

ROLLING STOCK AND INFRASTRUCTURE INVESTORS

A Sector On Track For Growth In A Post-Pandemic World

IN A NUTSHELL

- _ Rail is a key catalyst and beneficiary of the decarbonisation trend, as government policies support passenger and freight rail over other modes of transport. Passenger rail is essential for sustainable mobility. Rail freight emissions can be up to five times lower than road freight,¹ and Europe may reach a freight rail modal share of 30% by 2030, from 18% in 2020.² We expect the rolling stock market to grow over the next decade, as the liberalisation and integration of the European rail market continues.
- _ Private infrastructure capital has played a key role in supporting rolling stock growth and in replacing ageing fleets. Core infrastructure strategies invested mainly in regulated passenger rolling stock leasing services supported by long-term contracts, while core plus strategies focused more recently on acquiring stakes in rolling stock leasing platforms and supporting their expansion via active asset management.
- _ Rolling stock provides an essential service with high barriers to entry. Long-term leasing contracts with creditworthy counterparts, or a diversified and sticky customer base in case of shorter contracts, can underpin yield, while the gradual market expansion also offers a platform for value creation.
- _ Rail has provided essential freight services for commodities and medical supplies during Covid-19. Rail freight proved largely resilient during the pandemic, while rail passenger demand was materially affected by lockdowns and we anticipate a full recovery to protract into the medium term.
- _ The post-Covid market environment may offer a good entry point for acquiring transport assets. Rolling stock leasing may prove defensive in a macroeconomic environment characterised by rising medium-term inflation and moderate economic growth. In the long term, particularly for rolling stock freight, earnings' growth potential and a compression in cost of equity as the sector gradually matures, may support valuations in case of rising bond yields.

¹ European Environmental Agency, "Rail and waterborne — best for low-carbon motorised transport", 24 March 2021.

² Rail Freight Forward, "30 by 2030, Rail freight strategy to boost modal shift", 2020.

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1 / Rolling Stock and the Rail System

ROLLING STOCK IS AT THE HEART OF RAIL TRANSPORTATION SYSTEM

Rail Infrastructure	Rolling Stock			Signaling and Control
	Locomotives	Freight Carriages	Passenger Carriages	
Tracks (permanent way)	Electric	Tank wagons	Coaches	Train signaling system
Power supply	Diesel	Hoppers (bulk)	High-speed trains	Train control system
Stations and buildings	Hybrid	Open wagons	Electric multiple units	Automated driving system
Tunnels and bridges	Fuel cell-electric (Hydrogen)	Covered wagons	Diesel multiple units	Remote controls
Level crossings		Intermodal wagons	Light rail and metro	Fibre networks

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A Key Component of Rail Systems: Rolling stock is at the core of rail transportation. The term refers to the vehicles that operate on the tracks, including powered vehicles (such as locomotives) and unpowered vehicles (such as passenger or freight carriages). Rolling stock costs are meaningful, and account for about 20% of the total cost of a rail system, when considering whole life costs, including the upfront investment required to procure assets, maintenance, and financing.³ Historically, railway systems consisted of integrated businesses, with no separation of ownership between tracks and vehicles. Today, railway networks are often still owned by governments – directly or indirectly – but are frequently legally separate from rail operators and rolling stock, with the latter increasingly provided on a commercial basis.

Rolling Stock Ownership & Leasing: Today, rolling stock equipment of rail operators includes a combination of owned and leased locomotives and rail cars, EMUs⁴, DMUs⁵ and coaches, with the share of leased vehicles typically representing around 20% - 30% of the rail equipment fleets for freight, and a lower share for passenger fleets globally.⁶ However, market shares of leased passenger train fleets do vary by country. For instance, in the U.K. legislation requires passenger trains fleets to be leased by Train Operating Companies (TOCs) from Rolling Stock Companies (ROSCOs). In Germany, a market broadly comparable to the rest of Continental Europe, passenger trains tend to be owned by the national incumbent, particularly for long-distance travel, while private sector rolling stock is more widely employed across regional passenger services. Across North America and Europe, the rolling stock leasing market is relatively concentrated, with a relatively limited number of large rolling stock lessor companies providing services to a diversified range of companies across passenger and freight rail.

In the last two decades, private infrastructure capital has gradually played a more prominent role in providing cheap, long-term financing to fund rolling stock fleets. We have also seen private infrastructure equity investors acquiring stakes in rolling stock leasing companies that procure, own and lease rolling stock. We anticipate the share of leased rolling stock to increase over the next decade. With liberalisations expected to progress, sustainability policies supporting mass transit and freight rail, and a continued expansion of global trade, private infrastructure investors are anticipated to play a pivotal role in bridging the investment gap to replace ageing rolling stock and support the required rolling stock capacity growth.

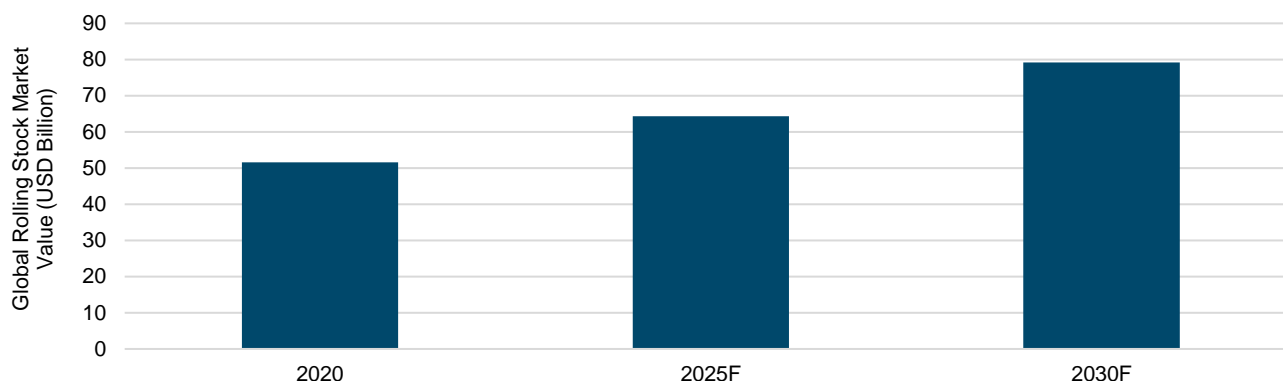
³ Statista, 2021.

⁴ Electric multiple unit trains.

⁵ Diesel multiple unit trains.

⁶ Union Pacific Corporation, Annual Report 2020.

GLOBAL ROLLING STOCK MARKET VALUE (USD BILLION, 2020-2030F)

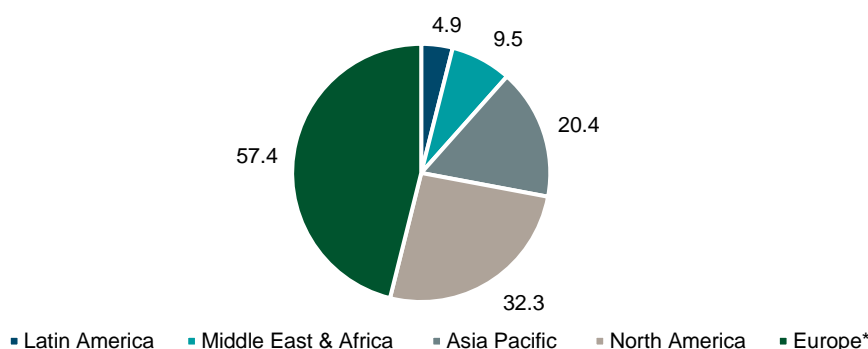


Source: DWS, Statista, as at September 2021. Notes: F=Forecast. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Governance and Regulation of Rail Systems: Given the large upfront sunk investment required for construction, railways are natural monopolies, and tend to be under direct or indirect government control or to be subject to some form of regulation. However, the governance structure of a rail system can vary materially across different markets. Historically, the evolution of rail transportation systems has been impacted by a combination of geographical, trade, demographic, and policy factors. These factors have contributed to determine for each individual rail market its competitive structure, the degree of openness to private capital, and the risk/return fundamentals across different components of the system.

The regulatory framework under which rail networks operate can vary substantially across geographies, with ownership models ranging from full public to full private ownership. Regulation can range from simply defining technical and safety standards, to economic regulation and tariff setting in case of market liberalisation. Regulation is a key determinant of the degree of openness of a railway market to private investment, while regulatory stability represents a key parameter that long-term infrastructure investors evaluate when deciding to enter a liberalised market. Therefore, Europe and North America continue to represent the largest markets from a private capital access perspective, given their comparatively mature institutional and regulatory frameworks, even though the largest investment gap for new greenfield rail networks and for rolling stock is typically concentrated in emerging markets.

ANNUAL AVERAGE ACCESSIBLE RAILWAY MARKET BY REGION (EUR BILLION, 2021-2023F)



Source: Alstom, Unife, 2021. Notes: *Includes North CIS, F = Forecast. Past performance is not indicative of future results. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

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- **United States:** The U.S. rail system consists primarily of over 600 railroads developed for freight transportation. Freight rail networks are nearly always privately owned, with network and services typically controlled by the same entity, including some of the world's largest rail freight companies. The government regulates rail freight services via the Department of Transportation and other regulatory bodies such as the Surface Transportation Board (STB). STB is responsible for approvals of new tracks, market access, transactions involving rail carriers, rates setting and service continuity.⁷ Passenger rail services make extensive use of freight rail networks, and are mainly government-owned, including the National Railway Passenger Corporation (Amtrak), while commuter rail networks are typically supported by state and local governments. The U.S. tends to lag other mature regions for the level of development of its passenger rail network, and high-speed passenger rail,⁸ with the new administration planning to allocate over USD 60 billion for the modernisation of networks over the coming years.⁹
- **European Union:** Historically, policies across various European countries have supported the development of extensive national passenger rail networks, including high-speed rail. Policy focus on rail freight has been lower, with governments generally allocating considerable resources to the development of road networks to support freight mobility. Rail freight operations were also limited by the lack of multimodal infrastructure, and by the fragmentation of cross-border services between European states. Over recent decades, EU legislation has consistently encouraged the creation of an interconnected single EU rail market, and has promoted common standards, such as with respect to signalling, competition and market opening to support passenger and freight rail transport.¹⁰

GLOBAL RAIL TRANSPORTATION SYSTEMS BY TRACK AND TRAIN OPERATIONS

Country	Legal Entity Separation	Strategic Planning	Rail Infrastructure Operations	Train Service Operations ¹²
U.S.	Separated	Separated	Rail network mostly owned and operated by private freight operators.	Freight private. Intercity passenger operations run by government-owned Amtrak.
Japan	Integrated	Integrated	Track and train operations are combined as fully integrated railway companies.	
U.K.	Separated	Separated	Tracks publicly owned.	Rail services franchised to private operators.
Germany	Integrated	Separated	Network is integrated at a holding company level but technically separated into infrastructure manager, station operations and passenger services.	
France	Integrated	Separated	Integrated track and train responsibilities at a holding company level. The infrastructure and operating passenger and freight services are separated.	
Italy	Separated	Integrated	Infrastructure manager and incumbent train service operator legally separated. Private operators provide some rail services for high-speed and commuter rail.	
Netherlands	Separated	Separated	Infrastructure owned and run by government-owned national network	Train operations predominantly run national passenger service operator.
Sweden	Separated	Separated	State-owned infrastructure manager responsible for path allocation, traffic control and track access charges.	Rail services are run by a mix of open access operators and competitively tendered contracts.
Hong Kong	Integrated	Integrated	The majority government-owned railway operator was granted an exclusive franchise until 2057 to operate the integrated railway and to construct and operate any extensions. It also has property-development rights and related-profit sharing.	

Source: DWS, Williams Rail Review (2019), Fitch as at September 2021. This information is intended for informational purposes only and does not constitute investment advice, recommendation, an offer or solicitation. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

⁷ Sidley Austin LLP, "Rail Transport in the USA", March 2019.

⁸ Global Railway Review, "High Speed rail in the United States", 6 May 2021.

⁹ Reuters, August 2021.

¹⁰ "Standardising European railways", Paye, 2010.

¹² Table covers mostly passenger rail.

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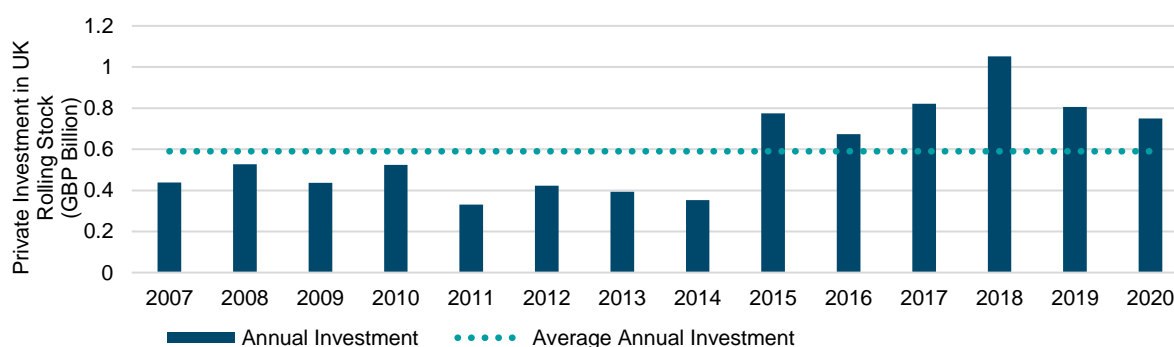
Under the 1991 EU Directive 91/440, the EU sustained a vertical unbundling of the rail network from the provision of railway services.¹³ Under this type of regulatory framework, rail service operators pay a track access charge to the monopolistic rail network operator that needs to guarantee access to different rail service providers to ensure competition. Today multiple ownership models co-exist across Europe, but generally rail networks remain under direct or indirect government control, mostly via state-owned companies operating under concession agreements. Rail services and rolling stock are increasingly managed on a commercial basis, with government subsidies frequently supporting rail service providers, particularly for commuter rail.

As a result of vertical unbundling, private infrastructure investors have increasingly played a role in the financing and operation of rail services in the EU, including rolling stock. Over the last few years, EU policy has increasingly encouraged sustainable mobility with the aim of transitioning international European freight transport from road to rail. Policy has also supported a regulatory reinforcement of common operational network standards to boost international interoperability and leverage more flexibly existing rolling stock fleets. This has incentivised private infrastructure investors to increasingly consider strategies focusing on building diversified rolling stock platforms operating across multiple European markets.¹⁴

The EU rail freight market was fully liberalised in 2007, for both national and international services, with licensed EU companies able to offer freight rail services throughout the EU. The market for international passenger rail services has been liberalised since 1 January 2010, while the market for domestic rail passenger services is regulated by the “4th EU railway package” establishing the general right for railway operators in a Member State to operate passenger services anywhere in the EU. While the liberalisation of commercial passenger rail is well under way, the market is still frequently dominated by domestic incumbents. Nevertheless, in some markets, such as Italy and Austria, commercial operators account for a material portion of domestic passenger market share, focusing mainly on the more profitable high-speed passenger rail services segment.¹⁵

➤ **United Kingdom:** The liberalisation of the British rail network was initiated in 1991 by the EU Directive 91/440 and took place via the Railways Act of 1993. Following the dissolution of government-owned British Rail as a single entity into over 100 separate companies, between 1994 and 1997 rail network ownership was split from train service operations and rolling stock fleet ownership. Since the introduction of the new rail franchising system, passenger train services have been managed by different private operators for national and regional commuter rail franchises, under publicly specified long-term franchise contracts let by DfT¹⁶, with the train fleet owned by private sector rolling stock companies and leased to train operators.¹⁷

PRIVATE CAPITAL INVESTMENT IN RAIL ROLLING STOCK IN GREAT BRITAIN (2007-2020, GBP BILLION)



Source: Statista, 16 July 2021. Past performance is not indicative of future results.

¹³ European Commission, “COUNCIL DIRECTIVE of 29 July 1991 on the development of the Community's railways (91 /440 /EEC)”.

¹⁴ McKinsey, “The liberalisation of the EU passenger rail market”, July 2019.

¹⁵ European Commission, Mobility and Transport.

¹⁶ DfT = Department for Transport.

¹⁷ UK Government, “Current railway models: Great Britain and overseas”.

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The liberalisation of the British passenger rail system has gradually led to a material improvement in service quality standards, with average annual private capital invested in new rolling stock across Great Britain of over GBP 0.5 billion between 2006 and 2020. The 1994 privatisation involved also freight rail, eventually leading to the creation of four main freight rail companies and several smaller freight rail service providers. Following the sharp downturn in passenger demand during the Covid-19 pandemic, in March 2020, train operating companies agreed emergency measure arrangements with the UK government, with franchise agreements temporarily amended to transfer almost all revenue and cost risk to the government. On 20 May 2021, under the Williams-Shapps Plan for Rail, a new public body – Great British Railways – was introduced to integrate the railways by owning the infrastructure, collecting fare revenue, and running and planning the network.¹⁸ The reform is still in a development stage and “does not assume any direct change to the current industry model for procurement of train fleets and maintenance by independent train-leasing companies”.¹⁹

– **Covid-19 and Rail:** The rail system has played a vital role during the Covid-19 pandemic by providing essential freight services, including the delivery of commodities and medical supplies. In Europe, rail freight proved comparatively resilient with a 7% reduction in freight volumes year-on-year in 2020²⁰ and a sharp rebound in 2021. Rail freight is expected play a key role in supporting the economic recovery by responding to rising demand for goods and commodities. Passenger rail, including commuter rail, was materially affected by the pandemic, due to lockdown measures. As lockdowns were largely lifted in mid-2021, we observed a rebound in passenger traffic, but we anticipate recovery to protract into the medium term.

¹⁸ UK Government, “Great British Railways: for the passenger”, 20 May 2021.

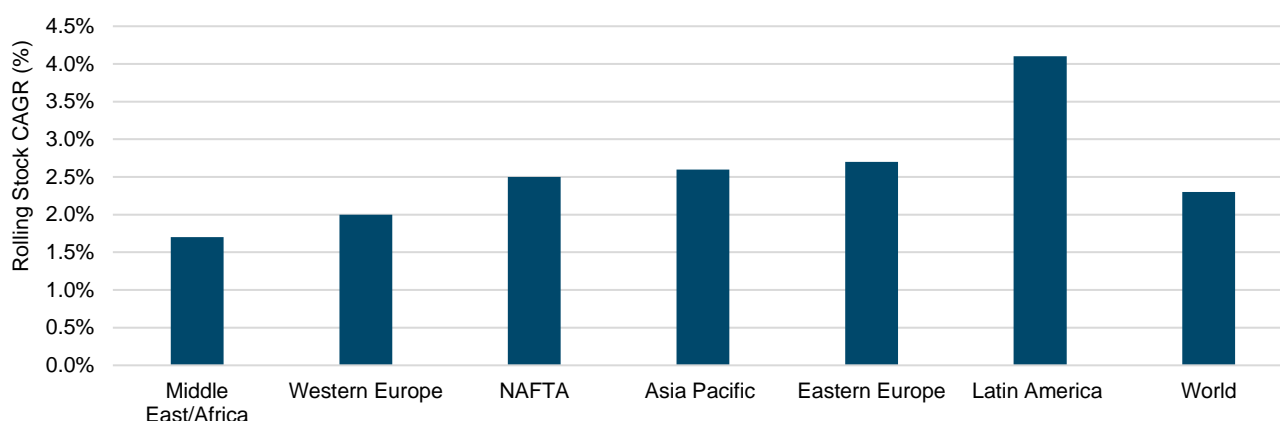
¹⁹ Department for Transport, Williams Rail Review, “Great British Railways. The Williams-Shapps Plan for Rail”, May 2021.

²⁰ IRG – rail, “Impacts of the COVID-19 crisis on 2020 railway markets”, July 2021.

2 / Rolling Stock Growth Drivers

Rolling Stock Market Overview: The value of the global rolling stock market exceeds USD 50 billion, and is projected to reach about USD 65 billion by 2025, driven by an increase in demand for freight and passenger transportation. The bulk of the growth is projected to be in Eastern Europe, Latin America, and Asia, and can be attributed to the ongoing expansion of railway networks. However, European and North American markets are anticipated to continue expanding at a CAGR above GDP growth, driven by demand for more sustainable and energy-efficient modes of transport. Fuelled by the underlying growth of the rolling stock market, we also anticipate the rolling stock leasing market to expand.

ROLLING STOCK CAGR BY REGION (2021-2023F)



Source: Statista, "Rolling Stock industry worldwide", 2021. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Rolling Stock Market Growth Drivers: Several key drivers are expected to support the growth of the rolling stock market globally. A dynamic global trade environment and continued technological evolution in the form of digitalisation and automation of rail represent, in our view, global trends driving the need for new rolling stock capacity, while also having positive effects on safety. Emerging markets are supported by favourable demographics and ongoing urbanisation underpinning rail demand. Developed markets and in particular Europe, are characterised by increased focus on transport decarbonisation, development of common rail standards and liberalisations.

MEGATRENDS IMPACTING RAIL AND ROLLING STOCK (GLOBAL)

Megatrend	Description	Region Impacted
DEMOGRAPHICS	Historically, passenger rail demand has expanded in line with population growth. Growing population underpins passenger volumes in emerging markets. Rising income supports private consumption and freight volumes.	Mainly emerging markets
URBANISATION	Urbanisation is a key driver of light rail and commuter rail passenger growth. Emerging markets with substantial rural population are expected to experience high urbanisation rates, supporting passenger rail demand. In advanced economies with maturing urbanisation rates, the demand for light rail is mainly driven by stricter environmental policies for road carbon emissions and air quality control in city centres.	Mainly emerging markets

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Megatrend	Description	Region Impacted
GLOBAL TRADE	Global trade underpins rail freight. Changing logistics and trade patterns may support rail freight also over long distances. For example, rail container volumes from China to Europe increased by 56% year-on-year in 2020 and are expected to accelerate in the future. ²¹ Rising trade barriers represent a risk that may cap trade growth.	Global
DECARBONISATION	Decarbonisation shapes transport innovation, particularly in Europe. By introducing ambitious targets of reducing greenhouse gas emissions (GHG) by at least 55% by 2030 (vs 1990 levels), ²² European policy makers aim to reduce transport's reliance on fossil fuels, with rail benefitting from the expected road-to-rail shift. Europe aims to increase the modal share of freight rail to 30% by 2030, from 18% in 2020, materially supporting investment needs into new rolling stock capacity. ²³ In the medium term, we expect increased electrification of rail networks and new technologies for locomotion, such as with hydrogen replacing diesel trains to further support rail. In the long term, we may see increased risks of competition from road, driven by road vehicles decarbonisation.	Mainly Europe
LIBERALISATIONS	EU liberalisations support the provision of commercial rail services. New entrants are expected to offer competing rail services or increasingly bid for public service rail contracts, driving demand for rolling stock leasing solutions. ²⁴	European Union
COMMON STANDARDS	The European rail industry is moving towards improved interoperability, i.e., technical compatibility of infrastructure, rolling stock, and signalling across the EU rail network. The European Rail Traffic Management System (ERTMS) is a single European signalling and speed control system that ensures interoperability of the national railway systems. It comprises of the European Train Control System (ETCS), i.e., a cab-signalling system that incorporates automatic train protection, and the Global System for Mobile communications for Railways (GSM-R). ²⁵	European Union
TECHNOLOGICAL EVOLUTION	New technology solutions such as information services, signalling systems, and automation are anticipated to improve demand for new rolling stock. Digitalisation may allow remote real-time diagnostics of rolling stock. Sensors placed on critical train components may detect defects, thereby improving safety and reducing maintenance costs. Automated train operation (ATO) solutions improve rail network capacity and reduce energy consumption via optimisation of processes. ²⁶	Global

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Locomotives Growth Drivers: Locomotives represent an essential component of the rolling stock market, as they provide the motive power of a train. Across Europe, we anticipate an increasing locomotive leasing penetration share, due to the ongoing liberalisation of freight and passenger operations. Locomotives have no payload capacity of their own, as their sole purpose is to move the train along the tracks. Demand for locomotives tends to be particularly predictable. In fact, despite demand for wagons proved relatively stable historically, the number of wagons used for a train may be in theory dependent on how demand for freight may fluctuate, while locomotives remain essential to power the train independently from the amount of train carriages. A classification of locomotives is based on their power source, mainly electricity, or diesel. While European rail networks are largely electrified (54.3% as at 2018 for EU-28),²⁷ and employ

²¹ Moody's, "Seaborne constraints aid growth prospects for Asia-Europe rail container transit", 17 May 2021.

²² European Commission, "Regulation (EU) 2021/1119", 30 June 2021.

²³ Rail Freight Forward, "30 by 2030, Rail freight strategy to boost modal shift", 2020.

²⁴ European Council, "The 4th railway package: measures to improve Europe's railways".

²⁵ European Union Agency for Railways, "European Rail Traffic Management System (ERTMS)".

²⁶ European Parliament, "Digitalisation in railway transport: A lever to improve rail competitiveness", 2019.

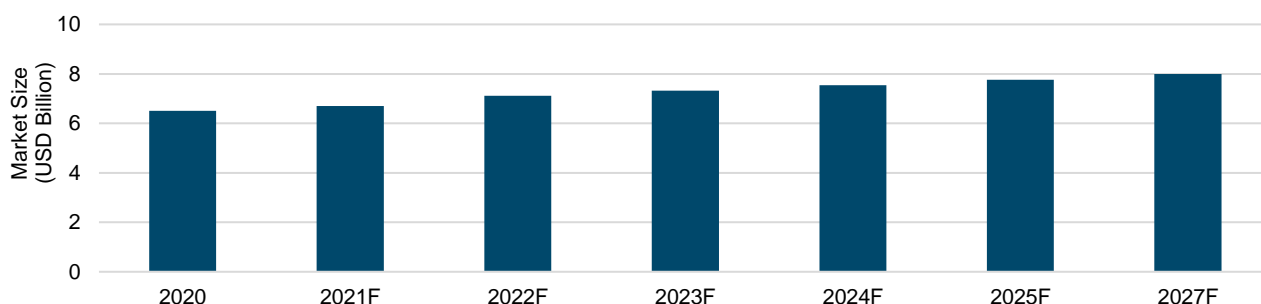
²⁷ Statista, "Percentage of the railway lines in use in Europe in 2018", 2021.

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electric locomotives, most of the North American passenger and freight rail market is powered by diesel locomotives, due to the lack of network electrification.

Some European rail networks, such as in parts of the U.K., may lack complete electrification. In these markets, dual-fuel locomotives may be used, that are capable of flexibly switching between diesel and electricity.²⁸ As decarbonisation policies evolve, we anticipate a more extensive use of biofuels and gas to reduce the emission of diesel locomotives and a gradual electrification of networks to reduce carbon emissions, where deemed economic to do so. In the medium term, as technological evolution progresses, we anticipate new locomotives to use alternative fuels such as biogas or hydrogen, with indications that the first hydrogen powered locomotives may come to the market by 2024.²⁹ The global locomotives market is anticipated to expand, positioning the locomotive leasing rolling stock market for growth over the coming years.

LOCOMOTIVE ROLLING STOCK MARKET (GLOBAL, 2020 – 2027F)

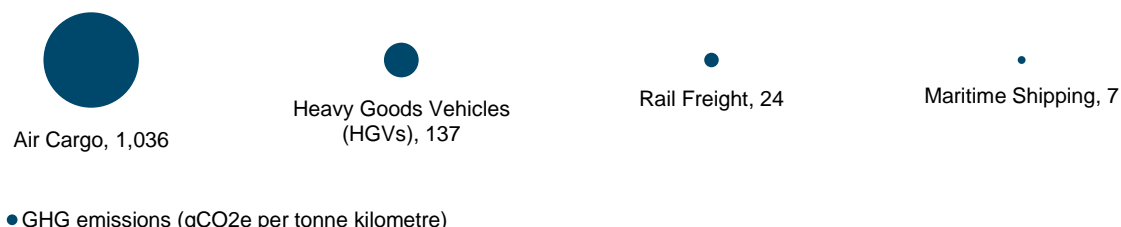


Source: Statista, 2020. Past performance is not indicative of future results. Notes: F = Forecast. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

European Freight Carriages Growth Drivers:

- **Decarbonisation:** Rail freight is estimated to produce five times less GHG emissions than road freight.³⁰ The European Green Deal calls for a substantial part of the 75% of inland freight carried today by road to shift to rail and inland waterways.³¹ As a result, the European Commission predicts rail freight traffic to increase by 50% until 2030 and to double by 2050.³² Rail Freight Forward, a coalition of European rail freight companies, aims to boost the share of freight rail from 18% in 2018 to 30% by 2030.³³

GREENHOUSE GAS (GHG) EMISSIONS FROM TRANSPORT IN THE EUROPEAN UNION (2018, AVERAGE)



Source: European Environmental Agency, based on Fraunhofer ISI and CE Delft, 2020. Past performance is not indicative of future results.

²⁸ European Commission, “Study on the competitiveness of the Rial Supply Industry”, September 2019.

²⁹ Intelligent Transport, “Deutsche Bahn to launch hydrogen train in 2024”, November 2020.

³⁰ European Environmental Agency, “Rail and waterborne — best for low-carbon motorised transport”, 24 March 2021.

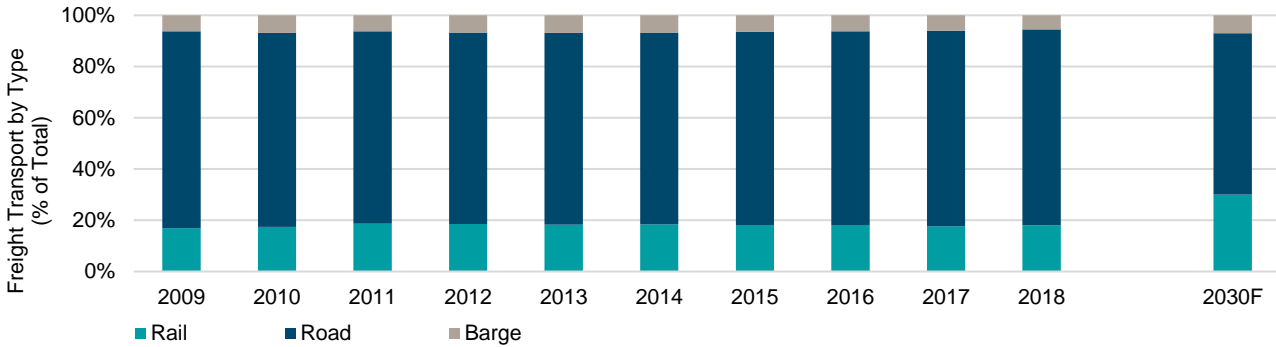
³¹ European Commission, “Sustainable and Smart Mobility Strategy – putting European transport on track for the future”, December 2020.

³² Compared to 2015. European Commission, “Sustainable and Smart Mobility Strategy – European transport on track for the future”, December 2020.

³³ UIC, “European rail freight companies double their ambitions to fight climate change”, 18 December 2018.

The market share of rail freight transport is generally above 25% of the total modal split in North-Eastern Europe, while across most Western European countries such as France and Spain it is below 12%, but we expect it to accelerate meaningfully over the coming decade.³⁴

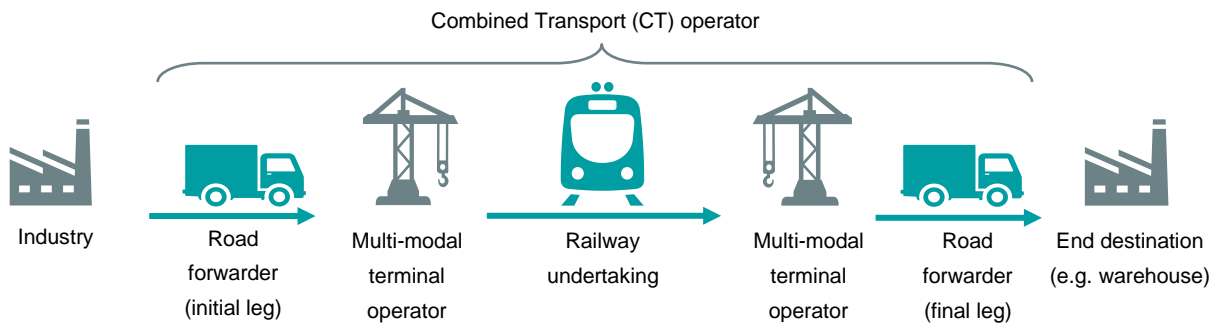
EUROPEAN FREIGHT TRANSPORT MODAL SPLIT (2009-2018, 2030F)



Source: Eurostat, Rail Freight Forward, 2020. Past performance is not indicative of future results. Notes: F = Forecast. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

➤ **Intermodal Transport:** The EU promotes the growth of combined transport, which is a specific form of intermodal transport supporting transportation of goods over long distances by rail (or ship) for the majority of a freight’s journey, while keeping road transport as short as possible. In the Combined Transport (CT) Directive (Council Directive 92/106/EEC),³⁵ the EU defines combined transport as “the transport of goods where the lorry, trailer, semi-trailer, with or without tractor unit, swap body or container of 20 feet or more uses the road on the initial or final leg of the journey and, on the other leg, rail or inland waterway or maritime services where this section exceeds 100 km”.³⁶ The annual growth rate of combined transport in the EU is expected to average 4.7% in the medium-to-long term, driving the demand for rail freight and intermodal wagon rolling stock in particular.

COMBINED TRANSPORT ILLUSTRATION (EXAMPLE)



Source: UIC Freight Department, “2020 Report on Combined Transport”, November 2020. For illustrative purpose only.

³⁴ UIC Freight Department, “2020 Report on Combined Transport”, November 2020.

³⁵ European Commission, “Multimodal and combined transport”.

³⁶ UIC Freight Department, “2020 Report on Combined Transport”, November 2020.

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➤ Freight Growth Drivers and Risks by Rolling Stock Type:

FREIGHT GROWTH DRIVERS AND RISKS BY ROLLING STOCK TYPE (EUROPEAN UNION)

Rolling Stock Type	Key Goods Transported	Key End Industry Growth Rate (Production, Avg., %, 2021F-2035F)		Long-Term Growth Drivers And Risks
OPEN WAGONS	Scrap, wood, solid mineral fuel	Coal & lignite	-2.7%	Diversified nature of end-markets underpins demand fundamentals. Risks: Europe committed to phase out coal power plants by 2030, reducing demand for coal.
		Intermediate goods	1.5%	
HOPPERS	Fertilisers, grain, cement, sand	Basic chemicals & fertilisers	1.1%	Chemicals underpinned by solid demand. Diversified profile of goods transported supports the demand for hoppers. Risks: Cyclical nature of construction industry may result in volatility of some inputs transported by rail. Fertilisers potentially subject to regulatory risks.
		Agriculture	0.5%	
		Ceramic, clay & refractory products	2.9%	
FLAT WAGONS	Metal sheets, building materials	Construction	1.5%	Under EU renovation wave, renovation rates of buildings should double by 2030, supporting the building and construction industry. ³⁷ Risks: Cyclical nature of construction industry may trigger volatility in demand profile.
		General purpose machinery	2.0%	
		Manufacturing	1.9%	
COVERED WAGONS	Palletised consumer goods	Packaged food	1.5%	Diversified product base supports demand profile and long-term growth. Risks: Competition with road transport, particularly for food segment and in case of new green road transport solutions.
		Beverages	1.8%	
TANK WAGONS	Liquid and gaseous commodities	Oil & natural gas	-4.9%	Growth of tank wagons expected to be driven by robust chemical demand and partial shift of chemical industry to Asia. Risks: Long-term structural decline in oil industry anticipated to cap growth in tank segment.
		Chemicals & pharmaceuticals	1.8%	
		Rubber & plastics	1.4%	
INTERMODAL WAGONS	Large containers	Consumer durables	2.2%	Development of large logistics hubs with integrated supply chains support the growth of intermodal wagons. Policy support of multi-modal freight transport should drive further growth. Risks: Onshoring of finished goods production may cap growth. 3D printing is a long-term risk.
		Domestic appliances	2.1%	
		Computers & office equipment	2.5%	
SPECIALISED WAGONS	Refrigerated food	Food	1.5%	Labour supply (e.g., shortage of truck drivers) and fuel price volatility may drive shift from road to rail for refrigerated food. Risks: Road remains the main transport solution for refrigerated products, expected to accelerate further with new green road solutions.

Source: DWS, Oxford Economics, as at September 2021. This information is intended for informational purposes only and does not constitute investment advice, recommendation, an offer or solicitation. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

³⁷ European Commission, "Renovation Wave: doubling the renovation rate to cut emissions, boost recovery and reduce energy poverty", 14 October 2020.

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Passenger Rolling Stock Growth Drivers: Passenger rolling stock includes various types of vehicles, such as multiple units, high-speed rail, metro & light rail, that provide services across different distance ranges and passenger markets segments, each with specific business fundamentals, risks, and growth profiles.

RAIL PASSENGER GROWTH DRIVERS AND RISKS BY ROLLING STOCK TYPE (GLOBAL)

Rolling Stock Type	Long-Term Growth Drivers And Risks
<p>MULTIPLE UNITS</p> <p>Multiple Units are self-propelled passenger carriages that consist of more than one carriage, coupling several similar carriages, and are controlled by one driving cab.</p> <p>Multiple units are classified by their power source: electric multiple unit (EMU) or diesel multiple unit (DMU).³⁸</p>	<p>Global demand for multiple units rolling stock is expected to grow at CAGR 4.5% in 2020-2024.³⁹ replacement of aging fleets and electrification of rail networks underpin demand for zero-emission EMUs across Europe.</p> <p>Decarbonisation policies incentivise electrification and alternative fuels over diesel, yet in the absence of network electrification diesel technology may remain pivotal, particularly across north America for both capacity growth and fleet replacement.</p> <p>Risks: Trains with alternative power sources – such as batteries or hydrogen – with better acceleration than diesel trains, resulting in reduced journey times and increased rail capacity may increase re-lease risk for diesel fleets in the medium term.⁴⁰</p>
<p>HIGH-SPEED RAIL</p> <p>High-speed rail is defined as rail services over long distances operating at a maximum speed above 250 kmph. High-speed rail may provide a high-quality alternative to short-haul flights.</p>	<p>Decarbonisation of air transport and the banning of short-haul flights may result in positive passenger flows into high-speed rail. In France, the government announced its decision to ban short-haul internal flights when there is an alternative train journey of less than 2.5 hours available.⁴¹</p> <p>Since 2000, high-speed rail has been one of the fastest growing areas of global rail networks due to large capacity additions in Asia. China accounts for a large share of high-speed rail developments, with around half of the global high-speed rail pipeline expected in China.</p> <p>Risks: In the long term, new technologies such as maglev⁴² (magnetic levitation) and the hyperloop⁴³ may become financially viable and replace high-speed rail.⁴⁴</p>
<p>METRO & LIGHT RAIL</p> <p>Metro rail refers to high-frequency, high-capacity urban services, often underground or elevated.</p> <p>Light rail refers to tramways and other urban transport systems, most often at street level and offering lower capacity and speed compared with metro rail.</p>	<p>Urbanisation rates drive new metro and light rail projects in emerging markets, with some megaprojects in Europe concentrated in London (Crossrail) and Paris (Grand Paris). In advanced economies, growth is also expected to be driven by cities expansion of metro and light rail networks and carbon emission reduction targets for road transport. Although the impact on urban traffic flows of Mobility As A Service (MAAS) platforms and micro mobility is yet to be fully understood, we anticipate a positive spillover to metro and light rail passenger volumes from improved intermodal mobility.</p> <p>Risks: Covid-19 had a substantial impact on urban transportation passenger volumes during the pandemic. The full recovery of urban passenger traffic may be protracted in the medium term, particularly in countries with robust digital infrastructure enabling remote working.</p>

Source: DWS, IEA "Future of Rail", Statista, as at September 2021. This information is intended for informational purposes only and does not constitute investment advice, recommendation, an offer or solicitation. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

³⁸ The Railway Technical Website.

³⁹ Statista, 2020. Past performance is not indicative of future results.

⁴⁰ Inframation News, 12 October 2020.

⁴¹ Bloomberg, "France Moves to Ban Short-Haul Flights, Paving Way Toward Cleaner Aviation", 13 April 2021.

⁴² Maglev technology relies on a system of coils and magnetic fields that move the train along the track and allows very high speeds. Unlike traditional rail systems, the train carriage does not come into contact with the track. IEA "Future of Rail", 2019.

⁴³ Hyperloop uses an electromagnetic propulsion system operating through a low-pressure tube. IEA "Future of Rail", 2019.

⁴⁴ IEA "Future of Rail", 2019.

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3 / Rolling Stock Infrastructure Fundamentals

Rolling Stock and Infrastructure Strategies: Despite the expectation that traditional infrastructure be “bolted on the ground”, we have observed material interest in rolling stock from infrastructure investors.⁴⁵ Historically, private core infrastructure equity investors have focused on passenger rolling stock deals providing services to train operators, under long-term lease agreements with limited fleet re-lease risk and a transparent regulatory framework, such as the U.K. passenger rail franchise model. These deals focused mainly on long-term contracts with a limited number of high credit quality customers, often directly backed by governments and public authorities, indexation of cash flows to inflation and long-term yield visibility. For this reason, core infrastructure investors focused mainly on countries with mature institutional frameworks such as the U.K., France, and Germany.⁴⁶

Core plus strategies have historically focused on procuring new passenger rolling stock fleets, with greenfield risk mitigated by long-term contracts and a transparent regulatory framework. More recently, we have seen core plus investors acquiring stakes in liberalised, operational locomotive and freight leasing wagons or industrial rail cars platforms, with a diversified customer base and high contract renewal rates supporting yield visibility. These deals were also structured as joint ventures with European incumbents, leveraging combined operational and financial expertise to optimise profitability, while also supporting platform expansion and value creation via active asset management and M&A.

ROLLING STOCK LEASING INFRASTRUCTURE CHARACTERISTICS

REAL ASSETS	Rolling stock constitutes of the physical infrastructure enabling rail transportation. There is a wide variety of rolling stock vehicles, but most vehicles have a long useful life of around 30-40 years or more if appropriately maintained.
ESSENTIAL SERVICE	Passenger and freight rail play an essential role for the functioning of the economy and are a focus of European policymakers supporting a modal shift from road to rail.
MONOPOLISTIC NATURE	Limited number of rolling stock companies capable of supplying a specific fleet on a required route, also given technical and operational requirements, and limited availability of off lease rolling stock. ⁴⁷
HIGH BARRIERS TO ENTRY	Large upfront investment and economies of scale act as barriers to entry. Limited number of manufacturers and long construction times limit supply of new rolling stock. Access to network of depots often difficult for new entrants, limiting competition.
RESILIENT END-USER BASE	High credit quality counterparties often backed by government support for passenger rolling stock. Highly diversified customer base for freight. Diversification across critical industries, such as chemicals, energy, food, agriculture, and consumer goods mitigate risk of demand and freight rate volatility across macroeconomic cycles.
LONG-TERM CASH FLOW VISIBILITY	Long-term contracts for passenger rolling stock (10-15 years). Medium-term contracts (3-10 years) for freight, typically with high renewal rates (ca. 80%) and high switching costs underpinning customer stickiness, cash flow visibility, and reducing re-lease risk. ⁴⁸
INFLATION PROTECTION	Contracts may provide explicit inflation pass-through. Strong ability by rolling stock lessors to pass through cost increases to end-customers via higher lease rates.
ACTIVE ASSET MANAGEMENT	Market provides opportunities for growth, organically, due to ongoing liberalisations and road to rail shift in Europe, or through M&A.

Source: DWS, as at September 2021. This information is intended for informational purposes only and does not constitute investment advice, recommendation, an offer or solicitation.

⁴⁵ IPE, “Is rolling stock infrastructure? Investors debate definition of asset class”, 10 June 2019.

⁴⁶ Moody’s, S&P Global, Fitch, as at September 2021.

⁴⁷ Office of Rail and Road, “Review of Rolling Stock Leasing Market”, as at 28 April 2020.

⁴⁸ Fitch, as at September 2021.

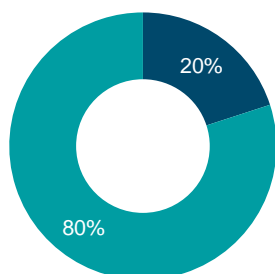
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Rolling Stock Manufacturing: The industry of rolling stock manufacturers is relatively concentrated, and supply is limited, particularly given the high technological expertise, sophisticated machinery and large upfront capital required for construction. Although locomotives manufacturers may sometimes differ from multiple unit train manufacturers, generally the five main global rolling stock manufacturers account for over 70% of the global market share for rolling stock construction, and play a pivotal role for maintenance.⁴⁹ The rolling stock manufacturing process is complex, costly and time consuming, involving a variety of parts suppliers, and with a typical time lag of 3-4 years between signing of contract, design, manufacturing, assembling, testing and delivery. However, time frames may vary materially, ranging from 3-4 years for trains, such as EMUs, to 1-3 years for locomotives, and 12-18 months for wagons. Moreover, the procurement process for new trains is typically complex and it can require more than 18 months to specify design, type and number of vehicles, budgeting and arranging financing.⁵⁰ The structural characteristics of the rolling stock manufacturing market are one of the key drivers supporting the growth of the rolling stock leasing market, particularly for freight.

A Growing Rolling Stock Leasing Market: Over the last two decades, U.K. regulation has incentivised a separation between rolling stock owners and service providers for passenger transportation, contributing to the development of the European rolling stock leasing market. The need to modernise existing fleets – which have an average age of over 25 years across Europe and North America – and a growing passenger and freight rail market have contributed to increase demand for rolling stock leasing services. Moreover, with the rolling stock procurement process requiring dedicated expertise and long lead times, freight operators have increasingly found in rolling stock leasing a solution for flexible fleet management, and a way to externalise non-core business. Increasing cost pressures on incumbent railway undertakings and industrials and falling financing costs have also facilitated the outsourcing of rolling stock and preference for leasing over ownership. We have also observed several sale and leaseback transactions over the past years that allowed incumbents and industrials to gain flexibility and reduce capital intensity.

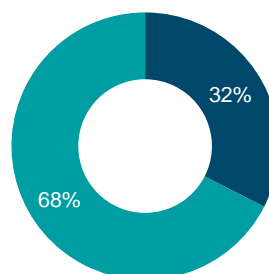
SHIFT TOWARDS LEASING IN FREIGHT TRANSPORTATION (ESTIMATES, AVERAGE, 2004 VS 2019)

FREIGHT RAIL CAR OWNERSHIP (2004)



■ Lessors ■ Incumbents, industrials

FREIGHT RAIL CAR OWNERSHIP (2019)



■ Lessors ■ Incumbents, industrials

Source: DWS, UIP, June 2021. Past performance is not indicative of future results.

Rolling Stock Lessors Business Model: The business model of rolling stock lessors is complex and may include a combination of different activities. Given the sizeable economies of scale achievable, the rolling stock lessor market is generally relatively concentrated. For example, as of January 2021, six lessors accounted for about 76% of the total freight rolling stock market share, with ca. 10%-12% market share each, while the remaining 24% was distributed among smaller lessors. In Europe, the five largest players, including two large international North American and European lessors and spin-offs from European national incumbents, accounted for ca. 75% of the total freight rolling stock market share. In the U.K., following the rail privatisation process, regulation has led to the constitution of three main rolling stock companies

⁴⁹ SCI, "Worldwide Rolling Stock Manufacturers", 2018.

⁵⁰ Railway Technical Website, "Rolling Stock Manufacturing", 1999.

for passenger rail, each owning fleets in the range of 3,500 – 4,500 coaches, and several additional players with materially smaller fleets.

- **Procurement and Financing:** Lessors procure and purchase locomotives, rail cars, EMUs⁵¹ and DMUs⁵² from manufacturers. The purchase agreement normally reflects the technical specifications required by the regulation and incorporates the manufacturer's contractual obligations. The purchase price is generally payable by the lessor in stage payments that depend on certain milestones, from order to delivery. While full equity financing may be a viable solution for larger lessors, leasing platforms managed by private infrastructure investors generally focus on pre-funding capex required for rolling stock purchase by tapping into bank or institutional investors' financing. Manufacturers may be required to post some collateral upon order, generally up to 10% of the purchase price, and often in the form of an advance payment bonds, with lessors able to call collateral in case of contract underperformance, such as with delays in delivery.
- **Lease Payments:** After procurement, rolling stock is leased by a lessor to a railway undertaking (a 'lessee'), such as a train operating company or a rail freight operator, in exchange for a periodic lease payment. The lease payment reflects the provision of rolling stock, and the range of additional services eventually provided by the lessor. Based on the type of lease agreement, lessors may, for instance, be responsible for servicing and maintaining rolling stock to ensure operational efficiency and safety standards, either directly or via ad-hoc O&M contracts with manufacturers.
- **Lease Rate:** The lease rate is a key metric used in the rolling stock leasing industry, and represents the amount paid by the lessee to the lessor for using rolling stock. Lease rates tend to be stable for passenger rolling stock leasing, given the long-term nature of contracts. Lease rates for freight rail may prove more volatile, and the level of demand-supply imbalance of freight rolling stock represents one of the key variables influencing freight lease rates, particularly for spot-hires. Different wagon types may be characterised by a specific supply/demand dynamic and may be influenced by freight volumes for specific goods and by the level of rolling stock surplus in the market. With newer vehicles generally being more expensive than older vehicles, vehicle specifications may also play a key role in determining lease rates. Specialised stock is generally leased at a higher price than vehicles that move a larger variety of goods. The level of equipment fitted to vehicles may also influence lease rates, with enhancements carrying a premium.
- **Operating Lease Agreements:** Operating lease agreements reflect the nature of the lessee's business requirements. The most common type of leasing agreement is the 'dry lease', pursuant to which the lessee assumes responsibility for the maintenance of the rolling stock during the term of the lease. Upon expiry of the lease period, the train operator is obliged to return the asset to the lessor and has no further legal obligation. A 'soggy lease' is less common than a 'dry lease' and requires the lessor to assume responsibility for part of the maintenance, with the lessee responsible for the rest. Typically, the lessor may be responsible for heavy maintenance, while the lessee may be responsible for the ongoing maintenance. In a 'wet lease' the lessor assumes responsibility for all the maintenance of the rolling stock. While rolling stock leasing arrangements may vary materially for passenger rail across different markets, generally locomotive and freight leasing arrangements tend to adopt 'wet lease' models.⁵³
- **Active Fleet Management:** Leasing of passenger rolling stock is generally provided on a long-term basis. However, lessors may be exposed to re-lease risk before an asset fully depreciates or ahead of the end of its useful life. Technical standards and rolling stock interoperability are key factors determining the ability of a lessor to re-lease assets across other franchises, markets and geographies. The relatively high age of existing passenger rail fleets operating across Europe is, in our view, a factor supporting the ability of lessors to re-lease fleets of relatively limited age. Locomotive or freight rolling stock leasing may involve more dynamic fleet management, with lessors actively involved in maximising fleet utilisation rates, repurposing and re-leasing vehicles, selling rail cars to optimise value creation or scrapping stock at the optimal time.

⁵¹ Electric multiple unit trains.

⁵² Diesel multiple unit units.

⁵³ Office of Rail Regulation, "Understanding the Rolling Stock Costs of TOCs in the UK", January 2015.

Rolling Stock Leasing Key Financial Metrics:

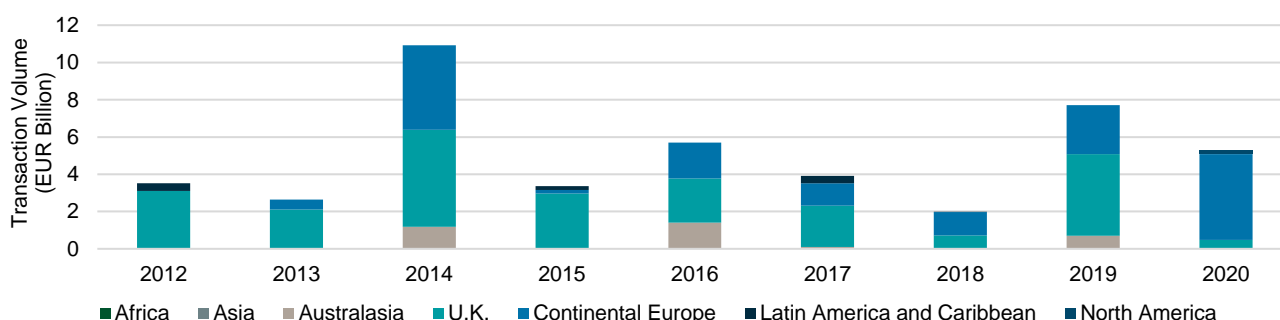
KEY FINANCIAL METRICS OF ROLLING STOCK LEASING COMPANIES (ESTIMATES)

REVENUES	We estimate average revenue growth of global rolling stock lessors in the range of 4-5%, but growth rates may be further supported by the possible increase in sale and leaseback activity of incumbents post Covid-19. Growth may vary substantially by region, strategy, type of fleet and lease agreement. Passenger rolling stock revenues are typically supported by relatively long leases and are often linked to inflation. Freight and locomotives rolling stock leases may have shorter contracts, but customer diversification and a staggered contract renewal profile tend to underpin yield. Lessors may see stronger revenue growth by benefiting from active asset management and M&A.
PROFITABILITY	EBITDA margins can be estimated in the range of 40-60%, a level supportive of infrastructure strategies, ⁵⁴ and may vary based on several factors such as type of lease agreement, rolling stock and fleet age. Maintenance costs may vary significantly based on fleet age, with newer fleet requiring less extraordinary maintenance.
LEVERAGE	Rolling stock lessors typically have a leverage profile of around 5.5x-7x (net debt-to- EBITDA). Higher leverage levels are typically associated to leasing services with long-term revenue visibility that have historically also attracted competitive IG infrastructure funding packages.
DIVIDEND YIELD	Dividend yield is estimated in the range of 4.5-6.5%, with strategies focusing on leasing services with stable fleet utilisation rates or long-term cash-flow predictability, supportive of dividend yields of over 5.5%.

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Historical Transaction Activity: Rolling stock represents a relatively niche market for private infrastructure investors, with global average transaction volumes of around EUR 5 billion per year representing about 2% of global annual transaction activity. The European market has historically been the most active, supported by liberalisations of the rail sector. We have observed an acceleration in transaction activity since 2010s due to privatisations, sale and leaseback and greenfield transactions. Historically, the U.K. accounted for the largest volume of transactions in the rolling stock leasing market, supported by the creation of rail franchises. However, as liberalisations across Europe have accelerated, activity in continental Europe has exceeded U.K. transaction volumes.⁵⁵

HISTORICAL ROLLING STOCK EQUITY TRANSACTIONS BY REGION (EUR BILLION, 2012-2020)



Source: InframationDeals database, as at July 2021. Past performance is not indicative of future results.

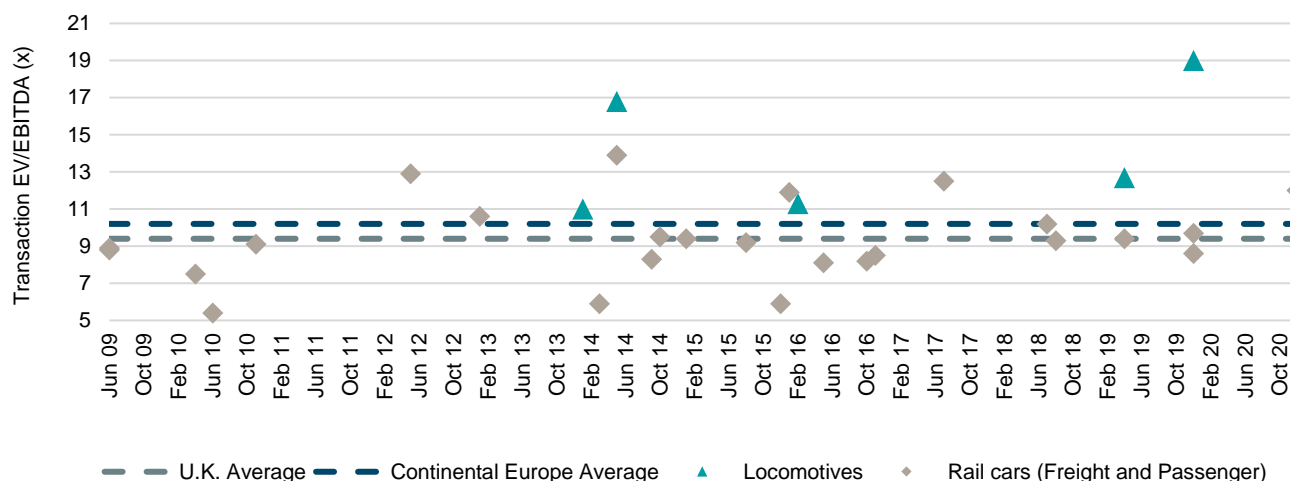
⁵⁴ Based on Bloomberg, as at July 2021. Past performance is not indicative of future results.

⁵⁵ Based on InframationDeals database, as at July 2021. Past performance is not indicative of future results.

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Historical Pricing: Given the relatively limited size of the rolling stock leasing market for private infrastructure investors, data availability on deal entry prices is relatively limited. In the period between 2009 to 2020, the average rolling stock EV/EBITDA transaction multiple in Europe was at around 10x, with a substantial dispersion of multiples around the average. On average, U.K. transactions traded in the range of 8-9x EV/EBITDA. We could not identify any meaningful trend in the dynamic of entry valuations compared to macroeconomic and market cycles, as entry prices for rolling stock transactions may vary substantially based on deal structure and underlying business growth assumptions, positioning sector investments for potential alpha generation.

ROLLING STOCK EV/EBITDA TRANSACTION MULTIPLES (EUROPE, X)



Source: DWS database, as at July 2021. Past performance is not indicative of future results.

Return Expectations: Rolling stock leasing deals may support both core and core plus private infrastructure investment strategies. We estimate entry returns for European core rolling stock deals focusing on long-term cash flow visibility and indexation of revenues to inflation to be in range of 7-9% IRR (levered, 10-year). For European core plus private infrastructure equity strategies focusing on assets providing a combination of yield and capital appreciation, we estimate levered entry returns to be in range of 11-13% IRR (levered, 10-year).

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