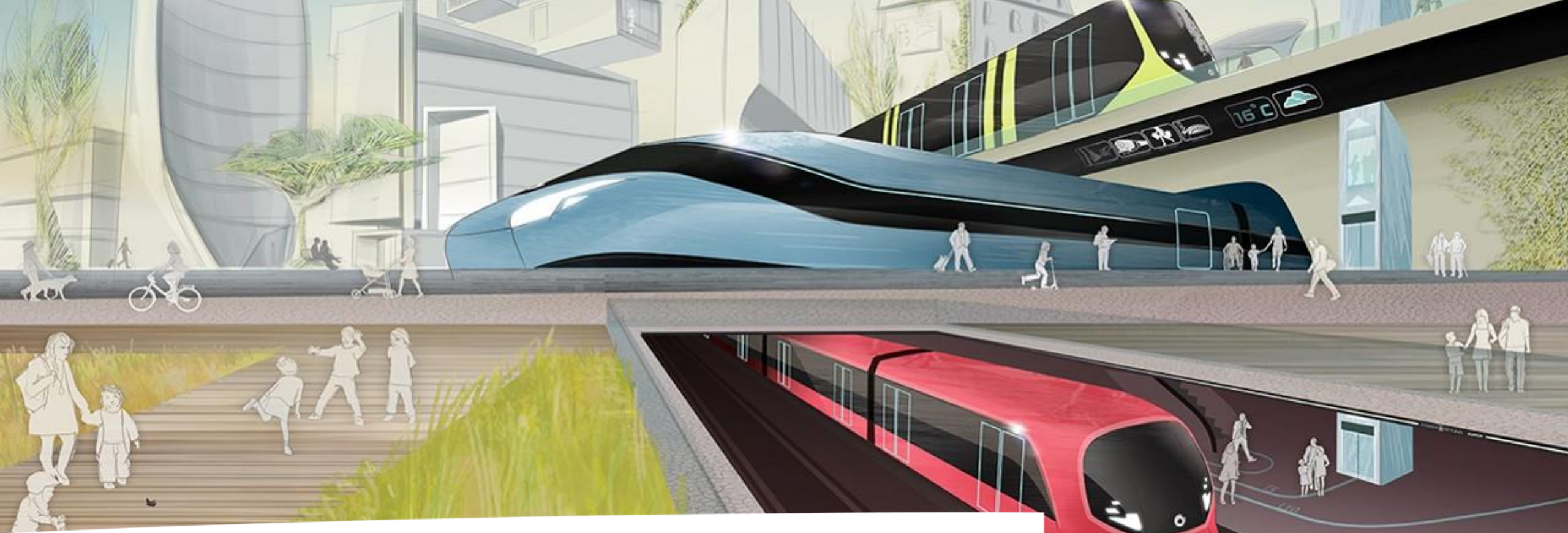




iLint: Hydrogen Fuel Cell Train (HFC)

Alstom

23/10/2019



ALSTOM
Designing fluidity

The proportion of non-electrified railway lines is comparatively high in Germany

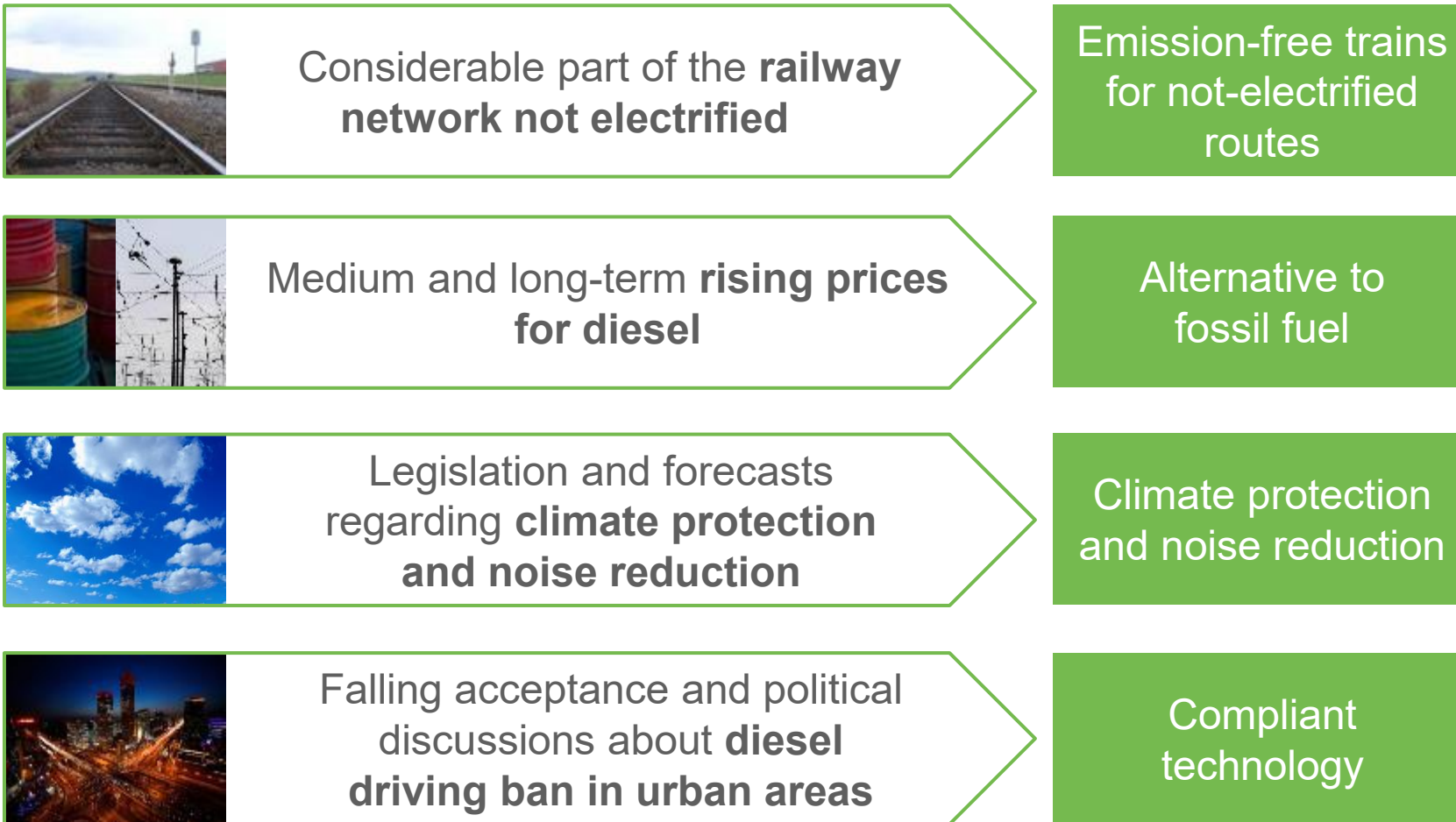
Electrification in the German rail network

- Over 40% (17,740km) of the German rail network is not electrified
- Planned increase in electrification level to 70 % by 2025 mainly
- Approx. 36% (240 Mio. Train/ KM) of the regional lines are operated by diesel vehicles
- High complexity of electrification requires long planning horizons and high construction costs
- Construction costs per km: more than 1 million €/km
- Total construction time: approx. 5 - 7 years

— Elektrifiziert
— Nicht Elektrifiziert



Need for alternative propulsion technology



iLint: The Technology – transformation from Diesel to HMU



Removal of diesel propulsion system



Integration of electrical propulsion system



Diesel powerpack



Diesel tank



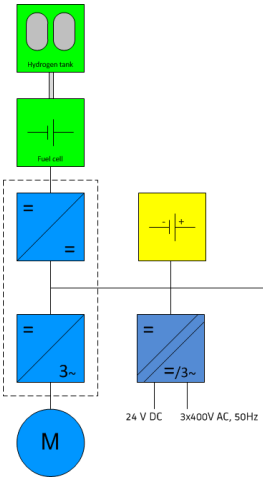
Hydrogen tank

Fuel cell pack

Battery pack

Converter system

Electrical traction motor

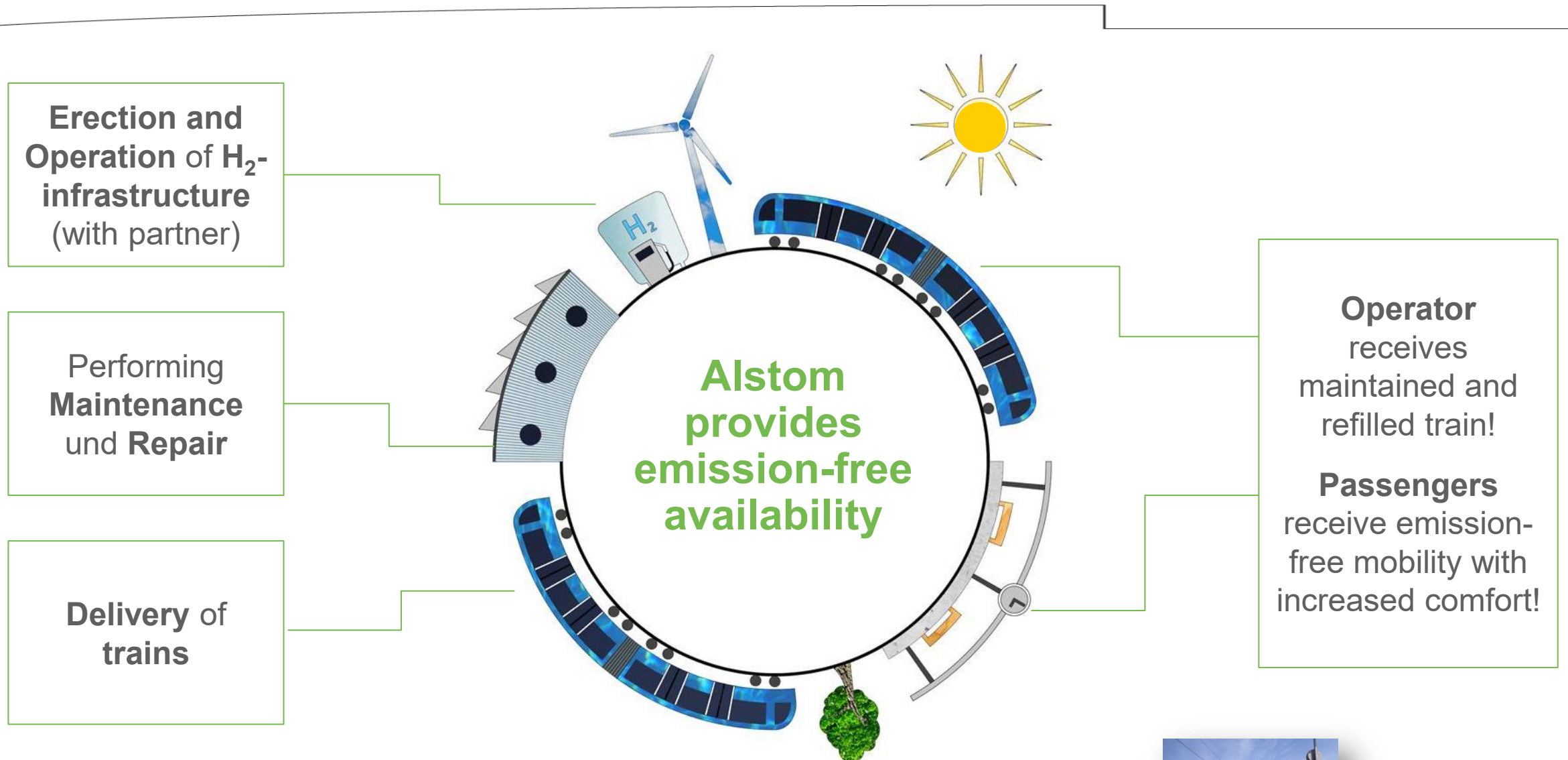


iLint: Design criteria

- Use of proven reliable product as base
- No significant changes in weight/point of gravity
- Re-use of train architecture and main components
- Maintain performance (availability, reliability, acceleration, range, etc)
- Avoid technical equipment in passenger areas
- No adverse impact on passenger experience and comfort
- High energy efficiency
- Interoperability (mixed fleet)
- Possibility to retrofit existing trains
- Scalability of components to make technology suitable for other platforms



RS + Maintenance and Hydrogen supply ... a complete mobility solution



Hydrogen contributing to de-carbonisation



minus
700t CO₂
per year...



...equals annual
emissions of
400 cars



Reduction per iLint vehicle



minus
11.000t CO₂
per year...



...equals annual
emissions of
6.000 cars



Reduction per iLint fleet



Daily revenue service operation in the north of Germany

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

19:28 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

Bremervörde

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

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

19:28 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

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

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

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

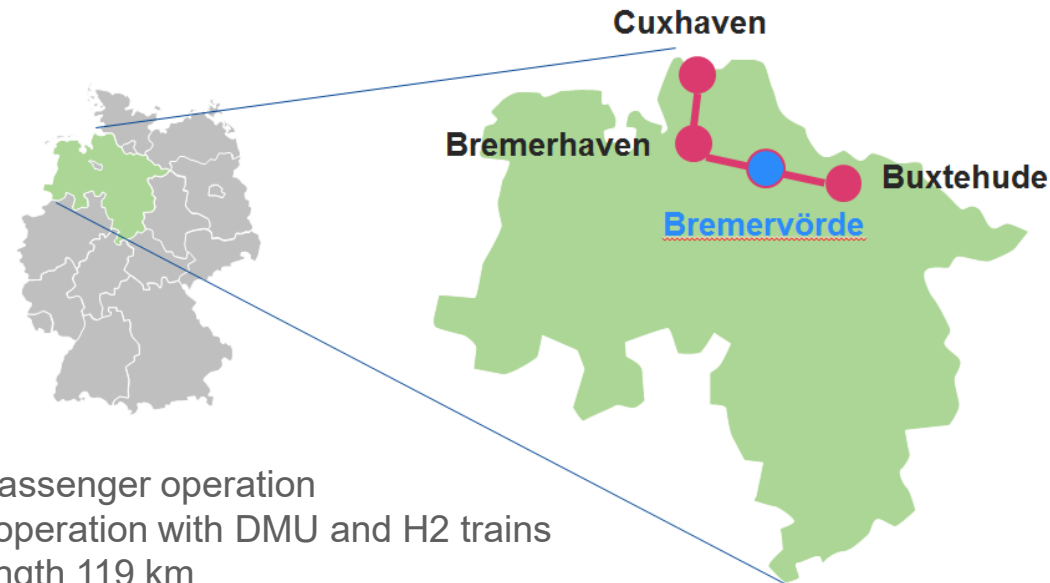
Bremerhaven Hbf

21:36 Uhr

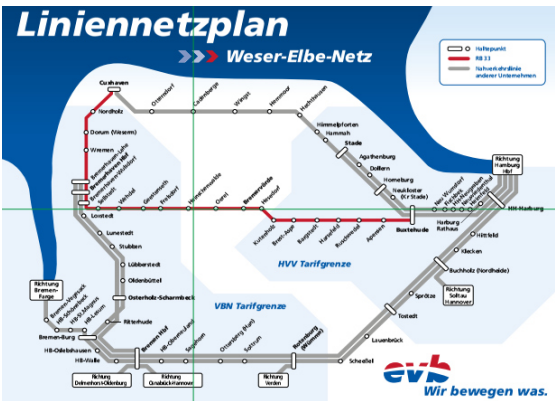
an

Bremervörde

22:20 Uhr

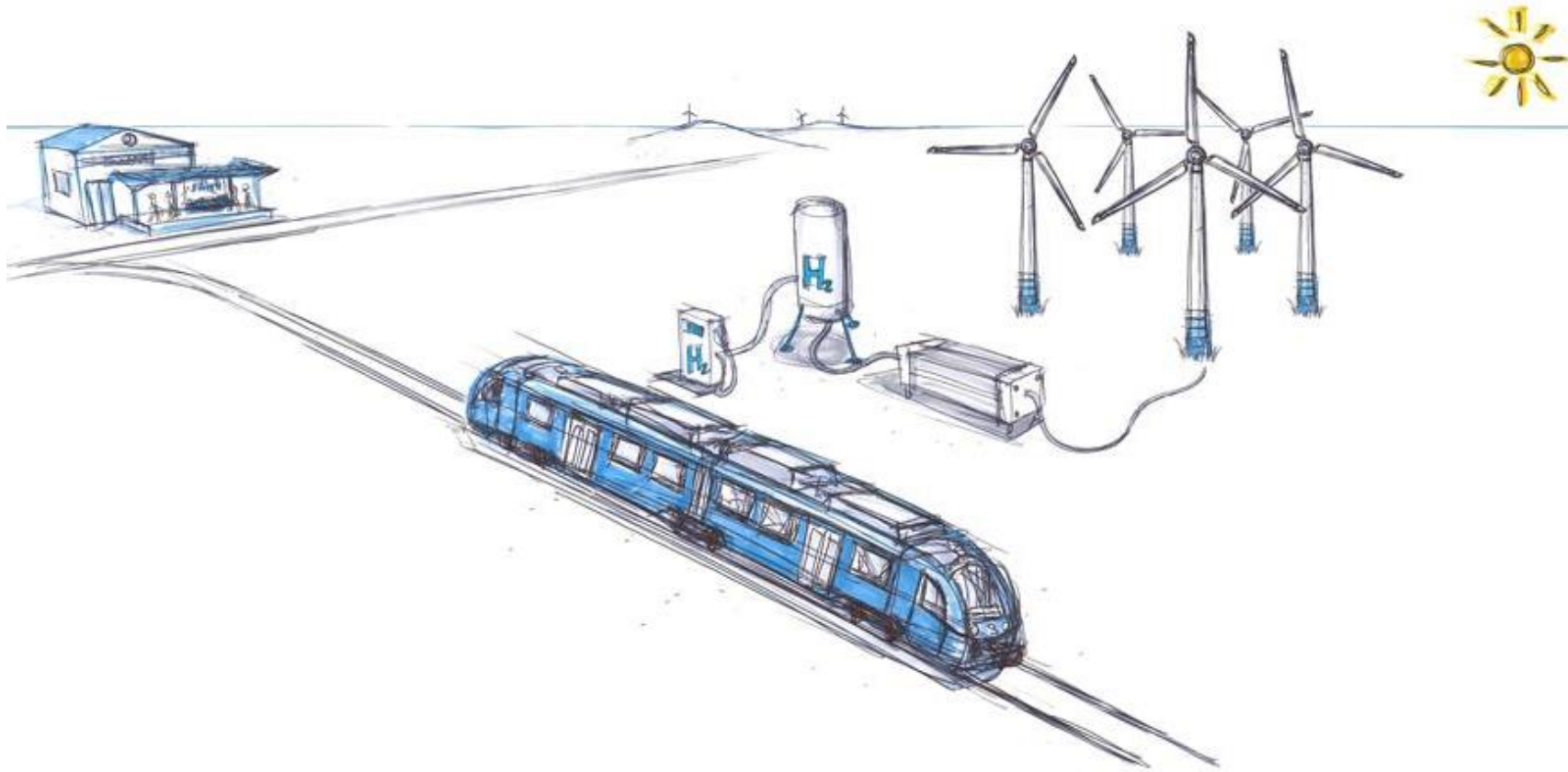


- Daily passenger operation
- Mixed operation with DMU and H2 trains
- Line length 119 km
- One mobile refueling station in Bremervörde
- More than 150.000 km

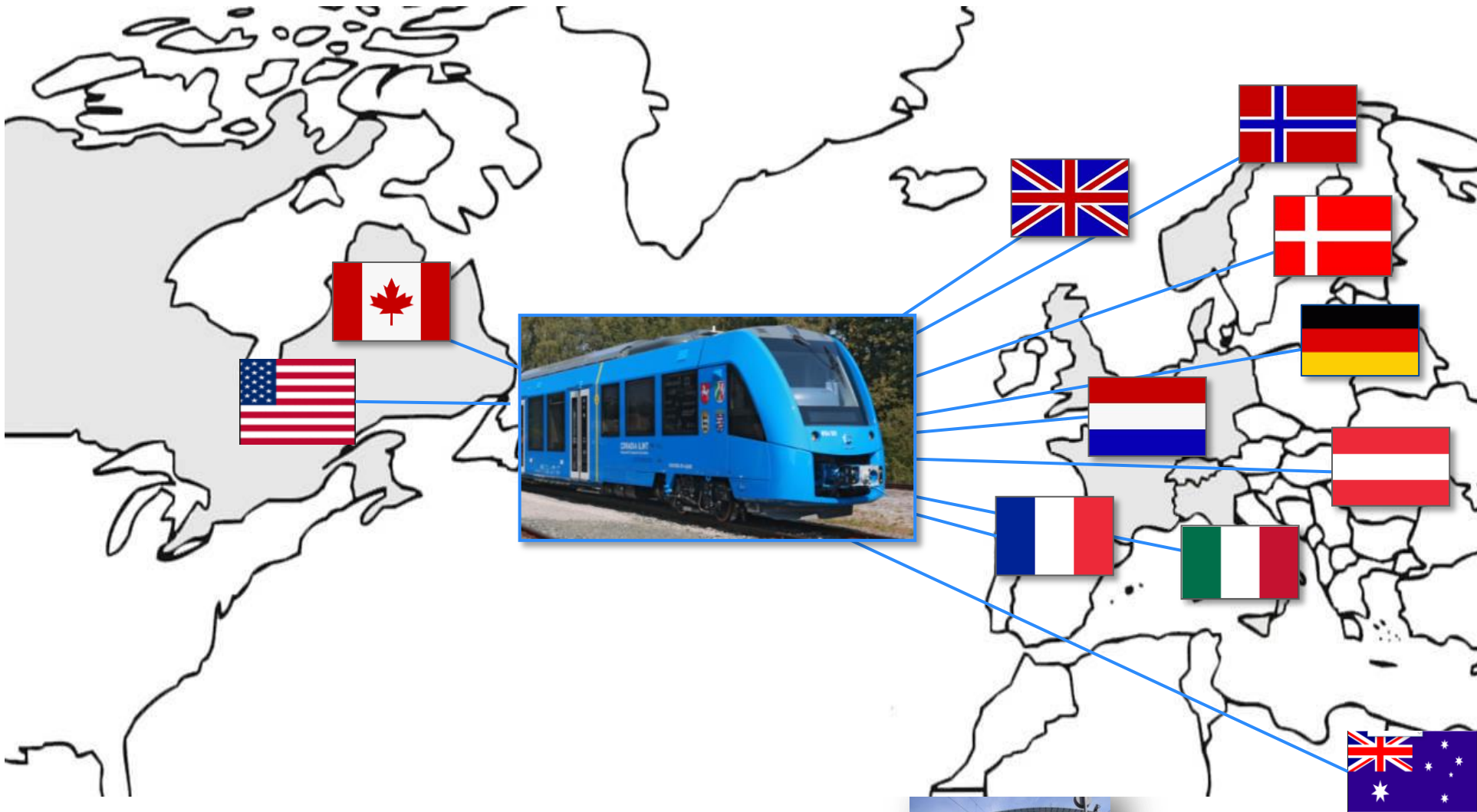


Operated by EVB (local operator)

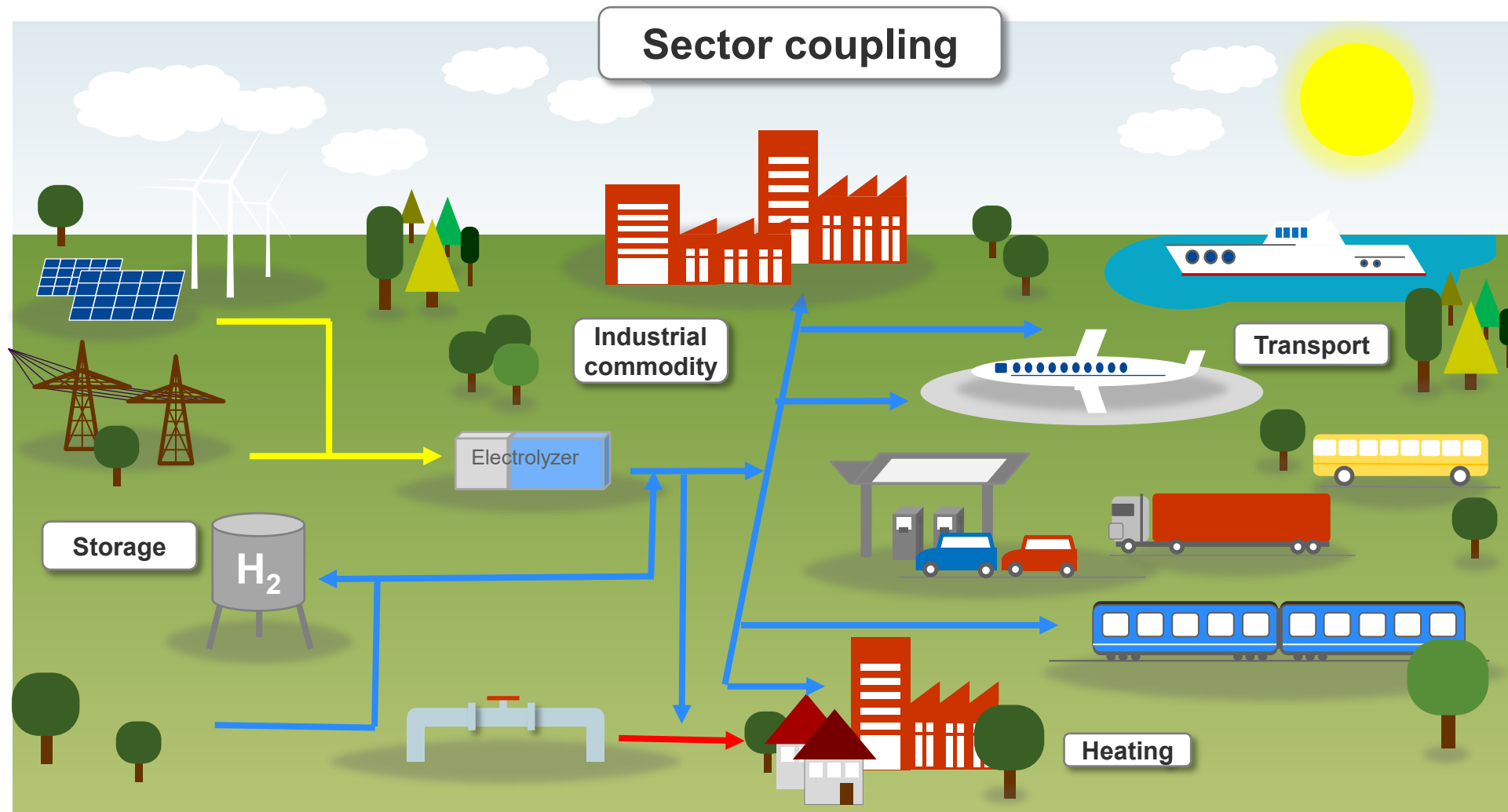
Hydrogen supply: Regenerative – Grid use/balancing



Next steps: Introduction of HFC Rolling Stock in....



Vision / Strategy for successful implementation of Hydrogen



Thank you for your attention

CORADIA iLint on YouTube ...

