



Department
for Transport

Rolling Stock Perspective

Second edition

Moving Britain Ahead



May 2016



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Contents

- Ministerial Foreword** **6**
- Rolling Stock Perspective** **8**
 - Summary 8
 - The future of passenger rolling stock 11
 - High Speed 2 14
 - Skills 15
 - Innovation and Research 17
 - Digital Future 20
 - Rolling stock mix 21
 - UK's supply chain 22
 - Conclusion 25
- Rolling Stock Aspirations by Service Group** **26**
 - High speed InterCity 26
 - InterCity 26
 - Inter-Urban 26
 - Metropolitan 27
 - Rural/Regional 27
- British Rolling Stock Fleet – Class by Class Overview** **33**
 - DMU Rolling Stock (Pre-1996 orders) 34
 - DMU Rolling Stock 36
 - AC EMU Rolling Stock (Pre-1996 orders) 37
 - AC EMU Rolling Stock 39
 - DC EMU Rolling Stock 40
 - LHCS & HST Rolling Stock 41
- Department for Transport – Franchised Operators View** **42**
 - Chiltern 43
 - Cross Country 43
 - East Anglia 44
 - East Midlands 44

Essex Thameside	45
Greater Western	45
InterCity East Coast	46
InterCity West Coast	46
Northern	47
South Eastern	47
South Western	48
Thameslink, Southern & Great Northern (Diesel Fleet)	49
Thameslink, Southern & Great Northern (Electric Fleet)	49
TransPennine Express	50
Wales & Borders	51
West Midlands	51
Key Rolling Stock Publications	52

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Ministerial Foreword



The rail industry is undergoing a transformation. Government and private industry are investing in the railways to deliver a generational change, creating a network and services fit for the 21st Century. At the same time the public is ever more empowered, as a period of unprecedented choice is driven to new heights by revolutionary technologies and innovative ideas.

The future of the rail industry must be one in which it uses this era of opportunity to become ever more customer focused. Passengers want, and deserve, reliable, frequent and fast services in comfortable trains with modern features. Everyone who works on the railway, from frontline customer facing staff to train drivers, signallers, telecoms experts and others need to be given the skills to make new rolling stock and signalling equipment work for passengers as it is introduced.

That is why I was pleased to open the National Training Academy for Rail (NTAR) in Northampton recently. This world-class facility will give the workforce of the future the skills and expertise the industry needs during this period of transformational change. In particular, following the success of Crossrail in attracting more women to the industry, I hope that others will take advantage of the opportunities that NTAR and others offer in this expanding and modernising industry.

Rail is competing with other industries such as energy, automotive, aviation etc. for the young engineers it needs to support its future plans. We must show the strengths and possibilities of the railway industry if we are to attract new talent to it and provide opportunities for people from all backgrounds to engage with rail.

Rail is already one of the most environmentally friendly forms of powered travel, but we need to go further. I want to see the industry develop and introduce uk-led innovative solutions such as battery-powered or hybrid trains which will make rail even better for the environment and reduce the industry's operating costs.

I look forward to seeing the winners of the Heritage and Community Rail Tourism Innovation Competition, and the good use that the £1m prize will be put to. This competition is to find the best ideas for encouraging people to visit the railway's many historic stations and picturesque routes.

The Government is committed to the full HS2 'Y' network to support the Northern Powerhouse. This new line is an integral part of our plans. I am also fully committed to seeing us delivering projects such as the Intercity Express Programme. This will enable the vision published in the Northern Transport Strategy with trains running in parts at their full potential of up to 140mph, increasing capacity and connectivity in this vital region.

Britain runs on rail. Rail drives our economic prosperity, it ensures we remain competitive as a nation on a global stage and brings us together for business, leisure, learning or just exploring this great country. I hope that this document will give you all some sense of how this government would like to see the rolling stock market of the future serving everyone who uses and relies on our great railways.

A handwritten signature in black ink, appearing to read 'CL Perry'.

Claire Perry MP
Parliamentary Under Secretary of State for Transport.

Rolling Stock Perspective

Summary

This is the second edition of the department's perspective document in which we set out our thoughts on the improvements that we want to see in rolling stock in order to deliver better journeys for all passengers, everywhere. We plan to continue to do this every year to provide guidance to everyone involved in the industry on the kind of rolling stock, both new and refurbished, that we want to see in future.

Thanks to the active support of franchisees, suppliers and financiers, as well as the new approach to franchising introduced since 2012, there has been a great deal of progress. In the last year alone, a further 1,000 new vehicles have been ordered, half of which are for the new Northern and TPE franchises and the remainder joining the network from the West of England to the Midlands and the North. The award also enabled the refurbishment of rolling stock in the North, to provide better facilities for passengers. We have seen the delivery of the first IEP trains as well as new Thameslink trains which are due to enter service later this year.

But we want to see TOCs, ROSCOs, manufacturers and suppliers doing much more in the years ahead, investing for themselves, taking their own risk-based decisions on procuring the train capacity we need now and in the future. We need trains that:

- Are well-designed both visually and in engineering terms. The trains should be modern in appearance and styling to reflect just how much rail travel has changed. The competition for new trains that HS2 Ltd is planning to start in 2017 provides a great opportunity for manufacturers and designers to show that they can realise the vision that the Government has set out for a state-of-the-art, high-speed rail network of the future;
- Use space as efficiently as possible, to reduce crowding on intercity, regional and outer suburban journeys and, on shorter distance journeys allow passengers to travel in reasonable levels of comfort. We look for innovation and creative thinking to address the challenges of capacity, including options such as double deck trains, seat layouts that can be quickly altered according to changes in demand and lighting to create a welcoming ambiance;
- Are explicitly designed to have a low environmental impact through low energy consumption, reduced emissions (in the case of diesels) and through ease of recycling at their end of life. For the existing fleet we want to see complete fitment of controlled

emission toilets putting an end, finally, to toilets discharging onto the track ahead of the January 2020 deadline we have set. The industry's Sustainable Development Principles are about to be re-launched and we want to see all trains complying with these;

- Offer much better on-board facilities including the functionality required by the 21st Century passenger: free Wi-Fi that works, reliable mobile reception that remains connected, charging facilities, comfortable ergonomic seating, quality provision for those with reduced mobility, reliable ventilation and air conditioning, adequate space to store luggage and trains that can be easily cleaned both internally and externally. Similarly, we are open to proposals for interiors that can be modified quickly to permit the transport of high-value goods or perishable foodstuffs;
- Can be more easily transferred between TOCs and routes than at present to make it easier to adapt to future market circumstances. This means more widespread inclusion of common systems for coupling, train management and train control enabling, for example, multiple unit trains of different generations and leased by different TOCs to operate together as a matter of course. It also means taking a long term view on liveries and brands to avoid the need to repaint trains every time a franchise changes operator;
- Are self-powered, where required, with such trains meeting the latest emission standards and being built by a range of suppliers. New diesels are being procured as part of the Northern franchise improvements and there are likely to be significant opportunities over the next decade to replace the last remaining diesel multiple units ordered in the BR era with modern diesels that offer much more for passengers, and
- Are designed with manufacturers and TOCs working ever more closely with Network Rail, to reduce the amounts of money needed to be spent to introduce them into service and to allow them to operate reliably and safely.

Our new approach to franchising is designed to support these improvements by:

- Providing the climate and incentives to take free standing investment risk;
- Crediting franchise bidders for measures they will introduce to improve quality alongside the total price offered;
- Ensuring that Network Rail play a full part in the franchise award process, offering advice and raising any concerns they have on bidder's plans;
- Stressing the need for franchise bidders to look closely at what customers want and how customer satisfaction can be improved;
- Providing a clear indication of capacity levels expected on trains so that bidders can consider the balance between adapting current train interiors or investing in new trains, and

- As a pilot on three franchises, requiring that, for three years, a percentage of the franchisee's annual turnover is placed in a fund which can then be used to support innovative solutions.



The franchise programme is updated each year and we are committed to achieving it. The clarity it gives is providing an ever broader pool of financiers that have the confidence to enter the market for rolling stock finance, without the need for guarantees beyond franchise lengths. However, we recognise that different approaches to procurement and financing of rolling stock can provide value for money.

We are actively working on the specification for HS2 trains which will raise the bar for the performance, quality, reliability and environmental standards of intercity rail travel. Full details on these requirements will be released once the competition gets underway.

To continue on this improvement path, a great deal needs to be done. The industry needs to work ever more closely together in a number of areas as discussed in this document.

The future of passenger rolling stock

Passengers are at the heart of the railway. The department is committed to working to understand what they want and wants TOCs, Network Rail, ROSCOs and manufacturers to do so as well.

An important source of insight is the National Passenger Survey carried out by Transport Focus which tells us, for example:

- Overall passenger satisfaction stubbornly sits in the low 80% range for the 5th year running,
- Satisfaction with the comfort of seating and information is improving at 72%, but
- There are large variations in satisfaction with sufficient room for all passengers to sit/stand of between 46% and 92%.



Transport Focus has also recently completed some very useful qualitative research into passenger expectations for train interiors in urban areas¹. In London, passengers generally accepted the need for 'metro' type trains to have a high seating density and also felt that future demand will be such that trains must have increased standing capacity as a priority.

1 <http://www.transportfocus.org.uk/research/publications/thameslink-rolling-stock-qualitative-research> and <http://www.transportfocus.org.uk/research/publications/future-merseyrail-rolling-stock-what-passengers-want>

The research, which was carried out for the new Thameslink trains, found that passengers preferred the 2+2 bay seating over 3+2 seating since it allows wider aisles. They also welcomed wider connections at carriage ends, which allow passengers to move freely throughout the train and when boarding or alighting. Passengers generally accepted that those boarding nearer to London in the morning peak were unlikely to get a seat.

Transport Focus also carried out similar research on users of Merseyrail services, which is also experiencing a significant growth in demand. Passengers here also welcomed 2+2 bay seating, but acknowledged that this may have to be replaced with layouts that offer more seats as demand grows, although passengers preferred a mix of seating layouts if possible.

At the heart of the franchising process we should see bidders researching the market and finding the most effective way of delivering improvements within the framework set by the our ITT requirements. This will often mean either new build or extensive refurbishment of existing fleets, where this is cost effective: this is where ROSCOs play a key role in identifying options and choices, negotiating terms with bidders' and then financing the refurbishments or new build.

It is rarely the case there are simple 'like for like' changes in rolling stock, replacing old for new. In practice, where a change in fleet is proposed, the TOCs and we look for improvements in all areas including:

- Capacity, in terms of vehicle interiors, train lengths, and train frequency;
- Comfort, including making it easy to stow luggage, cycles and bulky items;
- Technology and innovation, which sometimes needs to be balanced with the ability for new trains to couple with older trains allowing them to be deployed across different routes more easily;
- Operation, including making it easier to get on and off trains at busy stations and the ability to carry out train maintenance more quickly;
- Environmental impact, typically by making trains lighter, less noisy in operation, easier to recycle and eliminating the discharge of toilet waste onto the tracks (which about 25% of the fleet still do);
- Provision for those with reduced mobility, and
- Cost effectiveness, particularly in the way the fleet is timetabled and the way in which maintenance is carried out.



As a result, rolling stock changes can be quite complicated: the improvements being made in the new Northern and Trans Pennine franchises, for example, will allow the old Pacer trains to be replaced, longer trains to be introduced on suburban routes in Manchester and Leeds to reduce crowding, the use of trains that can run on both diesel and electric as the infrastructure is upgraded and much better provision for facilities for those with reduced mobility. A project of this scale is needed to completely modernise the services that passengers experience particularly on the many routes that have seen little improvement for over two or three decades.

Where new trains are proposed, we believe that more emphasis might be given to ‘future proofing’ them, to make it easier to move them between routes and so that they increasingly have common features (such as the elements set out in the Appendix). Much useful work has been done by train operators and manufacturers to develop ATOC’s Key Train Requirements² document, which brings together the train operators’ experience gained from buying substantial volumes of new trains since privatisation. Whilst total standardisation would unnecessarily restrict the ability to innovate, we would like to discuss this with TOCs, NR and ROSCOs to see whether the industry might sensibly evolve a number of ‘big ticket’ common elements, such as:

- Standard vehicle lengths and door positions which will help when infrastructure is being planned;
- Train heights and widths as, at the moment, almost every route is bespoke in its dimensions;
- Energy efficient trains (kW per vehicle kilometre) that use driver advisory systems;
- Lighter trains to reduce track damage, allowing better optimisation of cost between track and train, and

2 <http://www.rssb.co.uk/library/groups-and-committees/2014-09-report-key-train-requirements.pdf>

- A smaller variation in couplers and on-board control systems, to make it easier for trains of different types and age to couple together, to provide longer trains.

It remains essential for the rail industry to work to further improve its impact on the environment. Since the publication of the Rail Industry Sustainable Development Principles³ in 2009, there has been progress particularly on the use of regeneration for electric trains and on reducing the environmental impact of depots. The industry is about re-issue the Principles document and we want to see TOCs, NR and ROSCOS accelerate progress in this area in future.

High Speed 2

The building of the full HS2 'Y' network is central our plans for the rail network. This will see very-high-speed rolling stock operating in Britain connecting the north and major cities with the capital.

The process of procuring new trains for HS2 will begin next year. Decisions have yet to be taken on how the line will be operated but HS2 Ltd will procure the trains, as there no private sector operator in place to do this. It is important that services are integrated closely with those on the existing network as many HS2 trains will operate on the existing main lines as well as on the high-speed network to reach the North West, Scotland, Yorkshire and the North East. The procurement will set the bar very high on quality and design and will present a huge commercial opportunity for suppliers. HS2 rolling stock will transform connectivity between our major cities in Britain, providing very high speed capability. The HS2 trains will:

- Be designed to set new standards in passenger experience;
- Be designed, built and operated to the highest health, safety and security standards;
- Be a sustainable solution that minimizes adverse impacts to the environment and local communities;
- Set new standards in operational efficiency and resilience;
- Create opportunities for skills and employment;
- Add capacity and connectivity as part of a 21st century integrated transport system;
- Be a catalyst for balanced economic growth across the UK, and
- Deliver value to the UK taxpayer and passengers.

3 <http://www.rssb.co.uk/Library/improving-industry-performance/2009-report-rail-industry-sustainable-development-principles.pdf>



Skills

The rail sector fully recognises that it faces a significant skills challenge and is already taking action to address this, which the Government welcomes. This is driven by a combination of factors including an ageing workforce and a need to develop new skills to make the most of the introduction of new technology. The rolling stock sectors, including manufacturers and operators, face a particular challenge as 40% of its workforce is over the age of 50 and 22% is over the age of 55⁴.

In January 2016 the department published the Transport Infrastructure Skills Strategy⁵ setting out plans for addressing the critical shortfall in transport skills, which include creating 30,000 rail and road apprenticeships by 2020 and increasing the diversity of the transport workforce. This was followed by Fast Track to the Future⁶, the Rail Supply Group's strategy for productivity and growth in the GB rail supply chain which also has a strong focus on skills and diversity.

4 Based on data from a 2012 survey

5 <https://www.gov.uk/government/publications/transport-infrastructure-skills-strategy-building-sustainable-skills>

6 <http://www.railsupplygroup.org/wp-content/uploads/2016/01/RSG-Brochure-Jan-2016.pdf>



The Strategic Transport Apprenticeship Taskforce⁷ was launched in April 2016 to support the delivery of the recommendations in the Transport Infrastructure Skills Strategy. This body, chaired by Simon Kirby, the Chief Executive of HS2 Ltd, brings employers together to help the transport sector address skills challenges in a co-ordinated and collaborative way. In parallel, the rail sector, through the National Skills Academy for Rail (NSAR) has been developing a skills plan in consultation with rail stakeholders to improve productivity, reduce skills shortages and support the implementation of new technologies. Themes covered include attracting people to the railway industry from other sectors, creating a talent pool from which rail companies can recruit high calibre applicants; and developing a network of high quality training facilities and trainers.

Working with its partners in the Career Transition Partnership and the Army's Royal Electrical and Mechanical Engineers, NSAR is providing apprenticeships and a range of bespoke training courses for ex-service men and women. The aim is to support companies looking for skilled staff and meet the target for the number of service leavers working in the railway industry set in the Transport Infrastructure Skills Strategy document.

7 <https://www.gov.uk/government/news/strategic-transport-apprenticeship-taskforce-to-boost-apprenticeships>

Parts of the private sector, working with Government, are already taking forward initiatives of their own to improve skills. The National Training Academy for Rail (NTAR) is a world class training facility developed through a joint venture between NSAR and Siemens and co-funded by Government. From its base in Northampton, NTAR will act as both a UK flagship and an international Centre of Excellence for skills development and collaborative working in traction and rolling stock. We want to see the success of this facility being repeated with other industry partners elsewhere in the country.

The Government will play a key role, as set out in the recommendations from the Transport Infrastructure Skills Strategy and is committed to using contracts to deliver apprenticeships to build on our world class supply chain. However, employers throughout the supply chain (including the manufacturers, maintainers and operators of rolling stock) need to invest in people's skills development, through up-skilling the existing workforce.

The railway industry is competing with other sectors for young engineers, such as energy, construction, automotive etc. Employers need to encourage young people and others from a diverse range of backgrounds to work in engineering and specifically the rail sector.

Innovation and Research

Rolling stock orders have long lead times and long lifetimes so research and innovation today is needed to ensure that the industry is ready to provide rolling stock that meets the needs of passengers tomorrow and for years to come. We actively encourage franchise bidders to develop innovative ideas and technologies and to include them in their proposals to us. We have also created the innovation fund which is managed by FutureRailway and which provides £6 million a year to accelerate research and support development and innovation.

The development of technologies that will enable clean, comfortable, information-rich trains travelling more frequently is essential if the industry is to deliver the capacity needed, at an affordable cost with an ever reducing environmental impact. The UK's rail industry is already strong in many areas but has the opportunity to lead in the five key technology areas identified by the Rail Supply Group in their Fast Track to the Future document.

Innovation is taking place by the major rolling stock manufacturers and their supply chain; we are actively encouraging innovation within Great Britain through a cross-industry research and innovation fund provided by the department and managed by RSSB⁸. There have been some good examples of recent innovation that show the importance of continuing to take strides in this area and we expect to see technologies such as these increasingly used on new trains in future:

8 <http://www.rssb.co.uk/research-development-and-innovation>

The Powertrain Programme: With the ageing diesel fleet in need of replacement and the demand for trains that work just as well on as off the electrified network, a range of cutting edge electric power generation, energy storage, and transmission technologies are being developed by the Universities of Birmingham and Warwick, Artemis, Dynamic Boost, Entropea, G-volution, Vehicle Projects Inc, and Woolley GMC Eng Co.



The Predictable and Optimised Braking Programme: Today, variations in braking performance caused by damp conditions etc. mean that trains must be designed and operated very conservatively in order to provide a punctual service. Improving braking performance opens the door to increasing the frequency of train services. Initiatives ranging from designs that get more out of existing sanding systems, braking systems that don't rely on brake blocks, and technologies to clean rails as the wheels pass are currently being developed.

Tomorrow's Train Design Today Competition: New design solutions for adjustable interiors may help train companies develop new business models, achieve better utilisation during peak and off-peak time. Three designs submitted have entered a demonstration phase and are expected to challenge traditional thinking.



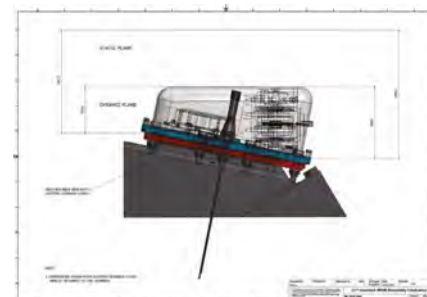
Customer Information: A new tool called OpenCapacity has been developed to let passengers know how busy train carriages are, reducing the time a train needs to wait at a platform by encouraging passengers to board where space is available. Combining real time sensing technology on-board trains with algorithms drawing on historical data and mobile phone technology has the potential to improve the travelling experience on our increasingly busy services.

Improved Pantograph Performance: Innovative pantograph designs are under development by Brecknell Willis and the University of Birmingham that will reduce costs, improve reliability and enable longer trains to run at higher speeds than currently possible.



Train positioning: New technology on-board trains will provide the accurate location information required by the next generation of signalling systems. A range of solutions are being developed to overcome the shortcomings of GPS and trackside detection, such as GoTRAX (patent pending) which has already spawned a variant ready for operational use which detects and prevents unintentional train movements, and video positioning technology which uses a forward facing camera to locate a train's position using real time image processing.

Reducing whole life costs: Delivering high quality rolling stock in an affordable way demands innovative thinking to cut costs throughout a train's life. Solutions such as the Perpetuum system for real-time remote monitoring of vibration and temperature inside the gearbox will allow the condition and performance of equipment to be closely monitored to better inform the maintenance schedules.



We provide around £22m a year to support industry research and innovation (through RSSB) and just under £1m per year to carry out technical research to support policy development. We expect to see these and other similar systems becoming commonplace on rolling stock in the future. We are also committed to transparency and the availability of data. We are reviewing our research library⁹ so that, where possible within commercial and confidentiality constraints, all the data it contains can be made available.

We also want to see a much greater emphasis put on research to develop solutions that reduce the weight of trains. There has recently been an improvement in some areas through the procurements of the AVENTRA and the new DESIRO CITY trains. However, trains need to be lighter, they need to be designed with reuse or recycling in mind, and further progress is needed in areas such as noise. There are benefits to be gained with a reduction in operating costs as well as improving the whole-life environmental impact of these vehicles.

9 <http://www.dft.gov.uk/rmd/>

Digital Future

In order to take a step forward the industry needs to continue to embrace digital systems which will ensure that our network uses the most up-to-date technologies to improve the way it is planned, operated, maintained and signalled and decisively move away from outdated methods still widely used today. A key element of this is the deployment of the European Train Control System (ETCS). ETCS is a central part of our long term strategy for the industry, with millions of pounds already being invested in new systems for rolling stock in Britain to make this a reality for programmes such as IEP and Thameslink.



ETCS will increase the safety, capacity, reliability and flexibility of the network and reduce costs. The removal of track-side signals, replaced by an in-cab signalling system, is a step towards freeing up the network and linking signalling systems with advisory systems that enable drivers to reduce the energy consumption of the trains and better regulate the services. We expect ETCS to be fitted on all new build trains and installed whenever possible during refurbishment of existing rolling stock in line with the ETCS infrastructure deployment plan. The migration to these new systems is a major project but one which the industry is fully capable of delivering. The experience of the introduction of the GSM R digital train radio system across the network in under 10 years from first deployment in Strathclyde shows that it can be achieved when the industry works together.

The investment made in this strategic national railway communications network, which has been designed with the future in mind, and other digital systems will not only support the deployment of ETCS but also positions the UK as having significant experience of the deployment and integration of these European standard systems.

Similar benefits to those above can be gained through the deployment of ETCS. The challenge of the successful implementation of ETCS is larger again than with GSM R but the prize is correspondingly bigger: the system can help increase capacity, improve reliability and reduce Network Rail's cost base. The new Thameslink trains, that will start running services through London later this year, are already fitted with ETCS. Once infrastructure compatibility testing has been completed and full integration with the automatic train control system is achieved, ETCS will allow 24 trains per hour to run through the core tunnel from London Blackfriars and London St Pancras International. ETCS, which was first deployed on the Cambrian route in Wales, will bring the signals into the driver's cab allowing the removal of track-side signals, improving safety and performance.

We believe that the rolling stock market has a major role to play in ensuring that the railway continues its positive record of delivering transformational change and to help realise a digital railway.

Rolling stock mix

We agree with the recent conclusion of the Rail Delivery Group that there will be an ongoing need for self-powered rolling stock with pure diesel, diesel/battery hybrid and bi-mode (diesel and electric) vehicles in the long term. The Rail Delivery Group forecast¹⁰, based on the assumption that there will be a continuing electrification programme beyond 2019, that self-powered units will only make up between 5% and 10% of the fleet in 2045. We want to see a choice of suppliers of rolling stock and the opportunities could be quite considerable. For example the Class 15X fleet, comprising of some 1,000 plus vehicles, will approach 35-40 years old by the middle of the 2020s. Many of the routes they operate on, will still require self-powered trains for years to come and are currently experiencing a growth in passenger numbers.

A lot of good work is already being done during refurbishments to improve the passengers' environment and to bring it into line with the accessibility regulations with 63% of all rolling stock in operation – both heavy and light rail – either already built to or refurbished to meet the accessibility regulations, a figure that will reach 100% by 2020. Easier access to trains for all passengers is becoming more important as the average age of the population increases.

It is important that refurbished stock still meets the passengers' expectations for comfort and facilities. We are looking for refurbishments that create a 'new-train environment' for passengers with at-seat sockets, free Wi-Fi access, flexible luggage/storage space and vehicles that are compliant with accessibility regulations. Refurbishments also provide an opportunity to address known reliability issues, to improve train energy efficiency and to bring the vehicles up-to-date with current requirements e.g. the fitment of controlled emission toilets before the end of 2019.

There is a particular opportunity for suppliers to replace those on-train computer systems fitted at the end of the last century. Many of these systems use technologies that are no longer supported and sourcing spare parts is becoming increasingly difficult. Innovative suppliers can help by developing modern replacement systems that can be easily interfaced with the existing on-train electrical network to provide control and communication throughout the remaining life of the vehicles.

Lessons should be learned from the problems facing rolling stock fitted with technologies that are no longer supported. The option of making on-train control systems modular should be explored, such that new technologies can be installed with the minimum amount of physical intervention, and designed so that new functionality can be introduced through software upgrades.



UK's supply chain

The UK was the birthplace of rail and has a world class railway supply chain. In January, the Rail Supply Group (RSG), a joint initiative between industry and government, published its strategy 'Fast Track to the Future'. This set the objective of doubling exports, partly by focussing on investment in innovation and skills.

Manufacturers often highlight the high number and wide range of quality systems and parts that are sourced from UK-based suppliers. Many British based companies supply parts to those manufacturing, overhauling, refurbishing and converting rolling stock all over the world, with exports worth approximately £400 million¹¹ a year. There are also now two rolling stock assembly plants in the UK, operated by Bombardier and Hitachi, with plans being mooted for a third, and the Government welcomes the jobs and economic benefits that these plants bring.

UK products are often positioned at the higher levels of performance and reliability, aiming to offer improved whole-life costs and environmental and energy performance gains, while minimising breakdowns and maintenance time. UK design and engineering consultancy and expertise in safety, testing and other issues are also highly valued.

11 RSG Fast Track to the Future

Work by the RSG and the National Skills Academy for Rail (NSAR) to analyse future manpower requirements has also been used by the Government in developing its Transport Infrastructure Skills Strategy. We would encourage franchisees, train manufacturers and owners of rolling stock to engage with the Rail Supply Group, the supply chain and especially SMEs to develop new products and ensure that the UK's supply chain is competitive and develops the capacity for orders.



These and other initiatives are intended to develop the supply chain to meet the industry's future needs for new and refurbished rolling stock, and to increase its contribution to the economy. They will also help provide resilience in a sector which has, in the past, been affected by irregular ordering profiles. The Government also welcomes new companies entering the market, to stimulate competition and productivity, and it encourages SMEs, new entrants and innovators to work with the supply sector to identify and take advantage of initiatives benefiting the supply chain and improving access to the market.

The department must adhere to the applicable legal framework in its own procurement processes. As set out above, through its approach to procuring franchises, we are committed to promoting innovation, enhancing sustainability and promoting corporate social responsibility; rolling stock is no exception to this. We are taking into account these wider objectives in franchise procurements by evaluating bids based on the extent to which they meet the objectives set out in the ITT, as well as on the basis of the price offered.

More generally, a change in European legislation recently transposed into UK law¹² will allow the Government, in future procurements which it is leading, to place greater emphasis on the social and economic impact of its spending, and to seek long term best value rather than the lowest first cost. The Government would also expect its franchisees to be taking into account the social and economic impact of their spending, reflecting best practice in its own evaluation of tenders. The Government will apply this approach to all HS2 procurements and it has set strategic goals such as the creation of opportunities for skills and employment, sustained and balanced economic growth across the UK and an environmentally sustainable solution. For HS2 it will test bidders' offers on these dimensions through a balanced score card approach that takes a range of factors into account such as creating apprenticeships, greater environmental sustainability etc.



12 <http://www.legislation.gov.uk/uksi/2016/274/contents/made>

Conclusion

Passengers will continue to be placed at the heart of our plans. From Transport Focus' research we learn that passengers feel the pressures that the industry is facing every day during their commute and that they are open to some compromise, but only if reliability, service frequency and quality are seen to increase.

It is clear that there are real opportunities for rolling stock to improve the passengers' experience. This document has set out the types of outcomes we would like to see as well as highlighting some of the good work already being done.

Investment in new signalling systems and trains will increase the opportunities for the industry to respond to changes in demand. If the industry is successful in increasing the flexibility of trains, train interiors and train services then this will allow a fundamental shift from trying to predict the future and planning on that basis, to optimising the industry and its systems for a much wider range of possible scenarios and to react quickly to take advantage of emerging demands. Those scenarios could see the carrying of low volume, high value freight on passenger vehicles in flexible vehicles and in partnership with logistics firms.

We intend to update this publication annually, as part of the Rail Industry Day, based on feedback from stakeholders, our latest policy position and market and technological developments. As our policy position evolves we will be open and transparent about it. We will feed comments on this document into our annual update. If you have views on the document and its annexes, please send them to the rolling stock team at:

RollingStockPerspective@dft.gsi.gov.uk



Rolling Stock Aspirations by Service Group

The aspirations for rolling stock on the coming pages are necessarily broad and do not take precedence over requirements set out in 'Invitations to Tender.' They provide a high level overview, which industry should work towards. These aspirations are intentionally cast as output based and we expect industry to take innovative approaches and use their experience to meet and exceed them.

We have divided services into five broad groups. It is important to note that trains can be used flexibly during off-peak periods. Britain has a high-intensity railway, particularly during the morning and evening rush hours, and a train used on a metropolitan service in the morning may be used on inter-urban or rural services outside of the peak. It is also important to note that passengers' perceptions of the type of service they are travelling on vary dependant on a number of factors.

It is essential for vehicles to have flexible interiors if the industry is to respond to increasing demands from passengers at manageable cost. In the long term this will ensure that rolling stock can be deployed on various routes with differing needs and ultimately allow train operators to prepare quickly and easily for occasions when passenger numbers will exceed capacity e.g. high season holiday or festival traffic. Thought should also be given to providing flexible interiors suitable for large packages, luggage or bicycles.

High speed InterCity

These vehicles are envisaged as providing ultra-high speed (up to 360kph ~225mph) services between major cities in Britain. Passengers will have high expectations for the facilities on board and for modern state-of-the-art interiors that have to be suitable for business, commuting and leisure travellers.

InterCity

The InterCity service group is one of predominantly long distance services where passenger expectations are generally high given the nature of the market, length of journey and the transport modes against which operators compete.

Inter-Urban

Passenger expectations of the Inter-urban service group are similar to the InterCity group on services that are primarily express with limited stops but may be of a shorter duration. It transports leisure and commuter passengers between towns and cities.

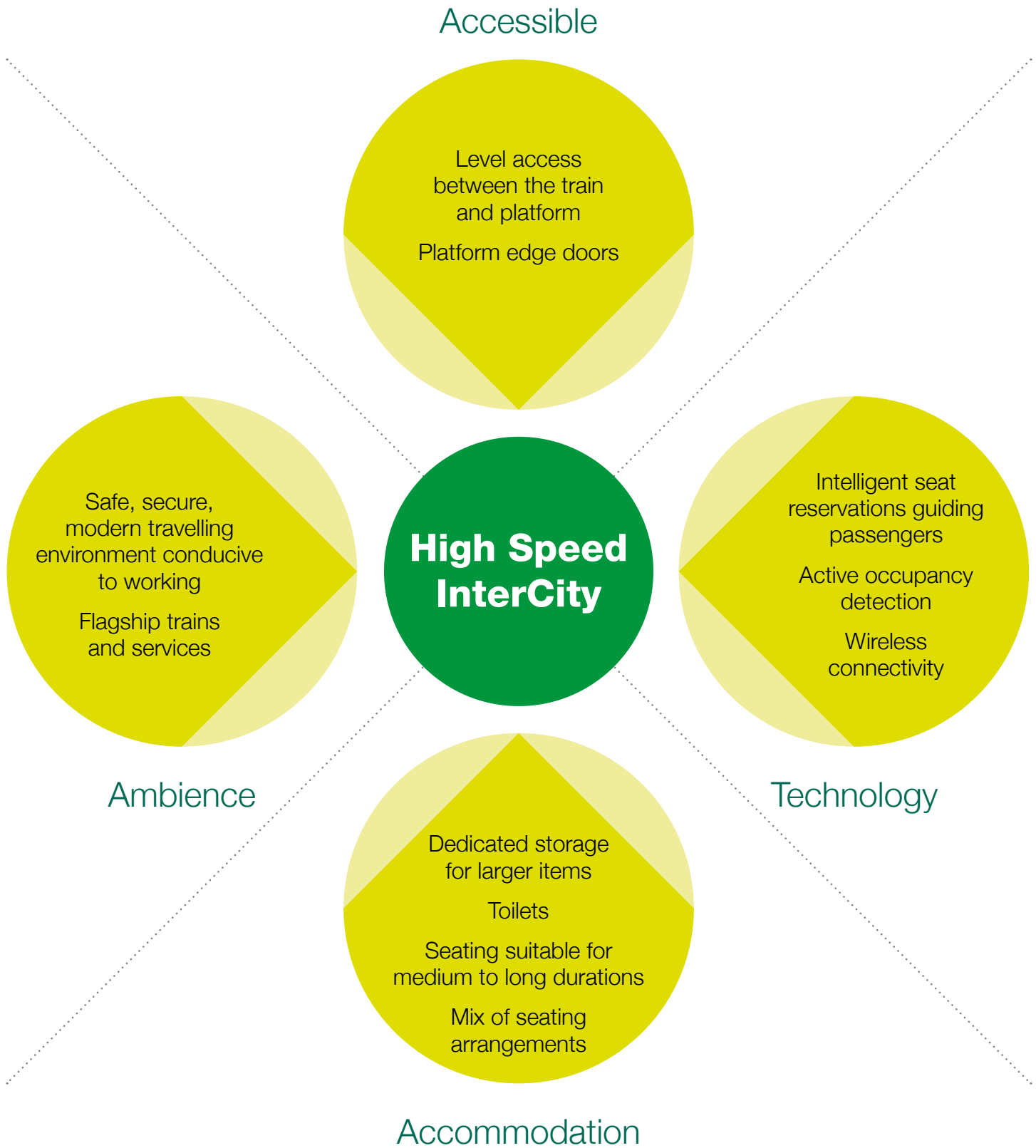
Metropolitan

The metropolitan service group typically serves high-density traffic flows to meet a high volume of passenger demand during the peak hours, with passengers generally making relatively short journeys on services with frequent stops. Passenger expectations may focus on certain aspects of comfort and there is a recognition that operators must balance the need to transport high volumes of passengers against the expectation of a seat.

Rural/Regional

This service group will generally serve more rural communities at a lower frequency than the other service groups and have lower ridership but it performs a vital service for travellers, the local community, tourists as well as the regional economy.

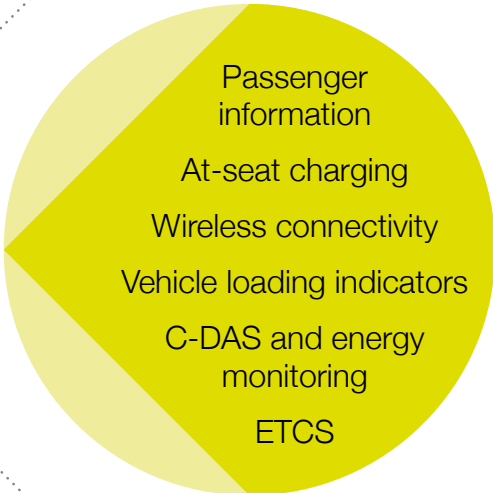




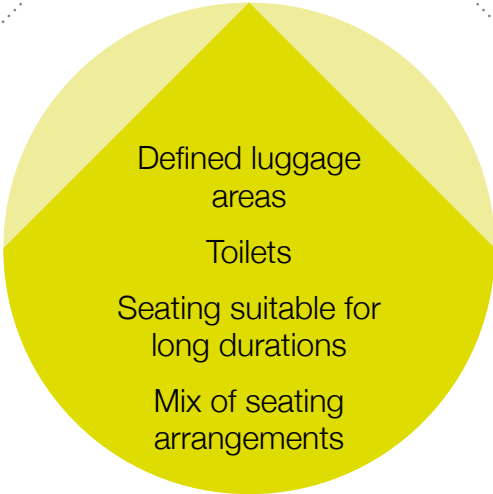
Accessible



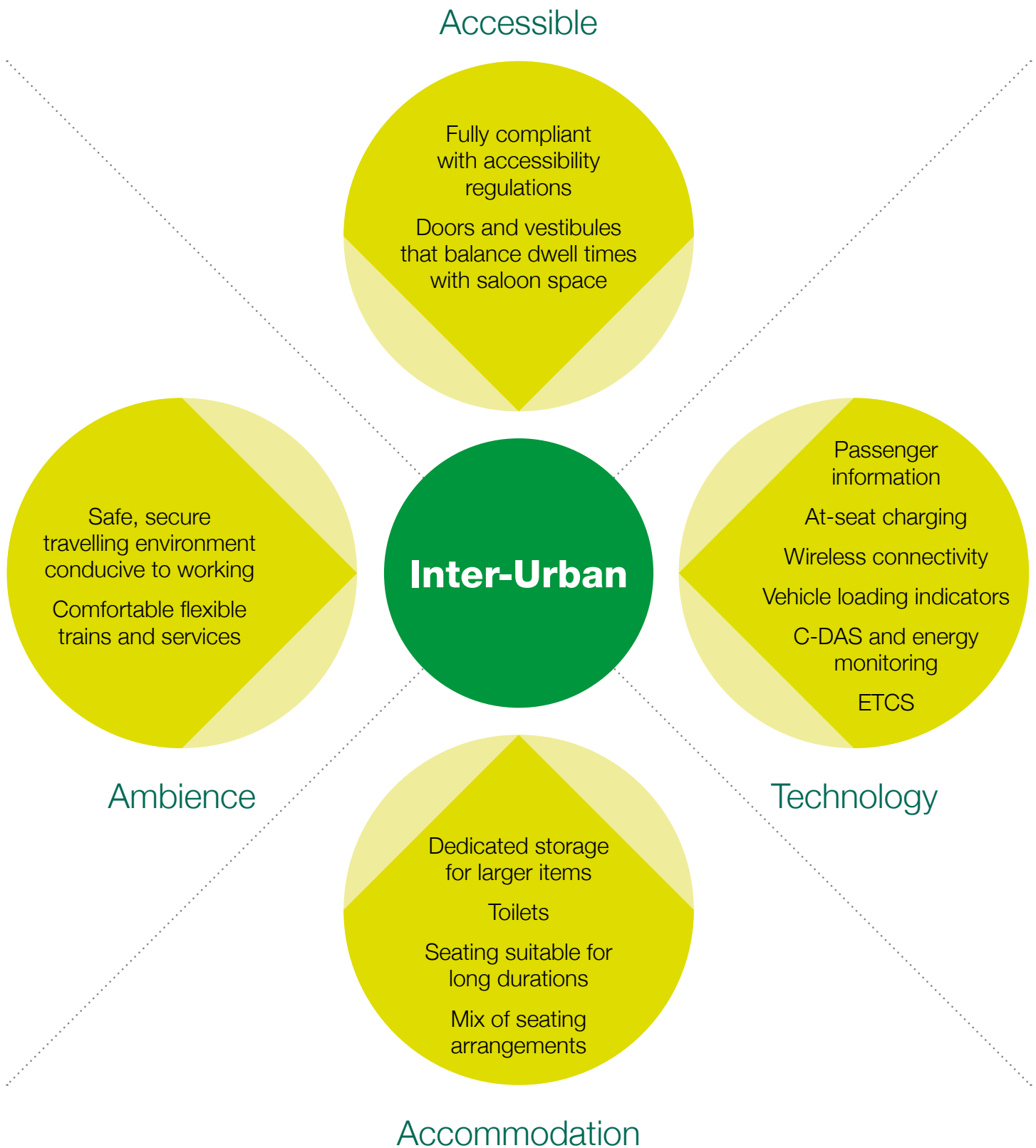
Ambience



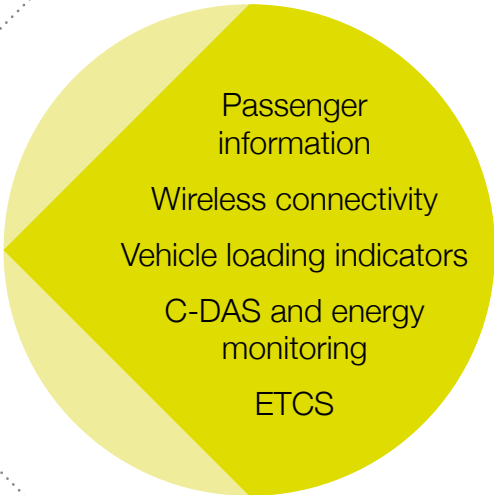
Technology



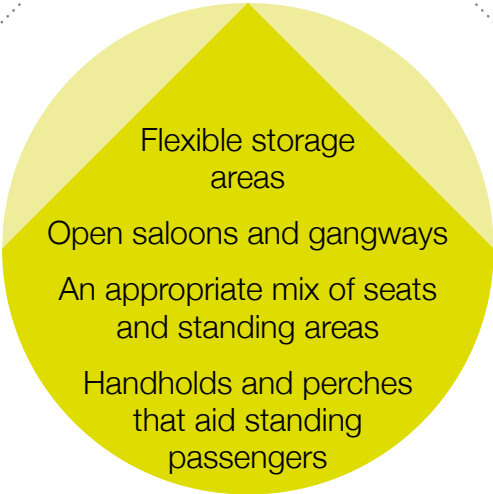
Accommodation



Accessible



Technology



Accommodation



Ambience

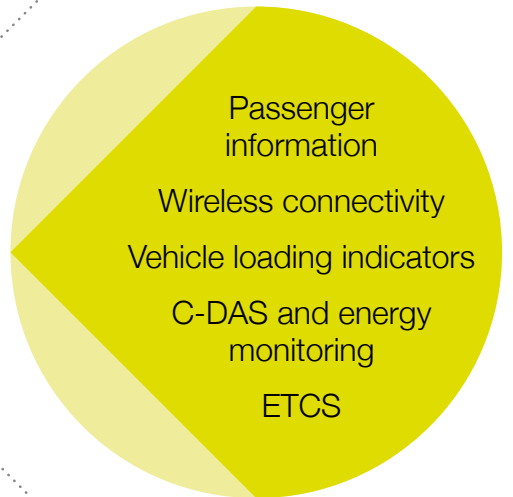
Accessible



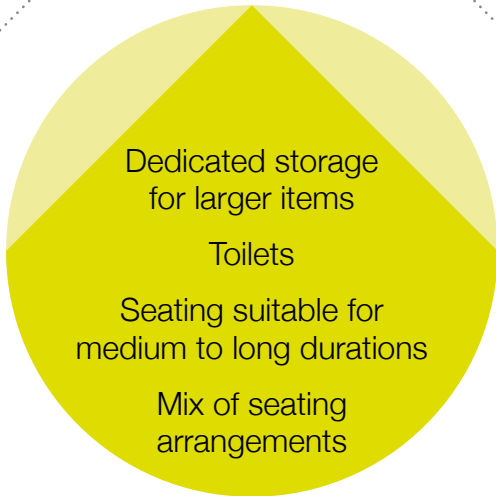
Rural/ Regional



Ambience



Technology



Accommodation

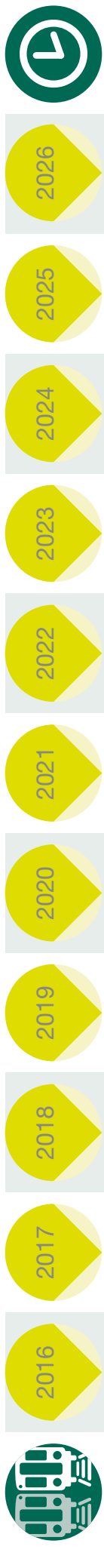
British Rolling Stock Fleet – Class by Class Overview

The following charts provide an overview of rolling stock in Britain, showing on which franchises or concessions they are currently operated as well as an indication of the year in which they were built. It is important to note that the quality of the vehicle is important, not its age. Good, high quality refurbishment can deliver a passenger experience comparable with new rolling stock.

The information contained within this section is indicative and has been prepared using Franchise Agreements and other material as available to the Secretary of State at the date of this document. As such neither the Secretary of State nor his officials, appointed agents or advisers makes any representation or warranty (express or implied) as to the accuracy or completeness of the information. It does not include Open Access Operators nor does it show Section 54 guarantees. Sub-leasing arrangements have been simplified in some instances. The rolling stock team welcome any comments or corrections and can be contacted at:

RollingStockPerspective@dft.gsi.gov.uk

DMU Rolling Stock (Pre-1996 Orders)



2026

2025

2024

2023

2022

2021

2020

2019

2018

2017

2016

Class

142 1985-1987 158 vehicles NT

30 vehicles WB

143 1985-1986 16 vehicles GW

30 vehicles WB

144 1986-1987 56 vehicles NT

80 vehicles Cascade GW

116 vehicles Cascade NT 182 vehicles NT

150 1984-1987 6 vehicles WM

72 vehicles WB

17 vehicles EM

14 vehicles GW

153 1987-1988 18 vehicles NT

8 vehicles WM

8 vehicles WB

5 vehicles EA

155 1988 14 vehicles NT

18 vehicles EA

30 vehicles EM

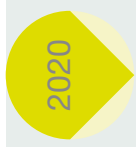
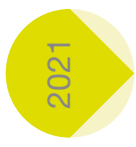
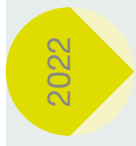
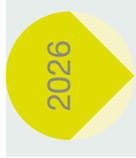
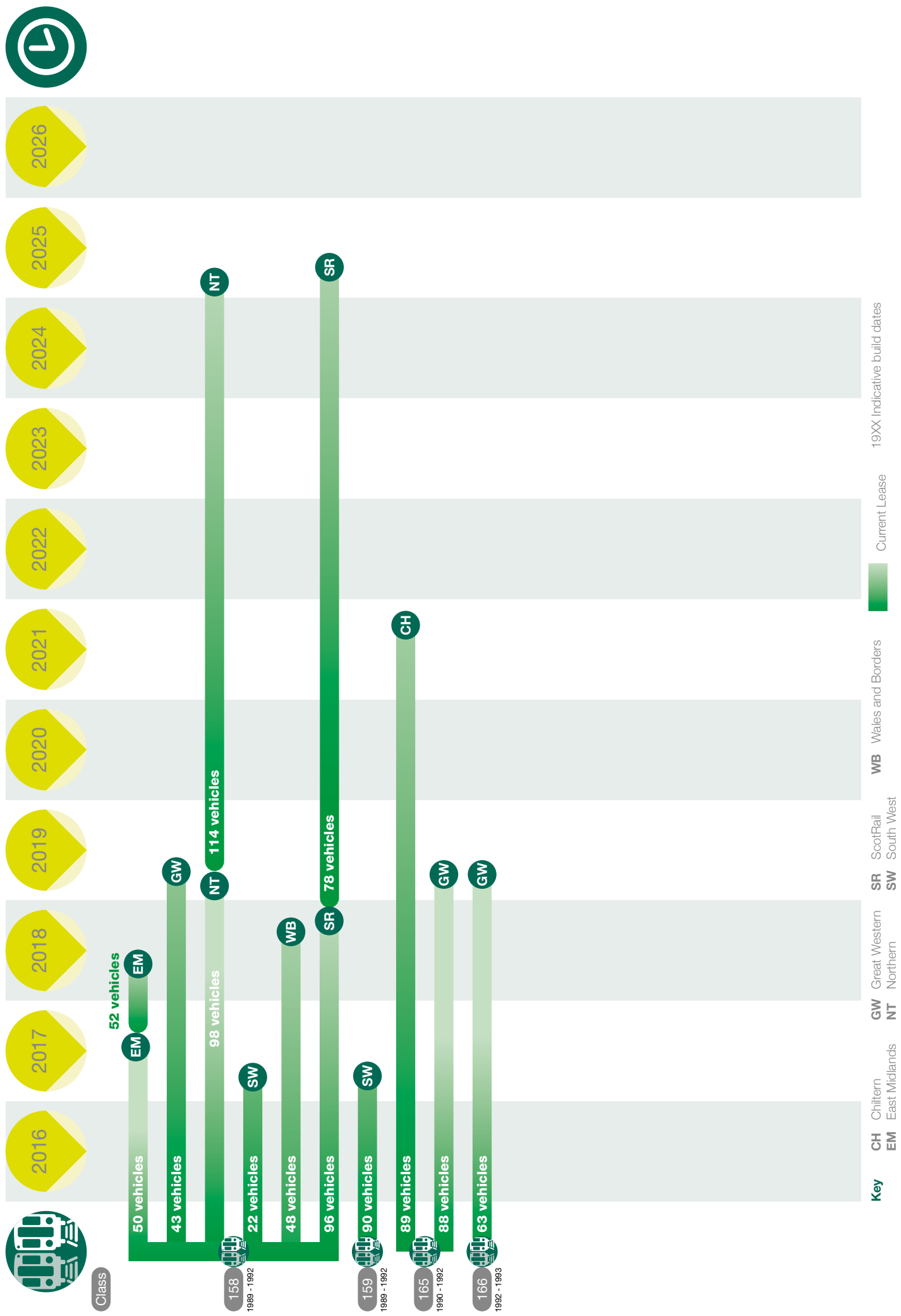
156 1987-1989 84 vehicles NT 94 vehicles NT

96 vehicles SR 76 vehicles SR

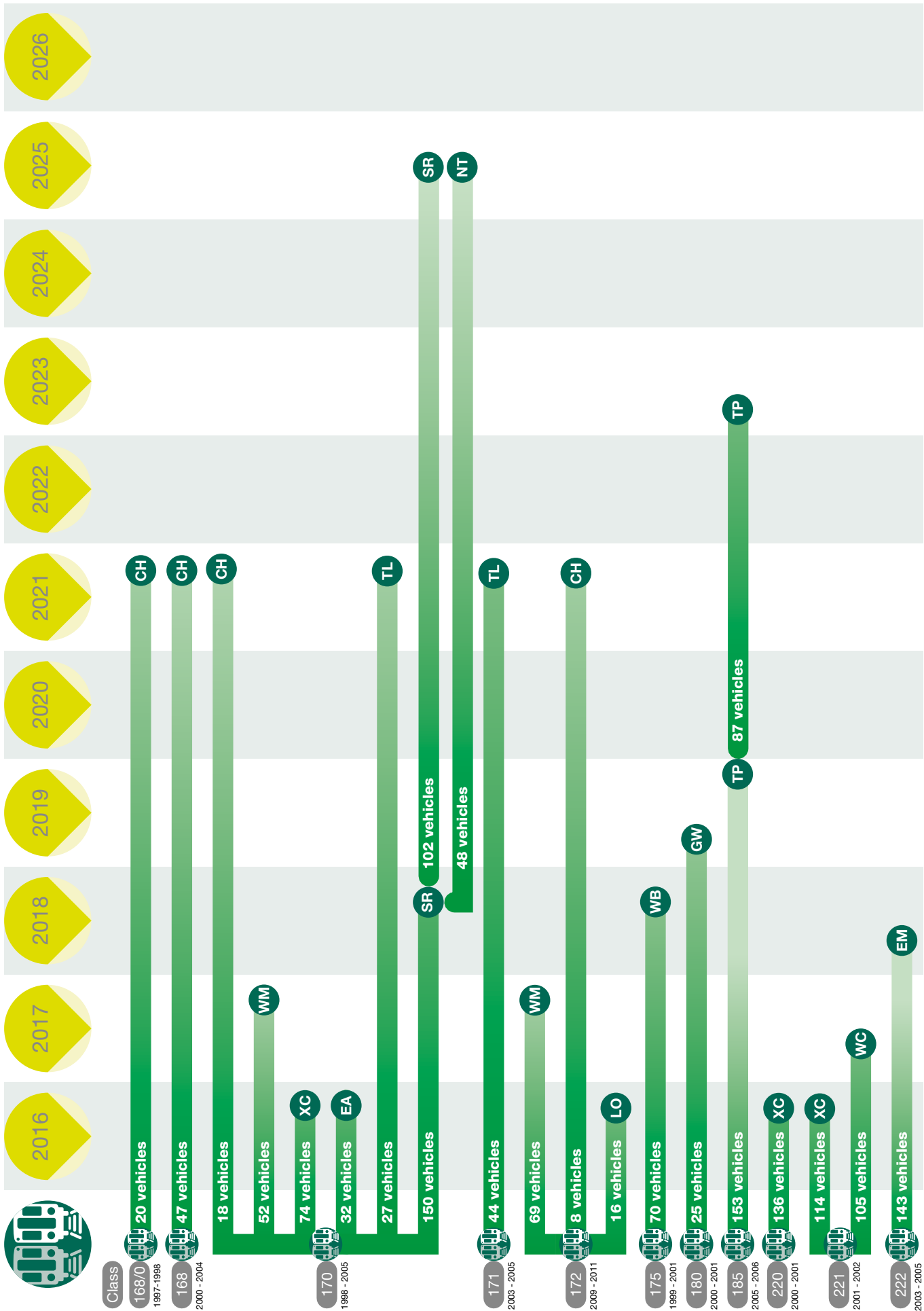
Key EA East Anglia EM East Midlands GW Great Western Northern NT Northern WB Wales and Borders WM West Midlands SR ScotRail SR Wales and Borders

Current Lease 19XX Indicative build dates

DMU Rolling Stock (Pre-1996 Orders)



DMU Rolling Stock

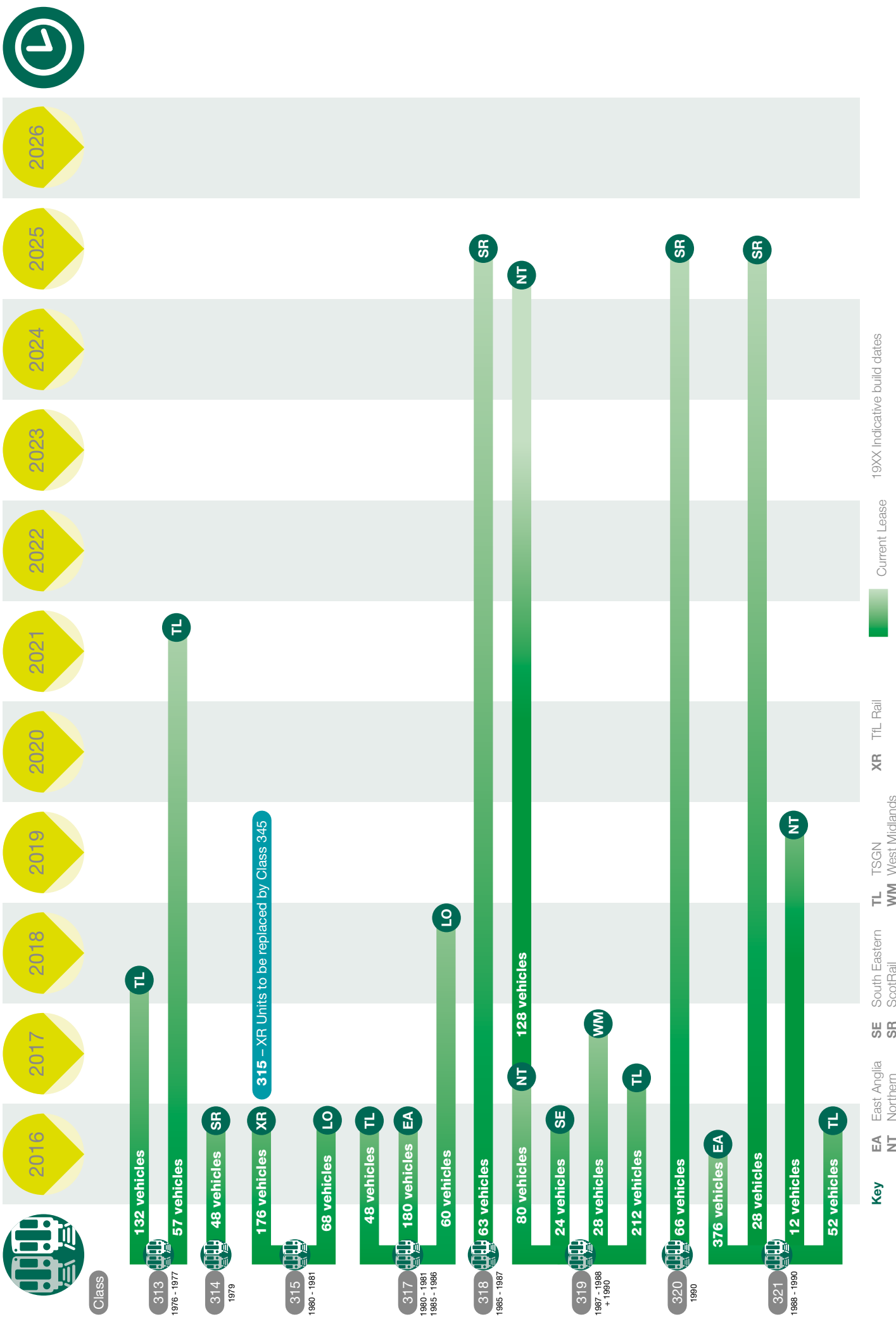


Key CH Chiltern EA East Anglia EM East Midlands GW Great Western LO Lorol SR ScotRail TP TransPennine Express TL TSGN WB Wales and Borders WC West Coast WM West Midlands XC Cross Country

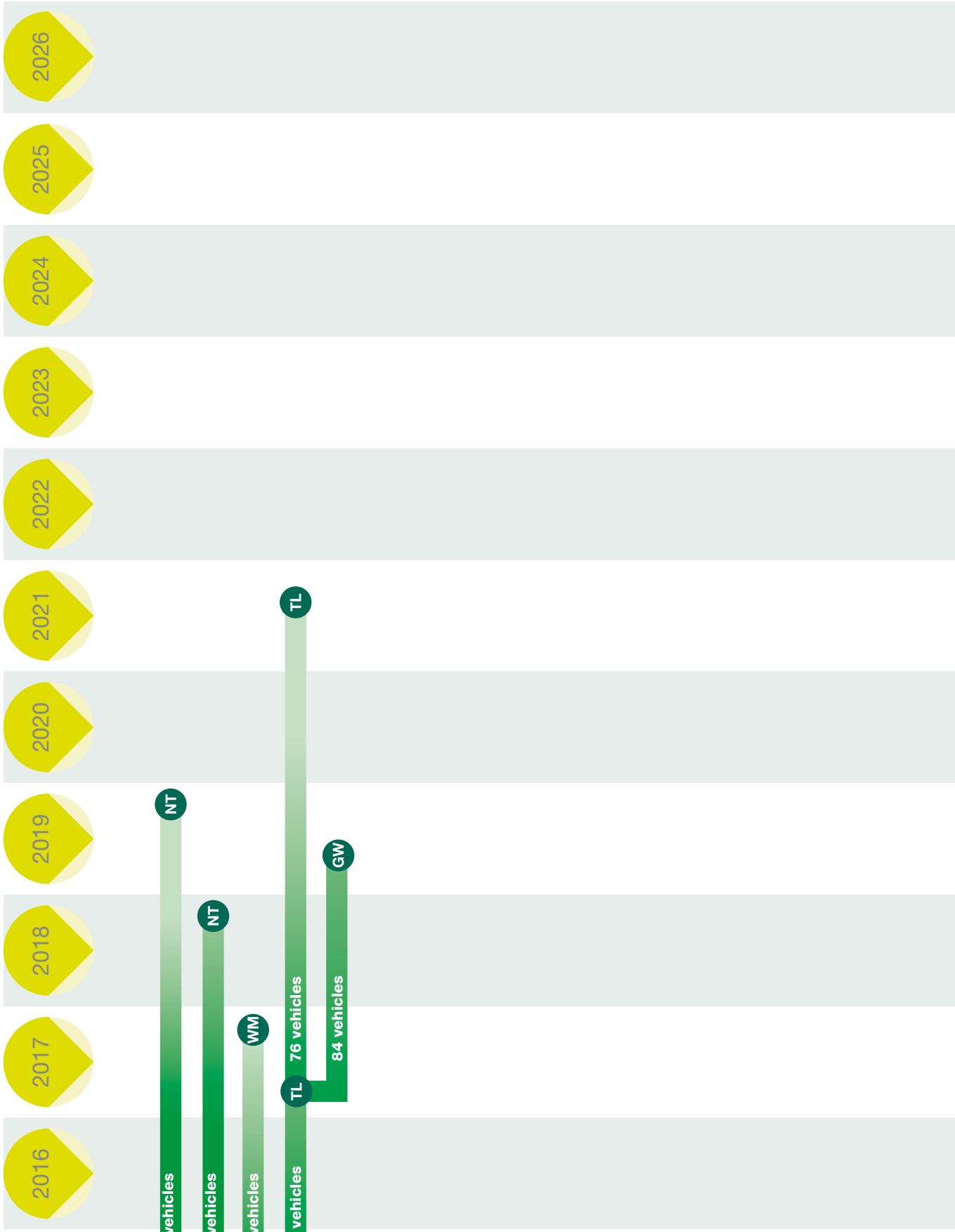
19XX Indicative build dates

Current Lease

AC EMU Rolling Stock (Pre-1996 Orders)



AC EMU Rolling Stock (Pre-1996 Orders)



Class

322
1990



20 vehicles

NT

323
1992 - 1993



51 vehicles

NT

365
1994 - 1995



78 vehicles

WM

365
1994 - 1995



160 vehicles

TL

76 vehicles

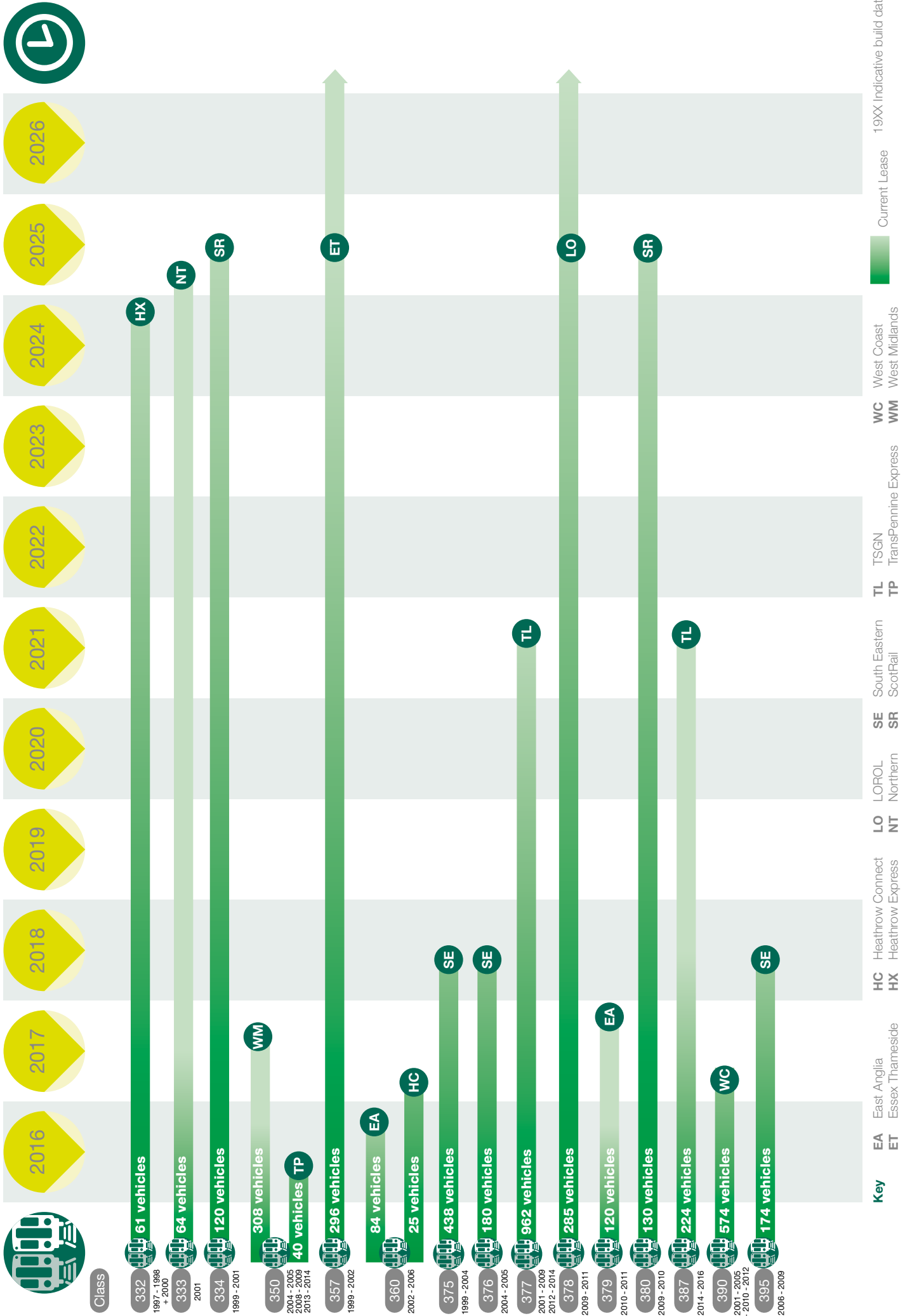
TL

84 vehicles

GW

Key WM West Midlands NT Northern TL TSGN
 GW Great Western TL TSGN
 Current Lease
 19XX Indicative build dates

AC EMU Rolling Stock



DC EMU Rolling Stock

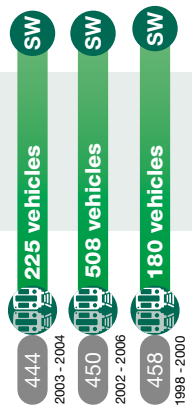


Class

Pre-1996 Orders

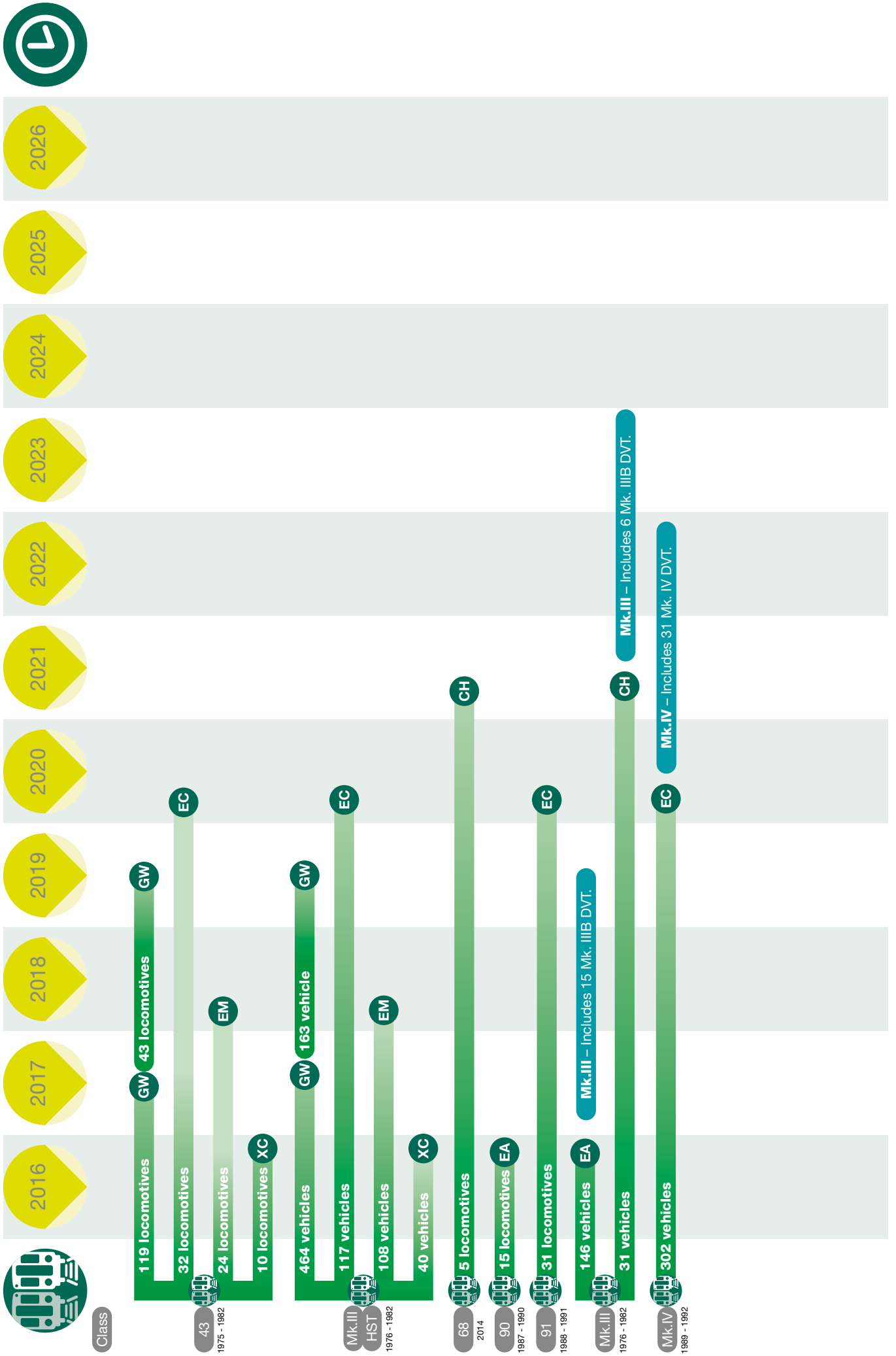


Post 1996 Orders



Key SE South Eastern SW South West TL TSGN Mersey/Rail MR Mersey/Rail
 19XX Indicative build dates
 Current Lease

LHCS & HST



Key CH Chiltern EA East Anglia EC East Coast EM East Midlands GW Great Western LHCS Loco Hauled Coaching Stock EC Cross Country DVT Driving Van Trailer

19XX Indicative build dates

Current Lease

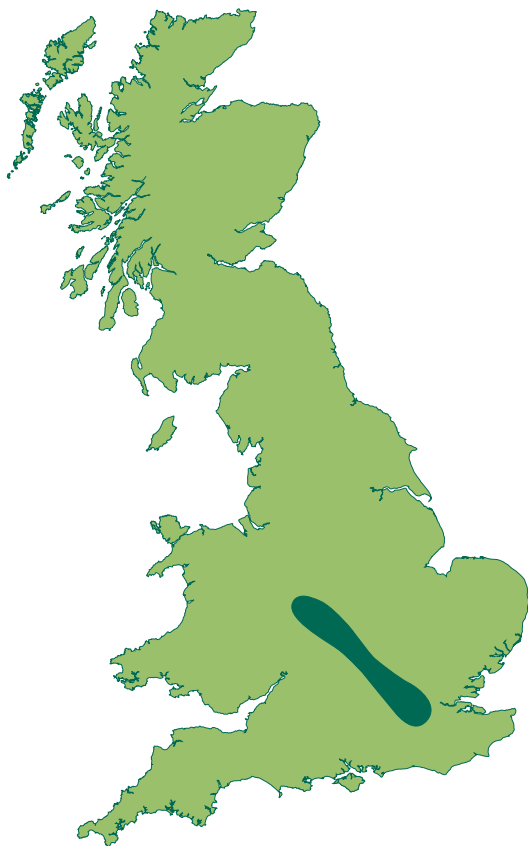
Department for Transport – Franchised Operators View

The following charts provide an overview of rolling stock that is currently on each of the franchises let by the department with an indication of the make-up of their fleets and the years in which they were built.

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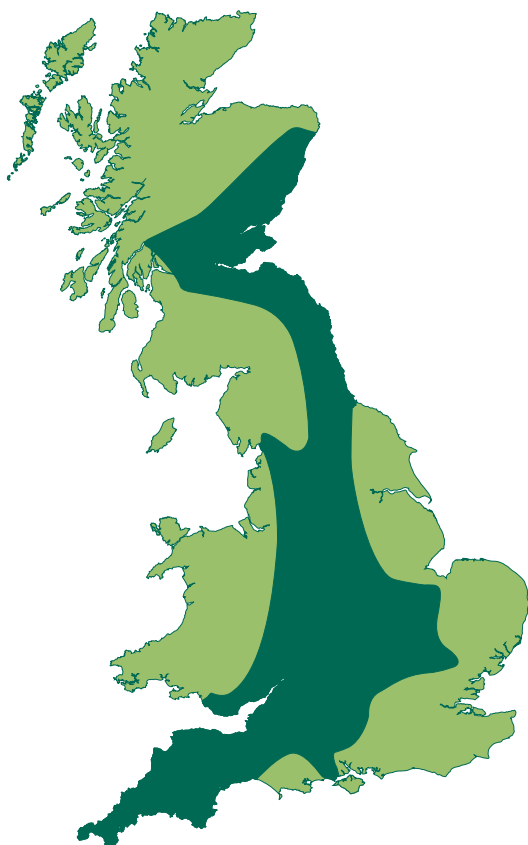
RollingStockPerspective@dft.gsi.gov.uk

Chiltern



Diesel Fleet		Class	Quantity	Built
		Class 68	6 Locomotives	2014
		Mk. III (inc. DVT)	32 Vehicles	1975–1988
		Class 121	2 Vehicles	1959–1960
		Class 165	89 Vehicles	1990–1992
		Class 168/0	20 Vehicles	1997–1998
		Class 168/1	26 Vehicles	2000
		Class 168/2	21 Vehicles	2003–2004
		Class 168/3	18 Vehicles	2000–2001
		Class 172/1	8 Vehicles	2009–2010

Cross Country



Diesel Fleet		Class	Quantity	Built
		Class 43	10 Locomotives	1976–1982
		Mk. III	40 Vehicles	1974–1988
		Class 170	74 Vehicles	1999–2000
		Class 220	136 Vehicles	2000–2001
		Class 221	114 Vehicles	2000–2001

East Anglia



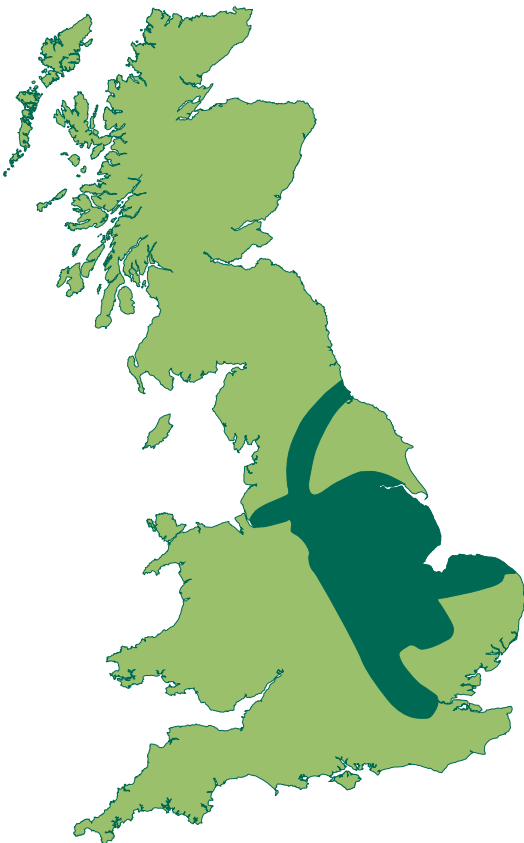
Diesel
Fleet

Class	Quantity	Built
Class 153	5 Vehicles	1985–1987
Class 156	18 Vehicles	1986–1987
Class 170	32 Vehicles	2002

Electric
Fleet

Class	Quantity	Built
Class 90	15 Locomotives	1987–1990
Mk. III (inc. DVT)	146 Vehicles	1975–1988
Class 317	76 Vehicles	1981–1982
Class 317/6	96 Vehicles	1985–1987
Class 321	376 Vehicles	1988–1990
Class 360	84 Vehicles	2002–2003
Class 379	120 Vehicles	2010–2011

East Midlands



Diesel
Fleet

Class	Quantity	Built
Class 43	24 Locomotives	1976–1982
Mk. III	108 Vehicles	1975–1988
Class 153	17 Vehicles	1987–1988
Class 156	30 Vehicles	1987–1989
Class 158	50 Vehicles	1989–1992
Class 222	143 Vehicles	2003–2005

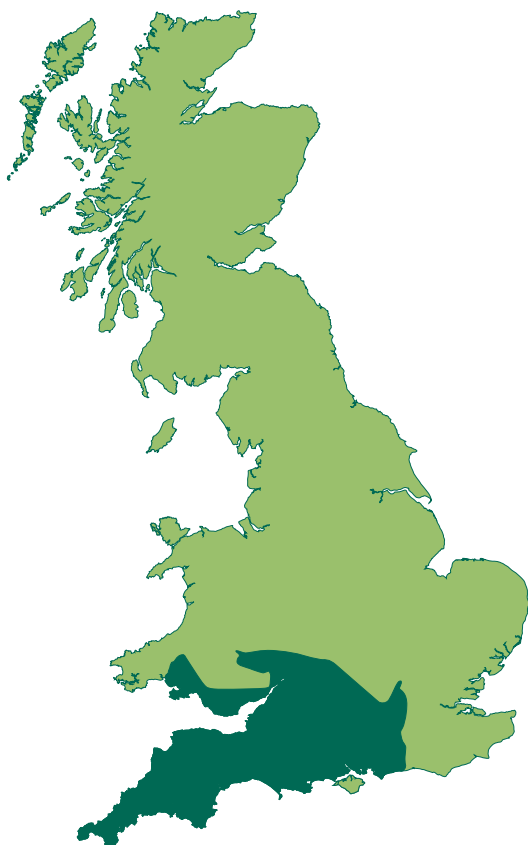
Essex Thameside



Electric Fleet

Class	Quantity	Built
Class 357/0	184 Vehicles	1999–2000
Class 357/2	44 Vehicles	2001–2002
Class 357/3	68 Vehicles	2001–2002

Great Western

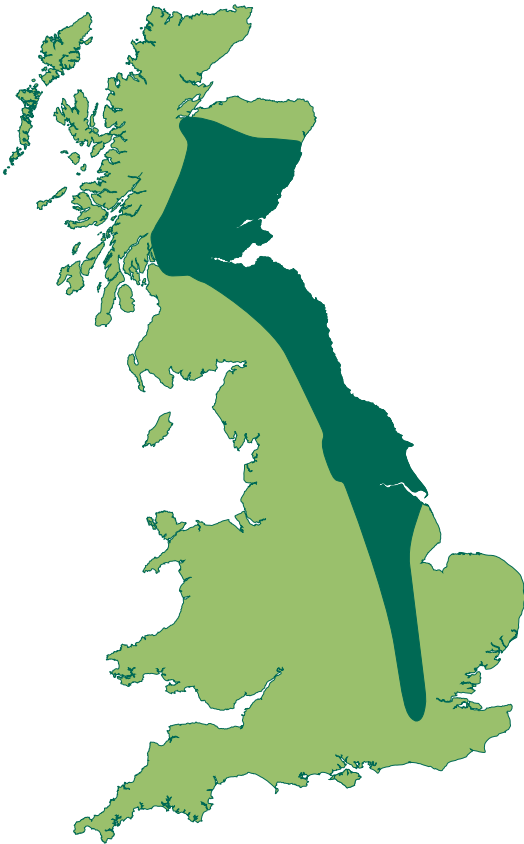


Diesel Fleet

Class	Quantity	Built
Class 43	119 Locomotives	1975–1982
Mk. III	464 Vehicles	1976–1982
Class 57	4 Locomotives	1964–1965*
Mk. III Sleeper	20 Vehicles	1982–1984
Class 143	16 Vehicles	1985–1986
Class 150	80 Vehicles	1984–1987
Class 153	14 Vehicles	1987–1988
Class 158	43 Vehicles	1989–1992
Class 165	88 Vehicles	1992
Class 166	63 Vehicles	1992–1993
Class 180	25 Vehicles	2000–2001

* Built as class 47 locomotives, rebuilt as Class 57 in 2004.

InterCity East Coast



Diesel
Fleet

Class	Quantity	Built
Class 43	32 Locomotives	1975–1982
Mk. III	117 Vehicles	1976–1982

Electric
Fleet

Class	Quantity	Built
Class 91	31 Locomotives	1988–1991
Mk. IV (inc. DVT)	302 Vehicles	1989–1992

InterCity West Coast



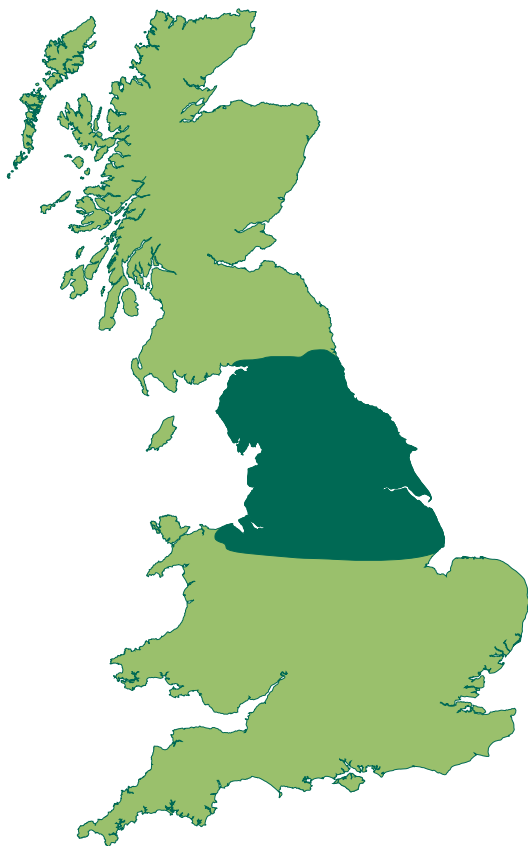
Diesel
Fleet

Class	Quantity	Built
Class 221	102 Vehicles	2001–2002

Electric
Fleet

Class	Quantity	Built
Class 390/0	189 Vehicles	2001–2004
Class 390/1	385 Vehicles	2001–2004 & 2010–2012

Northern



Diesel Fleet

Class	Quantity	Built
Class 142	158 Vehicles	1985–1987
Class 144	56 Vehicles	1986–1987
Class 150	116 Vehicles	1985–1987
Class 153	18 Vehicles	1987–1988
Class 155	14 Vehicles	1988
Class 156	84 Vehicles	1987–1988
Class 158	98 Vehicles	1989–1992

Electric Fleet

Class	Quantity	Built
Class 319	80 Vehicles	1990
Class 321	12 Vehicles	1988–1991
Class 322	20 Vehicles	1990
Class 323	51 Vehicles	1992–1993
Class 333	64 Vehicles	2000 & 2006

South Eastern



DC/DV Electric Fleet

Class	Quantity	Built
Class 319	24 Vehicles	1987–1988
Class 375	438 Vehicles	1999–2005
Class 376	180 Vehicles	2004–2005
Class 395	174 Vehicles	2006–2009
Class 465	588 Vehicles	1991–1994
Class 466	86 Vehicles	1993–1994

South Western



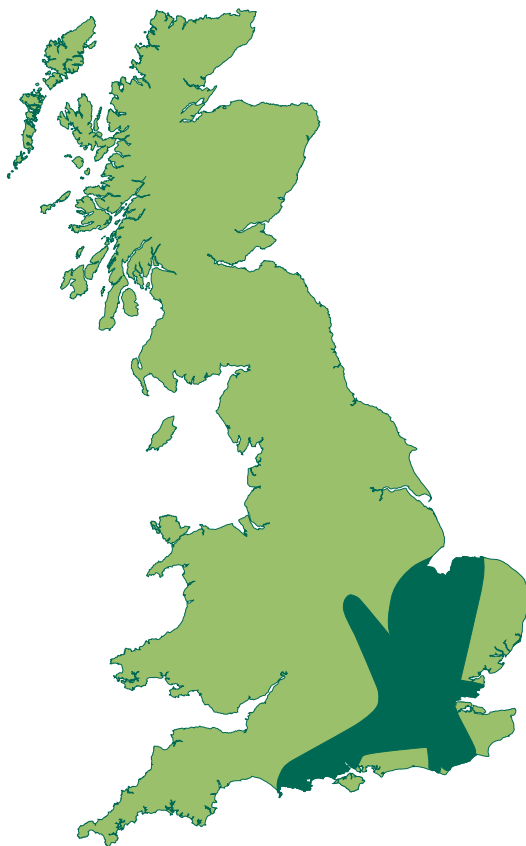
Diesel Fleet

<i>Class</i>	<i>Quantity</i>	<i>Built</i>
Class 158	22 Vehicles	1989–1992
Class 159	90 Vehicles	1989–1992

DC Electric Fleet

<i>Class</i>	<i>Quantity</i>	<i>Built</i>
Class 444	225 Vehicles	2003–2004
Class 450	508 Vehicles	2002–2006
Class 455	364 Vehicles	1984–1985
Class 456	48 Vehicles	1990–1991
Class 458/5	180 Vehicles	1998–2000
Class 483	12 Vehicles	1938

Thameslink, Southern & Great Northern



Diesel Fleet

Class	Quantity	Built
Class 171	44 Vehicles*	2003–2005

Electric Fleet

Class	Quantity	Built
Class 313	189 Vehicles	1976–1977
Class 317	48 Vehicles	1981–1982
Class 319	212 Vehicles*	1987–1988
Class 321	52 Vehicles	1989–1990
Class 365	160 Vehicles	1994–1995
Class 377/1	256 Vehicles	2002–2003
Class 377/2	60 Vehicles	2003–2004
Class 377/3	84 Vehicles	2001–2002
Class 377/4	300 Vehicles	2004–2005
Class 377/5	92 Vehicles	2008–2009
Class 377/6	130 Vehicles	2012–2013
Class 377/7	40 Vehicles	2013–2014
Class 387	224 Vehicles	2014–on
Class 442	30 Vehicles	1988–1989
Class 455	184 Vehicles	1982–1984

* Excludes 27 Vehicles of which 15 are sub-hired to Abellio ScotRail and 12 are awaiting conversion to Class 171.

TransPennine Express



Diesel Fleet	<i>Class</i>	<i>Quantity</i>	<i>Built</i>
	Class 185	153 Vehicles	2005–2006

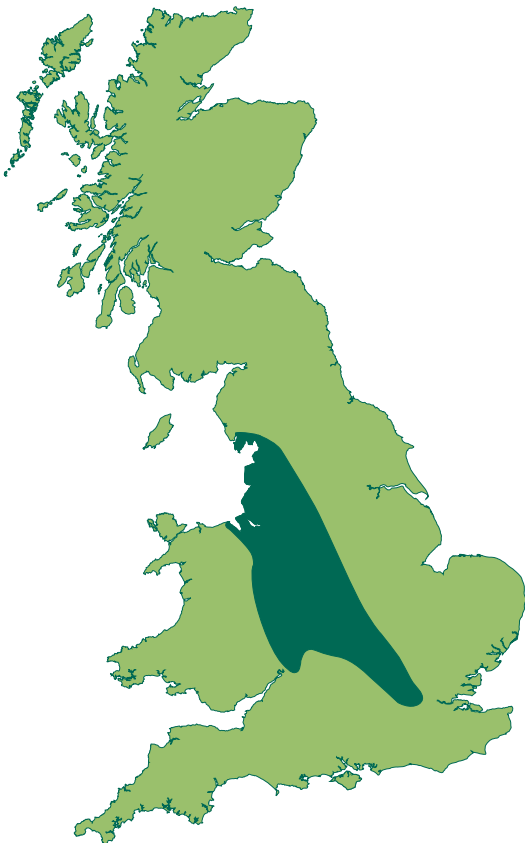
Electric Fleet	<i>Class</i>	<i>Quantity</i>	<i>Built</i>
	Class 350	40 Vehicles	2013–2014

Wales & Borders



Diesel Fleet	Class	Quantity	Built
	Class 67	3 Locomotives	1999–2000
	Mk. II (inc. DVT)	15 Vehicles	1975–1987
	Class 142	30 Vehicles	1985–1987
	Class 143	30 Vehicles	1985–1987
	Class 150	72 Vehicles	1986–1988
	Class 153	8 Vehicles	1987–1988
	Class 158	48 Vehicles	1989–1992
	Class 175/0	22 Vehicles	1999–2000
	Class 175/1	48 Vehicles	1999–2001

West Midlands



Diesel Fleet	Class	Quantity	Built
	Class 150	6 Vehicles	1984–1987
	Class 153	8 Vehicles	1987–1988
	Class 170	52 Vehicles	1999–2000
	Class 172	69 Vehicles	2011

Electric Fleet	Class	Quantity	Built
	Class 319	28 Vehicles	1988–1991*
	Class 323	78 Vehicles	1992–1993
	Class 350	308 Vehicles	2004–2005

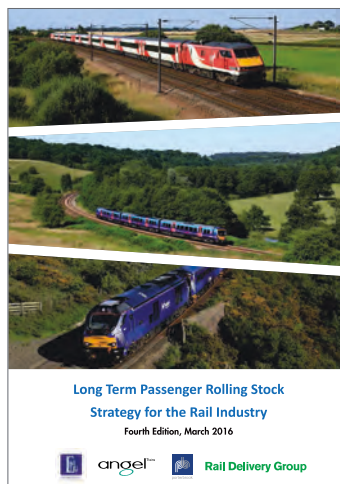
Key Rolling Stock Publications

There are a number of key publications for rolling stock which we have listed here for reference.

<http://www.rssb.co.uk/improving-industry-performance/sustainable-development/rail-sustainable-development-principles>



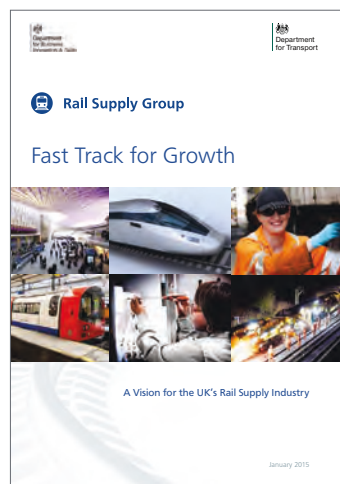
[Industry Rolling Stock Strategy Steering Group](#)



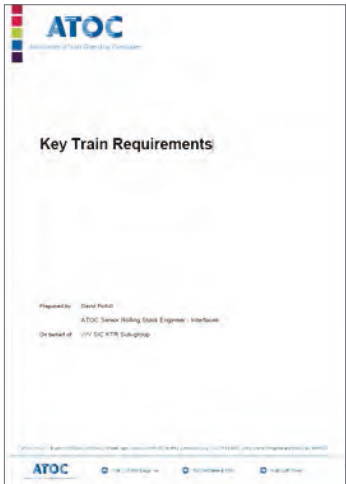
[The Rail Technical Strategy](#)



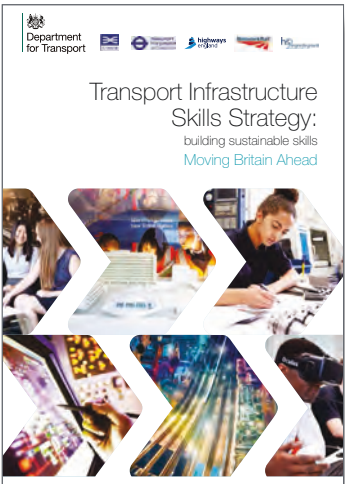
[Rail Supply Group – Fast Track for Growth](#)



The Key Train Requirements



Transport Infrastructure Skills Strategy



Technical Specifications for Interoperability



Fast Track to the Future



ISBN 978-1-84864-180-8



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