Leading the way to greener and smarter mobility worldwide

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28th of June 2023

ALSTOM
• mobility by nature •

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ALSTOM – who we are

We are where mobility is needed

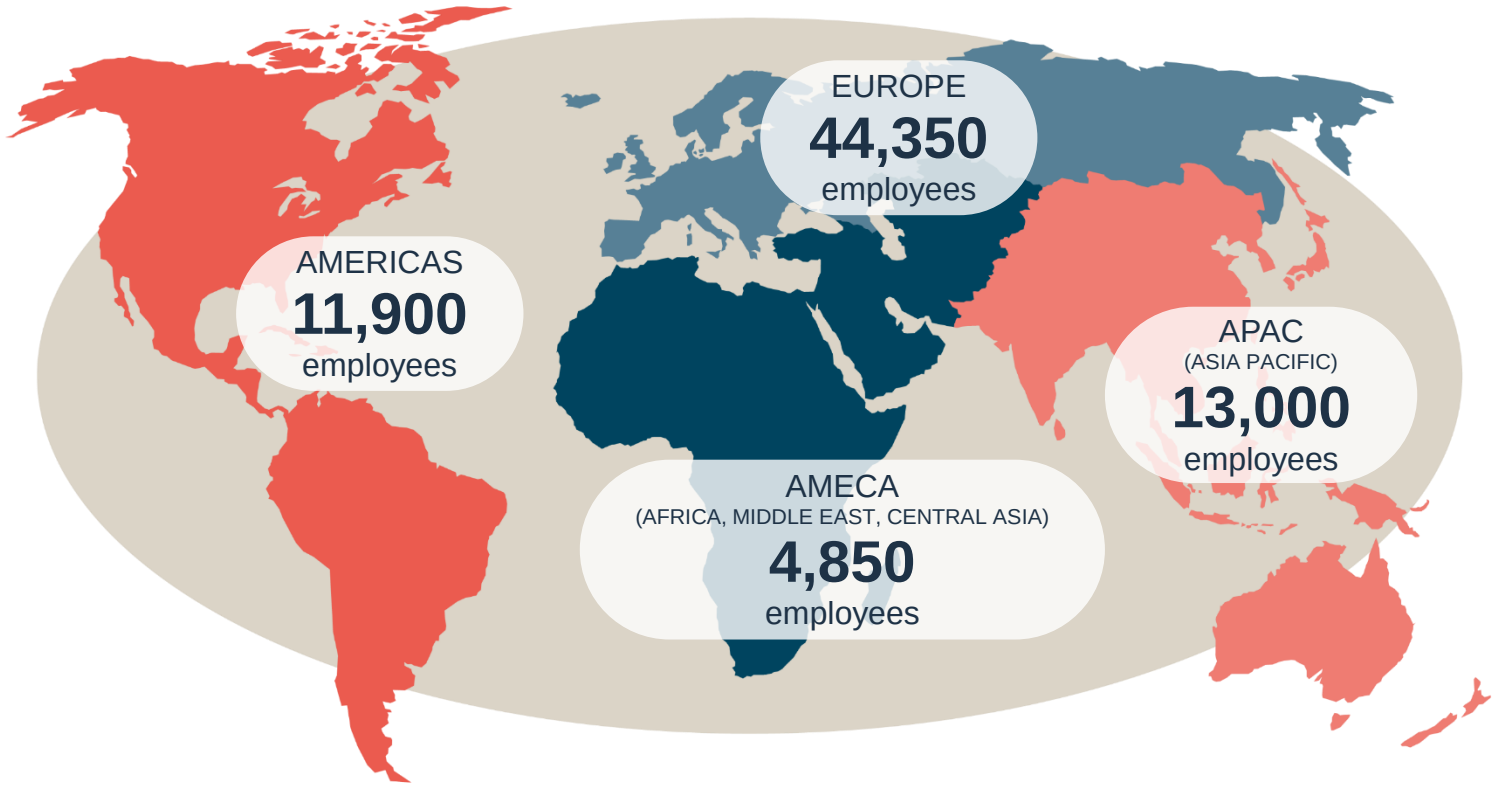
Over
74,000
employees worldwide

From
166
nationalities

70
countries

140 sites

250 depots



19,700
engineers

More than
9,400
patents

Over
150,000
vehicles in commercial service

Partner to over
300
cities

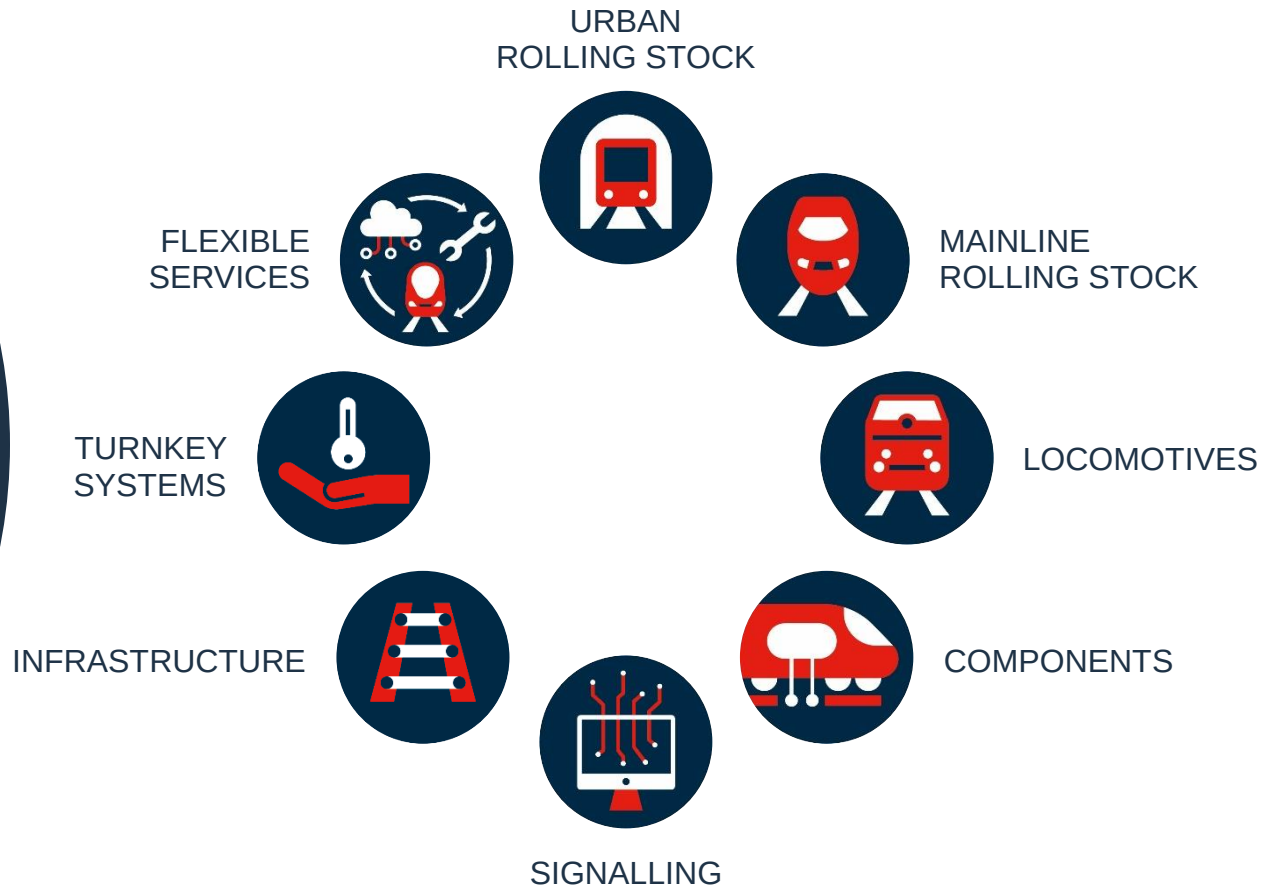
As of 31 March 2022

A global leader in the transportation sector in the digital age

Leading societies to a low carbon future

Alstom develops and markets mobility solutions that provide sustainable foundations for the future of transportation.

Our comprehensive product portfolio ranges from high-speed trains, metros, monorail and trams, to turnkey systems, services, infrastructure, signalling and digital mobility solutions.



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Hydrogen in the railway market

Need for alternative propulsion technology

Considerable part of the **railway network non-electrified**

→ Emission-free trains for non-electrified routes

Medium and long-term **rising prices for diesel** **Implementation of CO_2 tax**

→ Alternatives to fossil fuel

Legislation and forecasts regarding **climate protection and noise reduction**

→ Solutions with reduced CO_2 footprint and lower noise emissions

Falling acceptance and political discussions about **diesel driving ban in urban areas**

→ Compliant technology

iLint – from the idea to passenger operation

The success story

2012
The idea of a hydrogen train is born

2014
The development begins

2016
World premiere for the first H_2- train

2020
- Successfully tested in Germany, Austria and the Netherlands
- Perfect replacement for Diesel trains

From August 2022
Regular passenger operation in Germany

Alstom‘s current hydrogen projects

LNVG

- 14 Coradia iLint
- Start of operation 2022
- 30 years maintenance and hydrogen supply

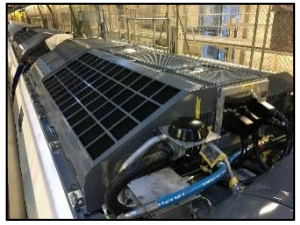
Taunusnetz (rmv)

- 27 Coradia iLint
- Start of operation 2022
- 29 years maintenance and hydrogen supply

FNM

- 6+8 Coradia Stream H
- Delivery 2023



Alstom green mobility solutions for non-electrified railways

Electrified lines are the most efficient solutions, but how to decarbonize non-electrified lines?

Zero emission

Hydrogen (FCMU / Hydrogen power car)

- Current range **up to 1000 km**
- **Performance equivalent to diesel trains**
- Suited for **catenary-free operations** with requirement of **hydrogen refueling station**

Coradia iLint

Battery (BEMU / Battery power car)

- Current range of **80-120 km on batteries**
- Suited for **catenary-free operations** with **recharging** in electrified sections and stations
- **Kinetic energy recovery** during braking

Coradia Continental BEMU

Reduced emission

Bi-mode (Diesel + EMU) / Hybrid (Diesel + energy storage)

- Bi-mode: Make use of catenary when operating on **electrified sections.**
- Hybrid: Energy storage, **reduction of energy consumption**, boost during acceleration. Plug-in option for full electric autonomy.

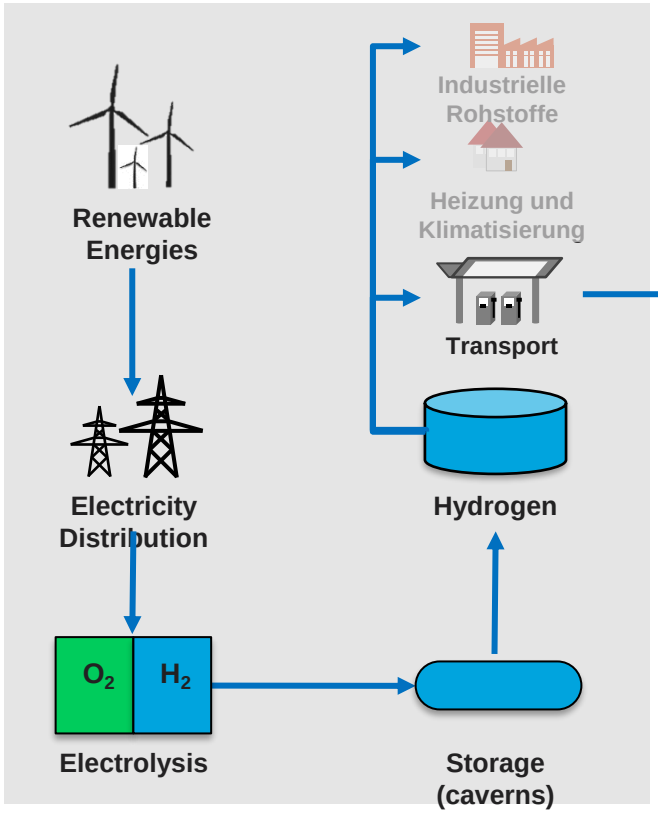
Prima H3 Hybrid Plug-in

Traxx Shunter platform development
Countries in Scope

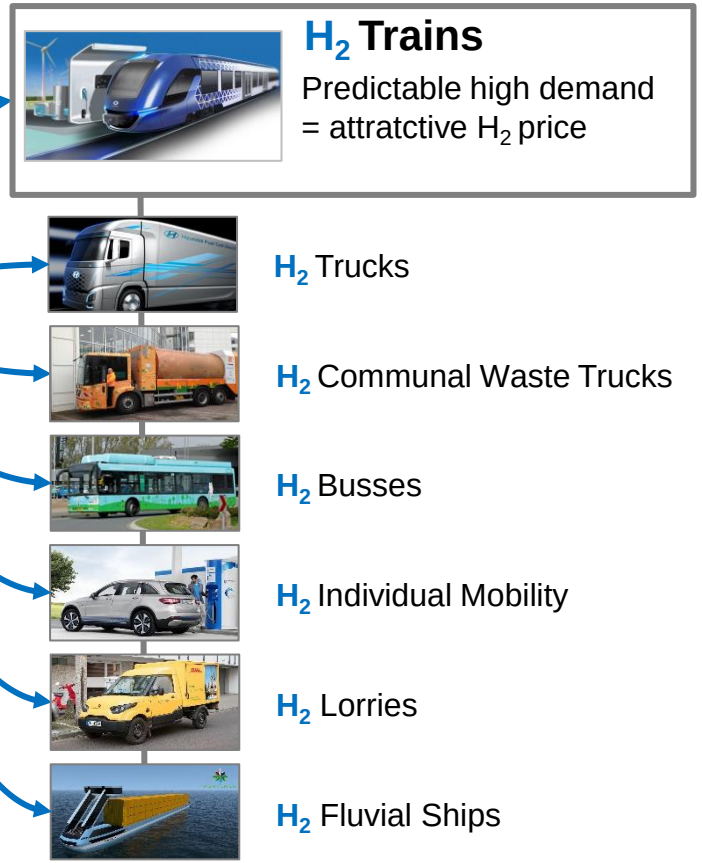
Alstom – paving the way for sector coupling

Focus on infrastructure

- Hydrogen Society



- Zero emission mobility



All advantages at a glance

- Sustainable
- Enabler for sector coupling
- Perfect replacement for Diesel trains
- Low noise emission
- State of the art technology
- A lot of experience

An emission free rail transportation is already possible

3 Further information

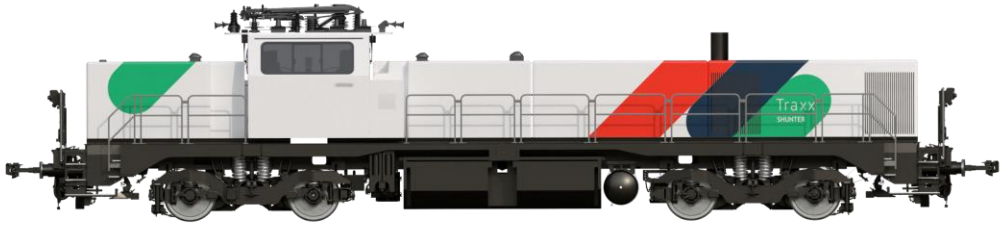
Alstom’s TRAXX locomotives

Broad worldwide market coverage

- Adopted for all climate conditions
- Products cover shunting, mainline freight and passenger as well as heavy freight applications
- Various power sources: Electric, diesel, battery, dual-mode, hybrid modes and last mile
- Strong product-off-the-shelf approach with application projects around the world
- History of over 150 years in Europe
- Over 3,200 Prima+ 2,300 TRAXX ordered over the past 20 years worldwide

Traxx Shunter platform

A new range to address the European shunting market



COMPETITIVE ADVANTAGES

Green Traction - The Traxx Shunter platform combines various energy sources, permitting an environmental-friendly operation as much as possible.

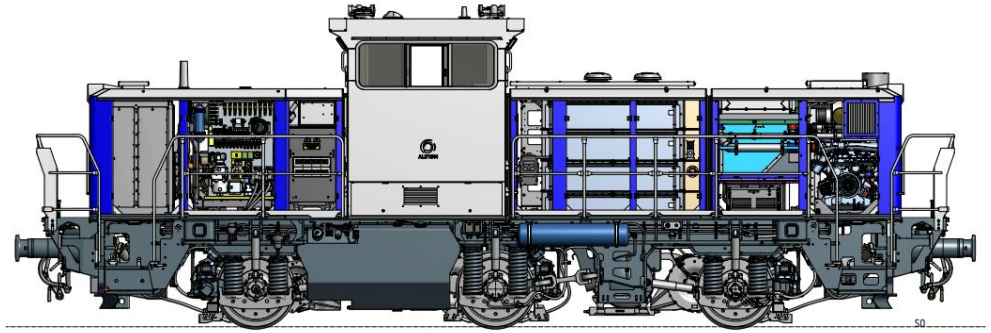
Modular design – The locomotives benefits from a modular approach providing flexibility to chose the best power source combination for the various use cases

Economic – With the high starting tractive effort of 300 kN, speeds up to 120 km/h and outstanding energy efficiency, the locomotives stand for best economic value.

KEY TECHNICAL DATA

Axle configuration	Bo'Bo'
Starting effort	300 kN
Mass	80 t up to 90 t
Gauge	1'435 mm (UIC standard)
Maximum axle load	20 t / 22.5 t
Energy supply	Catenary – Battery Hydrogen Catenary – Diesel
Voltages	25 kV AC, 15 kV AC, 3 kV DC, 1.5 kV DC
Max. power	2 to 2.5 MW peak for Electric Variant
Curve radius	75 m
Multiple operation	Up to 4 locomotives
Temperature range	-25°C to +40°C

Prima H3 Retraction
Next to new built Alstom is also retractioning existing locomotives



Retraction from Diesel Hybrid Loco to H_2Hybrid Loco. Reusing and upgrading existing Diesel Engine to H_2 internal combustion Engine

re-designed emission free H 3 Shunter

Services excellence

Ensuring locomotives perform optimally every day

Skilled engineering presence with expansive experience in locomotives guarantees smooth entry into service, maximum product support and highest availability.

- More than 50 depots across Europe
- More than 150 dedicated employees
- Supporting more than 2,000 locomotives in Europe having more than 500 locomotives in Europe under full service
- Spare parts availability and obsolescence management
- Full service maintenance with flexible service packages
- Condition-based / predictive maintenance → HealthHub
- ECM certified

Top service and availability levels ensured by the broadest maintenance network across Europe