The Green Scene: Hydrogen, battery technology, and zero emission rail technology

Southwest Rail Conference

2024-04-16

ALSTOM
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A rich history of rail in Texas

Library of Congress, Prints & Photographs Division, photograph by Carol M. Highsmith https://www.loc.gov/item/2017885475

Library of Congress, Prints & Photographs Division, photograph by Carol M. Highsmith https://www.loc.gov/item/2018698774

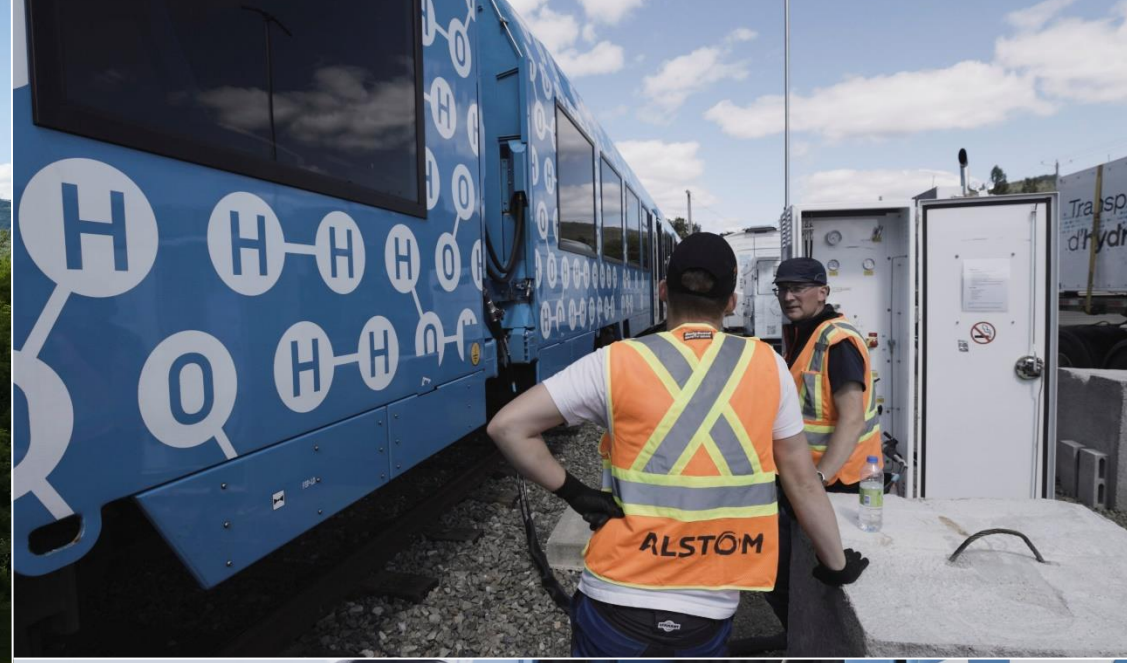
Trends in rail across North America

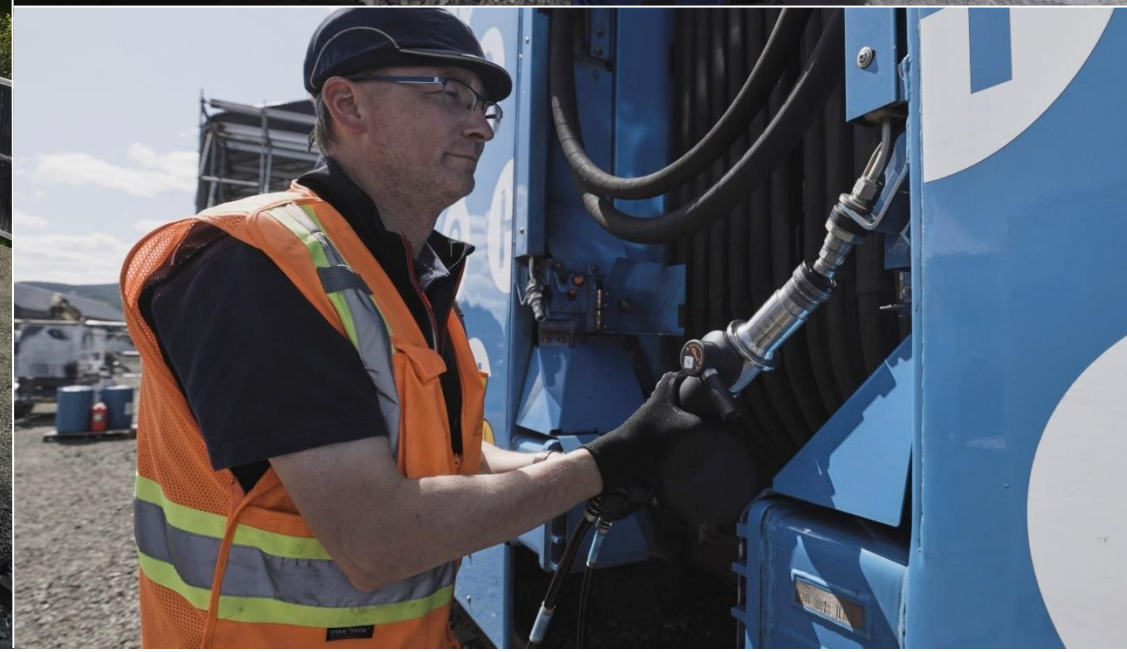
High Speed

Light Rail

Zero Emissions

Alstom’s Hydrogen and Battery solutions





9,132

Passengers Transported Over The Summer

9407 km

Distance covered

26,8 kg / 100 km

Average Hydrogen Consumption

266 kg of CO2 avoided per 100km

compared with a diesel train

60 Number of refills

Alstom roadmap to green: Our journey to carbon-free

Green Innovation Center in Québec for Americas

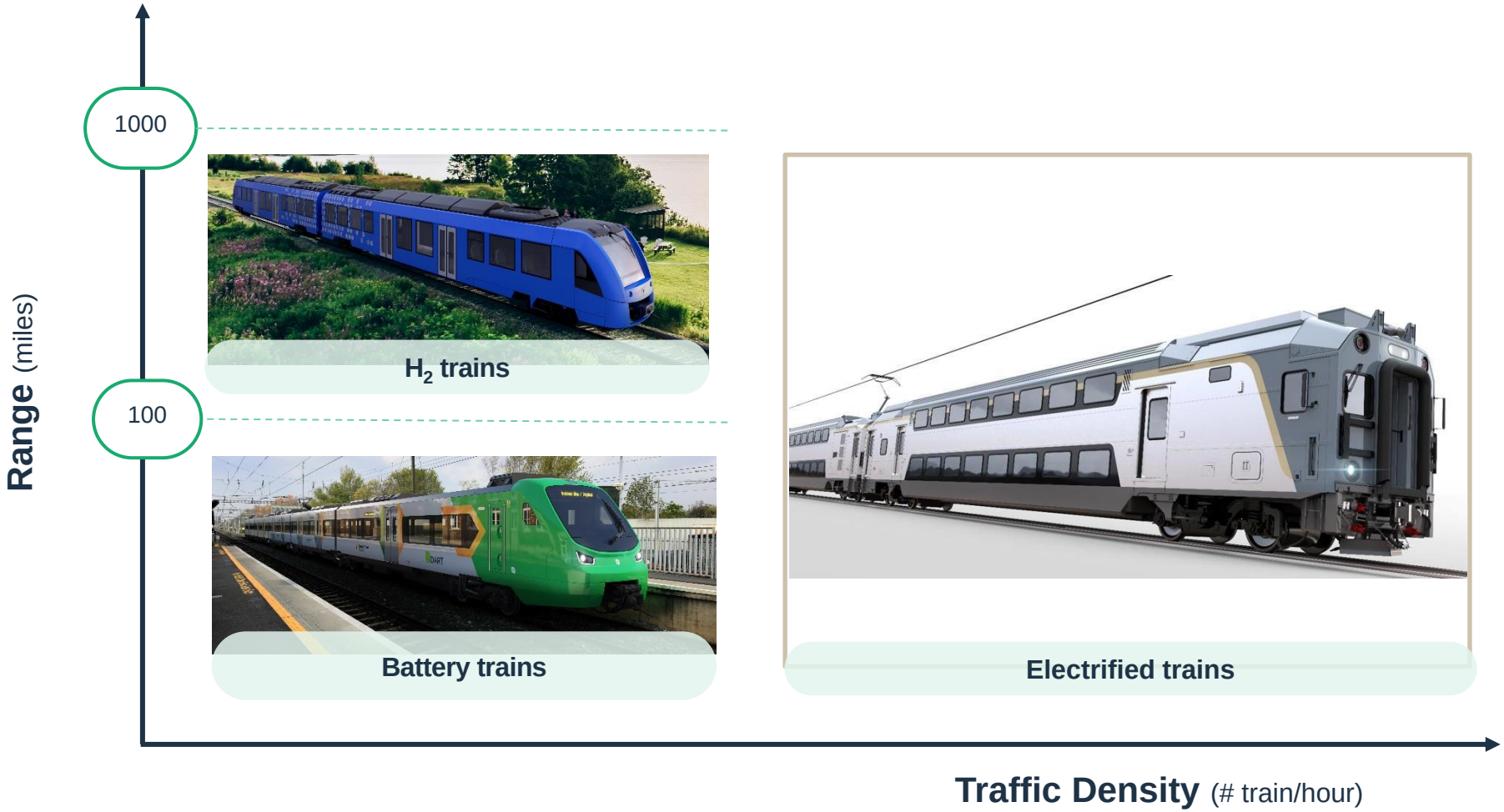
Hydrogen demonstrator in Charlevoix Québec

Development of components & green solutions

Product Maturity

Serial Production

Green technologies: A complementary field



Alstom Adessia single-deck

1.4k+ **cars sold** in North America **since 1999**

100% **compliant to FRA, APTA and ADA** standards

2 **doors** per side for **low** or **high-level** boarding

4 **motorisation variants:** Coach, EMU, BEMU, HEMU

FRA = Federal Railroad Administration | APTA = American Public Transportation Association | ADA = Americans with Disabilities Act

ALP-45

Battery technology in Light Rail

Light Rail systems: Meeting the challenges of modern cities

Adapted to a changing climate

Flexible passenger capacity

Local Content

Lifecycle support

Urban Integration

Eco-freindly

Existing Infrastructure

Cyber security

CITADIS for North America

Catenary-free solutions

Aesthetics and beyond

Minimise visual impact caused by overhead line and masts

- Historical areas
- City centres

Deal with possible constraints on the line

- Complex alignment
- Underpass, narrow streets
- Fire brigade access
- Low EMC* values (hospitals, labs…)

Reduce infrastructure width of tram lines

Keep existing landmarks including trees

EMC: Electromagnetic Compatibility

Reims, France: architectural heritage preserved

Cuenca, Ecuador: eased fire brigade access

Two types of systems for catenary-free operation to fit each city’s line specificities, whether environmental, architectural or costs-related

On-board battery-power and charging

On-board battery power system in Nice, France

Continuous ground power supply

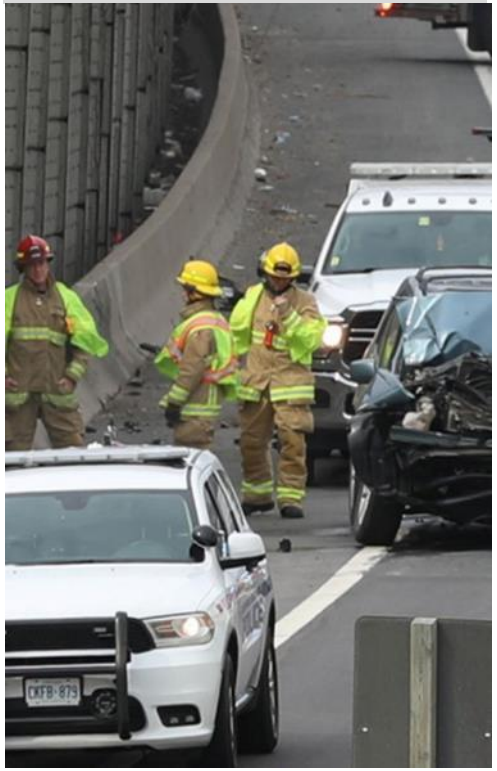
Continuous ground power supply in Bordeaux, France

High Speed

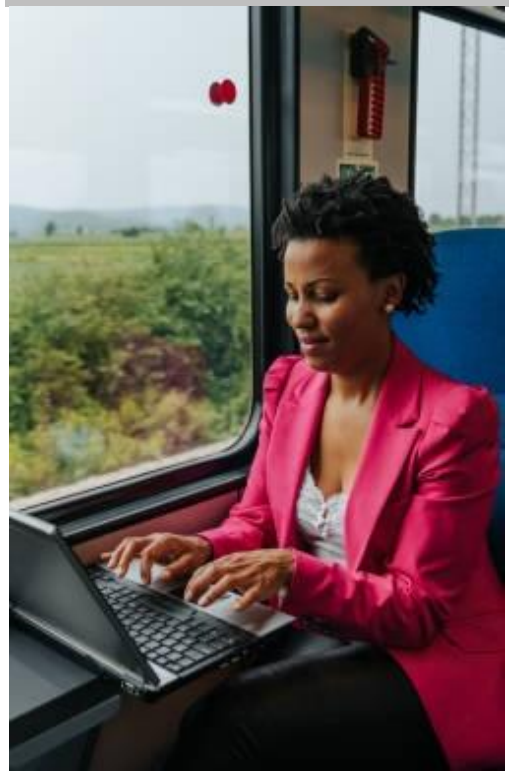
Socio-economic benefits of High Speed

Increase in productivity

Benefits to security



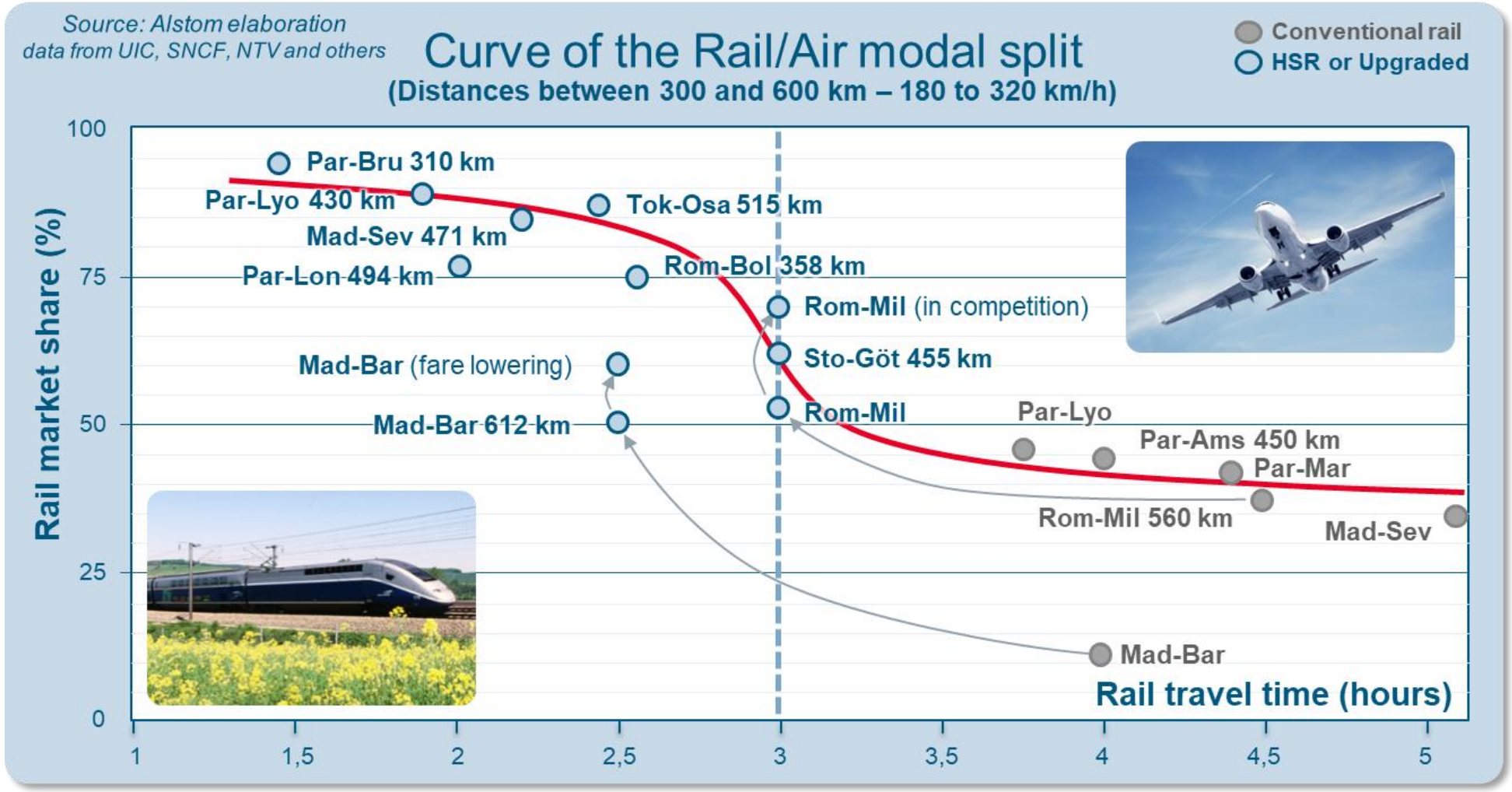
Access to employee base



Access to affordable housing

Increased multimodal connectivity

High Speed Rail: Achieving Modal Shift



Avelia Liberty™

New design based on proven components & technology

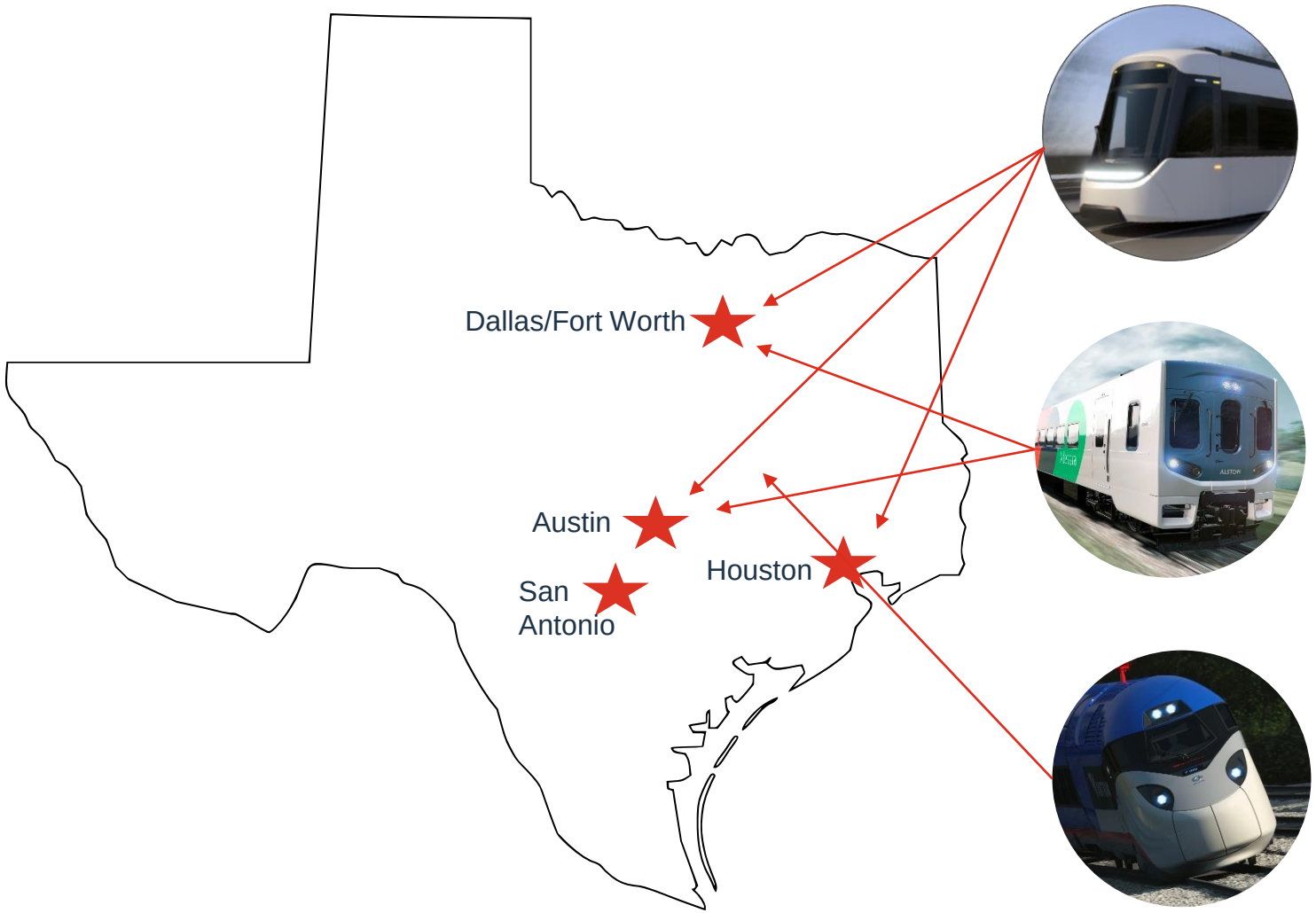
Compact power car and traction + motors (Incl. crash adaptation)	Bodyshell and articulation	Bogie	Tilting
Avelia Horizon™	**AGV™**	**TGV**	**Pendolino™ Tiltronix™**

Next Generation for Amtrak: **Avelia Liberty**

The future of rail in Texas

Rail Solutions … which apply to Texas!

- Existing light rail systems
- New light rail systems
- Existing Commuter Rail
- New light Commuter Rail
- Existing Intercity Rail
- New High Speed Rail



THANK YOU!

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