Green Power
& Logistics

wisdommotor INNOVATION & TECHNOLOGY

EBERT CONSULTING GMBH

Bridging the Gap – Deploying Hydrogen Vehicles in Medium- and LongHaul Logistics Cost-Effectively

Otto Uhlhorn, H2 greenpower & logistics, Münster, Germany
Jingde Tang, Wisdommotor Ltd., Zhangzhou, China
Prof PhD Jörg Ebert, Ebertconsulting GmbH, Cologne, Germany

Celle, 2025 04 June 25

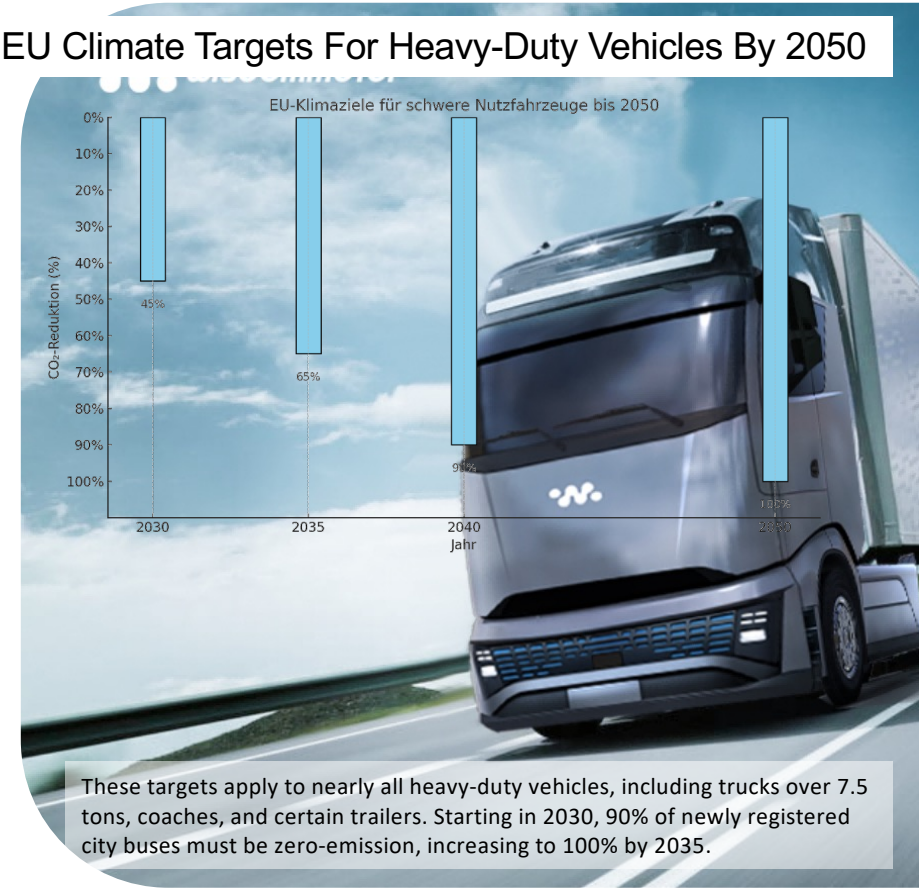
0. Agenda

1.	Introduction and Objectives	Jörg
2.	Current Status and Challenges	Otto
3.	Technical and Economic Advantages of FCEVs	Jingde
4.	Infrastructure Development and Service Organization	Otto
5.	Strategies to Accelerate Market Penetration	Jörg
6.	Outlook and Conclusions	Otto, Jingde, Jörg

Welcome

Relevance of the Topic: The importance of climate-neutral drives in logistics for decarbonizing the transportation sector

Objective: Demonstrate why to scale up and make FCEVs (Fuel Cell Electric Vehicles) economically viable in the European logistics market



Source: Rat der Europäischen Union Pressemitteilung 13. Mai 2024 10:20
Schwere Nutzfahrzeuge: Rat beschließt strengere CO_2-Emissionsnormen

Business Model & Services

Green Power & Logistics focuses on three core areas

Green Freight Forwarding

We act as a **freight forwarding** service provider with a **100% low-emission truck fleet**.

Pay-per-Use Trucking

Freight forwarders and companies **hire** our low-emission trucks on **a kilometre basis**.

Refueling Stations and charging parks

Building and operation of **H_2 filling stations, electricity charging parks & biogas stations.**

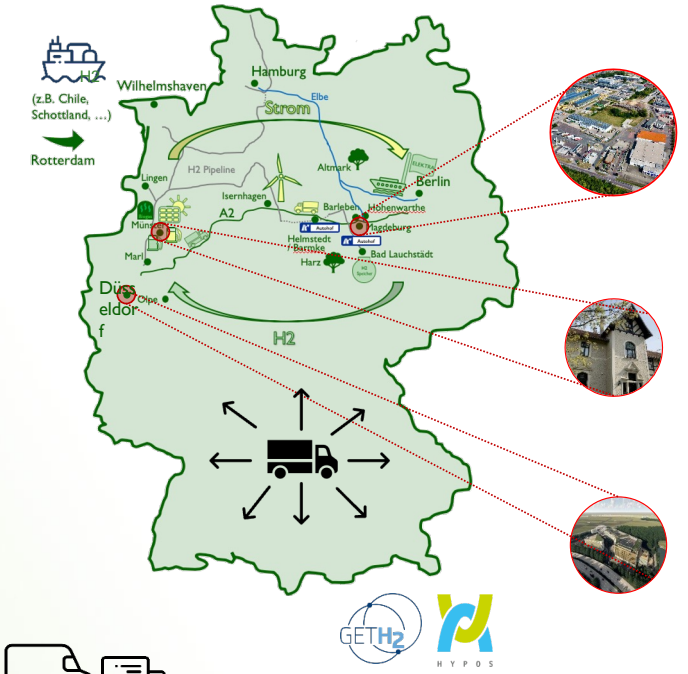
Green Power
& Logistics

H2 Delivery: Locations and self-perception

Locations

At home in Germany, On the road throughout Europe:

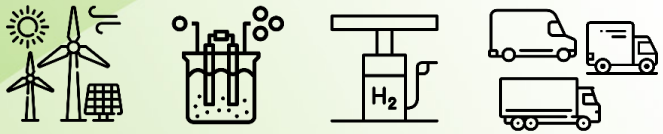
We take the energy transition onto the road



Niederlassung Magdeburg IGP Mittelelbe
H2 Factory
Gewerbevermietung - und verwaltung

Niederlassung Münster
Strategie, Projekt-entwicklung, Vertrieb, H2 Import

Niederlassung Düsseldorf Euref Campus
Forschung



Self-Perception

Holistic expertise: We enable the entire value chain for green hydrogen and green logistics.

Relevance of climate neutral drives for the transportation sector

Green Power & Logistics

Commercial vehicles listed in Germany

3,64 Million

Current share of Emission free vehicles

1,75 %

Carbon Emissions of one Diesel Truck per 100 km

90 kg

Share of worldwide CO2 emissions accountable to the transportation sector

20 %

➡ **Growing demand for low-emission logistics solutions.**

Company Overview

Wisdom is a high-end zero-emission commercial vehicle designer and manufacturer with strong capabilities to produce both tailor-engineered and standard products to developed markets worldwide

Compared to passenger vehicles, the new energy transformation of commercial vehicles lags significantly behind. Wisdom, through its strong customization capabilities, creates a new generation of BEV and FCEV products that truly meet the operational needs of end customers

- Wisdom was founded by a group of industry veterans who had collaborated for **more than 20 years and exported 20,000+ commercial vehicles** to global customers before its establishment.
- Wisdom provides 3 categories of products: buses and coaches, trucks and logistic vans, and specialized vehicles. Since its establishment, Wisdom has **delivered over 700 vehicles to customers in more than 22 countries and regions**, including Australia, Japan, Korea, Hong Kong, Singapore, the U.A.E., UK, Sweden, and Denmark.

Endorsed by Templewater & Ballard

wisdommotor

TEMPLEWATER BALLARD™

- Templewater: Founded by **Cliff Zhang** and **Investec Group** (international specialist banking group dual-listed in London and Johannesburg)
- Ballard Power: leading global provider of **innovative clean energy fuel cell solutions**

500+	10,000	700+	100+	8,000-10,000
Employees	Annual Production Capacity	Delivered vehicles since establishment	Patents	Units to deliver 2025-28E

Buses and Coaches

Trucks and Logistic Vans

Specialized Vehicles

1. Introduction and Objectives

MSCDPS®

Development engine for SMEs

2. Status & Challenges for H2 driven mobility

Green Power & Logistics

Truck Market

Discontinuation of funding

For Truck operators:

- High vehicle prices
- Limited vehicle types available means limited use: No tractors!

For OEMs:

- R&D + insdustrialization costs
- Low demand for vehicles

Infrastructure

For Truck operators:

- Too few H2 refueling stations, limited H2 capacity per station
- Volatile H2 availability due to downtimes & supply shortages
- High refueling costs

For H2 stations:

- High invest & running costs
- Low no. of customer vehicles

Service / Maintenance

For Truck operators:

- Insufficient cover of specialized service and maintenance
- Long downtimes due to overwhelmed workshops

For Workshops:

- High invest and training costs for workshops willing to adapt
- Low no. of customer vehicles

➡ **Impact on Adoption Speed: Hen & Egg Problem**

3. Technical and Economic Advantages of FCEVs

Superior Driving Range

- 12–16t FCEVs currently achieve 400–600 km
- Expected to exceed 700 km without increasing tank size
- BEVs offer only around 300 km on average

Faster Refueling

- 700-bar stations refuel 35 kg H_2 in 10–15 minutes
- Comparable to diesel trucks
- 6–8× faster than 1.5–2 hours fast charging of BEVs

Zero Local Emissions

- Only water vapor emitted during operation
- Fully compliant with EU "Fit for 55" and LEZ regulations
- A 12t FCEV cuts around 75 tonnes CO_2 per year

Lower Maintenance Cost & Higher Uptime

- No transmission or exhaust after-treatment
- 35–50% lower maintenance frequency than diesel trucks
- Saves EUR 3,000–5,000 annually in maintenance
- Reduced breakdowns → Increased logistics reliability

Australia Case Study: Wisdom Motor's Hydrogen Truck Deployment

Feb 2023: Wisdom Motor delivered first 49-T FCEV truck to PepsiCo.
Signed 5-year framework agreement with HDrive for 12,000 hydrogen trucks – largest hydrogen truck deal in APAC at the time.

Key Challenges Observed

- Limited H_2 Infrastructure:
  - Trucks rely on private or very limited public refueling stations
  - Average station coverage radius >150 km → complex logistics scheduling
- Underdeveloped After-Sales Network:
  - Scarcity of qualified FCEV maintenance centers, especially in remote areas
  - Service still depends on OEM/distributor local deployment

Positive Operational Findings

- High Efficiency:
  - 35 kg H_2 refueling in 10–12 min
  - Average range: 400–450 km → meets regional logistics needs
- Excellent Reliability:
  - 96% uptime reported by PepsiCo logistics
  - Stable thermal performance, low energy consumption even in harsh climates
- Strong Driver Feedback:
  - Superior torque and responsiveness on slopes & highways vs. diesel
  - Highly praised by operators and drivers alike

Green Power
& Logistics

4. Infrastructure Development & Service Network

Hydrogen network needs smart planning, a scale up and stability in order to prosper

Trucks

Spotlight on OPEX:
Boost mileage, shrink operating costs

Infrastructure

- Grow HRS network
- Grow Hydrogen supply
- Close alignment between customers, OEMs and operators
- Connect the dots: From local hubs to comprehensive network

Service / Maintenance

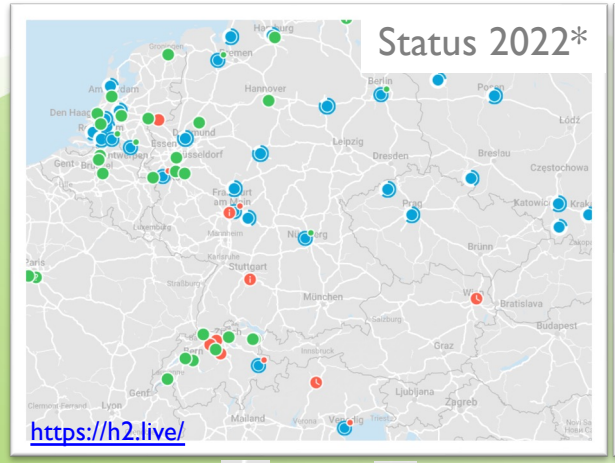
- Grow network of specialized workshops for service and aftersales of hydrogen and high voltage components
- Close alignment between customers, OEMs and workshops
- Flying Doctors provided by OEMs

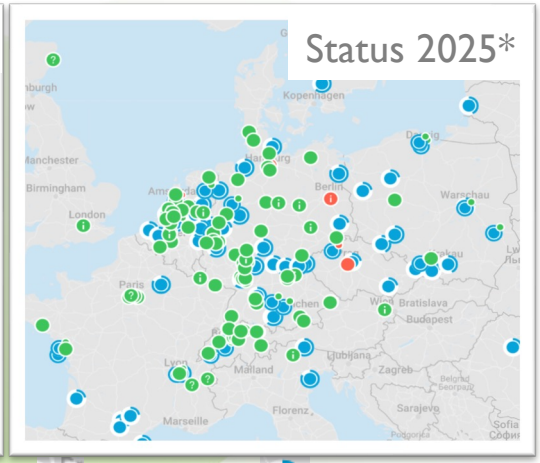
➡ **The right environment will naturally promote evolution**

4. Infrastructure Development & Service Network

Green Power & Logistics

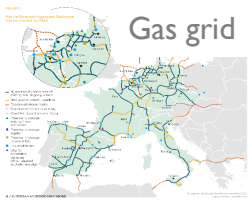
PROGRESS OF THE HYDROGEN REFUELING STATIONS NETWORK



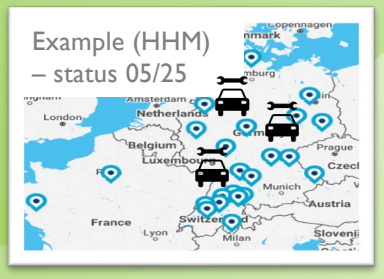


* 350 bar network — Operating — Operating (no service) — Operating shortly — Planned / Construction

SUPPLY OPTIONS FOR H2:



PROGRESS OF THE SERVICE STATIONS NETWORK



B+R AUTOHAUS
SCHADE Emotionen erfahren
RUSS JESINGER
IVECO BAYERN
TRUCK-EXPERT
GRUBER Nutzfahrzeuge
Paul Nutzfahrzeuge
BERESA
… AND MORE

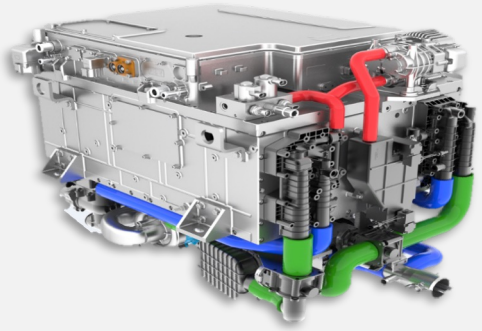
4. TECHNICAL OUTLOOK

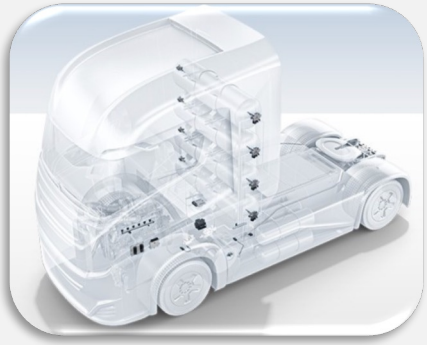
- Fuel Cell Breakthroughs (Ballard FCmove®-HD+):
120 kW output, 4.0 kW/L energy density
40% smaller, 35% lighter, >30,000-hour lifespan

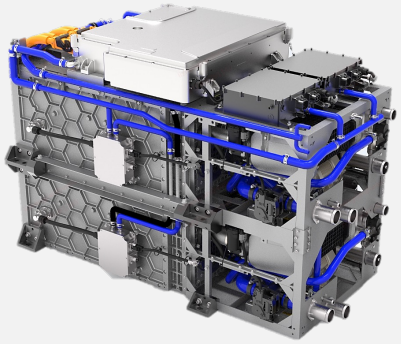
- Hydrogen Storage Progress:
Type IV 700-bar tanks: 7.5–10 kg H_2 per cylinder
Type V tanks in development: +20% density, lighter, >800 km range.

- High-Power Integration:
Multi-stack system scalable to 300+ kW
Supports 18m buses, port tractors, mining trucks

- Future Outlook:
35,000+ hour fuel cell life
30% drop in H_2 storage cost by 2027
Accelerated refueling infrastructure rollout
Ideal for long-haul, cold chain, ports, and mountain routes







5. Strategies to Accelerate Market Penetration

Collaboration Examples: Fleet Operators, Infrastructure Providers & Policymakers

	Project / Initiative	Key actors	Measures & Outcomes	Region
1	H2Accelerate & H2Accelerate TRUCKS	OEMs: Daimler Truck, Volvo Group, IVECO H_2 suppliers: Shell, TotalEnergies, Linde Policy: EU Clean Hydrogen JU (€75 m)	Deploy 150 FCEV trucks + 14 high-capacity stations along corridors; roadmap 10 000 trucks by 2030	EU
2	HyTrucks Corridor	Fleets: DHL, TTSI (Hyzon) H_2 supplier: Air Liquide, DATS 24 Ports/Authorities: Rotterdam, Antwerp, Duisburg	Goal: 1 000 H_2 trucks + 25 stations by 2025; >100 000 t CO_2/yr saved	BE / NL / DE
3	H2Haul	OEMs: IVECO, VDL Operators: Carrefour, Colruyt Policy: EU Clean Hydrogen JU (€12 m)	16 heavy-duty FCEVs + new 1 t/day stations; data to IRU for policy briefs	FR / BE / NL / DE
4	Shore-to-Store (Port of LA)	Fleets: TTSI, AiLO (100 Nikola order) OEMs/Infra: Toyota-Kenworth, Shell Policy: CARB, US-DOT ($82.5 m)	Demo of 15+ Class-8 FCEV drayage trucks; informs new CARB standards	USA (CA)
5	Tees Valley Hydrogen Transport Hub	Fleets: Electra, Quantron Infra: Exolum, Element 2 Policy: UK Dept. for Transport (£7 m)	Public 1.5 t/day station + 25 FCEV HGVs from 2025; skills programme	UK
6	Dachser & H2 Delivery	Fleet: Dachser (Hyundai XCIENT Fuel Cell) Infra: H2 MOBILITY Germany Policy: BMVI KsNI grant	Pay-per-use leasing lowers CAPEX; Medium delivery radius Magdeburg	DE

Theresia Glaser
Dachser Corporate Public Relations

Subsidies, regulations, and legal frameworks (e.g., toll exemptions, CO_2 pricing) (support with legal framework)

Legal Foundations – European Level

Legislation / Regulation	Relevance for Hydrogen Heavy-Duty Vehicles
Regulation (EU) 2023/1804 – AFIR	Hydrogen refueling stations every 200 km along TEN-T corridors (≥1 t/day, 700 bar); prerequisite for EU funding
Regulation (EU) 2019/1242 – CO_2 Fleet Limits HDV	ZLEV credits and high penalties push OEMs toward zero-emission trucks
Directive (EU) 2019/1161 – Clean Vehicles	Public procurement quotas for zero-emission trucks
GBER (EU) 651/2014 Art. 36a/38 & CEEAG 2022	Allows national grants covering up to 60 % of the incremental cost for FCEV trucks & infrastructure
Regulation (EU) 2021/2085 – Clean Hydrogen JU	**€1 bn Horizon-Europe funding for fuel-cell truck demonstration projects**

6. Outlook and conclusions

- Global Model of Success

Market breakthroughs rely on a combined strategy of:
Large-scale demonstration projects
Integrated hydrogen ecosystem operations
Asset-based financing and long-term support

- Ballard Hydrogen Cluster Project – Hamburg Port

Initial 30 FCEV trucks + 2 hydrogen stations
Planned expansion to 200 trucks in 3 years
Demonstrates TCO, reliability, and builds lender/operator confidence

- Templewater Case Study

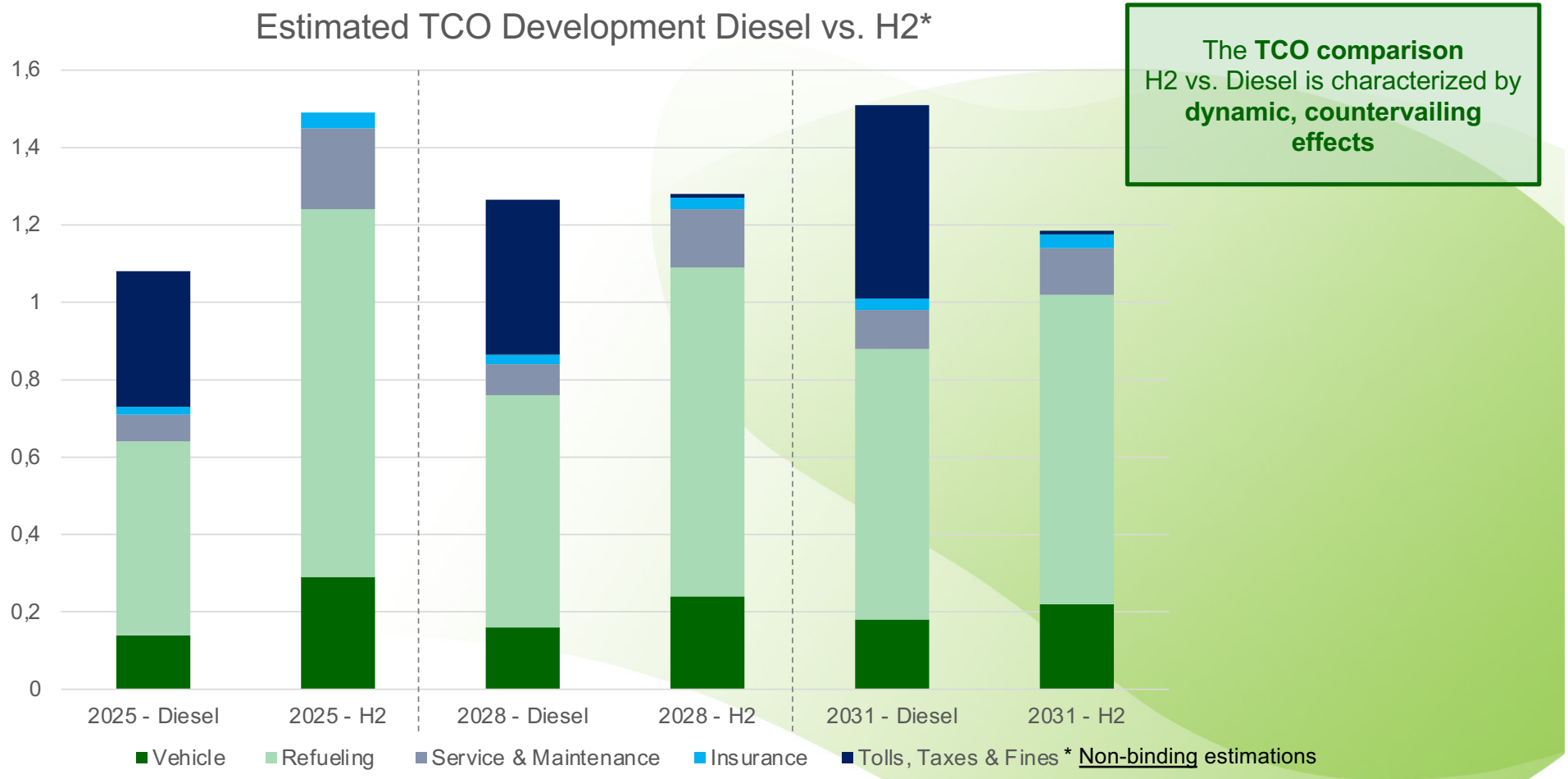
Active across Hong Kong and mainland China
Invests in full ecosystem: vehicles + hydrogen stations + fleet operations
Offers bundled solutions: vehicle, fuel, maintenance, financing
Pre-secures hydrogen supply to mitigate fuel & asset risk

- Wisdom Motor Strategy

Focus on ports, mining, urban cold chain, trunk logistics
Target: 50–200 vehicle demonstration fleets
Partner with hydrogen investors, station operators, financiers
Use project-based financing + government subsidies
Goal: Reduce upfront cost, accelerate adoption

Green Power
& Logistics

TCO (Total Cost of Ownership) considerations



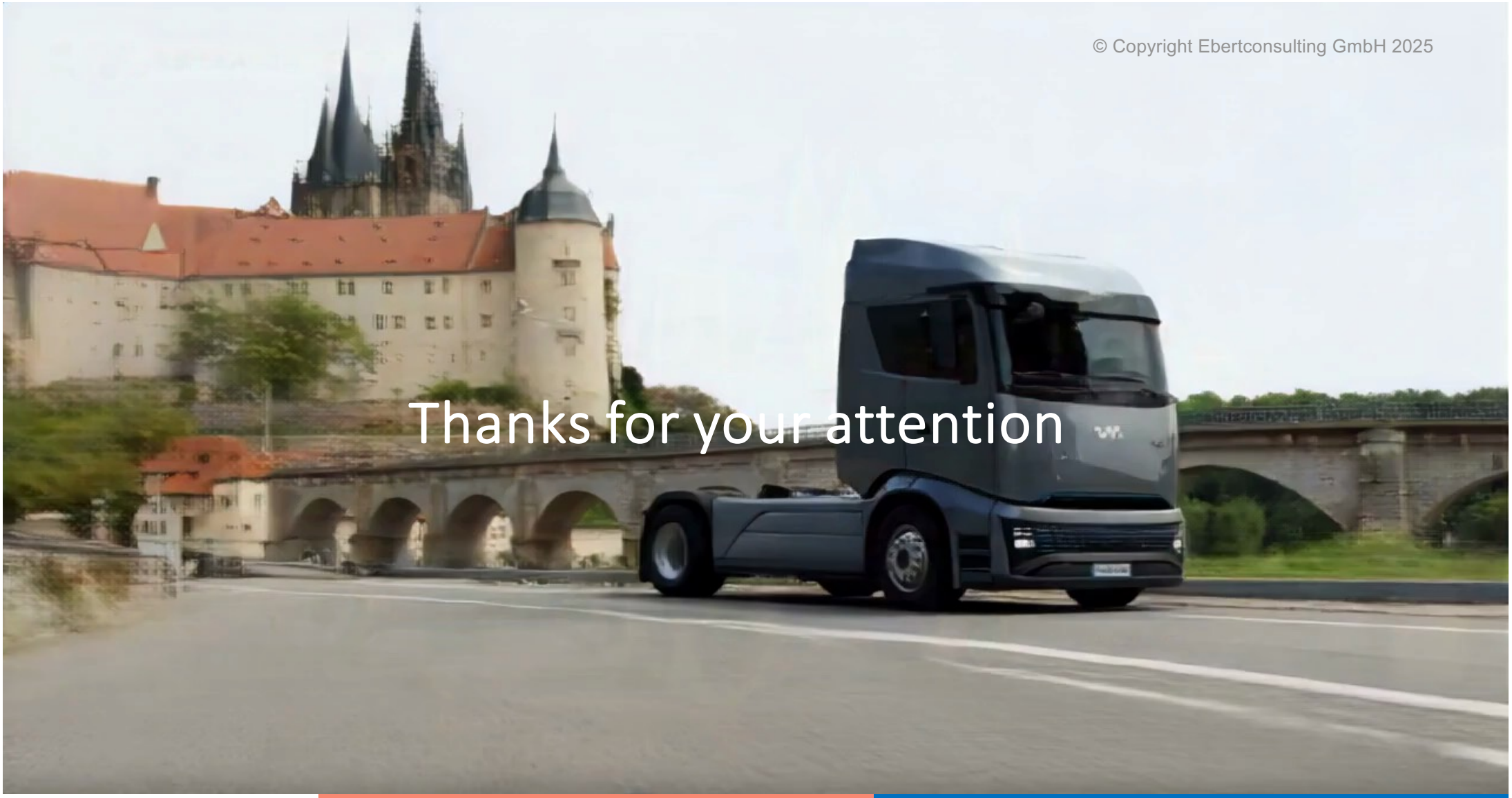
The **TCO comparison** H2 vs. Diesel is characterized by **dynamic, countervailing effects**

Key Takeaway:

Hydrogen can play a pivotal role in achieving climate-neutral long-haul lo
service capacity, an

Energiewende Größte Wasserstofftankstelle Europas in Düsseldorf eröffnet
Von Thorsten Breitkopf
KStA 27.05.2025 S. 8

NRW-Wirtschaftsministerin Mona Neubaur (Grüne) an der neuen Wasserstofftankstelle, die die leistungsstärkste Europas sein soll.

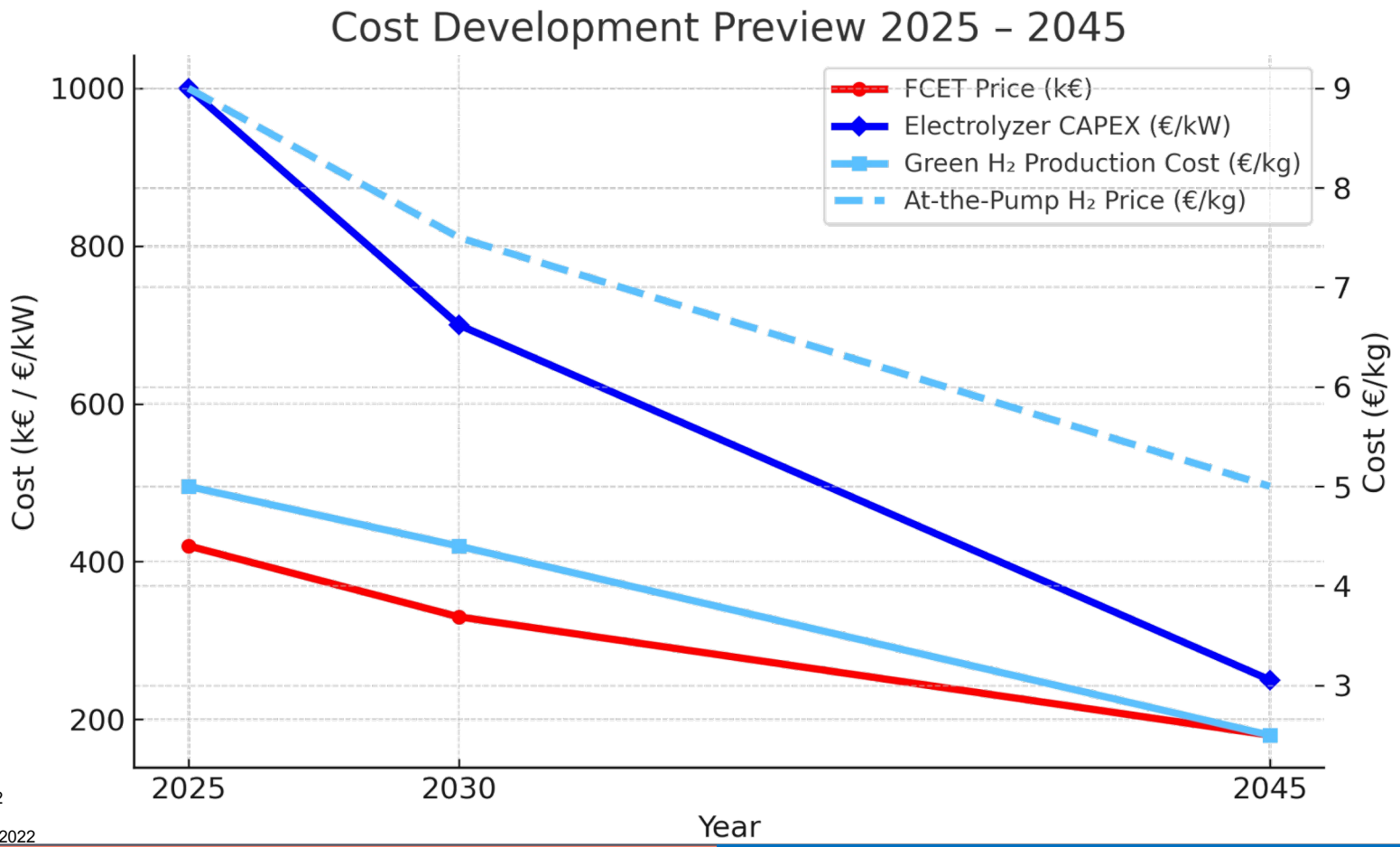


Thanks for your attention

7. Backup

6. Outlook and Conclusions

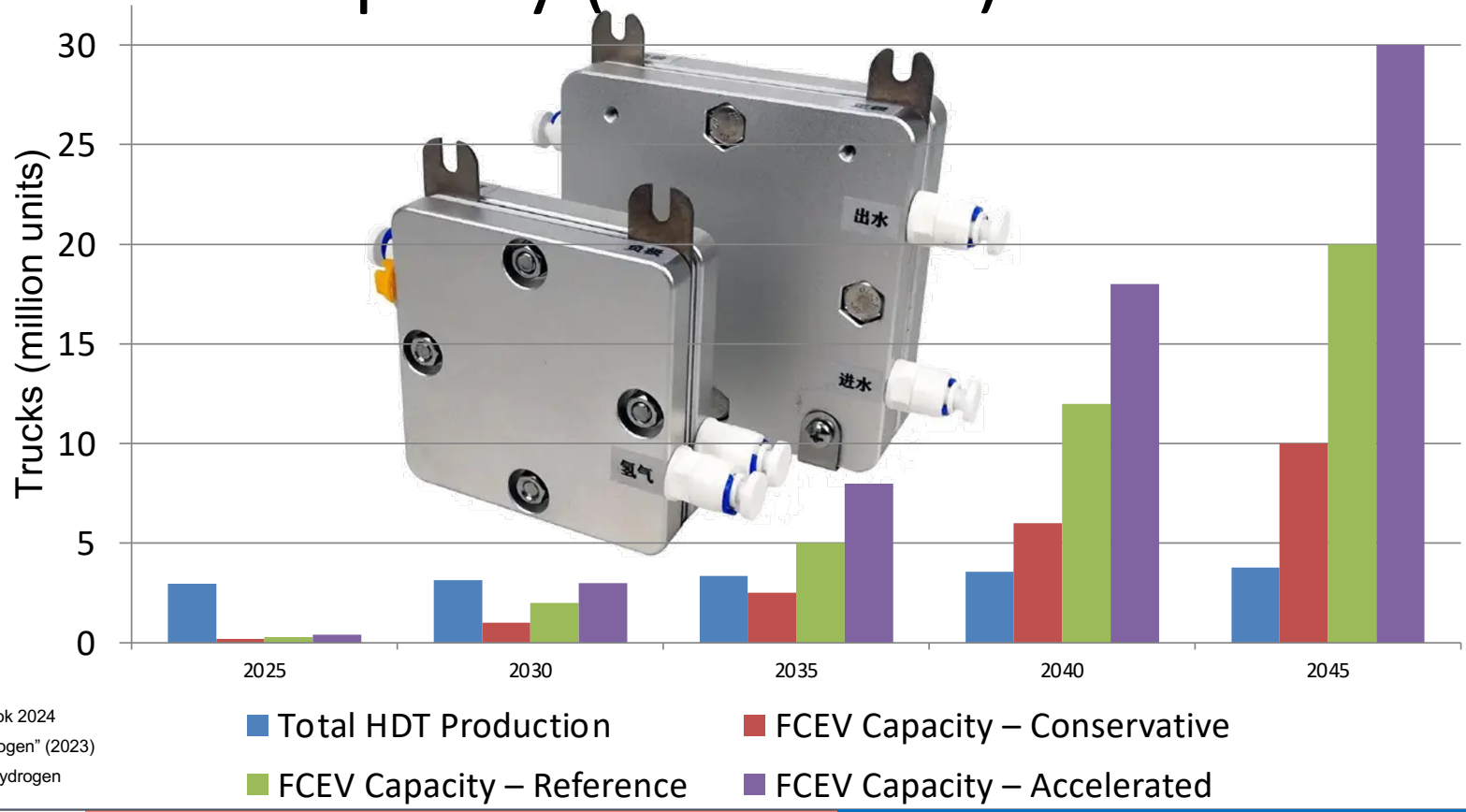
Economic effects of growing production volumes (cost reductions in vehicles and infrastructure)



Sources:
Learning-Curves Elektrolyse: TNO, 2022
FCET Retail-Preisentwicklung: ICCT White Paper, 2022
Grüner-H_2-Kostenpfad: RSC Energy Env. Sci., 2024
H_2-Tankstellen Levelized Cost: ICCT HRS-Cost Study, 2022

Projected Heavy-Duty Truck Production (2025-2045

Heavy-Duty Trucks: Production vs. Green-H_2-Driven Capacity (2025-2045)



Studie / Organisation

IEA – Net Zero Roadmap (2023-Update)

Bloomberg NEF – Hydrogen Supply Outlook 2024

IRENA – 1.5 °C Pathway / "Power-to-Hydrogen" (2023)

Hydrogen Council & McKinsey – "Global Hydrogen Flows" (2022)