



Coradia iLint First Hydrogen FCMU Alstom Presentation

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ALSTOM
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Alstom Coradia iLint — First Hydrogen FCMU

May 2022 operation in Czech Republic

[Coradia iLint Railshow 2022 | Alstom](#)



Agenda

1. Introduction
2. FCMU technology
3. Coradia iLint
4. Hydrogen infrastructure
5. Alstom's FCMU projects

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Introduction

The Polluters of the past.....



c/o: U.Gahl



c/o: U.Gahl

Alstom green mobility solutions for non-electrified lines

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

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.



Illustration with X'trapolis Tren Maya

Zero emission



**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



**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

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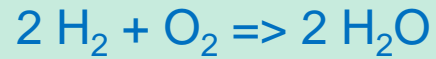
FCMU technology

FCMU technology – Example Coradia iLint

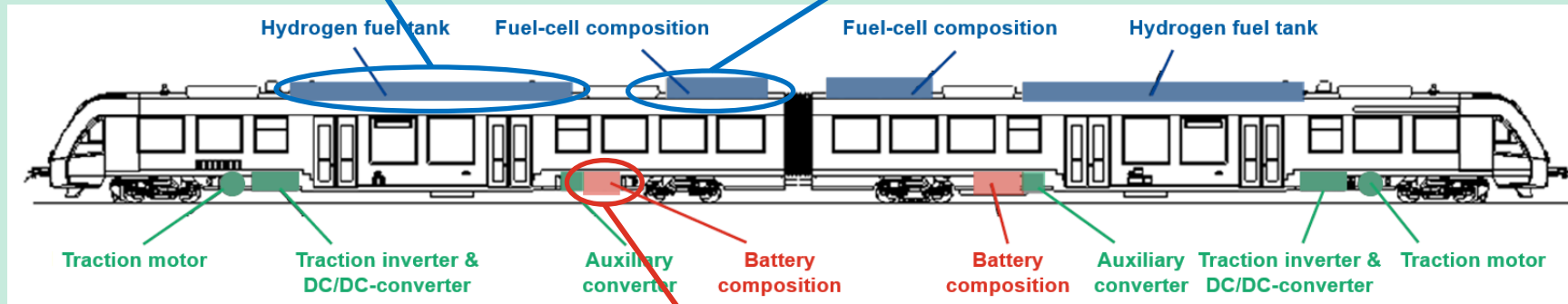
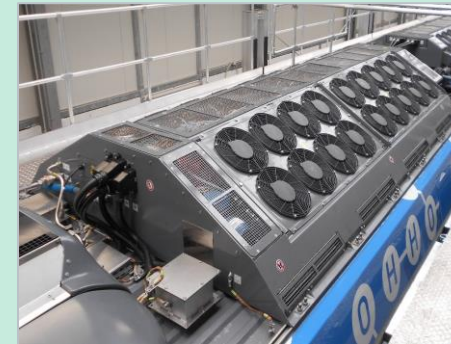
Hydrogen storage



Storage at 350 bar



Fuel cell composition



Lithium-Ion battery composition

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Coradia iLint

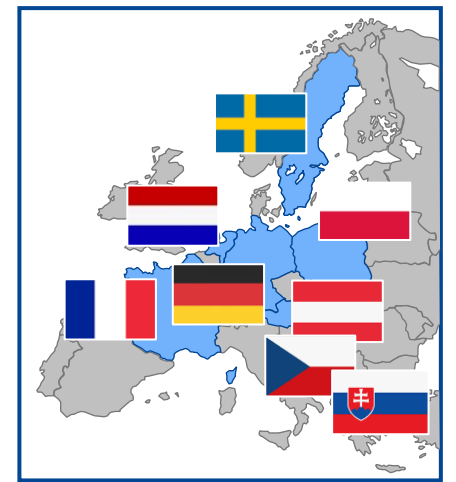
Alstom's Coradia iLint – A zero emission solution for tomorrow's challenges

- Based on successful Coradia Lint 54 DMU
- Designed for Central Europe application
- No technical components in the passenger area
- Zero local emissions and reduced noise level
- TSI compliant, easy access for PRM



Length / Axle load	54 m / 18 t
Multiple unit operation	up to 4 vehicles
Capacity	150 seats / 1 toilet / Flex Area
Low floor entrance	620 or 810 mm
Vmax	140 km/h
Range	1000 km

Alstom's Coradia iLint - Validation of fuel cell trains (1/3)



Germany

- Sep 2018 – 18 months, 2 trains
- **Passenger commercial service**
- Lower Saxony
- Authorization by EBA
- 180.000 km



Netherlands

- Feb 2020 – 2 weeks
- **Test campaign intercity**
- Line Groningen-Leeuwarden
- First H₂ rail trial in Netherlands
- Tests for operation, consumption & refuelling



Austria

- Sep 2020 – 3 months
- **Passenger commercial service**
- Aspangbahn (Viena), Wiener Neustadt-Puchberg, Gutenstei
- Service operated by ÖBB

Alstom's Coradia iLint - Validation of fuel cell trains (2/3)



Poland

- Jun 2021
- **Test campaign**
- Railway Research Institute
- First H₂ rail trial in Poland
- Test track in Żmigród



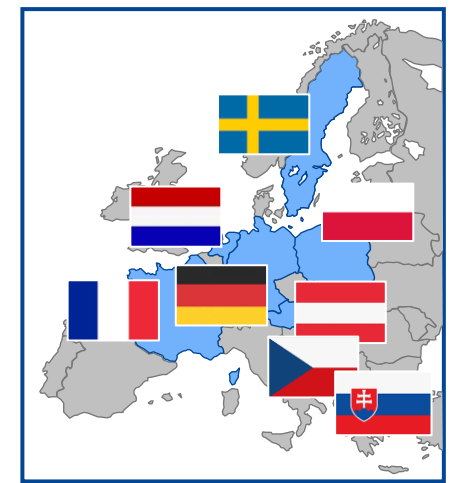
Sweden

- Aug 2021
- **Operation & presentation**
- Operated from Östersund
- First H₂ rail trial in Sweden



France

- Sep 2021
- **Tests in Railway Test Centre**
- First H₂ rail trial in France



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Hydrogen infrastructure

Hydrogen infrastructure - Hydrogen refueling station



- Alstom's transportable Hydrogen Refuelling Station (HRS) during passenger operation of the Coradia iLint pre-serial trains and final solution for serial trains in Bremervörde .



Transportable HRS for train trial operations

Final refueling station for serial trains

Hydrogen infrastructure - Hydrogen refueling station



- Alstom is not dealing with production of hydrogen, neither the with development, and operation of Hydrogen Refuelling Station (HRS)
- Alstom has partners of different companies in order to ensure the smooth operation of Hydrogen trains
- In Hungary in December 2021 **MOL Hungarian Oil and Gas Public Limited Company and Alstom Transport Hungary signed a Memorandum of Understanding on this fields**

ALSTOM



HUNGARY
MEMBER OF MOL GROUP

Hydrogen infrastructure - Benefits of fuel cell technology for trains

- The key benefits: Reduction of greenhouse gas emissions

Reduction per train



minus
700t CO₂
per year...



...equals annual
emissions of
400 cars

Reduction per fleet (30 trains)



minus
22.000t CO₂
per year...



...equals annual
emissions of
12.000 cars

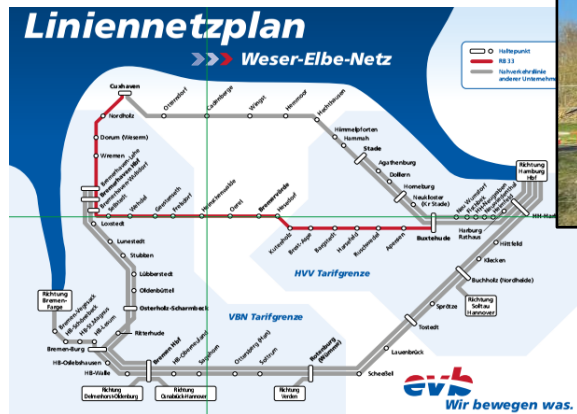
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Alstom's FCMU projects

Alstom's Coradia iLint – Contracts in Germany

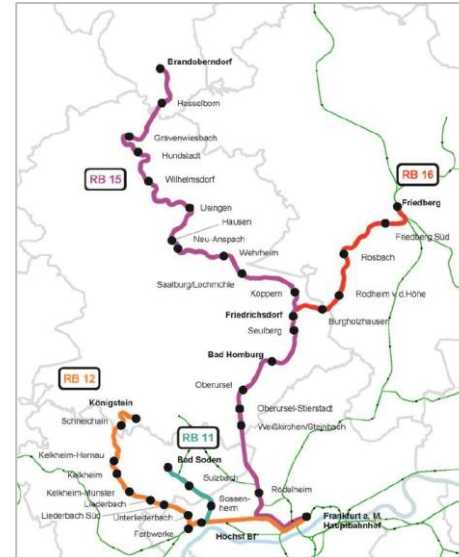
Elbe-Weser-Netz (Lower Saxony)

- 14 Coradia iLint
- Customer: LNVG
- Start of operation 2022
- 30 years of maintenance and H₂ supply



Taunusnetz (Hessen)

- 27 Coradia iLint
- Customer: RMV
- Start of operation 2022/23
- 25 years of maintenance and H₂ supply



Alstom's Coradia Stream FCMU

- Conversion of a Smart Coradia EMU, adding hydrogen-based energy generation, to be able to run on non-electrified lines.
- Capitalising on the vast experience gathered with Coradia iLint pre-serial train.
- A dedicated power car contains hydrogen storage, fuel cells are placed on the roof.
- Contract signature with FNM (Ferrovie Nord Milano) 11/2020 for 6 trains (+ 8 optional trains).



Length	96,7 m
Capacity	240-260 seats
Vmax	140 km/h
Power supply	Hydrogen fuel cell
Range	About 600 km
Delivery	2023

THANK YOU !

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