

Coradia iLint

- Hydrogen train

17-05-2019

Agenda

- 1 **Coradia iLint**
- 2 Coradia iLint and the technological challenges
- 3 Homologation and market introduction
- 4 Next steps

Coradia Lint: Diesel platform from which FC train was developed....

LINT 27:



LINT 41:



LINT 54:



LINT 81:



... a reliable and service proven base for the first hydrogen FCMU

Coradia iLint : Design criteria

- Use proven reliable product as base
- Retain the same train dimensions
- No significant changes in weight/center of gravity
- Re-use of architecture and main components
- Maintain performance (acceleration, range, etc)
- Avoid technical equipment in passenger areas
- No adverse impact on passenger experience and comfort
- High energy efficiency

The goal: The FCMU can operate the same services as the DMU

Fuel Cell Trains: The Technology – transformation from Diesel to FCMU



Removal of diesel propulsion system



Integration of electrical propulsion system



Diesel powerpack



Diesel tank



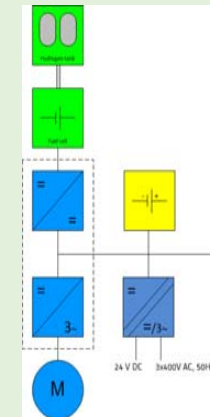
Hydrogen tank

Fuel cell pack

Battery pack

Converter system

Electrical traction motor



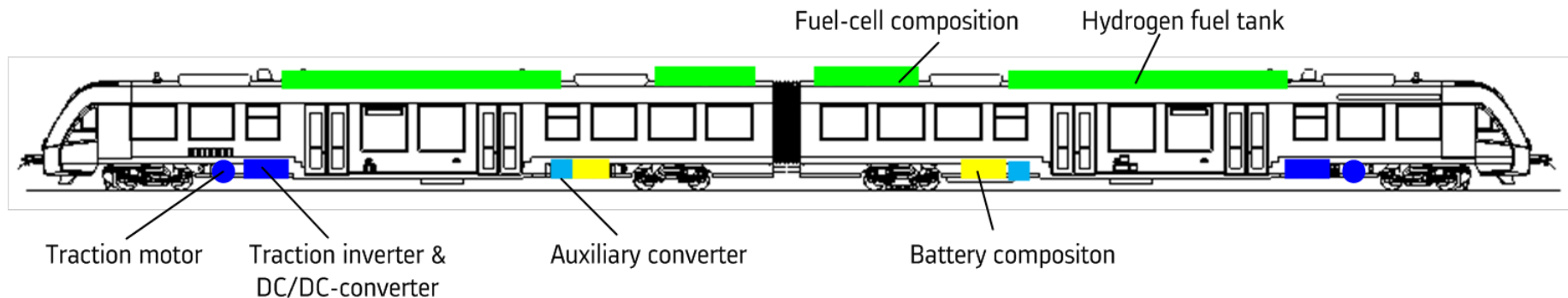
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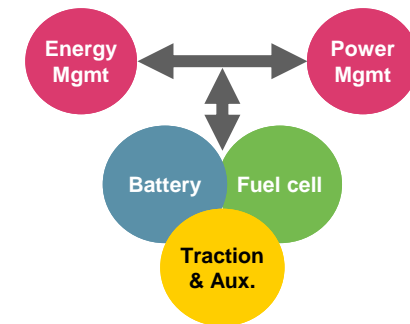
Coradia iLint



Coradia iLint: Diesel replaced with hydrogen and fuel cell technology



- Replacing diesel traction by electrical traction system
- Primary energy supply by hydrogen fuel cells
- Intermediate energy storage by Li-Ion batteries
 - to boost during acceleration
 - to recover kinetic energy during braking
- All electrical auxiliary supply



Modern energy supply and storage system combined with intelligent energy management

Coradia iLint - the components: -> fuel cell composition, -> hydrogen storage, -> lithium-Ion battery composition

Fuel cell composition



Hydrogen storage



Storage at 350 bar (@ 15°C)



Lithium-Ion battery composition

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Coradia iLint: Validation and certification process (as completed in Germany)



Core subjects

- Running dynamics
- Crash
- Brake
- Wheelsets
- Train radio / Train protection



Eisenbahn-Bundesamt
(EBA)



Technical Specification for Interoperability (TSI)

- LOC & PAS
- SRT
- PRM
- NOI



Notified National Technical Rules

- Running dynamics
- Fire Safety
- EMC
- Functional Safety
- Labeling
- *and some others*



Safety assessment on Common Safety Methods (CSM)



Coradia iLint: From certification to regular passenger service

- **Certification** for passenger service in Germany received on **11.07.2018**



- **Daily passenger service** according to regular time table since **17.09.2018**



Two pre-series vehicles in passenger service since 17.09.2018

Fahrplan iLint

Montag bis Donnerstag

ab Bremervörde	16:38 Uhr	an Bremerhaven Hbf	17:20 Uhr
ab Bremerhaven Hbf	17:36 Uhr	an Bremervörde	18:20 Uhr
ab Bremervörde	18:38 Uhr	an Buxtehude	19:26 Uhr
ab Buxtehude	19:53 Uhr	an Bremervörde	20:36 Uhr
ab Bremervörde	20:38 Uhr	an Bremerhaven Hbf	21:20 Uhr
ab Bremerhaven Hbf	21:36 Uhr	an Cuxhaven	22:27 Uhr
ab Cuxhaven	22:39 Uhr	an Bremerhaven Hbf	23:23 Uhr
ab Bremerhaven Hbf	23:54 Uhr	an Bremervörde	00:36 Uhr

Freitag

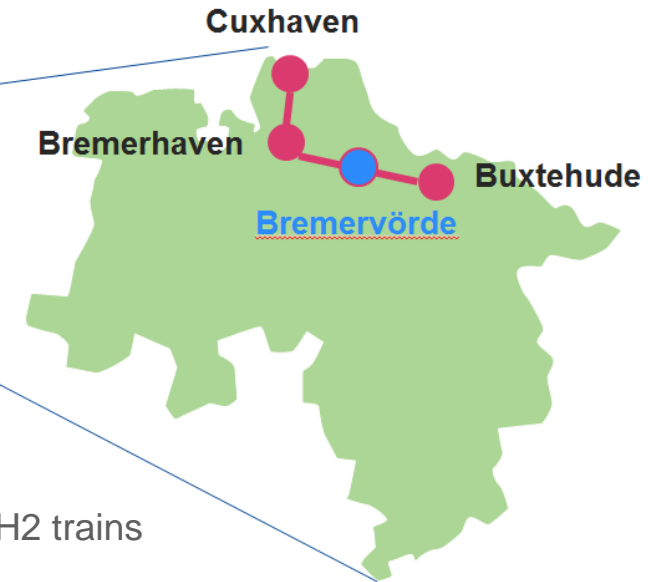
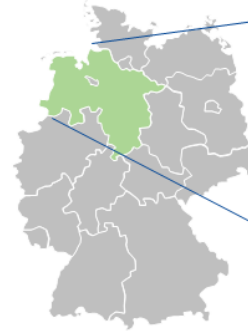
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ab Bremerhaven Hbf	21:36 Uhr	an Bremervörde	22:20 Uhr
ab Bremervörde	22:32 Uhr	an Buxtehude	23:16 Uhr
ab Buxtehude	00:42 Uhr	an Bremervörde	01:24 Uhr

Samstag

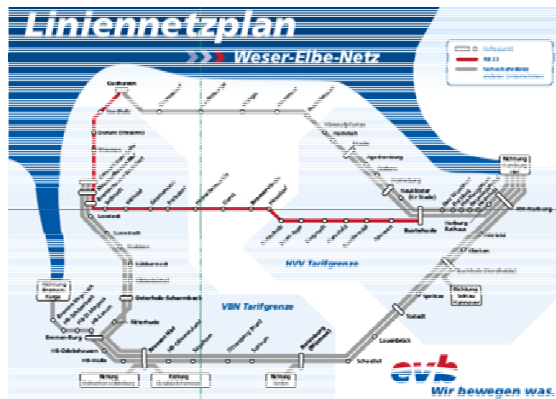
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ab Bremervörde	18:32 Uhr	an Buxtehude	19:16 Uhr
ab Buxtehude	19:45 Uhr	an Bremervörde	20:29 Uhr
ab Bremervörde	20:38 Uhr	an Bremerhaven Hbf	21:20 Uhr
an Bremerhaven Hbf	21:36 Uhr	an Bremervörde	22:20 Uhr
ab Bremervörde	22:32 Uhr	an Buxtehude	23:16 Uhr
ab Buxtehude	00:42 Uhr	an Bremervörde	01:24 Uhr

Sonntag

ab Bremervörde	14:32 Uhr	an Buxtehude	15:16 Uhr
an Buxtehude	15:45 Uhr	an Bremervörde	16:29 Uhr
ab Bremervörde	16:38 Uhr	an Bremerhaven Hbf	17:20 Uhr
ab Bremerhaven Hbf	17:36 Uhr	an Bremervörde	18:20 Uhr
ab Bremervörde	18:32 Uhr	an Buxtehude	19:16 Uhr
ab Buxtehude	19:45 Uhr	an Bremervörde	20:29 Uhr
ab Bremervörde	20:38 Uhr	an Bremerhaven Hbf	21:20 Uhr
ab Bremerhaven Hbf	21:36 Uhr	an Bremervörde	22:20 Uhr



- Daily passenger operation
- Mixed operation with DMU and H2 trains
- Line length 119 km
- One mobile refueling station in Bremervörde



Operated by EVB (local operator)

Interims H2 fuelling station installed in Bremervörde during operation of the Coradia iLint pre-series trains



Interims solution for train trial operation only

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Coradia iLint – next steps



- Passenger service mileage with pre-serial trains
- Development of the hydrogen infrastructure
- 2021/2022 Start of operation of fleet operations
- Homologation in other European countries



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