



Low emissions

GOALS	WHY?	RECENT POSITION (2020)	STEPPING STONES IN THE NEXT FIVE YEARS				VISION FOR 2025	VISION FOR 2040
Cheaper and less disruptive electrification	More electrification is fundamental to zero emissions, as well as giving great acceleration, reliability and operating cost benefits.	Concerns over cost and disruption following recent electrification schemes have undermined political support.	Introduction of discontinuous electrification.	Rail has a clear power-supply strategy, including lineside storage, distributed generation, onboard and hydrogen. This takes account of smart grid, storage and load balancing opportunities.	Standards/incentives adopted to reduce the need for civil engineering while maintaining safety.	Faster, more detailed and more effective planning and route clearance is enabled.	New electrification schemes, including discontinuous electrification, are being developed to address cost and disruption challenges.	All high-speed and high-intensity lines are electrified.
Zero-carbon self-powered vehicles	Where maximum journey speeds are under 100mph, there is increasing optimism that hydrogen and batteries will deliver a cost-effective low-carbon alternative that still delivers against operational and timetable requirements.	There are around 2,500 <100mph diesel vehicles currently active, many of which run on lines unlikely to be electrified.	Standards for hydrogen and battery trains and associated infrastructure are adopted.		In-service fleet deployments for hydrogen- and battery-powered trains.	Clear transitional and replacement plans for Sprinters (Classes 150-159) delivering zero-carbon.	All self-powered passenger vehicles are zero carbon.	
Low carbon freight	There is currently no viable alternative to electrification or diesel power for rail freight that delivers the necessary power. There is a need to maximise benefits from electrification, as well as from hybrid and bi-/tri-mode locomotives.	Rail freight, with its significant reliance on diesel, runs the risk of being penalised while alternative modes may be more carbon intensive and increase congestion.	Options, criteria and business case to retrofit traction options and alternative drop in fuels are developed.	Clear understanding of where electrification could provide tipping point for freight traction.	Energy-optimised timetable and real-time train speed profiles are enabled for off-peak operation.	Clear understanding of delivery roadmap and transition arrangements for low carbon freight.	Clear role for rail as part of overall net zero logistics chain.	
Increased energy efficiency	Reducing energy consumption (losses and useful consumption) is often a cost-effective way to reduce carbon and can have immediate benefits for existing rolling stock.	The industry is neither incentivised nor aligned to improve the efficiency of rolling stock or infrastructure.	There is a strategy for reducing losses, especially on DC network as well as handling increased freight demand on the DC rail network.	Clear and agreed technical requirements for rolling stock efficiency and emissions reduction, including retrofit, are adopted.		Clear programme to reduce energy use is being delivered across the network.	Energy required per passenger vehicle km is minimised. Smart 'rail power network' that minimises traction carbon at source.	
Reducing polluting emissions	Air quality is the most pressing environmental health risk in the UK. There is a need to balance the best route to long-term decarbonisation against the more pressing need to mitigate harmful air pollutants.	While overall emissions from rail are low, they can be significant locally. The industry currently has limited understanding of the scale, location and risk of emissions.	Low-cost intelligent emissions monitoring and risk mapping is in place.	A programme of trials to test and compare mitigation options is delivered.	Air Quality Improvement Plans are in place and in action at locations where one is required.	Rail has a negligible impact on local air quality.		