

Decarbonizing Road Freight Transport: Zero Emission Vehicles Availability – Update 2023

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Consultants

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The project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement N°101006681.

ABOUT PNO – The Group

PNO CONSULTANTS

From our start-up roots, we have grown to become **EUROPEAN MARKET LEADER IN FUNDING AND INNOVATION SERVICES** with offices in **8 EUROPEAN COUNTRIES**.

Our company is connected to a **GLOBAL NETWORK OF NATIONAL AND REGIONAL CREATIVE PARTNERS**: multinationals, start-ups, RTOs and universities as well as sector and public organisations.

KEY BUSINESS FOCUS

- **RD&I STRATEGY** design with recent insight in technology, market and policy trends
- **OPEN INNOVATION** : tap into external innovations and partners, by building collaborative projects and scouting solution providers and potential partners
- **FINANCE**: securing and funding projects through co-development, business modelling, grants, finance and realisation

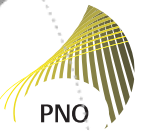
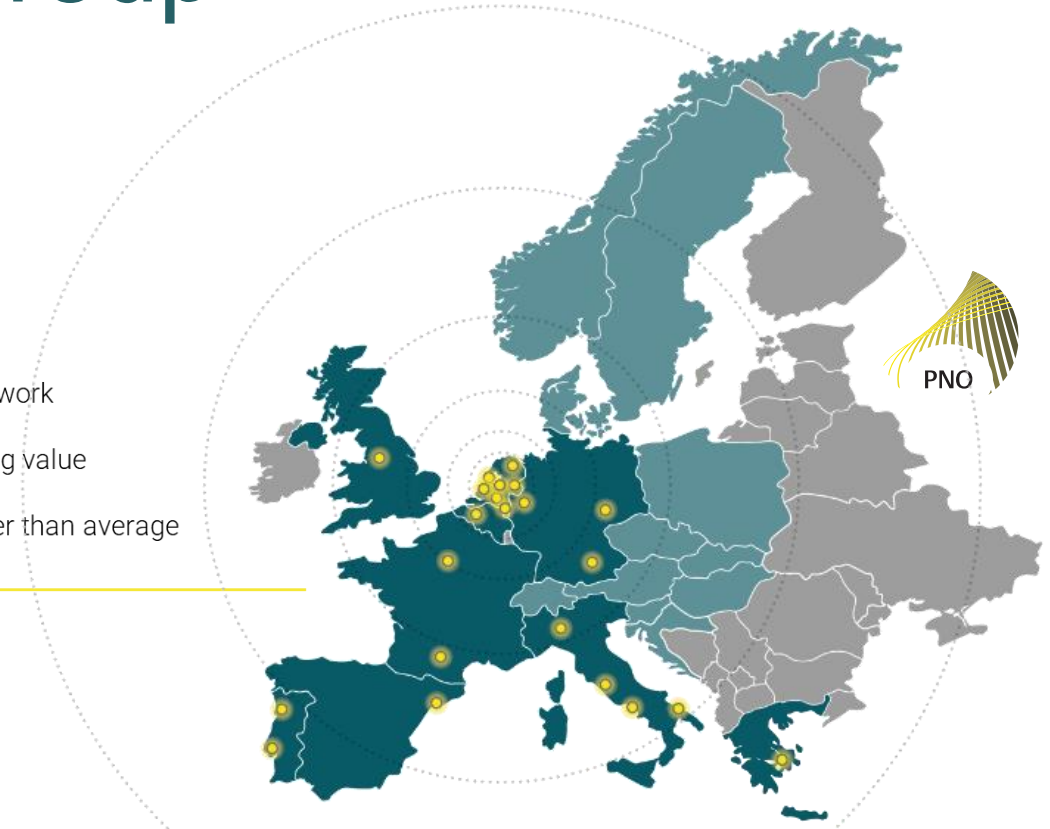
- ⚙️ Founded in 1985
- 🌐 Offices in 9 countries
- 👥 2000+ direct clients
- 🌳 10.000+ organisations network
- 💰 Over € 1 billion total funding value
- 🎯 Success rate 3 times higher than average


Partners PNO

GIA Sweden, Sweden
www.giasweden.com

BMGZ, USA
www.bmgzstrategies.com

Rödl & Partners, Central and East Europe
www.roedl.com



| | | | | | |
|--|--|--|--|--|---|
|  Innovation & Public Funding |  Innovation & Public Funding |  Accelerating Green Innovation |  Life Science Innovation |  Impact by Knowledge |  Grants Management & Compliance |
|  Grants Assurance |  EU Funded Projects |  Public Funding SMEs |  Funding & Innovation in the chemical sector |  Online Marketing |  IT Solutions for Innovation |

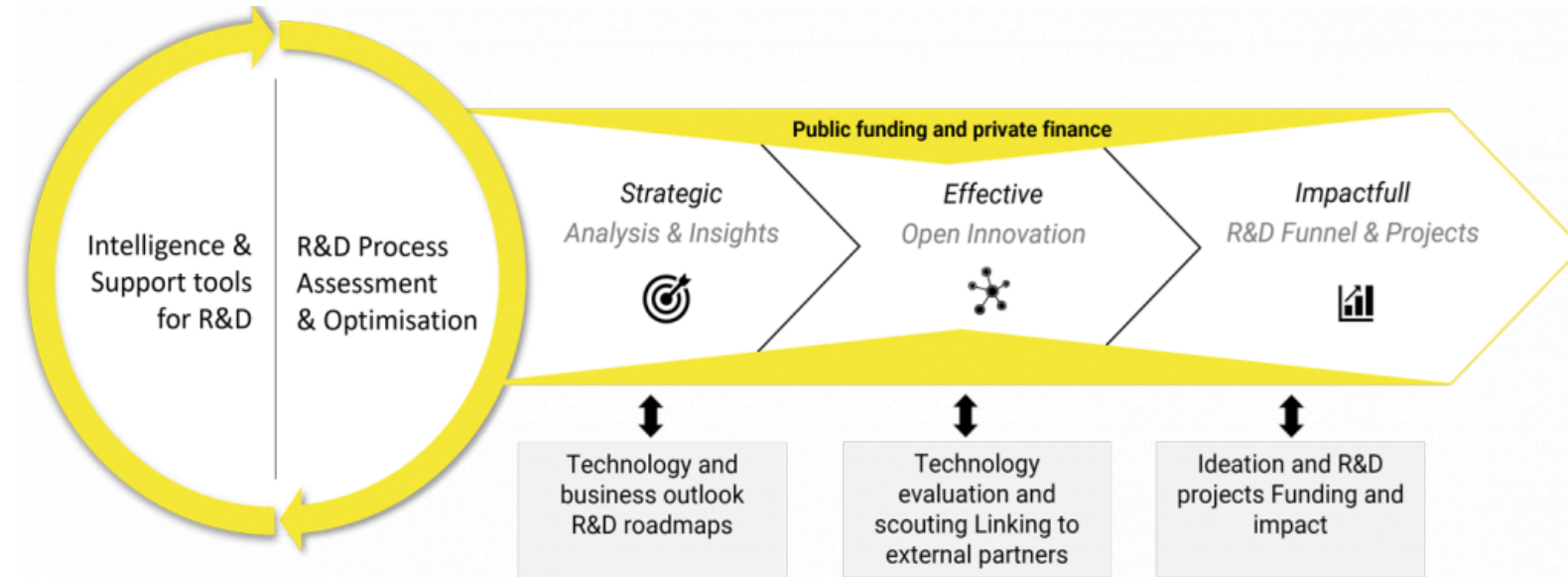


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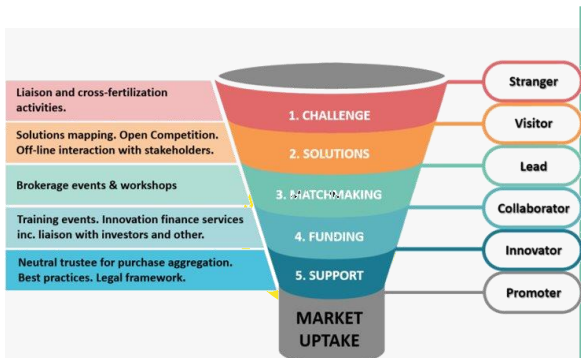
ABOUT PNO – The R&D Advisory Team

PNO R&D ADVISORY makes innovation processes intelligence based, more focused, faster and funded.

- Strategic Technology Intelligence and Analysis
- Design Thinking
- Business modeling and planning
- Market research
- Innovation scouting
- Roadmap development
- R&D process optimisation, portfolio creation and co-development



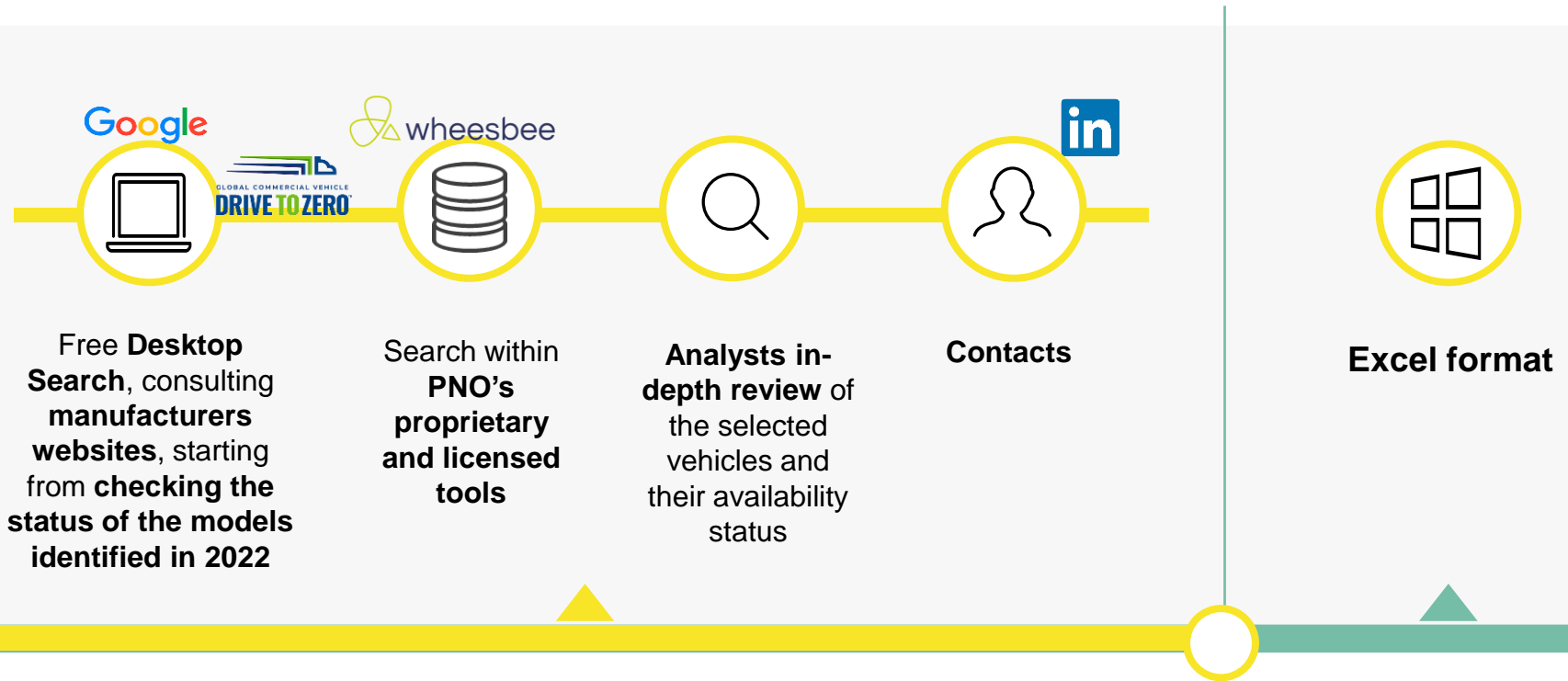
Scope and Approach



Scope: Identify and analyse the availability of zero emission vehicles for long-haul freight transportation

STEP 1

MARKET INTELLIGENCE



STEP 2

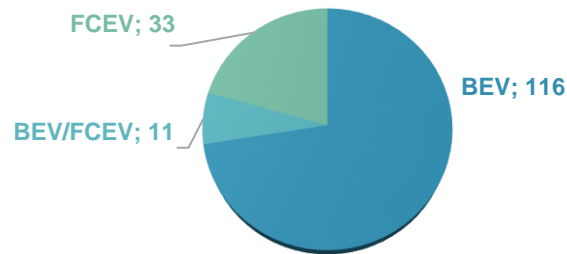
STEP 3



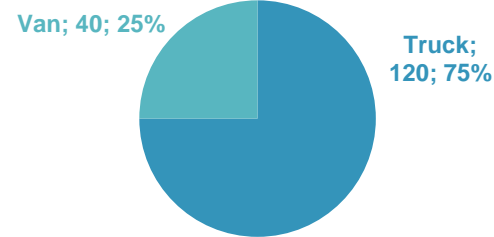
Zero Emission Vehicles for Road Freight Transport – Update 2023 Results Overview

The analysis led to the identification of **160 different models**, provided by **85 different manufacturers** divided between OEMs and retrofit solution providers. The total number of models takes into account both the new ones identified and those updated compared to 2022, when 129 were selected.

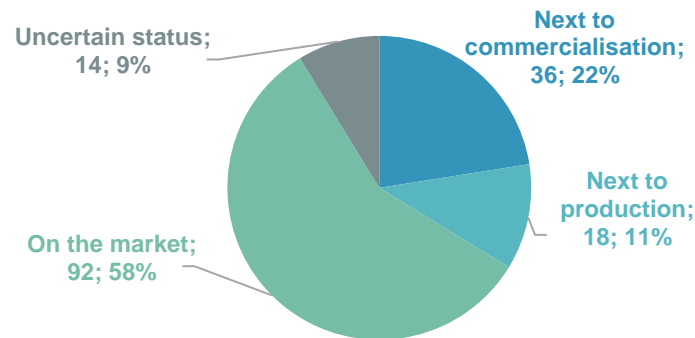
Number of Models by "Fuel" Type



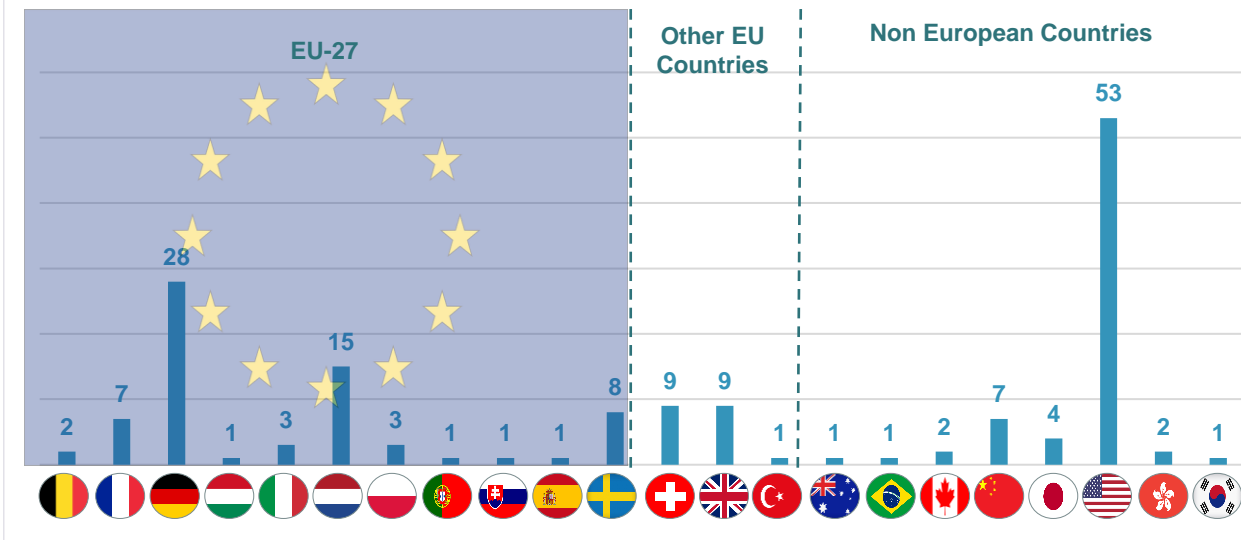
Number of Models by Vehicle Type



Status of the Identified Vehicles



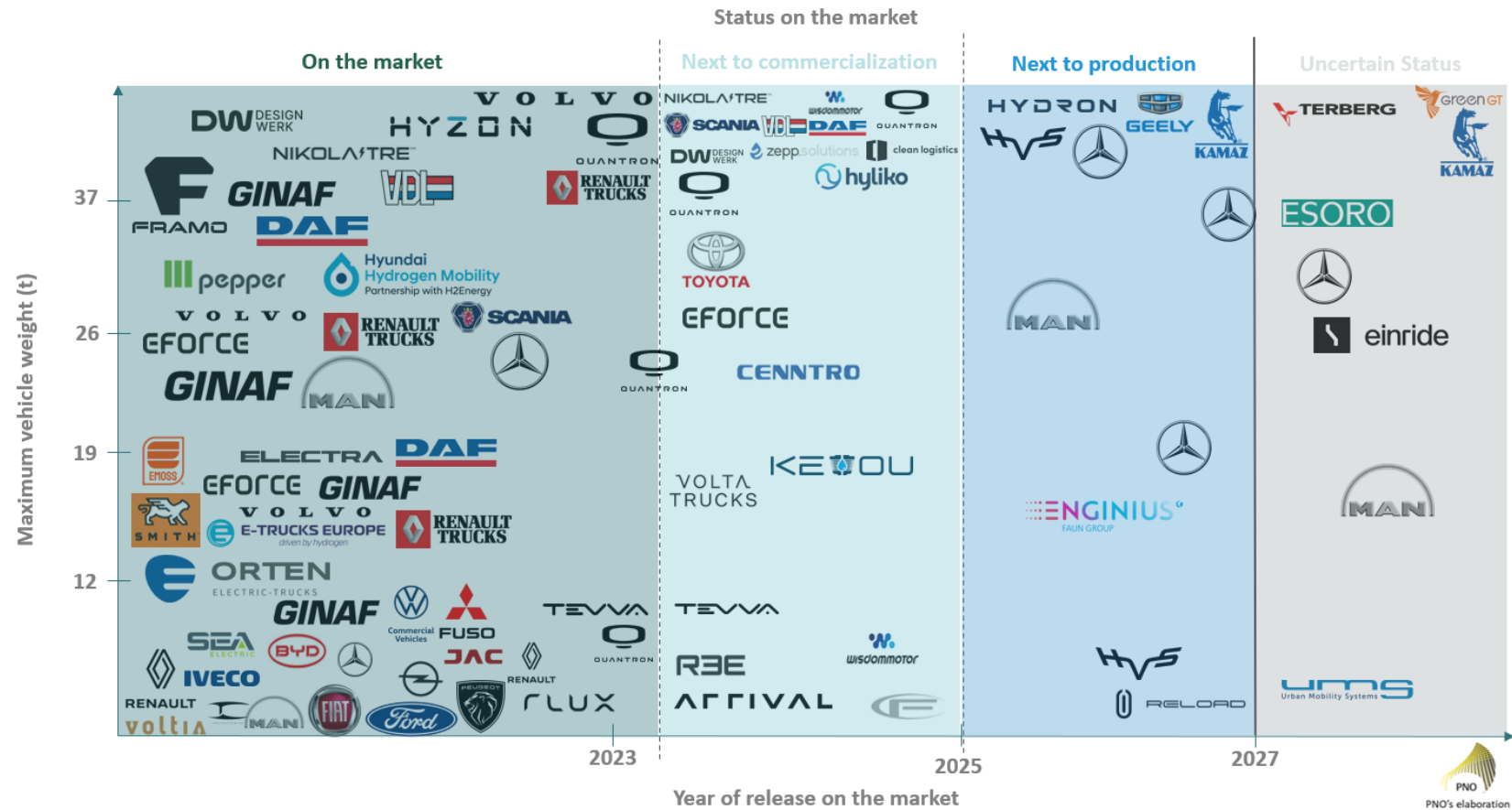
Manufacturing / Production Location of the Identified Vehicles



Zero Emission Vehicles for Road Freight Transport – Update 2023

- Focus on Availability in Europe

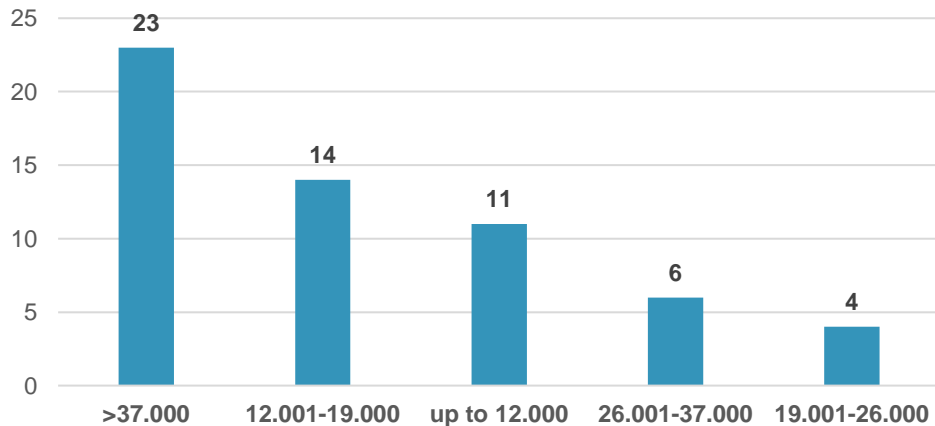
Focusing on availability in Europe, we have identified **99 different models** (with respect the 71 identified in the market analysis done in 2022), provided by **58 different manufacturers**. Of these, 59 are already on the market (delivered to customers), 22 are next to commercialization (vehicles in production and delivered to customers by the end 2024) and 11 are next to be produced (within the next two years). 7 of the identified models have been tested, presented or designed but there has been no further update.



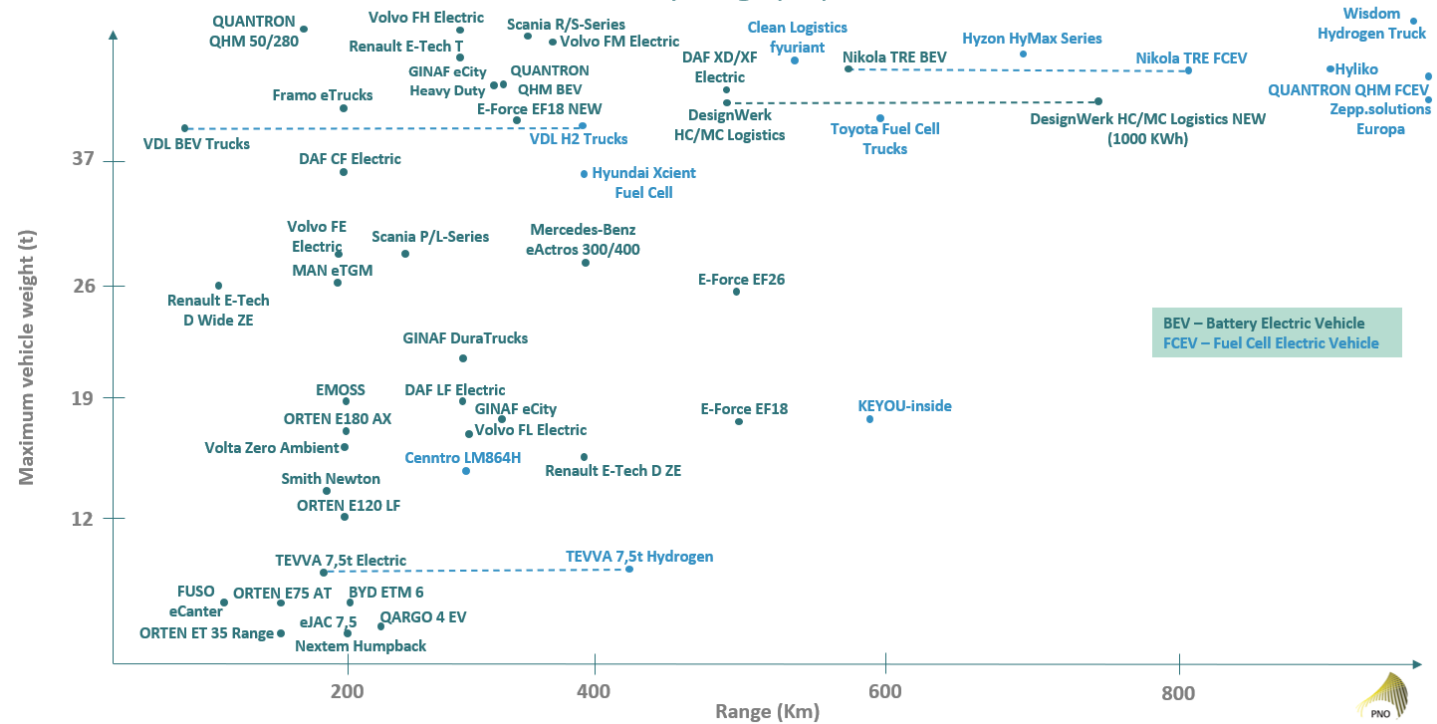
Zero Emission Vehicles for Road Freight Transport – Update 2023 - Focus on Availability in Europe

Out of the 99 identified vehicles, **76 are trucks** (on which we will focus in this presentation).
Of these, 58 models are already on the market or will be marketed by end 2024.

Number of Trucks Available or Next to Commercialization in Europe per Size



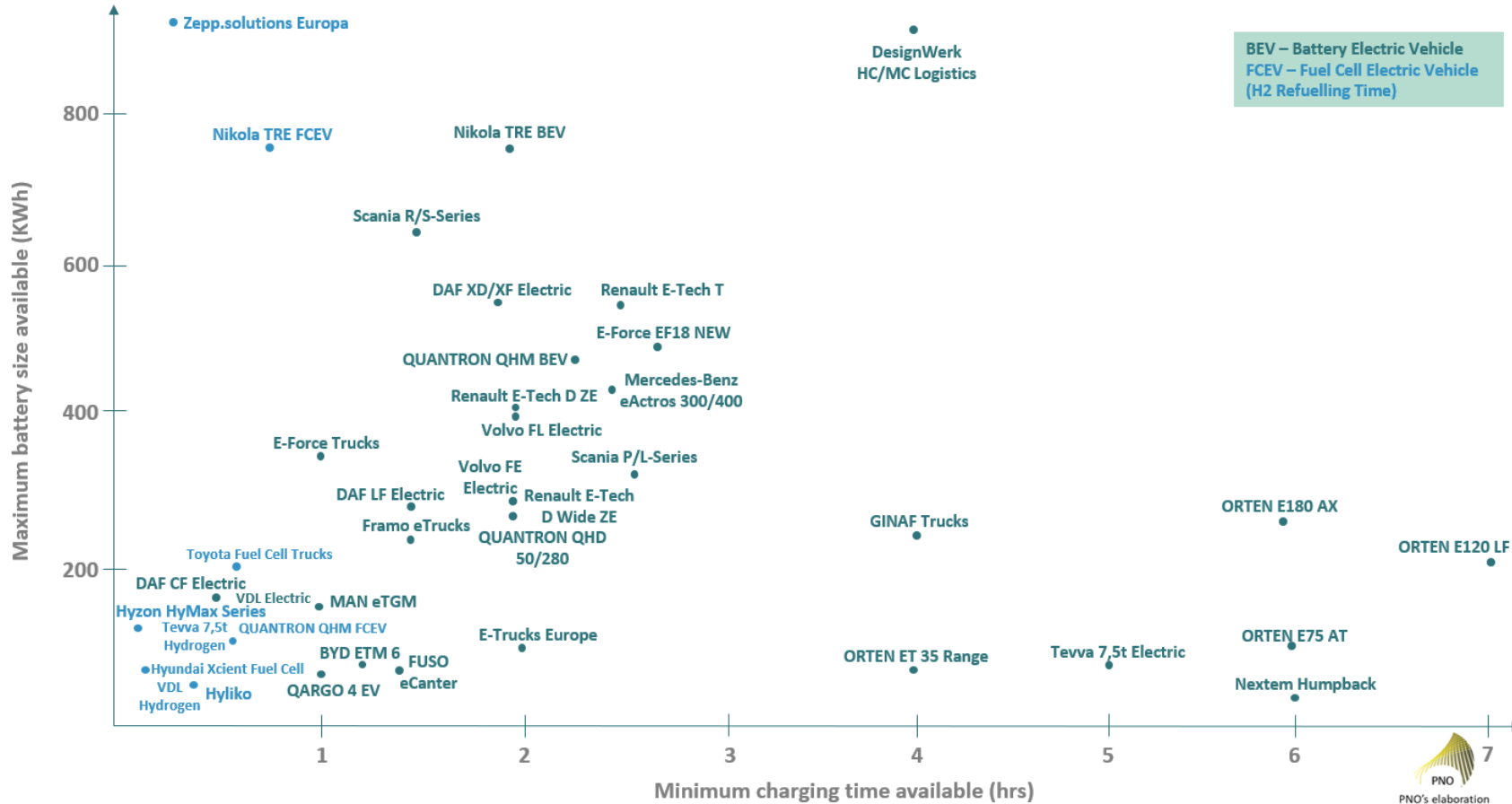
Already Available or Next to Commercialization Identified Models in Europe, per Size (tonnes) and Autonomy Range (km)



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Zero Emission Vehicles for Road Freight Transport – Update 2023 - Focus on Availability in Europe

Already Available or Next to Commercialization Identified Models in Europe, per Maximum Battery Size (KWh) and Minimum Charging Time* (hrs)

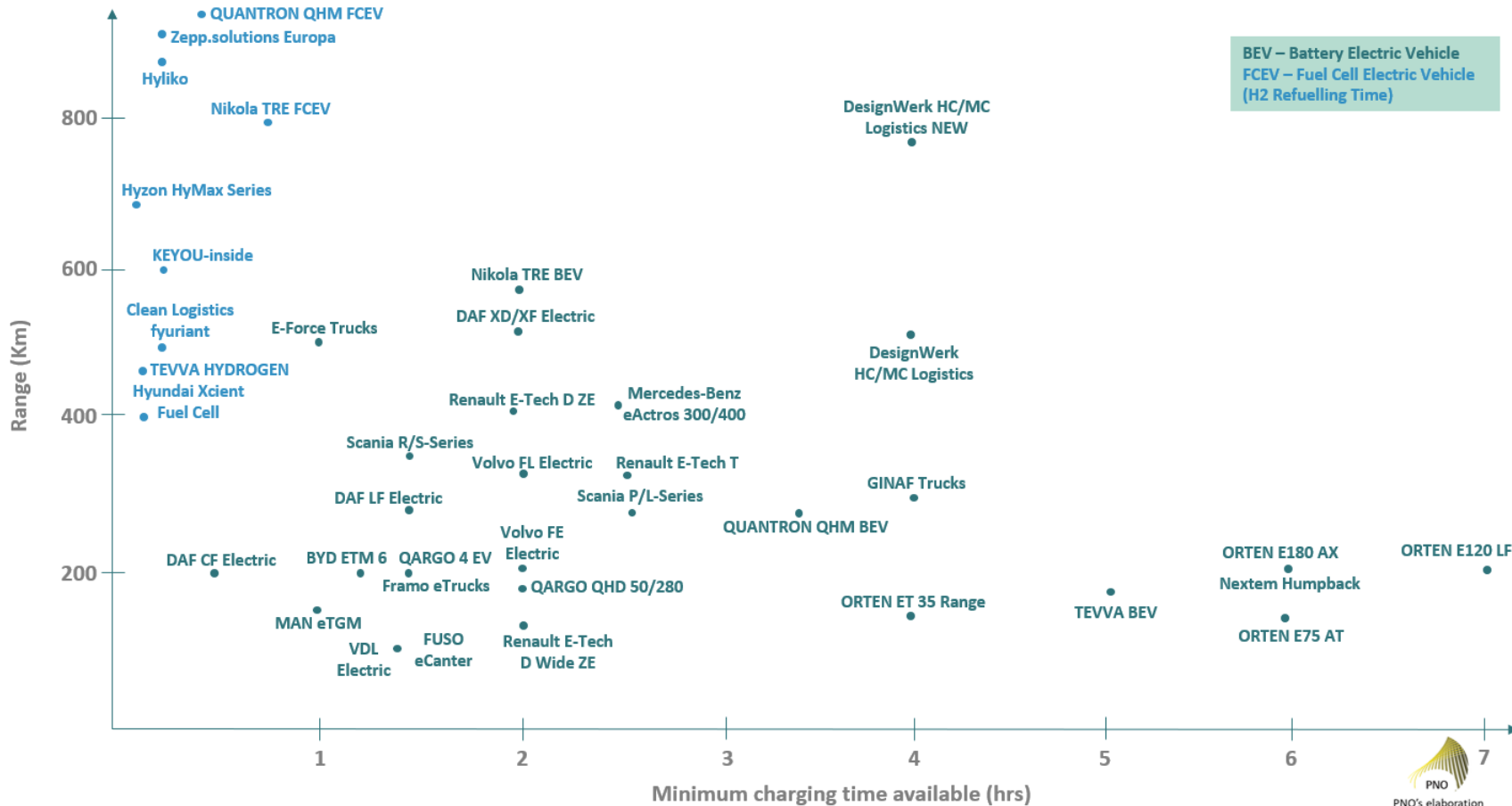


* The minimum charging time specified per each vehicle present in the chart is related to the battery size considered. More vehicles mentioned in the chart have different battery configurations and consequently different charging times.



Zero Emission Vehicles for Road Freight Transport – Update 2023 - Focus on Availability in Europe

Already Available or Next to Commercialization Identified Models in Europe, per Minimum Charging Time* (hrs) and Range (Km)

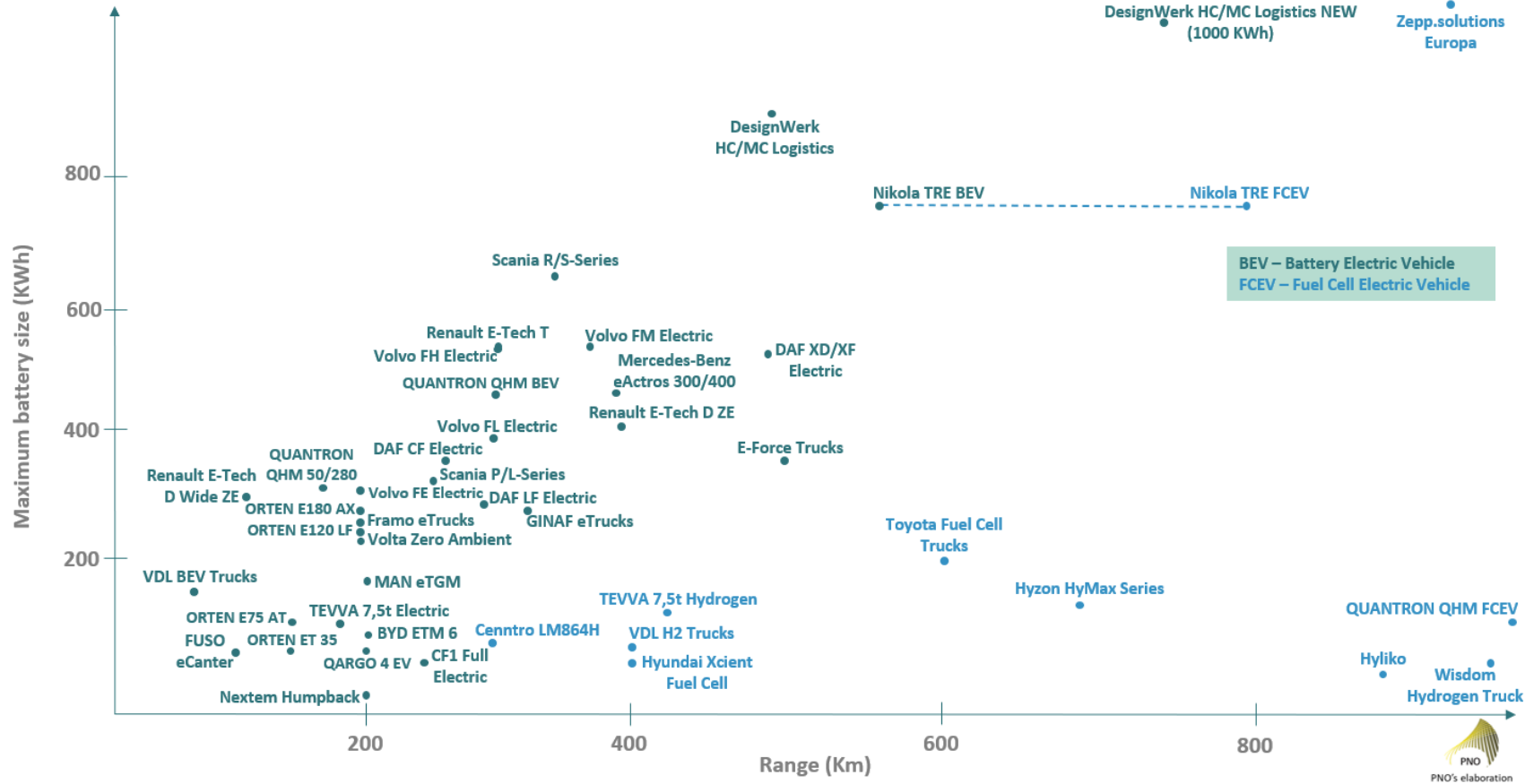


* The maximum range specified per each vehicle in the chart is related to the minimum charging time necessary to cover the mentioned kilometers. More vehicles in the chart have different battery configurations and consequently different charging times and range extension.



Zero Emission Vehicles for Road Freight Transport – Update 2023 - Focus on Availability in Europe

Already Available or Next to Commercialization Identified Models in Europe, per Maximum Battery Size (KWh) and Autonomy Range (km)



* The maximum range specified per each vehicle in the chart is related to the maximum battery size necessary to cover the mentioned kilometers. More vehicles in the chart have different battery configurations and consequently different range extensions.



Zero Emission Vehicles for Road Freight Transport – Update 2023 - News Compared to 2022 – Example 1

DAF XD/XF ELECTRIC



| | |
|------------------------------|---|
| Power Supply | Battery |
| Gross Vehicle Weight | > 40 tonnes |
| Payload | - |
| Chassis / Body Type | Rigid, Tractor + Trailer |
| Power / Output Engine | 170-350 KW |
| Battery Size | 210-525 kWh |
| Charging Time | 80% in 45 minutes; 100% in less than 2 hours |
| Range | 300-500 km |
| Availability | Next to commercialization (late 2023 / early 2024) |
| Comment | Production and assembly started this year (2023) in Eindhoven site. Vehicle already orderable. For the XD version, 50 trucks ordered by Einride and 75 by Asset Alliance Group. |



Zero Emission Vehicles for Road Freight Transport – Update 2023 - News Compared to 2022 – Example 2

HYLIKO RIGID AND TRACTOR TRUCKS



| | |
|------------------------------|---|
| Power Supply | Fuel Cell |
| Gross Vehicle Weight | 26-44 tonnes |
| Payload | - |
| Chassis / Body Type | Rigid, Tractor + Trailer |
| Power / Output Engine | 350 KW (of which 160 KW of fuel cells) |
| Battery Size | 60 kWh (+ 40 kg of hydrogen capacity) |
| Charging Time | 20 minutes for refuelling |
| Range | 400-900 km |
| Availability | Next to commercialization (end 2023) |
| Comment | Designed on Renault Trucks T model retrofitted. Hyliko is planning to deploy 6,000 hydrogen trucks and develop 60 hydrogen fueling stations by 2030 across Europe. First vehicles acquired by Point.P which will launch them in Paris |



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Zero Emission Vehicles for Road Freight Transport – Update 2023 - News Compared to 2022 - Example 3

MAN NEW eTRUCK



| | |
|------------------------------|--|
| Power Supply | Battery |
| Gross Vehicle Weight | 20-28 tonnes solo chassis; 42 tonnes chassis + trailer |
| Payload | - |
| Chassis / Body Type | Tractor + Trailer |
| Power / Output Engine | 200-350 KW |
| Battery Size | 200-500 kWh |
| Charging Time | - |
| Range | 600-800 km |
| Availability | Next to production (2024) |
| Comment | The very first 200 heavy-duty electric truck units will be produced in Munich at the beginning of 2024, one year ahead the original schedule. First 100 eTrucks ordered by DB Schenker and delivered by 2026 (first 10 in late 2024?). |



Zero Emission Vehicles for Road Freight Transport – Update 2023 - News Compared to 2022 – Example 4

MERCEDES-BENZ eACTROS LongHaul



| | |
|------------------------------|---|
| Power Supply | Battery |
| Gross Vehicle Weight | 40 tonnes |
| Payload | - |
| Chassis / Body Type | Rigid, Tractor + Trailer |
| Power / Output Engine | 400-600 KW |
| Battery Size | 600 kWh |
| Charging Time | - |
| Range | 500 km |
| Availability | Next to production (2024) |
| Comment | The eActros LongHaul is scheduled to be ready for series production in 2024. The vehicle hit the roads for testing in 2022 for the first time. 100 vehicles ordered by DB Schenker. |



Mercedes-Benz



Zero Emission Vehicles for Road Freight Transport – Update 2023 - News compared to 2022 – Example 5

QUANTRON QHM BEV / QHM FCEV



| | |
|------------------------------|--|
| Power Supply | Battery, Fuel Cell |
| Gross Vehicle Weight | BEV: 28-44 tonnes; FCEV: 28-44-50-65 tonnes |
| Payload | - |
| Chassis / Body Type | Tractor + Trailer |
| Power / Output Engine | BEV: 375 KW; FCEV: 420-550 KW + 120-240 KW FC |
| Battery Size | BEV: 280-450 kWh; FCEV: 124 kWh (54-116 kg H2 capacity) |
| Charging Time | BEV: 2-4 hours; FCEV: 20-40 minutes refuelling |
| Range | BEV: 200-300 km; FCEV: 500-1400 km |
| Availability | BEV: On the market; FCEV: Next to commercialization (2023) |
| Comment | Base trucks: MAN TGX and TGS. The FCEV truck will be available from the second half of 2023. QUANTRON-as-a-service is a solution that covers all facets of the mobility value chain. |



Zero Emission Vehicles for Road Freight Transport – Update 2023 - News Compared to 2022 – Example 6

Renault Trucks T E-Tech



| | |
|------------------------------|---|
| Power Supply | Battery |
| Gross Vehicle Weight | 44 tonnes |
| Payload | - |
| Chassis / Body Type | Rigid, Tractor + Trailer |
| Power / Output Engine | 490 KW |
| Battery Size | 360-540 kWh |
| Charging Time | 2,5 hours with DC (250 KW); 9,5 hours with AC (43 KW) |
| Range | 300 km |
| Availability | On the market (2023) |
| Comment | - |



Zero Emission Vehicles for Road Freight Transport – Update 2023 - News Compared to 2022 – Example 7

SCANIA Regional Transport 40-45 R/S-Series



| | |
|------------------------------|---|
| Power Supply | Battery |
| Gross Vehicle Weight | 40-64 tonnes |
| Payload | - |
| Chassis / Body Type | Rigid, Tractor + Trailer |
| Power / Output Engine | 400-450 KW |
| Battery Size | 624 kWh (Installed), 468 kWh (usable) |
| Charging Time | 90 minutes with DC (375 KW) |
| Range | 250-350 km |
| Availability | Next to commercialization (Q4 2023) |
| Comment | Scania helps clients plan a full solution, with grid connection, charging hardware and even green energy contracts. |



Zero Emission Vehicles for Road Freight Transport - News Compared to 2022 – Example 8

VOLTA ZERO AMBIENT



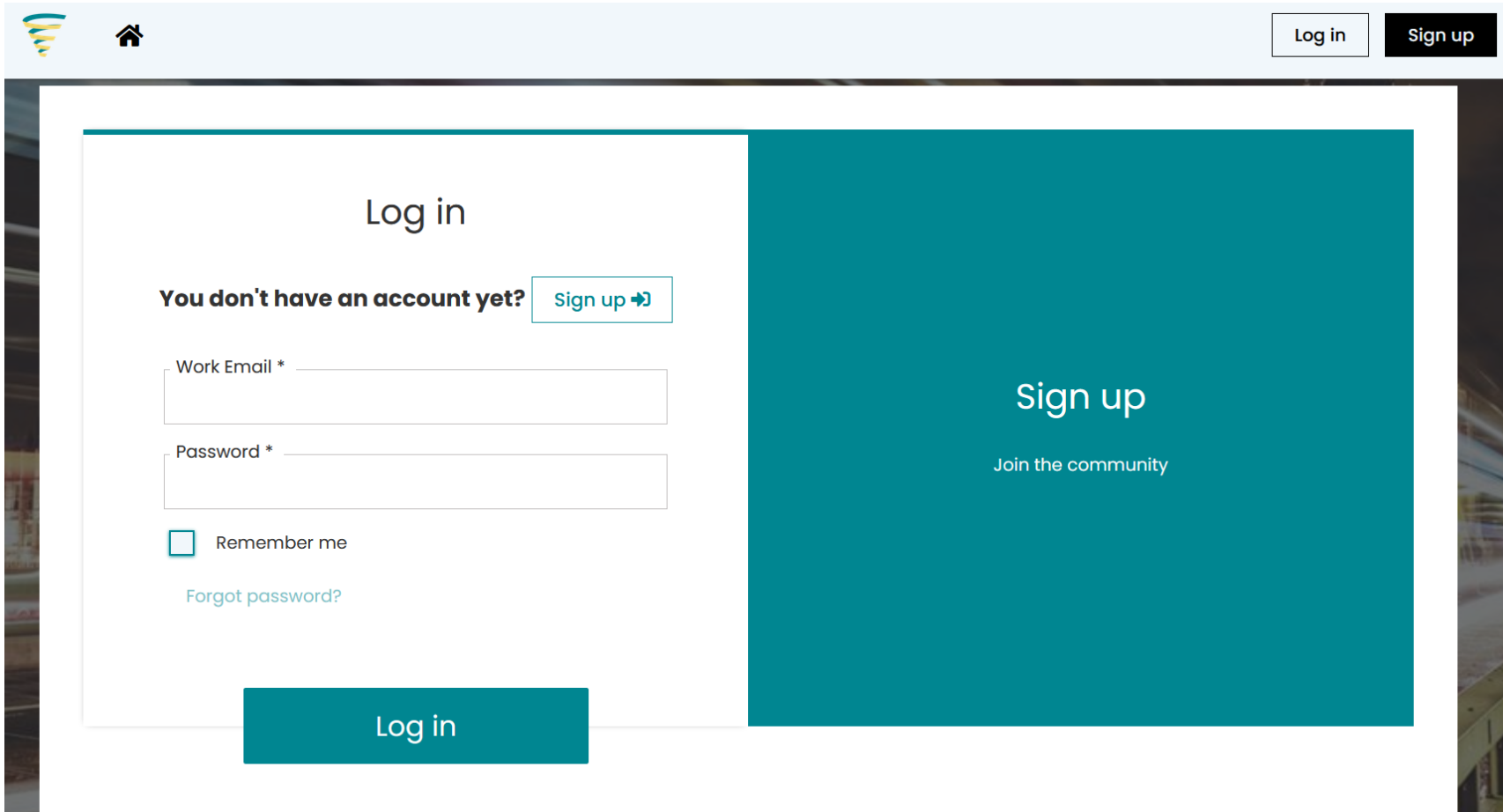
| | |
|------------------------------|--|
| Power Supply | Battery |
| Gross Vehicle Weight | 16 tonnes |
| Payload | 8,2 tonnes |
| Chassis / Body Type | Rigid |
| Power / Output Engine | - |
| Battery Size | 150-225 kWh |
| Charging Time | - |
| Range | 150-200 km |
| Availability | Next to commercialization (2 nd half 2023) |
| Comment | 6000 vehicles already pre-ordered. They also provide 7,5T and 12T versions, which will be available in the coming years. |



VOLTA
TRUCKS



REGISTER TO GET THE FULL DATA



The screenshot shows the ENTRANCE platform's login and sign-up interface. At the top right, there are buttons for "Log in" and "Sign up". The main content area is split into two sections. On the left, the "Log in" section features a heading, a link for users without accounts, input fields for "Work Email" and "Password", a "Remember me" checkbox, a "Forgot password?" link, and a "Log in" button. On the right, the "Sign up" section has a heading and the text "Join the community".

To register to the platform link [here](#)



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Thank you!



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