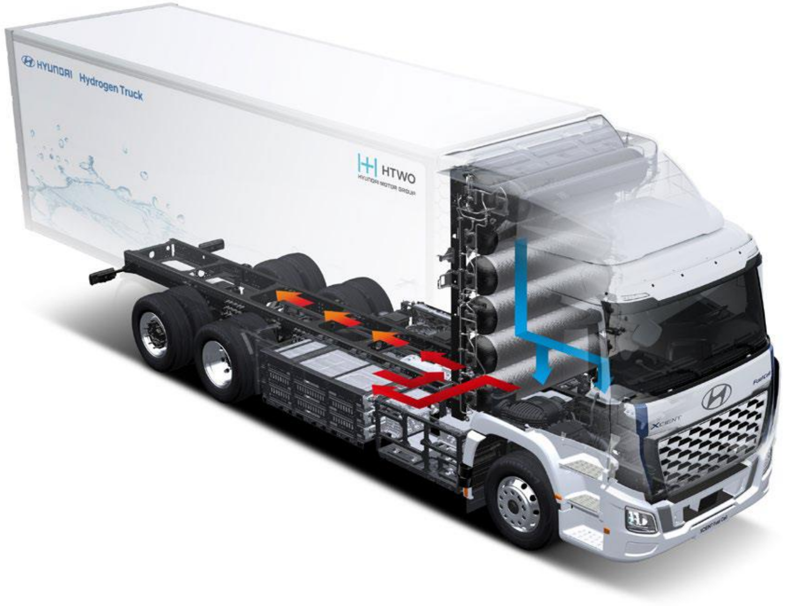
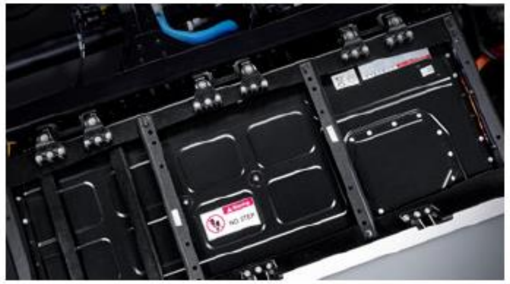
Type	4x2 / 6x2 Rigid Truck
Max GVW	27 t / 42 t
Stack Voltage	250 – 450 V
Transmission	Allison ATM 4500 R – 6 gear
Max Speed	85 / 90 kph
LV Battery	24 V-230 AH MF
ADAS	GSR 2 ready



31.08 kg H_2 (350 bar)
Hydrogen Storage Tank

220 kW* (2 x 110 kW each)
Fuel Cell System



72 kWh (3 x 24 kWh each)
Battery

350 kW / 2,237 Nm
Motor

XCIENT FC Truck Vehicle Progress

Gen 1 [2020]

- Market Intro: Oct 2020
- Where: Switzerland
- FC: Gen 2.0 (2x 95 kW)
- H2: 31kg @ 350 bar
- Features:
  - 4x2 Rigid (38 t GVW)
  - 1st Mass Produced FC Truck
  - Body Variants limited

Gen 2 [2022]

- Market Intro: Jun 2022
- Where: EU, Start Germany
- FC: Gen 2.0 (2x 90 kW)
- H2: 31kg @ 350 bar
- Features:
  - 4x2 & 6x2 Rigid (42 t GVW)
  - New powertrain suppliers
  - Various upfits, incl. swap body, garbage, hook lift, etc.

Gen 3 [2025]

- Market Intro: Sep 2025
- Where: EU, Start Germany
- FC: Gen 2.5 (2x 110 kW)
- H2: 31kg @ 350 bar
- Features:
  - 4x2 & 6x2 Rigid (42 t GVW)
  - State of the Art GSR2-compliant ADAS, CS & OTA
  - All new Cabin & HMI

Customer Operation Profile

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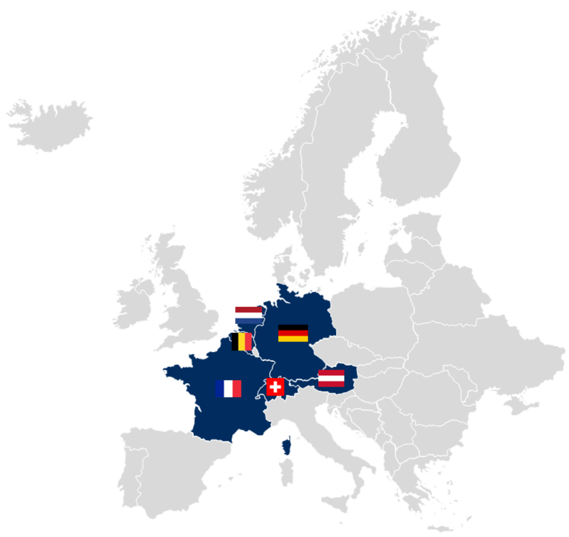
> 150	Vehicles in Operation in Europe
> 18 Mio km	Overall Mileage Fleet in Europe
> 500k km	Odometer of longest running single vehicle
> 500 km/day	Max. Average daily driving distance
100->500 km/day	Average daily driving distance
1	Average Refueling per day

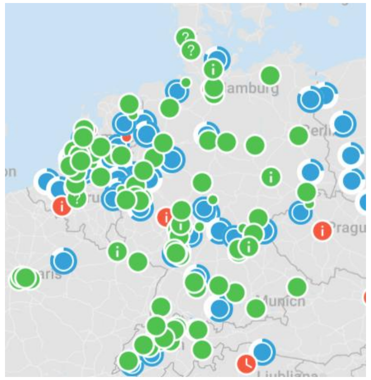


Hydrogen trucks fit reliably into today's logistics operations.

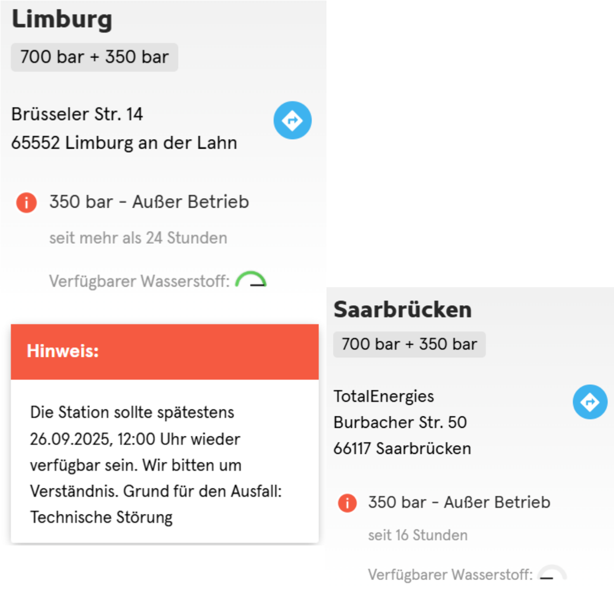
Challenges in Real Operation & Learnings

- HRS infrastructure & availability
- HRS & Truck Communication and Compatibility

Refueling with Customer Truck to identify issues



HRS 350 bar in EU



Reality Check – it hasn't all been smooth

Challenges in Real Operation & Learnings

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- Challenges for Low Volt System 12V & 24V
- Auxiliaries first time adjusted for H2 electric powertrain
- Short-term support and long-term solution

Original LV-System in Gen 1&2

→

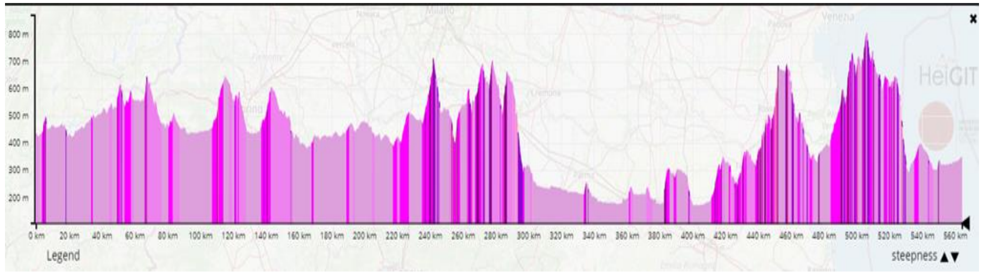
Long-Term solution in Gen3 – 3 LV Batteries

Reality Check – it hasn’t all been smooth

Validation & Testing

- Difficult topography in Europe for electric and H2 Powertrains
- Vehicle usage in different load conditions in different areas
- Hybrid strategy improvement & Driver Training

„Kasseler Berge“



EU Hill Topography

Improve vehicle performance in operation according to customer usage

Quo Vadis Hydrogen What Next?

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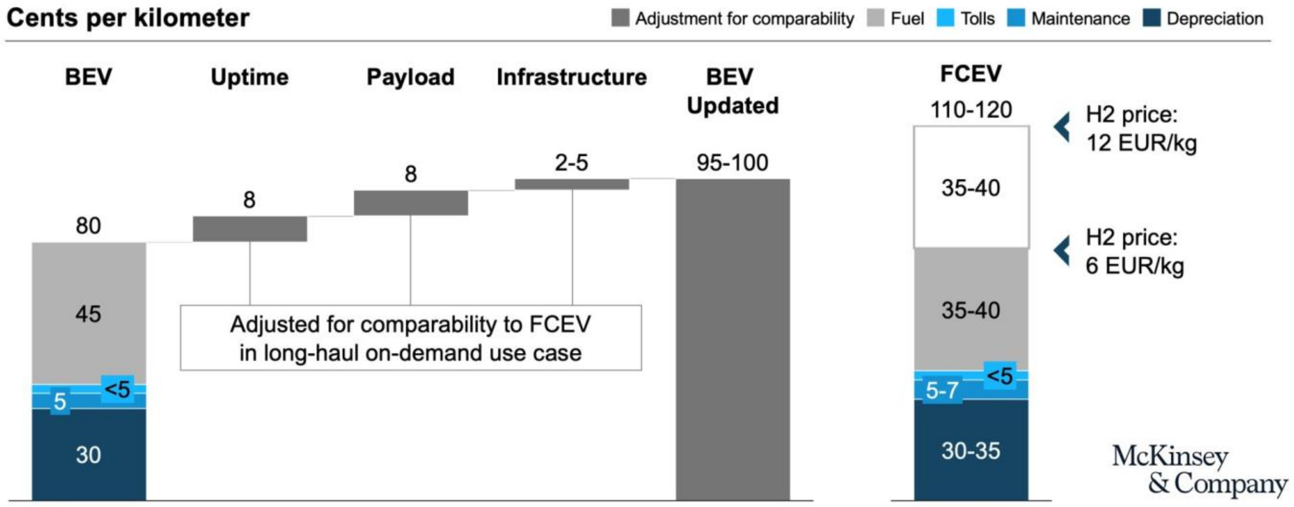
- TCO (Total Cost of Ownership)
- Hydrogen Price
- Regional Approach
- Refueling Infrastructure – which one?
- Scaling Production

Total cost of ownership projection in 2030 for a long-haul HDT in Germany in a flexible on-demand use case



Source: McKinsey & Company via Sara Schiffer @ LinkedIn

The Trucks work! How do we speed up the eco-system?

Conclusion Key Takeaways

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- Hydrogen trucks work in daily operation
- Challenges are real but solvable
- Scaling depends on eco-system & cost factors

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THANK YOU

ANY QUESTIONS?

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