Henkel

The Sustainable High-Speed Future of Rail Travel

Rail transportation has experienced something of a chequered history since famously opening up the American West in the late 1800s.

While some economies have embraced rail travel as a central part of their passenger transport infrastructure, others have placed greater emphasis on road and air, or focused rail investment mainly on transporting freight.

The global ambition towards net zero carbon across many regions and industries is driving a renewed focus on rail transportation, and in particular high-speed rail (HSR), with **11,693km** of high-speed lines under construction, representing a 25% growth in HSR networks over the next 4–5 years.

HSR is set to play a key role in delivering the sustainable, integrated transportation systems required to meet global climate goals, while helping to satisfy the ever-growing worldwide demand for mobility.

This article considers:

- why HSR is key to sustainable transportation and how this affects the wider rail sector
- the challenges for HSR and how they mirror some of the challenges facing sustainable air transport – weight, propulsion, materials, manufacturing and maintenance
- the importance of innovation in meeting these challenges
- how Henkel's position as a global leader in materials and adhesives technologies is enabling innovation in sustainable rail transportation, in the same way as it is doing in other sectors

HSR's Role in a Sustainable Transport Future

HSR's potential contribution to achieving net zero is clear – it is simply much less polluting than air travel. One recent article comparing HSR with domestic air travel in **China** states that, on average, aircraft carbon emissions per passenger kilometre are seven times those of HSR.

It is hardly surprising that countries with well-developed HSR infrastructure, like China and France, are actively pursuing **transport policies** to move

passengers off domestic flights and on to high-speed rail links.

While others, such as the US, may be slower to join the party, moves such as the US government restoration of almost $1bn in funding for a **high-speed rail service in California** demonstrate there is still strong interest.

What Does This Mean for the Future of Rail Travel in General?

A **2019 International Energy Authority report** cites HSR and metro rail – high-frequency, high-capacity urban services – as the types of rail transportation receiving most investment. The report highlights electrification as one of rail's key sustainability credentials – where electrified rail infrastructure exists, the challenge of finding a sustainable power source is already resolved.

Conventional rail covers the mid-range and suburban journeys that sit between HSR and metro. While its role in a sustainable transport infrastructure may be less clear-cut, it would be surprising if it did not also benefit from the advantages of electrification and of innovation in those markets.

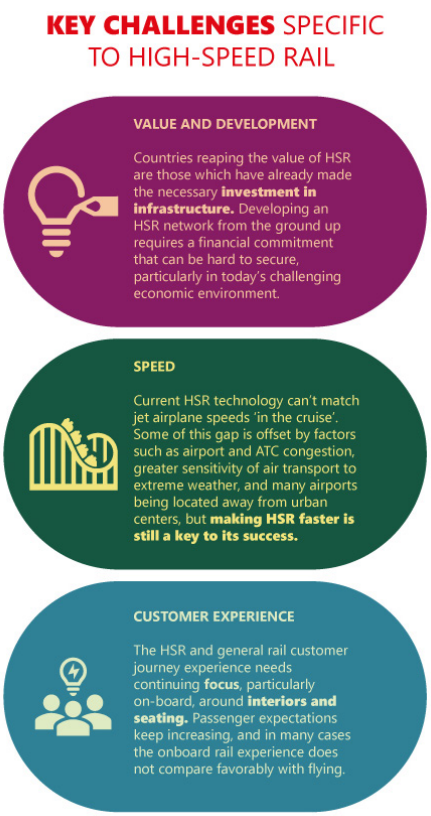
Sustainability Challenges for HSR

HSR undoubtedly has sustainability advantages over air or road transport, but it also faces some challenges. Some of these are specific to the HSR sector, while others are shared with aerospace and road transportation.

Some challenges that HSR shares with the aerospace and automotive sectors:

- reducing weight to deliver maximum efficiency
- increasing power plant energy density and end-to-end sustainability, from raw material extraction to disposal or recycling; electrification of rail lines can only ever be a partial answer – HSR needs sustainable, self-powered locomotives for where electrification is not an option
- minimising the environmental footprint of materials, manufacturing and maintenance

HSR needs to address these challenges to ensure a viable



future at the heart of a sustainable transportation infrastructure.

The Power of Innovation and Collaboration

HSR has come a long way, but there is massive potential still to be realised through greater innovation and collaboration throughout the value chain, and relentless focus on sustainability.

Alstom's acquisition of Bombardier has demonstrated one major player's commitment to embed innovation in sustainability through its strategies and partnerships.

Decarbonising rail at speed is a major technological goal for companies throughout the rail value chain, with innovation in propulsion through fuel cell and pure hydrogen solutions.

The drive to sustainable rail transportation goes beyond propulsion into the materials that make trains themselves lighter, more sustainable, more comfortable and attractive to passengers.

How Henkel Adds Value

Materials, coatings and bonding technologies are core to delivering the sustainable end-to-end value chain for rail travel.

Henkel's position as a market leader in this area and our consultative and collaborative capabilities make us an ideal partner in delivering the innovation required.

Sustainable high-speed rail travel is already established in some countries as part of a wider carbon-neutral, integrated transport strategy. This movement is likely to continue, with growing investment and focus on HSR as a viable alternative to domestic air travel, as long as it is sustained by the same innovation and collaboration that is driving the move to carbon neutral in other transportation sectors.

What Next?

Henkel is playing a leading role in delivering the future of sustainable transportation manufacturing through innovation, process optimisation, collaboration and a commitment to sustainability.

To learn more about innovation and the value of a partner like Henkel, or if you have an interest in driving appropriate collaboration in the sector, feel free to reach out on **LinkedIn**, or visit us at **www.henkel-adhesives.com/aerospace**.

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