



# Railway Gazette

## INTERNATIONAL



# Building resilience

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A recent relaying project at Stockholm Central station was facilitated by the use of plug-and-play modular turnouts with concrete bearers supplied by Vossloh Nordic Switch Systems. The company is working closely with infrastructure manager Trafikverket to digitalise the design and maintenance of Sweden's national rail network to improve both capacity and reliability (p26).

## CONTACT

Railway Gazette International

1st Floor, Chancery House, St Nicholas Way, Sutton, SM1 1JB, Great Britain

Tel +44 20 8652 5200

editor@railwaygazette.com

See p50 for full details



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## INFRASTRUCTURE

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- Flexible wagons to refresh maintenance fleet** GB Railfreight, Wascosa and Greenbrier are supplying innovative wagons for use on Network Rail's infrastructure maintenance trains
- A change of track** Advances in turnout design, greater use of digital technologies and a strong focus on performance are helping to improve the capacity and reliability of Sweden's rail network
- Connected workers inspect catenary** A novel workflow tool has been trialled by Network Rail on the East Coast Main Line to combine the benefits of monitoring overhead lines using drones with the elimination of paper-based processes

- Snow blowers await the winter season** Swiss specialist Zaugg has supplied a batch of snow clearance machines for use by Swedish infrastructure manager Trafikverket

## NORTH AMERICA

- Generational change will transform travel** A multi-billion dollar investment programme will change the way people use public transport in Canada's most populated area, with GO Expansion bringing frequent all-day electric train services to routes across the Toronto region
- Are hydrogen locomotives the next big thing?** Several US and Canadian railroads have teamed up with suppliers to investigate the potential for hydrogen as an alternative to diesel traction for heavy freight operations. Dave Lustig investigates
- Attracting shippers to freight rail** AAR subsidiary Railinc has developed an intuitive software platform aimed at making it easier for freight shippers to choose rail over other modes

## IN FOCUS

- Making more use of urban railways** Better utilisation of under-used main line railways is seen as key to developing cost-effective urban and suburban rail networks that can relieve road congestion in Brazil's fast-growing cities. Benjamin Zelki investigates
- Accelerating the national rail investment programme** Managing Director of Rete Ferroviaria Italiana Vera Fiorani and Enrico Giovannini, Minister of Infrastructure & Sustainable Mobility, have confirmed plans to meet sustainability targets and accelerate investment in railway infrastructure as part of Italy's post-Covid economic recovery programme. Christian Scasso reports
- Capacity directive could be a real game-changer** With legislation being considered to enhance capacity on Europe's rail network, Murray Hughes asks Forum Train Europe Managing Director Edgar Schenk and Senior Project Manager Sebastian Carek how this would improve rail's ability to compete against road and air

## SIDETRACK & CONTACT

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## IMAGE OF THE MONTH Norway



As a pilot for the renewal of Norway's long-distance passenger train fleet, state-owned leasing company Norske Tog is retrofitting reclining seats to eight coaches used on overnight services, funded through an Nkr80m government grant.

Borcad has supplied 180 seats that recline by 45° for six B5 vehicles used by Go-Ahead and SJ Norge on the Sørlandsbanen, Dovrebanen and Nordlandsbanen. These are being installed by Mantena at the Nyland workshops near Oslo. Georg Eknes Industrier is supplying 46 flat-bed seats for two B7 coaches to be trialled on Vy Tog's Oslo – Bergen route later this year.

'The recliners are a response to what many are now demanding: eco-friendly travel by rail without compromising on comfort', explained Norske Tog CEO Øystein Risan. 'These are not off-the-shelf products. They have been custom-ordered to our own specifications.'

# COMMENT

Nick Kingsley, Executive Editor, Railway Gazette International

nicholas.kingsley@railwaygazette.com



## The need for high speed

While cinema-goers across the world have flocked to see Hollywood actor Tom Cruise reprise his famous role as fighter pilot Maverick in *Top Gun* this summer, in the real world modal shift from air to rail in Europe seems finally to be gaining meaningful momentum.

On August 1, Deutsche Bahn becomes the first Intermodal Partner in the Star Alliance group of airlines, which includes Lufthansa, United and Turkish. Member airlines will be able to include DB's ICE trains as flight numbers in their booking engines, with customers benefiting from combined tickets for connecting journeys, points or miles from through bookings, and priority baggage handling at Frankfurt Airport.

DB's accession to the alliance is arguably a case of pushing at an open door. Cross-Channel high speed operator Eurostar said on July 18 that it had seen a 'robust return of business travel' in the first six months of 2022, reaching 70% of 2019 levels, while its managed corporate accounts have increased by 40% between 2019 and 2022. And in mid-July, would-be travellers were reporting all Eurostar services being sold out days ahead, even at top-priced premium fares.

Any significant shift away from short-haul aviation poses profound questions about how quickly the rail sector can grow capacity to handle the extra business successfully. While the romantic renaissance of overnight trains across Europe has captured the imagination of rail advocates, it must be recognised that this is a low-volume operation with high fixed costs. Meanwhile, as the European Court of Auditors pointed out in 2018, the continent does not yet have a truly international high speed network able to offer competitive journey times with which to attract passengers from air (RG 8.18 p25).

The urgent need to address this challenge was the subject of a conference in Brussels on July 11, entitled — with a nod to *Top Gun* — 'The Need for High

40%

increase in managed corporate accounts at Eurostar between 2019 and 2022

Speed'. Organised by the Community of European Railways & Infrastructure Companies in partnership with České Dráhy and Správa Železnic, it marked the start of the Czech Republic's six-month presidency of the EU Council and sought to set the scene for the development of a pan-European high speed network.

Czech infrastructure manager SŽ is developing plans for a new line between Praha and Dresden to relieve congestion on the existing cross-border route, and for three other high speed lines between the country's principal cities. Transport Minister Martin Kupka told attendees that this would place the Czech Republic at the heart of a more coherent European high speed network. 'High speed rail represents the future of European travel', he insisted. 'The development of high speed lines by revising the TEN-T regulation is one of our main transport priorities during the presidency. We must overcome "national high-speed islands" and build a truly pan-European network.'

SŽ Director-General Jiří Svoboda explained that a key element in the business case for the proposed lines was the urgent need to release capacity on the country's existing network for more local, regional and freight trains. This emphasis was warmly welcomed by Kristian Schmidt, Director of Land Transport at DG Move, who suggested that historically not enough had been made of such benefits in the business cases for other new line projects.

Rethinking the appraisal of high speed rail proposals needs to be

addressed in a forthcoming study into 'Smart & Affordable High-Speed Services in the European Union', which was launched at the Connecting Europe Days in Lyon on June 29 (p9). This wide-ranging study will aim to identify the most significant benefits of completing a network connecting Europe's capitals and major cities.

Signing an MoU supporting the study, CER, AllRail, UNIFE and the Europe's Rail Joint Undertaking explained that it is intended to foster a 'radical transformation' of the rail system to deliver on European Green Deal objectives. Walter Goetz, Head of Cabinet for European Transport Commissioner Adina Vălean, reminded the signatories that 'our Sustainable & Smart Mobility Strategy aims to double high speed rail traffic by 2030 and triple it by 2050'. But he added a warning. 'I see a central role for rail in our future sustainable transport system, but rail must also fulfil its part in becoming a more attractive choice by getting more efficient, cost-effective and innovative.'

Europe's Rail Executive Director Carlo Borghini committed to presenting the first outcomes of the research by the end of this year. Meanwhile, CER is urging policymakers to back proposals for 10% of the revenues from the next iteration of the EU Emissions Trading Scheme to be allocated to funding sustainable transport infrastructure, notably railways.

But nobody should be under any illusions about the scale of the task: planning, approving and building new infrastructure remains a fraught task. And often, as Svoboda acknowledged, there is very mixed public backing, especially in the localities where construction is planned.

That said, the grim heatwave scorching much of Europe this summer may serve to reiterate just how urgent is the need to combat climate change. Can European countries muster the political will to decarbonise transport and put rail at the backbone of green mobility? The answer will surely become clear over the next 12 months.

“Any significant shift away from short-haul aviation poses profound questions about how quickly the rail sector can grow capacity”

## Briefing

**Transnet Freight Rail** has signed a through-running agreement with Mozambique's CFM, under which pairs of Class 43 diesel locos will haul trains of export chrome and ferrochrome from Belfast to Maputo, cutting transit times by 12 h and boosting throughput from 15 to 21 trains/week.

India's National Capital Region Transport Corp has selected **Deutsche Bahn International Operations** to operate and maintain the 82 km Delhi – Ghaziabad – Meerut Regional Rapid Transit System. The 12-year contract is valued at more than €100m.

**Virginia Railway Express** has completed a \$120m green bond sale to support its \$195m contribution towards the state's \$4bn Transforming Rail in Virginia programme, including the purchase of a disused CSX line in the Interstate 95 corridor. Maturing in 2052, the bonds are backed by fuel tax revenues from the Commuter Rail Operating & Capital Fund.

**Estonia** has agreed to apply CIV rules for international passenger traffic and the CIM equivalent for freight to its entire network with effect from June 16. The country acceded to COTIF in 2009 but the uniform rules initially only applied to the 273 km section of Pan-European Corridor I from Tallinn to Tapa and Valga on the border with Latvia.

Belgium's Minister of Mobility Georges Gilkinet has begun consultation over the next 10-year operating contracts for state-owned passenger operator **SNCB** and national infrastructure manager **Infrabel**, which envisage that by 2032 there should be 10% more trains than today, carrying 30% more passengers. Around €3.8bn in capital investment is envisaged, allowing annual operating support to be reduced from €1.2bn to €982m per year over the 10-year period.

# Consultation starts on *Bahn 2050* programme

## SWITZERLAND

The Federal Council has begun consultation on detailed proposals for a further long-term programme of investment in the Swiss rail network. *Perspektive Bahn 2050* emphasises the development of short and medium distance passenger services and proposes significant changes to current projects, including full double tracking of the Lötschberg Base Tunnel.

Enhancement of the existing network to allow more intensive use is seen as preferable to starting more major projects, explained Transport Minister Simonetta Sommaruga. Consultation is due to conclude in October, and will feed into legislation to be passed in 2026.

Driving the council's deliberations is the need for more action to combat climate change and achieve net zero emissions by 2050. Whereas previous investment was geared mainly towards easing bottlenecks and enhancing regular-interval services, a focus on local and regional traffic is seen as offering the highest potential for increasing rail's market share.

Within an overall target of increasing usage of public transport from 26 billion passenger-km to 38 billion by 2050, the Council has outlined a range of measures for *Bahn 2050*.

Specific proposals include the expansion of S-Bahn services, the development of new cross-city lines, and better links from

small or middle-sized towns to the major conurbations. Stations should be developed into multi-modal transport hubs, including cycling and car-sharing. The plan also envisages targeted reductions in long-distance journey times to make rail more competitive with road, and more frequent international passenger services with good connections.

Measures for freight traffic include more intermodal terminals along the principal north-south and east-west corridors, rail-connected logistics facilities in large and medium-sized cities, and targeted capacity improvements.

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## Etihad Rail signs passenger contract

### UAE

Etihad Rail has awarded a 1.2bn dirham contract to CAF for the design, supply and maintenance of push-pull passenger trainsets to operate on its national rail network. The deal announced on June 23 was signed by Etihad Rail CEO Shadi Malak and the CEO of CAF's rolling stock business Josu Imaz in Sakamkam, where the first station is to be built in Fujairah.

Running at up to 200 km/h, the diesel trainsets will offer journey times of 50 min from Abu Dhabi to Dubai, 50 min from Dubai to Fujairah and 70 min from Abu Dhabi to Al Ruwais.

Designed to European standards, the trains will be equipped with 'the latest cutting-edge technologies' to suit the UAE's topography and climate. Each will have more than 400 seats in first, business and economy classes. Passenger amenities will include infotainment systems, charging points, food and drinks, 'ample' legroom and 'advanced' air-conditioning.



Malak said CAF had considerable experience of manufacturing trains for the Gulf region; the company has previously supplied push-pull trains to Saudi Arabia. The Etihad Rail fleet is to be manufactured in Spain, but the final number of vehicles and the delivery dates have not yet been confirmed.

## Padma bridge inaugurated

### BANGLADESH

The 6241 m long rail and road bridge over the River Padma was inaugurated by Prime Minister Sheikh Hasina on June 25. Intended to improve links between Dhaka and the southwest of the country, the bridge was designed by

AECOM and built by China Major Bridge Engineering Co. Built at a cost of US\$3.86bn, it carries a four-lane road on the upper level and a 1676 mm gauge railway below.

The 169 km Padma Bridge Rail Link under construction between Dhaka and Jashore is expected to open in 2024, connecting the

isolated Faridpur – Bhanga and Rajbari – Bhatiapara Ghat railways in the southwest to the capital.

The 392bn taka railway is 85% financed by a loan from China's Exim Bank, with the Bangladesh government contributing 15%. Main contractor is China Railway Engineering Corp.

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## Briefing

The UK government has approved the final business case for the **East Coast Digital Programme** to deploy ETCS Level 2 on 160 km of the East Coast Main Line between London's King's Cross and Stoke Tunnel, south of Grantham, releasing a further £950.5m tranche of funding towards the total cost now estimated at just under £2bn.

Lithuanian freight operator **LTG Cargo** has signed a co-operation agreement with the KTZ Express intermodal subsidiary of **Kazakhstan's** national railway aimed at developing transport along the Trans-Caspian corridor, and an agreement with Eurasian Vector for the transport of metal alloy from Kazakhstan to the port of Klaipėda. LTG Cargo will also provide locomotives to Kamkor to support the modernisation of the 233 km Bender (Tighina) – Basarabeasca – Giurgiulești line in Moldova.

Liberty Development Partners has acquired US Class III railway **CMC Railroad** and the Gulf Inland Logistics Park near Dayton, Texas, using a \$66.5m loan from Trez Capital to fund the acquisition and launch a project to turn the park into a manufacturing, distribution, storage and transport hub.

The German *Land of Thüringen* has directly awarded **Erfurter Bahn** a contract to operate Zeulenroda – Hof passenger services until December 2024. This aligns the end dates of the contract with that for the Gera – Zeulenroda service, to enable a competitive tender for operation of the through route from December 2024.

Canada's National Trade Corridors Fund has awarded C\$4.4m for the University of Calgary to study current and future permafrost conditions along the **Hudson Bay Railway** to Churchill in Manitoba. This will support the development of strategies to ensure the safety and resilience of the railway, described by Minister of Northern Affairs Daniel Vandal as 'a critical transportation, supply and tourism link for communities along the route'.

## Cross-city tunnel links high speed networks

### SPAIN

The 7.3 km cross-city tunnel between Madrid Atocha and Chamartín to integrate the 1435 mm gauge high speed lines to the north and south of the Spanish capital was finally opened on July 1. Through trains no longer need to use gauge-changers at Atocha and Chamartín, reducing journey times by up to 20 min.

Under construction since 2010, the tunnel was expected to open in 2013; the final cost has risen from €206m to €338m. In the longer term, a low-level station with four tracks and two island platforms is to be built under Atocha, but contracts for this have not yet been awarded.


The scheme was subsequently expanded to include four-tracking between Atocha and Torrejón de Velasco where the Levante and Sevilla lines diverge, at a cost of €734m. 



Photo: Miguel Ángel Laserna

## Serving Cairo's new cities

### EGYPT

The 68.8 km first phase of Cairo's Capital Train electric railway was inaugurated by President Abdel Fattah Al Sisi on July 3, with passenger services starting the following day.

Starting from an interchange with Cairo Metro Line 3 at Adly Mansour, the 'light rail' line runs east through New Heliopolis City to a junction at Badr. One branch turns north to Knowledge City in 10th Ramadan City, and the other runs south to Arts & Culture City


in the New Administrative Capital. There are 12 stations.

The second phase will extend the NAC branch by 18.5 km and four stations, while the third will add 16 km and three stations to serve the centre of 10th Ramadan City.

The railway has been built using Chinese finance under a US\$1.24bn contract awarded by National Authority for Tunnels to China Railway Engineering Corp and AVIC International in 2017. TSO and Orascom Construction were awarded a US\$112.5m sub-contract for tracklaying, while

CASCO has supplied the CBTC.

CRRC Qingdao Sifang has delivered 22 'sand-resistant' six-car EMUs and will maintain them for 12 years. The 120 km/h trains can each carry 2 222 passengers.

The 103 km network is being operated and maintained by RATP Dev Mobility Cairo under a 15-year contract with a five-year extension. It is projected to carry 340 000 passengers/day when fully operational. 



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## Taklimakan loop completed

### CHINA

The 825 km Hotan – Ruoqiang line in the Xinjiang Uygur Autonomous Region has been opened for revenue service, completing a 2769 km railway ring around the Taklimakan desert.

The non-electrified single-track line has 22 stations, serving towns between the Tarim Basin and the Altun Shan mountain range. Designed for 120 km/h operation, it can accommodate trains of up to 850 m and 4000 tonnes.

★ The 424 km Xiangyang – Wanzhou section of the Chongqing – Zhengzhou high speed line and the 195 km Zhengzhou – Puyang section of the Zhengzhou – Jinan corridor were opened on June 20. Beijing Fengtai station reopened on the same date following a multi-year modernisation, and speeds on the Beijing – Wuhan PDL were increased from 310 to 350 km/h.

The Xiangyang – Wanzhou line has 57 tunnels, including 11 between 10 km and 19 km in length. Its opening has reduced Chongqing – Zhengzhou journey times from 8 h to 4 h 23 min, putting Chongqing within 7 h of the capital. 


## Private operator leases hotel trains

### TURKEY

Private operator Sun Tren has agreed to lease two Talgo locomotive-hauled hotel trains from RENFE for use on a luxury tourist service linking Istanbul with Cappadocia. The joint venture of Japan's HIS Global travel agency and Turkey's Sun Group is targeting 'high-end' Japanese tourists, and hopes to carry 200 000 passengers/year.

Brokered by the Turkish government's Investment Office, the lease of the Talgo VII sleeping car trains runs for two years, with options for further extensions. The variable gauge trainsets can run at up to 220 km/h. They offer high class cabins with beds, televisions, toilets and showers. Each 20-car set is expected to make 300 trips totalling approximately 285 000 km per year.

Sun Tren is currently negotiating a contract with Talgo for their maintenance.

The Spanish national operator said the agreement opened the door to possible future operations in Turkey, which is 'in full expansion with numerous development plans including the high speed market'. 



# High speed funding finalised

## USA

California Governor Gavin Newsom has allocated \$4.2bn in his annual state budget to complete the Initial Operating Section of the high speed line under construction in the Central Valley, as part of a \$14.8bn package of rail and public transport investment.

This will enable California High Speed Rail Authority to finalise a high speed rail interim service

line between Merced, Fresno and Bakersfield, a 270 km section of the 1 300 km network envisaged in 2009. Procurement of rolling stock and railway systems is expected to start in the coming months.

The programme has faced criticism that the IOS would serve neither Los Angeles nor San Francisco, as envisaged in the authority's 'Bay to Basin' vision. However, on June 10 CHSRA issued a final environmental impact statement

for the 69 km between San Jose and San Francisco, which would largely be shared with the Caltrain commuter rail corridor now being electrified. High speed trains would use an 'interim station' at 4th & King in San Francisco until a connection could be built to the proposed terminus at Salesforce Transit Center. An interchange with BART at Millbrae would provide access to San Francisco International Airport. 📍

## Contracts renegotiated

### NORWAY

National rail authority Jernbanedirektoratet has renegotiated its train operating contracts with Go-Ahead Norge, SJ Norge and Vy Tog to reflect changed economic conditions following the coronavirus pandemic.

The Lot 1 Sør, Lot 2 Nor and Lot 3 Vest contracts all came into force before the outbreak of Covid-19, which led to a collapse in ridership over two years, and created significant uncertainty about future travel patterns. The renegotiated contracts which apply from July 1 specify a train service 'that is at least as good as today', while accepting that committed improvements in the original contracts can only be introduced when ridership has recovered. Financial terms have been 'adapted' to reflect the lower travel volumes and ongoing uncertainty.

According to Director of Passenger Traffic Agreements Hans Henrik Kristensen, delivery obligations have been amended to reduce the operators' costs and give them more flexibility to grow revenue. The operators will receive a bonus for recovering revenue to pre-pandemic levels, and smaller bonuses for efficiency improvements. Additional compensation is envisaged to cover the increase in energy prices as a result of the conflict in Ukraine. 📍

# Grants back cross-border links

## EUROPE

The European Commission has selected 135 transport projects as eligible for co-funding grants totalling €5.4bn, under the latest Connecting Europe Facility call for proposals, out of 399 applications.

The awards were announced on June 29, during the Connecting Europe Days event in Lyon. The Commission reiterated its objective of completing the TEN-T core network by 2030 and the comprehensive network by 2050, helping

the EU to deliver its climate objectives under the Green Deal. 'These challenging times have reinforced the importance of our transport sector,' explained Commissioner for Transport Adina-Ioana Vălean.

Funding has been allocated to various cross-border rail projects, including the Fehmarn Belt tunnel and Rail Baltica. A memorandum of understanding was signed to support the reopening of the 23 km cross-border route between Berezyne in Ukraine and Basarabasca in Moldova, which

has been out of use for 25 years (RG 12.21 p46).

The Commission used the event to call for proposals for pilot cross-border rail services as part of its Action Plan to boost long-distance passenger trains. 'We need more cross-border rail connections; they must be faster and more affordable,' said Vălean. 'Today, cross-border rail still faces obstacles to the operation and introduction of new services. These pilot projects are part of our strategy to break down the remaining barriers.' 📍

# MRS invests as concession renewed

## BRAZIL

The Federal Audit Court has approved the early renewal of MRS Logística's concession to operate the 1643 km broad and mixed gauge network serving the states of Rio de Janeiro, Minas Gerais and São Paulo, paving the way for the operator to invest R\$10bn in enhancing the network.

The concession was due to expire on November 30

2026, but will now run to the end of 2056. MRS Logística handles around 20% of Brazil's export cargo, including iron ore, steel, cement, bauxite, coal, agricultural produce and containers. Much of the planned investment will be used to expand capacity and improve the flow of products to the port of Santos.

In the São Paulo area, rail freight flows will be segregated on routes shared with CPTM suburban passenger services.



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## Briefing

A 2.7 km western extension of **Warszawa** metro Line M2 from Ksiecia Janusza to Bemowo was opened by Mayor Rafał Trzaskowski and European Commissioner for Cohesion & Reforms Elisa Ferreira on June 30. It has been built by a consortium of Gülermak and Astaldi, with EU sources covering 70% of the 959m zloty cost.

**London** Underground has called tenders for a long-term contract for the supply of electricity from renewable sources, as part of a wider scheme for the Greater London Authority group to move to renewable energy by 2030. TFL uses around 1.6 TWh/year, and the PPA Comet contract is expected to cover the supply of 150-200 GWh/year for 15 years, starting between June 2024 and June 2026.

**Bursa** tram route T2 was opened on July 2, operated by Silkworm trams from Durmazlar. Built at a cost of TL1bn, the 9.4 km line with 11 stops connects the Terminal bus station in the north to an interchange with T1 at Kent Meydanı.

Transdev has been awarded a further eight-year contract to operate the STAS public transport network in **Saint-Etienne**, with an optional one-year extension. The target is to grow ridership by 15% to 20% from the pre-Covid figure of 48 million trips/year, including the expansion of tram services and the introduction of contactless payment.

**Vlaanderen** Minister of Mobility Lydia Peters has agreed a 2023-27 contract for De Lijn, giving the public transport operator more flexibility to improve its farebox recovery. The region will provide €940m in operating support, plus investment ranging from €270m in 2023 to €252m in 2027 to cover renewal of the tram networks in Antwerpen and Gent plus the procurement of electric buses.

## Putrajaya Line inaugurated

## MALAYSIA

The second line of the Klang Valley MRT network has been inaugurated by Prime Minister Ismail Sabri Yaakob, who announced 30 days of free travel to encourage ridership.


Running east-west across the north of Kuala Lumpur, the 17.5 km first phase of the fully automated Putrajaya Line connects Kampung Batu to Kwasa Damansara, serving 12 stations. Interchange with KTM Komuter

services is provided at Kampung Batu, Kepong Sentral and Sungai Buloh.

The westernmost 5.4 km between Sungai Buloh and Kwasa Damansara was opened in 2016 as part of the Kajang Line (MRT1), but closed in October 2021 for reconfiguration.

Built by the MMC-Gamuda joint venture and operated by Rapid KL, MRT2 is worked by 20 of the 49 four-car trainsets ordered from the HAP Consortium of Hyundai Rotem, Apex

Communications and Posco Engineering for 1.62bn ringgit. These 77.4 m long driverless trains can carry up to 1200 passengers, and operate at up to 100 km/h. The first two were manufactured in South Korea, and the rest are being assembled locally by Apex.

The 34.7 km second phase of the Putrajaya Line from Kampung Batu to Putrajaya Sentral is expected to open in January 2023. 

Read the latest news at [www.railwaygazette.com](http://www.railwaygazette.com)

## Tramlink delivery

## SWITZERLAND

The first of 10 Be 6/8 Tramlink light rail vehicles being supplied by Stadler Valencia to operate the Waldenburgerbahn south of Basel was delivered to Bad Bubendorf on the night of June 29.

The seven-section low-floor cars were ordered by Baselland Transport in April 2019 as part of a joint procurement with Aargau Verkehr, which has bought eight similar Tramlink vehicles for the Limmattalbahn in Zürich.


The 13.1 km single-track railway from Liestal to Waldenburg was closed in April 2021 to facilitate an extensive modernisation, including conversion from 750 mm to metre gauge. It will become BLT Line 19, and is scheduled to reopen with the December timetable change. 



Photo: Lorenz Diegen

## Get Wellington moving


## NEW ZEALAND

The government has backed plans for a light rail line from Wellington station to the Regional Hospital and Island Bay under the Let's Get Wellington Moving programme.

A study of four public transport options concluded that light rail offered the best social, environmental and urban development outcomes. Public engagement had also showed strong support for light rail, because of its capacity,

reliability and frequency, as well as environmental benefits.

A detailed business case is to be developed by 2024, with the design phase expected to run to 2027. Construction could begin in 2028 and take eight to 15 years.

'This is a once-in-a-generation opportunity to shape Wellington's future, align transport and urban development, and help to address the climate crisis by moving more people with fewer vehicles', explained Infrastructure Minister Grant Robertson. 

## Lyon Line B goes driverless

## FRANCE


Transport authority Sytral Mobilités and Keolis have launched unattended operation of Lyon metro Line B to Grade of Automation 4, following a €387m signalling and rolling stock renewal programme.

The 77 km rubber-tired line from Charpenne-Charles-Hernu to Oullins-Gare carries 180 000 passengers/day, and has been automated as part of Sytral's *Avenir Métro 2030* plan.

Alstom's Urbalis 400 CBTC has replaced the legacy PA MPL75 train control equipment. Platform edges have been fitted with optical barriers as used on Line D to avoid the cost of platform screen doors.

Alstom is also supplying 36 two-car MPL16 trainsets, of which 20 have been delivered. These are 36 m long with capacity for 325 passengers, including 64 seated. The remainder will be required by the end of 2023, when Line B is to be extended from Oullins-Gare to Saint-Genis-Laval-Hopitaux-Sud.

The use of two-car trains instead of three has been balanced by cutting peak headways from 3 min 11 sec to 2 min 20 sec. The limiting factor is the single-track terminus at Charpenne.

The MPL75 trainsets displaced from Line B are being refurbished by ACC M in Clermont-Ferrand for further use on Line A, which is now carrying 270 000 passengers/day. This is expected to be upgraded to GoA4 by 2035. 

# Tram-train T13 runs left and right

## FRANCE

Orbital tram-train line T13 was opened on July 6, running for 18.8 km between Saint-Cyr and Saint-Germain-en-Laye to the west of Paris. Built at a cost of €306.7m, T13 was funded by the national government, Ile-de-France region and the *département* of Yvelines. Ile-de-France Mobilités financed 11 Alstom Citadis Dualis LRVs for €68.8m.

The 15 km from Saint-Cyr to Lisière-Pereire uses a section of the *Grande Ceinture Ouest* railway, with 25 kV 50 Hz electrification, a maximum speed of 100 km/h and left-hand running. The remaining 3.8 km to Saint-Germain has been built as a street tramway, wired at 750 V DC, with a 70 km/h speed limit and right-hand running.

Five stops have been rebuilt from existing stations, while seven are new. Interchange is provided to Line A at Saint-Germain, to Transilien suburban line L at Saint-Nom-La-Bretèche, and to Line C and Transilien N and U at Saint-Cyr. The depot and control centre are located at Versailles-Matelots. A 10.5 km branch from Lisière-Pereire to Poissy and Achères is under construction for opening in 2027.

The route is operated by the



Photos: Jérôme Anne

Transkeo T13 joint venture of Keolis and SNCF Voyageurs. Trams run every 10 min in the peaks and every 20 min off peak, offering an end to end journey time of 30 min. ★ RATP has suspended services on the central section of tram route T1 north of Paris to facilitate an extensive refurbishment of the line which opened in 1992. As well as track renewals and renovation of the stops, the work will pave the way for the introduction from 2024 of a new fleet of 37 Alstom Citadis X05 trams branded as TW20. 📍

# Metro expansion continues apace

## CHINA

The second phase of **Chongqing's** Line 4 from Tangjiatuo to Huangling was opened on June 18, adding 32.6 route-km and 15 stations. Of this 21.2 km runs in tunnel, with the rest on an elevated alignment.

Line 4 currently joins Chongqing's loop Line O at Min'andadao, with trains running to Tiaodeng on a southern branch of Line 5. A 10.9 km western extension now under construction will continue Line 4 from Min'andadao to Panguilu in Jiangbei via interchanges at Jizhoulu, Huahuiyuan, Dashiba and Yudaishan.

June 20 saw the start of revenue services on the second phase of **Zhengzhou's** Chengjiao Line, running underground for 9 km from Xinzheng International Airport to Zhengzhou Hangkonggang railway station. The 32 km first phase

of the Chengjiao Line from Nansihuan to XIA opened in January 2017 as a southeastern extension of metro Line 2.

**Changsha** opened its east-west Line 6 on June 28, running 48.1 km from Huanghua Airport to Xiejiaqiao with 34 stations including seven interchanges. Under construction since December 2016, it takes the network to 190.7 km and 127 stations.

**Kunming** metro Line 5 opened on June 29, 10 years and one day after the city's first metro route. The 26.5 km line links World Horti-Expo Garden in the north-east to the city centre to Baofeng in the south, serving 22 stations. This line is operated using six-car Type B trainsets assembled locally by CRRC, which are fitted with lithium titanate batteries that can power the trains for up to 2 km in the case of an electrical supply failure. 📍

# Fornebu metro contract awarded

## NORWAY

The second major tunnelling contract for Oslo's Fornebu metro line has been signed, following the agreement of a revised funding package for the project.

Running southwest from the existing metro hub at Majorstuen, the line is intended to support development around the capital's former airport. Construction began in 2020, at which time opening was expected in mid-2027.

Veidekke Anlegg has been awarded a Nkr1.15bn contract to build the 2.35 km section from Lysaker to Vækerø, including two station caverns and emergency access shafts. Passing under the

Lysaker River in an area of challenging geology, the tunnel is to be completed in 2025.

The Fornebubanen was costed at Nkr16.2bn in 2018 prices, with half to be funded by the national government, and half by local authorities in Oslo and the county of Viken. Following increases in construction costs, the authorities have agreed a revised budget envelope of Nkr27.6bn to Nkr31.3bn.

A review by Dovre Group Consulting has proposed various cost-saving initiatives, including an 'optimised' route that would shorten the line from 8.3 km to 7.7 km and an extended construction timescale. Opening is now envisaged for June 2029. 📍



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Briefing

Funds managed by Swiss Life Asset Managers and Vauban Infrastructure Partners have acquired Luzern-based wagon leasing company **Wascosa** (p24) from the Müller family, although Philipp Müller has agreed to stay on as Chairman. The two investors last year acquired an 88% stake in German wagon owner Aves One, which has Wascosa as a key commercial partner.

Dutch technology specialist **Dual Inventive** has signed a co-operation agreement with **Plasser & Theurer** aimed at improving track worker safety. Dual Inventive is supplying ZKL3000 digital track protection for tamping machines, and the partners envisage integrating track worker safety systems using a SIL4-compliant Machine Warning System.

Rubber-to-metal bonded components supplier **Ferrabyrne Ltd** has been acquired by the Dellner Polymer Solutions subsidiary of Sweden's **Dellner Group**. Ferrabyrne has more than doubled turnover since YFM Equity Partners invested in the business in 2016, expanding into India and China and investing in new processes and technologies.

Global Infrastructure Partners and Abu Dhabi Investment Authority are to acquire a 72-55% equity interest in wagon leasing and logistics company **VTG** from Morgan Stanley Infrastructure Partners and Joachim Herz Stiftung. Khadem Al-Remeithi, Executive Director of AIDA's Infrastructure Department, said the investment 'aligns with our continued focus on pursuing infrastructure opportunities backed by strong energy transition-related tailwinds'.

**Siemens Mobility** is to open a £7m traction drive and motor maintenance facility in the 'rail village' being developed around its future UK rolling stock plant at Goole. To be built by local contractor GMI Construction Group for opening in 2023, the facility will undertake work currently done in Leeds, and will also maintain HVAC units.

Škoda Group to rebrand

CZECH REPUBLIC

In a bid to end 'frequent confusion', Czech investor PPF Group has reached agreement to sell the rights to the Škoda brand to Škoda Auto, and will



use the proceeds to reduce Škoda Group's debt and expand its business.

Škoda registered the winged arrow logo as a trademark in December 1923. The car maker, which started as Laurin & Klement, has used the brand since being taken over by Škoda in 1925, and continued to do so after it was spun off in the 1990s.

PPF now owns the Plzeň-based Škoda Group engineering business including Škoda Transportation, while the Mladá Boleslav-based car manufacturer is part of the Volkswagen Group. Under the deal, Škoda Group can continue to use the brand and logo until 2029; PPF has not yet revealed the name it will adopt after that date.

'We remain proud ambassadors of the legacy left by Emil Škoda, who paved the way for the industry to flourish in Plzeň and across the Czech Republic', said Stanislav Kuba, head of PPF Group's industry division and Chairman of Škoda Transportation's supervisory board. 'However, the time has come to acknowledge reality.'

Flexible leasing options

USA

Rolling Stock Solutions and strategic partner Alternate Concepts are to offer commuter rail agencies flexible options for the lease of 'like new' modernised diesel locomotives, with backing from private equity investor Adelphi Capital Advisory.

According to RSS, the average age of diesel locomotives used by US commuter rail operators is now 26 years, and maintenance costs per passenger-km have increased by 33% in recent years. Most locomotives are pre-Tier 0 rated, with an emissions profile 'far below' current standards. Procurement

cycles for new locos can be up to 10 years, and there is a limited supply base for Buy America compliant Tier 4 locomotives.

RSS has acquired an initial fleet of EMD F40PHs, which are being modernised by Canada's Cad Railway Industries and US partner Metro East Industries with a rebuilt prime mover, EPA Tier 4 compliant head-end power and provision for the installation of PTC.

Deployment of the first locomotives is planned for mid-2023. RSS says they will have a 20+ year service life, offering greater reliability and lower noise, NO<sub>x</sub>, hydrocarbon and PM10 emissions than most locos in service today. The rebuilt

locos meet industry standards, which will enable them to 'seamlessly' integrate into existing operating and maintenance programmes.

RSS says its locomotives will be 100% Buy America compliant, meaning that lease contracts will be eligible for FTA capital investment funding.

RSS is led by CEO Phil Puccia, a former Deputy General Manager of Boston's MBTA who spent 12 years at JP Morgan. Boston-based ACI is led by CEO Jim O'Leary and COO Mike Mulhern, both former MBTA General Managers.

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Alstom transfers V300 Zefiro to Hitachi Rail

HIGH SPEED

Alstom has completed the transfer of its activities relating to V300 Zefiro high speed trainsets to Hitachi Rail, which produced the trains in partnership with the

former Bombardier Transportation business.

Divesting the V300 Zefiro was one of the commitments which Alstom made to the European Commission to obtain regulatory approval for the acquisition of

Bombardier Transportation.

Announcing the completion of the transfer on July 1, Alstom said it would honour its obligations under existing orders placed by Trenitalia and ILSA to ensure a seamless transition.

It said the transaction complied with all applicable social processes and consultations with employee representatives, and was subject to regulatory approvals.

## Pointers

Turkey's Transport Minister Adil Karaismaioğlu has insisted that the 405 km **Ankara – Sivas** high speed line will open by the end of this year, despite emerging concerns over some of the tunnelling and subsidence problems on an 80 km section of the route. He told a parliamentary hearing that 99% of the civil works were now finished and certification of the 315 km between Baliseyh and Sivas had been completed.

The Irish government has approved the preliminary business case for **Dublin's** MetroLink automated metro, which will run for 19.4 km from Swords to Charlemont via the airport and city centre. Transport Infrastructure Ireland is expected to submit a formal planning application in September, and begin procurement next year for construction to start from 2025. Opening is envisaged by the early 2030s.

The use of double-deck trains on the 54 km **Moscow Central Ring** line is being studied, according to Deputy Mayor for Transport, Maksim Liksutov. Ridership has reached 550 000 passengers/day, but the infrastructure is nearing capacity, with the single-deck Lastochka EMUs operating 242 trains each way per day at 4 min headways.

## Heads of the month

**Clément Beaune** has been named Minister of Transport in the Ministry of Environment, Energy & Territories of the new French government.

**Roger Harris** has been appointed President of Amtrak with effect from July 5, reporting to CEO **Stephen Gardner** following a decision to split the two roles. Chief Commercial Officer since April 2019, Harris will lead the co-ordination of Amtrak's service delivery and operations, marketing, customer service, network planning, real estate and accessibility functions. **Gerhard Williams** becomes Executive Vice-President, Service Delivery & Operations, in succession to **Scot Naparstek** who is retiring.



Most recently CFO for SSG, **Pernille Damm Nielsen** is to join Danish state operator DSB as Chief Financial Officer from September 1. She succeeds **Thomas Thellersen Børner**, who is moving to food retailer Dagrofa.

**Eric Dehlinger** has been appointed CEO of the SNCF-SBB joint venture TGV Lyria, replacing **Fabien Soulet**. SBB's Head of International Passenger Services **Philipp Mäder** has been named President of TGV Lyria.



**Rajendra Prasad** has been named Managing Director of India's National High Speed Rail Corp Ltd with effect from July 7. He has worked for NHSRCL since 2017 and also serves as Project Director for the Gujarat section of the Mumbai – Ahmedabad high speed line.



**Raymond Betler** has been elected Chairman of L B Foster, following the retirement of **Lee Foster II**, grandson of the company's founder. A former President & CEO of Wabtec Corp until his retirement in July 2019, Betler was appointed to the L B Foster board of directors in August 2020.

**Stefan Krispin** has been appointed Commercial Director of the Passenger Division at Alpha Trains Europa, succeeding **Thomas Paul Müller**. A former CEO of Go-Ahead Germany, Krispin has also held roles at Bombardier Transportation and DaimlerChrysler Rail Systems.

**Dr Linda Wain** has been appointed Engineering Director at UK inter-city operator LNER. She was previously Head of Engineering & Assurance.



SNCF Réseau has appointed **Olivier Bancel** as Executive General Manager, Projects, Maintenance & Operations, in succession to **Mathieu Chabanel**, while **Vincent Téton** becomes Deputy Manager, Operations & Production. **Séverine Lepère** has taken over as General Manager, Ile-de-France, with effect from July 1, replacing **Guillaume Marbach**.

**Olivier Loison** has been named Managing Director of Alstom's India business, in succession to **Alain Spohr**. He is succeeded as Managing Director for East Asia by **Toby Tiberghien**.

Siemens Mobility has appointed **Mathias Hüske** as CEO of its transport ticketing software subsidiary Eos.uptrade, in succession to founder **Michael Kujas** who stepped down after more than 20 years at the helm. Having held various positions at DB, Hüske will run the business with Chief Financial Officer **Babette Röder**.

**Emmanuelle Guyavarch** has been appointed as Customer Service Mediator at Paris operator RATP with effect from July 1. Formerly head of the mission against exclusion at RATP Sureté, she succeeds **Betty Chappe**.

Worldline UK & Europe CEO **James Bain** has been named Chair of the UK's Rail Supply Group, replacing Atkins President **Philip Hoare**, who has stepped down after four years in the role.



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# Orion EMU unveiled

## SWITZERLAND

The first of 12 metre-gauge rack-and-adhesion EMUs ordered by Matterhorn Gotthard Bahn in March 2020 has been unveiled at Stadler's Bussnang factory.

The three-car ABeh 8/12 EMUs have been branded Orion, or *Optimaler Regionalzug Im Oeffentlichen Nahverkehr* (optimal regional train in public transport), continuing the astronomy theme adopted by parent company BVZ Holding.

The first unit is expected to be delivered in September and to enter traffic in May 2023, with all 12 to be in service from the December 2023 timetable change. They will be able to operate over the entire MGBahn network between Zermatt and Disentis, including the 18% gradient between Göschenen and Andermatt. Maximum speed is 100 km/h on adhesion sections and 35 km/h going uphill on the rack. 



detailed design and construction of its planned Interchange station east of Birmingham. Linked to the National Exhibition Centre and Birmingham Airport via an automated peoplemover, the station will have two 415 m island platforms and two central high speed through lines.

Transport for London has appointed Costain to design signalling enhancements on London Underground's Piccadilly Line. Awarded under TfL's Professional Services Framework, the contract will ensure that the signalling between Heathrow Airport and Barons Court is compatible with the existing trains and the Siemens Mobility fleet due to enter service from 2025.

Network Rail is to replace the concrete footbridge at Stowmarket station using a modular 'flat pack' stainless-steel framed design, developed by the AVA consortium of Expedition Engineering, Hawkins Brown, Atelier Ten, X-Treme Systems, Walker Construction and Quantum Infrastructure, with funding from Innovate UK.

## INFRASTRUCTURE

### DENMARK

Atkins has been appointed as lead consultant for the US\$430m Vestfyn Line project to build a 250 km/h railway between Odense and Kauslunde, working with engineering consultancy NIRAS to design the 35 km line which is due to open at the end of 2028.

### GERMANY

DB Netz has reached agreement with the Rheinland-Pfalz Ministry of Climate Protection and SPNV Nord to electrify its Ahrtal and Eifel lines as part of repairs being undertaken following severe flooding in July 2021. The work will be funded by €308m from the federal government and €80m from the Land.

### LATVIA

A joint venture of BRD Projekts and Italian firm Sintagma has been awarded a contract covering technical design and construction supervision for the Salaspils intermodal terminal near Rīga to be served by Rail Baltica.

### MONGOLIA

Using its Nebula platform, Teltronic has installed a Tetra communications network for the 240 route-km heavy haul railway between Tavan Tolgoi and Gashuun Sukhait (RG 6.22 p46).

### NETHERLANDS

ProRail has selected Arcadis, Movares, Nexus, Royal Haskoning DHV and Sweco to provide engineering services for the roll-out of ERTMS on its Hanzelijn – Lelystad and Schiphol – Amsterdam – Almere – Lelystad corridors plus the Northern lines around Groningen and Leeuwarden.

### PORTUGAL

Infraestruturas de Portugal has signed a contract for a consortium of Ramalho Rosa Cobetar, FCC and Convensa to modernise and electrify the 44 km central section of its Linha do Oeste between Torres Vedras and Caldas da Rainha. The €38.4m project is due to be completed in just under two years.

### SPAIN

ADIF has awarded Comsa an 18-month, €36m contract to renovate the 64 km line between Brazatortas and Guadalmez, which will form part of an electrified branch of the TEN-T Mediterranean Corridor to the port of Sines.

ADIF has called tenders for reconstruction and electrification of a 10 km section of the disused Madrid – Burgos direct line between Colmenar Viejo and Soto del Real to facilitate the extension of Madrid suburban line C-4B, at an estimated cost of €25.4m.

### TANZANIA

TRC has awarded a US\$900.1m contract to Yapı Merkezi for the construction of Stage 4 of its standard gauge railway network. The 130 km section between Tabora and Isaka and 35 km of connecting links are due to be completed within 42 months.

### UK

HS2 Ltd has selected Laing O'Rourke Delivery Ltd for a £370m contract to undertake

### USA

As part of the Gateway Programme being developed by Amtrak, NJ Transit and MTA, an Arup-led consortium including Grimshaw, Kohn Pedersen Fox Associates, Hatch LTK and Lendlease has been awarded a contract to produce preliminary design options for the railway infrastructure elements of the planned redevelopment of New York Penn Station, including tracks, platforms and concourses. The design work is expected to take two years and cost \$73m.

## ROLLING STOCK

### ARGENTINA

As part of its decarbonisation strategy, Ferrocarriles Argentinos SE has selected OptiFuel Systems to repower 400 diesel locomotives to run on 100% compressed and/or renewable natural gas. Modular kits to be delivered from the USA would include battery hybrid engine 'pods' to provide between 1500 hp and 4500 hp, along with control modules and CNG/RNG tanks.

**FRANCE**

Montpellier Méditerranée Métropole has selected CAF France to supply 60 seven-section Urbos trams to TaM, with options for 17 more bringing the total value of the order to €223.7m. To be delivered from Bagnères-de-Bigorre in 2024-30, the first 30 vehicles will replace Alstom Citadis trams on Route 1, and 22 are required for the new Route 5 due to open in 2025.

**GERMANY**

Niederbarnimer Eisenbahn has confirmed an order for Siemens Mobility to supply and maintain for 10 years seven two-car Mireo Plus H hydrogen fuel cell multiple-units. They will be used on Heidekrautbahn service RB27 in Berlin-Brandenburg from December 2024 as well as the reopened route between Basdorf and Wilhelmsruh.

Rostocker Straßenbahnen has ordered 28 three-section TINA trams from Stadler for €98.2m. They will replace its 6N1 trams dating from 1994-96 on six routes from 2025.

**EUROPE**

SNCF Voyageurs and TMR have awarded Stadler a €72.6m contract to supply seven rack-equipped Class Z890 EMUs for *Mont-Blanc Express* services on the 1000 mm gauge line between Martigny and Saint-Gervais-les-Bains-Le Fayet, for delivery in 2024-25. Four are being financed by the French region of Auvergne-Rhône-Alpes and three by the Swiss government and canton Valais.

**INDIA**

Madhya Pradesh Metro Rail Corp has awarded Alstom a €387m contract to supply and maintain 52 three-car Movia metro trains, CBTC and telecoms for the Bhopal and Indore metro networks now under construction. The order covers 27 trains for the two-line metro in Bhopal and 25 for Indore's Yellow Line.

**POLAND**

Leasing company Cargounit has ordered a further five Vectron multi-system locomotives from Siemens Mobility for delivery in 2023-24. The option

takes Cargounit's total order for Vectron and Smartron locomotives to 28.

**SLOVAKIA**

ZSSK Cargo has awarded CZ Loko a contract to rebuild 20 Class 742 Bo-Bo diesel-electric locomotives to the EffiShunter 1000M design, similar to the Czech Class 741.71, with an option for another 20. Most are to be rebuilt by Zagreb-based TŽV Gredelj using kits supplied by CZ Loko.

**SOUTH AFRICA**

PRASA has awarded contracts valued at R7.5bn to five companies for the heavy overhaul of Metrorail suburban EMUs, pending the delivery of its new Gibela trainsets. The five-year contracts awarded to Armature Technology, CTE Investment, Karabo Nhlamolo Projects Co-operative, TMH Africa and YNF Engineering cover between 380 and 400 vehicles per year, creating an estimated 2000 jobs.

**SWEDEN**

SJ has awarded CAF a €300m contract to supply 25 five-car Civity Nordic EMUs, with options for 35 more. The 200 km/h inter-regional units are scheduled to enter service in 2026 on the Stockholm – Västerås – Örebro – Skövde – Göteborg, Stockholm – Uppsala, Linköping – Norrköping

– Stockholm – Arlanda – Uppsala – Gävle – Ljusdal and Kalmar – Göteborg routes.

**SWITZERLAND**

SBB took delivery of the last of 62 FV Dosto double-deck EMUs from the former Bombardier Transportation plant at Villeneuve on July 14. The operator will no longer pursue plans to introduce active suspension on the much-delayed Twindexx fleet in 2027, noting that tests had found that the complex WAKO technology actually reduced passenger comfort levels.

SüdLeasing has ordered 20 Vectron multi-system locomotives from Siemens Mobility to be leased by SBB Cargo International from early 2024. The 160 km/h ETCS-equipped locos will be fitted with Siemens Mobility's XLoad package to improve traction performance on the north-south trans-Alpine corridor from Amsterdam, Rotterdam and Antwerpen to Italy.

Genève operator TPG has selected Stadler to supply 38 Tramlink trams from November 2024, with an option for up to 25 more. The 44 m long metre gauge vehicles are intended to replace 40-year old Duewag trams and support planned expansion of the network to Grand-Saconnex, Ferney-Voltaire and Saint-Julien-en-Genevois.

**USA**

Amtrak has placed a firm order with Siemens Mobility for a further 50 ALC-42 200 km/h Charger locomotives rated at 4200 hp, exercising an option on its December 2018 contract for an initial 75.

**CONTRACTS**

**AUSTRIA**

ÖBB-Personenverkehr has awarded CN-Consult a framework contract for renewal of its onboard passenger information systems, using a real-time audio visual platform based on CN-Consult's DiLoc|Motion technology.

**EGYPT**

National Authority for Tunnels has awarded Thales, Orascom Construction and Colas Rail a turnkey contract to design and supply telecoms, control and ticketing systems for the first phase of Cairo Metro Line 4 and provide two years of maintenance.

**SPAIN**

The Catalan government and FGC have announced feasibility studies for the development of four tram-train networks serving Terres de l'Ebre, Bages, the Costa Brava and Andorra which would have a combined length of around 280 km.


**DMU deliveries completed**

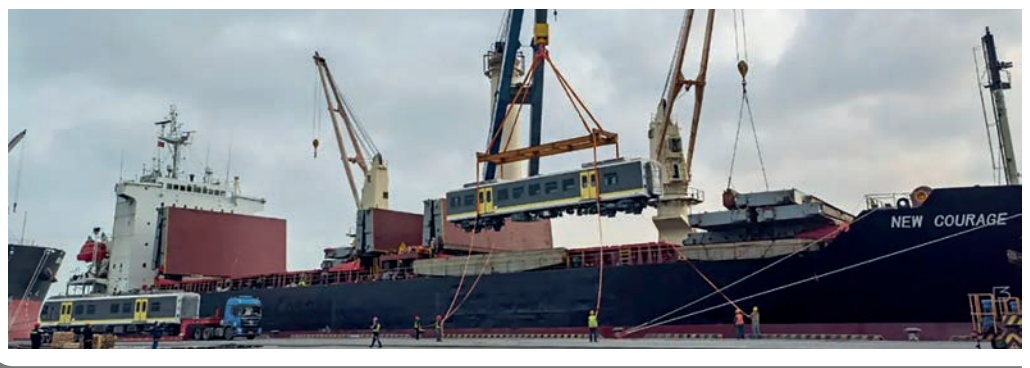
**ANGOLA**

CRRC Tangshan has delivered the final three of 10 four-car DMUs ordered by INCEA for use on services between Luanda and Quatro de Fevereiro International Airport.

Each of the 1067 mm gauge trainsets has a capacity of 696 passengers, and up to three units can run

in multiple. They are designed to operate at a maximum speed of 100 km/h.

The first batch of four DMUs was delivered in February 2020, and three more followed in April 2020. Those sets are deployed on services from Luanda to Malanje and from Lobito to Luau on the Benguela Railway. 



# Central bank to roll out contactless payments

**COSTA RICA**

Central bank BCCR is spearheading the roll-out on trains and buses of the SINPE-TP contactless payment system for public transport, which it estimates could reduce cash payments nationwide by 25%.

Announcing a contract to provide a cloud based platform for processing the EMV payments, technology supplier Littlepay said

this was the first time that a central bank had managed the deployment of a nationwide open payment system for public transport.

SINPE-TP will be a 'truly innovative, national, transit payment system', Littlepay CEO Amin Shayan told *Railway Gazette International*, adding that it would deliver 'the interoperability and seamless travel experience that so many cities around the world aspire to'.


Benefits to operators will include faster boarding and a reduction in cash handling, and thus greater staff safety, along with improved hygiene.

Littlepay is working with BCCR, BAC-Credomatic and Banco Nacional, and will integrate a variety of validators into the system, enabling operators to choose different terminals to suit their needs.

SINPE-TP is being launched on

INCOFER train services, but nationwide expansion will see it rolled out across 5000 buses and up to 600 million transactions per year.

Passengers will be able to use a bank card for pay-as-you-go travel. The cost of trips will be calculated based on fare models defined by the various transport authorities, with SINPE-TP ensuring the correct collection and distribution of revenue among operators.

The system will launch with flat fares, but is designed to accommodate fare caps and discounts, as well as other fare models that may be required. It is also designed to process payments using QR codes and mobile wallets. 

## Briefing

HID Global has launched its **TripTick Halo** ticket reader, which combines near-field communication, QR/barcode and contactless EMV payments in a single device that can be mounted on a surface, pole or desk. It has a single user interface, complying with standards for contactless payment, 1D and 2D barcodes and NFC/RFID tickets and tokens from mobile phones, tablets, wearables, contactless cards and paper.



Ticketing, payment and identification company **Paragon ID** has acquired **UrbanThings**, which develops passenger information, vehicle tracking, digital ticketing and analytical systems. Paragon ID holds a contract to print magnetic-stripe paper ticket stock for the British rail network, but has expanded into mobile and web ticketing with its Open ABT platform including EMV payment. UrbanThings produces the Bus Checker app, which has been downloaded more than 2 million times, as well as mobile ticketing, websites and analysis products for various rail operators.

Great Western Railway is to begin trials of pay-as-you-go smart card ticketing in the Bristol area, using token-agnostic **SmartTIS** technology from Tracsis Group company iBlocks. This will offer a 'frictionless tap and travel experience', with single-leg pricing and zone-based day and weekly best value fares calculated automatically. The SmartTIS back office will be integrated with the GWR website, enabling registered users to review their journey history and manage their account preferences.

Trainline has launched **Platform One** as the new brand for its technology that powers ticket retailing for more than 270 rail and coach companies across 45 countries, including its own retailing channels. The company says Platform One is currently hosting around 78 million visits every month, powering 296 searches/sec. It employs around 400 engineers, data and tech specialists who process more than 600 system releases every week.

Lombardia operator **Trenord** has introduced 'buy now pay later' functionality for ticket purchases made online at [trenord.it](http://trenord.it) or through its Trenord app, thanks to a partnership with Milano-based payments company **Scalapay**. Passengers using regional trains or Malpensa Express services who book single tickets, multi-ride carnets or integrated passes valued at €10 or more using Trenord's digital channels are offered the option to pay in three monthly instalments, without any surcharge or interest.


## Be in, be out trial in Scotland

**UK**

Discussions are underway for ScotRail to launch a pilot 'be in be out' rail ticketing scheme this autumn, ready for public use from early 2023. The promoters hope that this would be quick and easy to deploy, avoiding the need for EMV card readers to be installed at remote locations.

The trial would use iBlocks' Hopsta mobile ticketing platform. Geofences would be created at

stations, and entering passengers would receive a message on their mobile device asking them to confirm that they are planning to travel. On confirmation, they would be issued with a barcode to be used at ticket gates or shown to ticket inspectors during the journey.

On arrival at their destination, the station geofence would trigger another message asking the passenger to confirm that they have completed their journey. 


## Multi-operator ticketing venture

**UK**

Unicard and Amdocs are co-operating to use their account-based ticketing and cloud-based payment platforms to offer a multi-mode and multi-operator 'tap-in, tap-out' ticketing system for rail, tram, bus and micromobility services. Announced at the Transport Ticketing Global exhibition in London, the venture is initially targeting partnerships with UK city regions, local authorities and other public bodies.

Anthony Goonetilleke, Group President of Technology & Head of Strategy at Amdocs, said the initiative was intended to promote 'sustainable and flexible travel options alongside a frictionless customer experience.'

Unicard's ABT system supports contactless travel, facilitated by tokens in the form of smart tickets, smart cards, mobile apps or digital wallets. The Amdocs cloud-based payment platform running on Amazon Web Services allows for the quick and easy addition and integration of new modes and additional operators.

'Public transport is changing rapidly and Unicard is well placed to support the rollout of more diverse and sustainable integrated networks, particularly with the uptake of new modes of transport including dockless bikes and electric vehicles,' said Unicard CEO Sean Dickinson. 'Amdocs, with its global expertise in automation and customer experience, was the ideal partner.' 



# Installation robot to accelerate ETCS roll-out

## NETHERLANDS

Strukton Rail is to work with Trackbot robot developers AMT Group and No Man Trackwork to produce an autonomous robot for the fast and accurate installation of balises and axle counters as part of the Dutch national ERTMS deployment programme.

The partners hope that a prototype will be ready in 2023. No Man Trackwork said 'robotisation is the

future for rail construction', as the machines were able to work 'faster, more accurately and safer'.



AMT Group will be displaying a Trackbot at InnoTrans as part of its range of electrically powered equipment designed to make smarter use of labour by automating physically demanding and monotonous work.

The project forms part of Strukton Rail's work to develop faster ways of deploying equipment under the ASAP ERTMS innovation partnership which infrastructure manager ProRail has formed with suppliers with the aim of accelerating the nationwide roll-out of ETCS on the main line network.

## Prototype wagon

## UZKBEKISTAN

Steel fabricator Orient Metal has produced a prototype wagon for transporting four 20 ft or two 40 ft containers. Acceptance and certification testing is expected to be completed in Q3 2022, enabling the company to produce up to 200 wagons per year from its plant in the Yashnobod district of Toshkent.

'We decided to expand our production activities because we see quite high demand from major customers', said Dilshod Shukurov, Managing Director of Orient Group's metallurgy business. 'Uzbekistan Railways needs up to 200 units per year. In addition, partners from the EU and CIS, as well as UzAuto Motors, a Chevrolet car plant, have expressed interest.'

# Autonomous shunting locomotive on test

## FINLAND

A shunting locomotive retrofitted for unattended operation to Grade of Automation 4 is being tested at the Voikkaa Business Area as part of a €3.6m project to develop an autonomous shunter for use at freight terminals, industrial sites and ports. The project is being co-funded by various local companies as well as government innovation and trade body Business Finland.

Steelwheel has retrofitted the 1975-built Otso 4 locomotive for autonomous operation, and has developed a concept for a purpose-built machine for automated shunting. CEO Kimmo Hämäläinen suggested that the 'sustainable, battery-driven

locomotive will be the future of industrial transport'.

Technology, data and training company Proxion has developed the software, and Electric Power Finland the trackside equipment including route setting using 5G links, a radar-monitored level crossing and LIDAR obstacle detection.

The project partners do not expect to see autonomous operation on mixed-use main line tracks until at least 2035, but believe it could be achieved 10 years sooner on private and industrial tracks. Proxion commented that the technology was 'ahead of its time', as current regulations from the EU Agency for Railways only cover Grades of Automation 1 and 2. Regulations for GoA 3 and 4 are not expected to be put in place until the middle of the decade at the earliest.



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## UTA to offer rail apprenticeships

### USA

Utah Transit Authority has appointed specialist training company Xpan to develop apprenticeships in light rail vehicle maintenance, maintenance of way and commuter rail vehicle maintenance.

The three-year apprenticeships will offer a mix of e-learning, interactive simulations, instructor-led training, labs and on-the-job training. UTA is developing its own Transit Technical Education Center in Salt Lake City, with the first rail apprentices expected to join in early 2023.

'Our bus maintenance apprenticeship programme has been an incredible success, so it was a logical decision to expand our offering to support skill development in our rail division', explained UTA's Acting Chief Operating Officer Cheryl Beveridge.

'Creating blended learning solutions for the transportation industry has been the core of Xpan's 20-year history', said founder and President Ron Thiele. 

## Shake and brake


### USA

An earthquake early warning system that uses Positive Train Control to apply train brakes automatically is being tested by Los Angeles commuter operator Metrolink, California Department of Transportation and the

US Geological Survey ahead of a potential network-wide roll-out.

Metrolink already uses the US Geological Survey's ShakeAlert system, which provides warnings when an earthquake has begun and protective action should be taken. This triggers automated messages telling train crews to

slow or stop, but does not include automated brake enforcement.

The technology being piloted on the 91/Perris Valley Line between Riverside and Perris sends PTC messages to trains in the impacted area, based on the severity of the earthquake, automatically slowing or stopping trains as necessary. It also provides enhanced data to support infrastructure inspection and the resumption of services. 

## Towards driverless regional trains

### GERMANY

Work has started on a project to develop and test technology for the driverless operation of regional passenger trains, and to identify the regulatory changes which would be needed to permit their use in future.


Supported by the Federal Ministry for Economic Affairs & Climate Action, the project is being undertaken by Alstom, the DLR aerospace research centre and Technische Universität Berlin. It is looking at using ETCS to support attended operation using Grade of Automation 3, although GoA4 is envisaged for moving empty trains in depots.

Niedersachsen's Ministry of Economic Affairs, Employment, Transport & Digitalisation is providing €5.5m to fund the retrofitting of onboard equipment to two Alstom Lint 41 DMUs belonging to its transport authority LNVG.

The first phase of the project involves the development of technology to support automated operation, including systems for signal recognition, obstacle detection and to enable a train to be controlled remotely or by an attendant, inside or outside the cab.

The second phase will see ATO installed on the DMUs to enable testing under real-world conditions from mid-2024. Tests will be

undertaken in a 'regulatory sandbox' on lines in Niedersachsen. DLR will identify the operational requirements and vehicle modifications needed to obtain regulatory approval, while TU Berlin is looking at human factors, including future staff roles.

Alstom said tests in other countries had demonstrated that automated operation and remote control was technically feasible. The current project will include assessing whether the existing regulatory framework for ATO could be adapted for regional trains, and what would be needed to demonstrate adequate safety for passenger operation. 

## Tight finish in Railway Challenge

### UK

A German team from FH Aachen and Reuschling has won the 11th Railway Challenge competition organised by the Institution of Mechanical Engineers.


Sponsored by bodies including RSSB, Angel Trains, Beacon Rail Leasing, Network Rail and Young Rail Professional, the competition is intended to reinforce practical skills and system engineering processes. Teams of students, apprentices, and young professionals must develop and build miniature locomotives to achieve specific objectives.

International teams were unable to travel to the UK during the coronavirus pandemic, but seven teams participated in the

2022 competition, which culminated with three days of testing at the 261 mm gauge Stapleford Miniature Railway on June 23-26:

- Alstom & University of Derby;
- FH Aachen & Reuschling;
- Network Rail;
- Technical University of Poznań;
- Transport for London;
- University of Huddersfield;
- University of Sheffield.

This year saw a very close contest between the top three teams. FH Aachen and Reuschling won first place with a spectacular result in the energy recovery challenge. Runner-up Transport for London took the most awards in the individual categories, narrowly beating the team from Alstom and the University of Derby.


'The Railway Challenge provides a fantastic learning experience and many of the participants take these lessons with them as they progress in their careers', said organising committee chair Professor Simon Iwnicki. 'The teams who participated got the full experience of managing the design and operation of a locomotive as well as dealing with all the competing demands of a real-world problem.' 

## Addressing the effects of climate change

### CANADA

Transport Canada is to provide up to C\$22m of co-funding under its Rail Climate Change Adaptation Programme to support the research and development of 'innovative technologies, tools, and approaches' to better understand and address the impacts of climate change on the rail sector, including flooding, landslides and fires.

The ministry has also introduced safety measures to reduce the risk of rail-related wildfires in the context of extreme weather. Operators will be required to reduce speeds and conduct additional track inspections when temperatures are high to reduce the risk of a derailment, inspect locomotive exhaust systems more frequently, and implement a fire risk reduction plan.

'In a period where we are seeing the impacts of climate change and extreme weather in Canada, it's important that we do everything we can to mitigate future risks', explained Minister of Transport Omar Alghabra. 'The Rail Climate Change Adaptation Programme will help railways assess and adopt next generation tools to mitigate adverse issues caused by climate change.' 



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# Learning to live with extreme weather

Europe is now living with extreme weather conditions, experiencing long periods of drought, storms and heat spikes. In the summer of 2021, these consequences of climate change caused the most devastating floods in Belgium that the country has ever seen. They interrupted rail traffic across almost half the country for several days, and our neighbours in Germany and the Netherlands were also badly affected.

Teams from Infrabel restored what needed to be restored in record time, but the event still left its mark, with thousands of trains cancelled and a bill of more than €60m. It also raised a host of questions about how we should adapt our infrastructure to this new climatic reality. To this end, we are harnessing digitalisation, which we believe could help us anticipate some of these phenomena, particularly using

Infrabel CEO **Benoit Gilson** reflects on the devastating floods which paralysed the Belgian network in mid-2021, and explains how the infrastructure manager has started to adapt its operations and harden its assets to cope with the impact of extreme weather.

the Internet of Things to support remote condition monitoring systems.

## Unprecedented scale

I remember it very clearly. We had just experienced several weeks of abnormally dry weather. During a walk with my family on Sunday July 11, I was struck by the rather low level of the River Ourthe, close to my home, which is paralleled for a significant length by the railway connecting Liège to the Grand Duchy of Luxembourg. Although usually calm, this river would turn into a furious torrent over the next few days.

*Flooding at Lesterny washed out a 50 m section of the Namur – Luxembourg line.*

At the time, in Belgium as elsewhere, it was looking set to be a summer full of promise. People working on and living alongside the railway were looking forward to some well-deserved rest and less intense activity. But then the sky fell on us.

Belgium was the unfortunate epicentre of what meteorologists explained was an extremely rare climatic phenomenon. A very severe and almost immobile depression precipitated torrential and uninterrupted rain on the southeastern part of our country. We would learn later that more than 270 mm of water had fallen in just 48 h. That was the



equivalent of a quarter of the country's average annual precipitation.

The days that followed saw one of the most traumatic events in Belgian history, with 41 deaths, 50 000 homes submerged, 11 000 vehicles washed away, and around 100 km<sup>2</sup> of the country drowned under a thick layer of water, mud and debris of all kinds.

From Wednesday July 14, it was all hands on deck at Infrabel. From across the network came reports of flooded tracksides, a collapsed embankment and fallen trees which were disrupting rail traffic.

The situation deteriorated further during the night. Next morning, the first train of the day derailed at Lesterny on the international line between Namur and the Luxembourg border. A stream running under the railway tracks in a very isolated area had broken its banks and carried away the ballast for about 50 m. Fortunately it was an empty train, and we were relieved to learn that the driver was uninjured. However, that relief was short-lived because we soon became aware of an unprecedented threat to train safety in many places.

There was widespread damage to the rail network. In total 3 km of track was wrecked, 100 000 tonnes of ballast washed away and four bridges were completely or partially destroyed. In the early hours of the floods, no one at the infrastructure manager could appreciate

the scale of the task ahead, or the need to mobilise so many staff who were looking forward to a well-deserved summer break. I would like to pay tribute to all of our railway workers who rallied around and did everything possible to restore traffic in record time.

### Immediate shutdown

At dawn on July 15, in consultation with the Federal Minister of Mobility, Infrabel

making these lines impassable, or doubts about how the situation would evolve and the potential threat to the integrity of our infrastructure.

Working hand-in-hand with our colleagues at SNCB, the national passenger train operator, we agreed that it was out of the question to add another layer of crisis. Attempting to maintain traffic at all costs posed the risk of having to call on the emergency

“ ‘We found ourselves with traffic at a standstill on 25 lines in the southern part of Belgium’

*Benoit Gilson, CEO, Infrabel*



took a decision that was unprecedented in Belgian railway history: to shut down traffic on almost half the network. Subsequent events confirmed that this had been the only reasonable choice in the face of impending disaster.

While the north of the country was mostly spared by the elements, we found ourselves with traffic at a standstill on 25 lines in the southern part of Belgium. This was either due to the damage

services — which were already overwhelmed trying to evacuate entire villages now under water — in order to assist the occupants of a train stuck in the middle of a flood.

Once we were certain that network users and our technical teams were safe, Infrabel's senior management entered a phase that I would call 'collective intelligence' — bringing all our experience to try and answer the questions that arose from this new climatic reality. What should be the priorities for restoration? And above all, how could we rebuild quickly and well, or rather well but quickly?

During the first few days of this crisis, I made numerous visits to the field, in order to support my colleagues, many of whom had spontaneously returned to work or agreed to give up their holidays to help address the exceptional situation. I also wanted to see for myself the damage caused by the raging waters, so I could understand better the issues at stake, whether they were related to deadlines or to the resources needed to meet the challenge of reconstruction.

A thousand images from these visits are forever etched into my mind, but I will mention just two. These are not linked to any barometer of my emotions, but I have chosen them because they illustrate two different approaches taken by Infrabel to repairing our infrastructure.

### The bridge at Pepinster

My first example is the 'martyred' municipality of Pepinster in the Ardennes, where a dozen people died.



**41**  
Number of fatalities in the Belgian floods of summer 2021, which left 100 km<sup>2</sup> of the country submerged

*An empty passenger train was derailed by the washout at Lesterny in the early hours of July 15 2021.*

The so-called Pepinster-Cité bridge carrying the railway to Spa over the River Hoëgne was 50 years old, but built on older foundations dating back more than a century. The bridge was sound, with no structural weaknesses, but the sudden power of the current swept away the central pier, causing the whole structure to collapse. Both the deck and its supports had to be rebuilt.

As with three other damaged bridges, our engineers decided to rebuild the structure in an identical form, because of the urgency of the situation. Without this bridge, it would not be possible to restore rail services to Spa. Fortunately, here and elsewhere, we were able to mobilise a large number of people, including subcontractors, and after 12 weeks of hard work the trains were once again crossing the now calm river.

Given the exceptional nature of the flood, we decided to rebuild the bridge 'as is', without additional reinforcing. The average age of the bridges on the Belgian railway network is around 100 years, and most of our engineering structures are time-proven and designed to withstand extreme situations. This is what we call 'sizing to standards'. Systematically exceeding this threshold would come at a very high cost relative to the benefits. As a public company, Infrabel must invest its resources as judiciously as possible to provide its customers with a quality service. Investing wisely means allocating public funds to deliver permanent improvements in safety and punctuality as well as capacity



*The Louheau bridge at Pepinster was damaged by same flood as the nearby Pepinster-Cité bridge on the Spa branch.*

*Innovative methods were needed to repair the embankment collapse at Mont-St-Guibert.*

expansion, as we are currently doing to benefit a number of connected companies and ports.

## Embankment collapse

This brings me to my second example. We are in Mont-Saint-Guibert, 30 km south of the capital on the Brussels – Namur main line. This is a strategic section of the North Sea – Mediterranean Rail Freight Corridor, one of three international freight corridors that cross the country. Here the damage was not caused by rising water but by run-off. The tracks are located on an embankment that rises up to 15 m above the adjacent houses. The heavy rains in mid-July turned the parallel service roads into torrents, with water flowing off the adjoining land. Cracks appeared along the foot of the embankment, and were infiltrated by the water, until the whole bank became waterlogged and gave way. Thousands of cubic metres of earth slipped over a length of nearly 500 m, offering the astonished residents a rare view of the underside of the sleepers. Fortunately, this was one of the lines on which traffic had already been suspended as a preventive measure.

A colossal task awaited our teams. It was impossible to work from track level, due to the instability of the embankment. Our first challenge was therefore to provide access to the site from below. It was clearly out of the question to raze a house to allow heavy machinery to get to the bottom of the gardens. So we had to get around this, using small caterpillar-tracked machines that could

squeeze between the buildings, or using a nearby river culvert as an access route. The preparatory work to develop the access and bring in raw materials alone took nearly three weeks.

Unlike Pepinster, our engineers did not choose to rebuild to the old standards in Mont-Saint-Guibert, out of absolute necessity. The fragile embankment had to be treated radically to allow the resumption of heavy traffic on this important corridor which is essential for serving the capital as well as carrying pan-European freight transport.

By working 18 h in every 24, we brought in 15 000 tonnes of rock, with each piece weighing more than 2 tonnes. These were arranged in staircases, like Lego, to create a solid foundation for the tracks. Even though new rainfall in August increased the damage, traffic was able to resume at the beginning of September. This example was enough to convince us of the advisability of reinforcing our strategic infrastructure, and adapt it to against future climatic hazards.

By the start of the school year, barely six weeks after the terrible storms, only three of the 25 lines originally declared 'impassable' were still out of use. Our timetable for a gradual return to service, which was established on July 20 but considered by some to be optimistic, had been achieved, thanks to an unprecedented mobilisation of human and material resources, and the perseverance of the railway workers.

This disaster cost Infrabel more than €60m, although fortunately a significant part could be pre-financed



by the federal government before being reimbursed by the insurers.

## The importance of prevention

Over the past 12 months since that fateful week, Belgium has experienced other signs of climate disruption, notably the so-called Storm Eunice in February. That brought winds in excess of 120 km/h, which forced a further interruption in traffic for a few hours following a series of incidents, although fortunately not on the scale of the 2021 floods. This storm reiterated the importance of continuing the preventive measures that we have been taking for years: pruning trees alongside the tracks, putting track and catenary maintenance teams on alert to respond to emergencies, and regularly reminding residents living near the railway to anchor any items such as greenhouses or trampolines that are likely to be blown away by the wind.

For several years now, Infrabel and SNCB have been drawing up 'hot weather', 'autumn' and 'winter' plans that include preventive measures to minimise the potential impact of certain climatic events on rail traffic. As well as setting out traffic management and maintenance procedures to be adopted in the case of extreme weather, these plans require specific investment. For example, we have improved the ventilation in signal boxes to prevent the installations from overheating. There are also plans to make our turnout heating system 'smart', so that it can be controlled by weather data.

Infrabel is also preparing an in-depth analysis of the exposure of our assets to the impacts of climate change. The first priority in this work concerns the stability of the embankment slopes in the event of flooding and heavy rains. We intend to map the more vulnerable areas, taking into account long-term climate scenarios.

At the same time, we have started to think about the potential contribution of the Internet of Things to our climate change adaptation strategy, notably around monitoring the condition of our assets. Last year, our ICT teams began testing various remote monitoring applications for certain critical assets, using a private mobile network.

One example is the flood-prevention installation at the entrance to the Diabolo tunnel at Zaventem, used by passenger trains from Antwerpen to Brussels Airport. This incorporates a water tank, coupled with three huge pumps, responsible for channelling rainwater and discharging it back to the sewerage system. The extreme precipitation seen last year highlighted the need to be informed of potential

anomalies. Any malfunction of these pumps could lead to a rise in the water level at the tunnel portal, with consequences for train operations, and potentially cause damage to other parts of the infrastructure. The pumps have therefore been equipped with a 'watchdog', which constantly monitors their proper performance and is able to report any defect that may indicate an impending breakdown. This should ensure that the pumps will work when we need to rely on them.

Nearby, there is a second 'connected object' which is independent from the pumping system but complementary to it, and also set to play a crucial role. A probe in the ground informs our technical teams about the soil hygrometry, whether the land is waterlogged, or whether it has any capacity to absorb heavy rains. This helps us to understand how much water the pumps may have to deal with in the event of a storm.

*Below: Infrabel has decided to introduce 'green' sleepers made of sulphur concrete to reduce its carbon footprint.*

*Bottom: Remote monitoring is being fitted to the pumps which drain the Diabolo tunnel at Zaventem.*



Photo: Infrabel / Benjamin Bralet



Another warning device is being deployed in areas exposed not to rain but to wind. Developers in our ICT department have designed connected boxes that can be magnetically attached to catenary masts. These are fitted with an accelerometer and can detect abnormal movements of the gantries in strong winds, informing us remotely of any structural weakness.

Urged on by the torments of the weather, Infrabel is banking on 'innovation for prevention' and demonstrating how technology is working to support soft mobility. There is much to celebrate.

Although, on second thoughts, not so much, because when it comes to climate change, the only real solution is not to fight the consequences but rather to act radically to curb the causes. There is no lack of work in this area, in Belgium as elsewhere, and not only in the railway sector.

Infrabel will do its part. Our ambition is to achieve carbon neutrality by 2040. We are giving ourselves the resources to achieve this, among other things, by increasing the energy efficiency of our buildings, boosting the production of green energy, and by integrating CO<sub>2</sub> as a criterion in our calls for tenders for the supply of green energy by 2025.

We have just taken another step, and Infrabel will soon be the first infrastructure manager to install 'green sleepers'. These are manufactured using 'sulphur concrete' in place of traditional cement. This material is infinitely recyclable, and emits 40% less CO<sub>2</sub> during the manufacturing cycle. 🌱

# Flexible wagons to refresh maintenance fleet

GB Railfreight, Wascosa and Greenbrier are supplying innovative wagons for use on Network Rail's infrastructure maintenance trains. **Chris Jackson** investigates.

Swiss wagon leasing group Wascosa marked its entry into the UK market with an event at London Victoria station on June 28 to unveil three designs of wagon it is delivering to refresh Network Rail's infrastructure maintenance fleet.

The company is supplying 570 vehicles under a 10-year leasing agreement, in partnership with GB Railfreight, which will be responsible for management and maintenance of the fleet. GBRf has in turn subcontracted the maintenance work to Wabtec's Doncaster plant.

In 2018 Network Rail tendered for the provision of 2000 wagons to refresh the fleet used for delivery and removal of materials during maintenance and renewals. The Wascosa vehicles are new, but the remainder will be existing stock refurbished or repurposed.

The vehicles are being manufactured by Greenbrier Europe: 310 box wagons of two types are coming from the Astra Rail plant in Romania and 260 intermodal flat wagons are being assembled at Swydnica in Poland. Wascosa's UK representative Mick Tinsley told *Railway Gazette International* that around 320 wagons have so far been delivered, with the remainder expected to arrive by December, around six months ahead of the original schedule.

## Flex Freight System

At the heart of the project are the 260 multi-purpose wagons based on Wascosa's 'Flex Freight' concept, which has been adopted by a number of European freight shippers including German chemical group BASF (RG 8.19 p32).

The basic vehicles are standard FEA-W intermodal flats, which can be fitted with a variety of modular superstructure elements. GBRf is procuring the superstructures directly from Greenbrier, buying modules for 218 vehicles and refurbishing existing stock for the remaining 42.

The modules are based around a 20 ft flat deck weighing 1.8 tonnes, of which three are fitted to each 60 ft FEA. They can be used as flatbeds to carry track panels and sleepers, or equipped with bolsters for rails. A third variant with bolt-on end units and mesh drop-sides will be used to move smaller components and bagged materials. Individual modules can be lifted on and off the wagons using a fork-lift truck and stacked at the hub depots when not required, helping to minimise storage space.

Other modules may be developed in future, with GBRf insiders suggesting that this might include specialist overhead line maintenance units.

Because the superstructure modules are carried on the container spigots, they are regarded as part of the load, rather than the wagon. This simplifies acceptance, as the FEA-W flats are TSI-compliant, and the modules do not require separate certification, providing they meet ISO standards and fit the loading gauge and weight restrictions. The vehicles run on Y33 bogies and are authorised for a gross load of 80 tonnes.

The Arad-built box wagons are intended for the movement of ballast, aggregates and spoil. Wascosa is supplying 50 JNA wagons, identical to those used for aggregates traffic across the UK network. These have a capacity of 60 m<sup>3</sup> or 77 tonnes, and will mainly be used for deliveries of ballast from quarries to Network Rail's local distribution centres. The other 260 vehicles are designated MLA, and branded as Falcon. These have lower sides to facilitate unloading by grab at worksites under overhead wires. They have a payload capacity of 43 m<sup>3</sup> and can carry 66 tonnes.

## Delivering a better service

Hosting a locomotive naming ceremony to celebrate the partnership with Wascosa, GBRf Managing Director



On display at London Victoria were FEA-W flat wagons with different superstructure modules, plus MLA and JNA box wagons for ballast and aggregates.

John Smith emphasised the growing importance of rail freight in meeting the challenges of transport decarbonisation, which would require additional rolling stock.

Recalling that GBRf had started by providing infrastructure trains before expanding to become the UK's second largest rail freight operator, he hoped that the NR contract would similarly provide a springboard for Wascosa.

Explaining that the Luzern-based company had been started in 1964 as a family owned business, Wascosa CEO Peter Balzer said it now had a fleet of almost 16000 wagons operating in 23 countries across Europe. The Network Rail contract was the group's largest single order, and a vindication of its investment in developing the Flex Freight concept over the past 15 years.

'I take great pride in this pioneering technical development', he said, adding that BASF was currently expanding its Flex Freight fleet in Germany which includes the XXL tank containers used for specialist chemicals.

Describing the partnership with Wascosa and GBRf as 'a great example of the industry coming together', Network Rail's Engineering Services Director Leevan Finney said the vehicles would support 'critical maintenance enhancements', helping the infrastructure manager 'deliver a better service for freight and passenger users'. The fleet would also help to improve the safety culture around track renewals and maintenance, as part of NR's wider 'safe services' strategy. 

# 570

wagons are being supplied to Network Rail by Wascosa, in partnership with GB Railfreight





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# A change of track

Advances in turnout design, greater use of digital technologies and a strong focus on performance are helping to improve the capacity and reliability of Sweden's rail network.

**Chris Jackson** reports from Örebro.

Over the Easter weekend of April 16-17, Swedish infrastructure manager Trafikverket, contractor Infrakraft and turnout supplier Vossloh Nordic Switch Systems completed a critical relaying project in the northern throat of Stockholm Central station. Four double slips, a scissors crossing and two standard turnouts were replaced with new modular units in just 11½ h, thanks to careful project design and advanced planning.

The work forms part of a six-year renewal and remodelling programme at the country's busiest railway hub, which could only begin in 2020 after the capital's suburban services were diverted into the new Citybanan cross-city tunnel, releasing the necessary capacity.

The turnouts with concrete bearers were supplied by Vossloh, having been designed, fabricated, assembled and tested in just six months.

The complete track layout was assembled at the company's plant in Örebro for acceptance testing at the end of March. The turnouts were then partially dismantled and shipped to Stockholm on three trains, ready for installation using a self-propelled Kirow crane. Vossloh also provided site management and co-ordination to ensure a smooth installation and helped with the subsequent commissioning of the finished trackwork.

Considerable use was made of digital simulation in planning the possession, using CAD drawings of the existing and future track layouts from engineering consultancy Sweco, and converting these into a 3D model to check how the various machines could be moved around the site, where components could be delivered and stored ahead of the work, and how the project could be phased to avoid interference between the different working processes.

## Digital transformation

The use of digital design techniques and simulation in planning the Stockholm C relaying is just one example of an extensive transformation

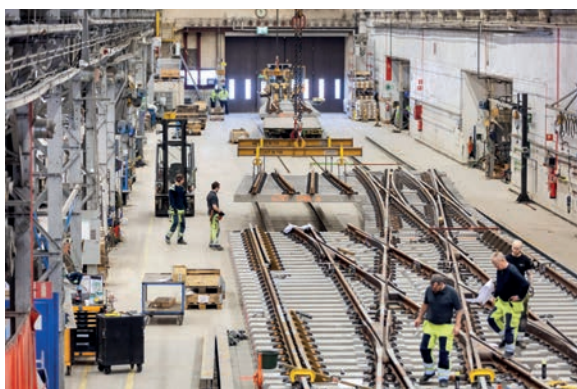


underway at Trafikverket, which is harnessing digitalisation in every aspect of its asset management processes in order to improve the quality and performance of the national rail network.

Former Director of Infrastructure Björn Östlund points out that 'the railway is a process industry, and the cost of malfunctions and failures is much wider than just the infrastructure — without the right infrastructure you can't run the trains. We need to take a long-term perspective to improve resilience, while also getting the life-cycle costs down.'

Emphasising that the infrastructure manager is essentially 'a supplier of slots' to multiple train operators, he argues that maintenance and renewals have a significant impact on availability. Suggesting that 'the technology of maintenance is really lagging', he tells *Railway Gazette International* that 'we need to be more efficient'.

Nevertheless, increased digitalisation is delivering a better balance between preventive and reactive maintenance, he believes. This has helped to reduce



*All of the turnouts and crossings for the Stockholm Central renewal project were assembled at tested in Örebro before being delivered to site to facilitate rapid installation.*

the impact on capacity, and facilitate the operation of up to 24 trains/h on the busiest parts of the network.

## Performance priorities

Favouring a collaborative approach, Trafikverket has established a performance working group with the national passenger operator SJ and other train operators, aimed at identifying problems and making informed recommendations to decision-makers about where to focus investment.

SJ's Head of Punctuality Britt-Marie Olsson reiterates the need for reliable infrastructure to support modal shift. Commenting that 'it should be easy for people to act climate-friendly', she believes that digitalisation and automation are helping to make railways easier to use, and thus more competitive with air or road. This has been reflected in growing demand, despite some short-term disruption from the coronavirus pandemic.

Pointing out that front-line operating staff often bear the brunt of customer dissatisfaction in the event of train delays or cancellations, Olsson says better reliability would improve their working environment. Moving from reactive to proactive maintenance should also bring more operational flexibility, she suggests, noting that at present it can take up to two years to plan and implement timetable changes.

Olsson says SJ is aiming to achieve an average 95% punctuality across its whole business. That would require 98% of short-distance trains to arrive within 3 min of schedule, but it is often a bigger challenge to operate long-distance trains to a 5 min margin, given their longer journey times and challenging weather conditions, particularly during winter. She says high winds have become a much greater problem in recent years, especially in 2021, which might be an impact of climate change.

Speaking for the freight operators, former Hector Rail CEO Mats Nyblom points out that rail freight is more competitive over longer distances, but fitting around engineering works can be challenging — particularly on international flows where infrastructure managers do not always co-ordinate their maintenance planning (p48).

Rail benefits from a relatively high market share in Sweden, thanks in part to the size of the country, with a lot of bulk products such as timber and iron ore. In terms of tonne-km, rail's market share in 2020 was around 20%, against 28% for coastal shipping and 52% for road.

While climate concerns are encouraging more shippers to consider switching to rail, Nyblom says freight operators need to offer a high quality of service if they are to meet the expectations of customers more used to road. In a typical year, he points out, there were more than 500 short-term timetable changes as a result of engineering work on the network, which has an impact on both operating costs and the ability to meet customer delivery schedules.

Track works have a much greater impact on freight than passengers, he

## Rethinking turnout production



Vossloh Nordic Switch Systems is the principal supplier of turnouts for the Nordic region, and has framework contracts from the infrastructure managers in Sweden, Norway, Denmark and Finland. However, CEO Bertrand Gryspeert adds that it occasionally also supplies other markets — the company is currently delivering turnouts for a high speed line project in Turkey where a Swedish export financing package specified a proportion of local content.

The company has been built around the turnout manufacturing activities of the former Swedish State Railway, which were privatised as a stand-alone business during the break-up of the national railway around 25 years ago. Initially acquired by Cogifer, it became part of Vossloh-Cogifer in 2002 and is now one of 19 subsidiaries in the Vossloh Group's Customised Modules business unit.

As well as a small head office in Stockholm, VNSS has two main plants in Sweden. Component fabrication and machining work is done at Ystad in the south of the country, while turnout assembly is concentrated at Örebro, where the company leases part of the former state railway's central workshop complex from Jernhusen. The Örebro plant also manufactures insulated block joints for Trafikverket under a separate framework contract.


'Our business has changed significantly since I came here 23 years ago', recalls Gryspeert. 'It was old fashioned, with lots of manual processes. Since then, we have developed a new range of modular products, restructured our working practices to improve productivity, and increased our throughput by 1000%, without any additional buildings.' Describing the company as 'small and lean', he explains that 'we don't want to be big, we just want to be good.'

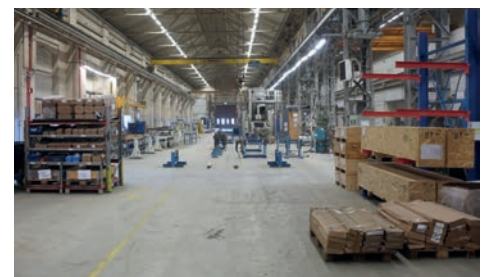
'As the incumbent supplier, we support a lot of legacy equipment up to 100 years old, and we have committed to our customers that will continue as long as they need it. We are talking about a product life of 50 years, which can lead to conservatism if you don't need to change anything.'

'About 10 years ago we started to develop a new generation of modular switches and crossings, moving towards a functional "plug and play" approach. Turnouts are all assembled and systematically tested in the factory before delivery, which helps to optimise the cost whilst reducing the time needed for installation. We know that our customers want to run trains, so we need to keep the railway open as much as possible.'

Following assembly and testing in the Örebro plant, turnouts are partially dismantled for delivery using a small fleet of tilting wagons.

Gryspeert says all turnouts are built to order, using designs that can be customised to fit specific locations — around 99% are intended for brown-field renewals, which come with more constraints than greenfield projects that can be developed around standard modules. Today, the plant can deliver between 350 and 600 turnouts in a typical year, with each taking around 18 h to assemble, test and dismantle for dispatch.

Production continues around the year, although the Scandinavian weather typically limits major track works to the summer period between April and October. Completed turnout assemblies are stacked outside the plant ready for dispatch. Smaller elements are shipped on flat wagons, but VNSS leases seven tilting wagons for moving larger assemblies, taking full advantage of the generous Swedish loading gauge. A few years ago the company acquired a second-hand reach stacker from a local port which has been modified to speed up the loading process, allowing the critical tilting wagons to make more delivery runs each week, depending on the ultimate destination. 



warns, pointing out that ‘you can’t put freight on a replacement bus’. Operators need to have ‘an infrastructure that is robust and predictable.’

## Digital revolution

Recognising the benefits of digitalisation, Trafikverket has established a dedicated team to increase the use of BIM in its asset management and maintenance planning. According to project manager Karrar Ibrahim, ‘our goal is to be a catalyst for digitalising the rail industry in Sweden.’ The team works with partners, suppliers and contractors to develop smarter structures, in line with ISO principles of modern asset management.

The infrastructure manager also has a range of research projects underway aimed at making its network more reliable, more productive and more sustainable, he says. Many of these are being undertaken at a European level, as Trafikverket was a founding member of Shift2Rail and continues to play a key role in its successor Europe’s Rail.

Ibrahim explains that his team is focusing on using BIM to manage asset life cycles better. This includes the development of virtual ‘reference models’ of key assets, using a standardised object library, to inform maintenance regimes. Many of these standard models will be applicable to different geographical locations, and it is important to consider how they interact with the local environment. However, Trafikverket is not currently looking at creating a digital twin of its entire network, he confirms.

The infrastructure manager is working closely with its principal suppliers and contractors to roll out digital technologies, and Vossloh Cogifer’s Business Development Director Mirko Maksimovic suggests that Sweden’s open market has encouraged greater innovation. Collaboration between Trafikverket and its suppliers has delivered multiple innovations that are helping to improve the reliability of the infrastructure, increasing both capacity and performance, he says.

Pointing out that the maintenance of existing railways is very different from new line construction, Maksimovic adds that increased capital investment in smarter technology can deliver longer-term benefits in reducing operating costs.

While Östlund agrees with this view, he emphasises that public procurement rules can constrain ‘what you can do and how you do it’. While it is necessary to work ‘within the limits of the contract’, he feels that this should not

preclude any players from looking for opportunities to harness innovations or technical enhancements.

## Continuous relationship

Vossloh Nordic CEO Bertrand Gryspeert explains that the turnout manufacturer is working closely with Trafikverket on its digital transformation, looking at ‘the whole of the value chain’. This will help the infrastructure manager to put in place a more nuanced management system ‘based on understanding what is happening’.

Highlighting an important change from traditional practice, Gryspeert emphasises that the manufacturer wants to have a ‘continuous relationship to our products’, which can be beneficial to supplier and customer alike. In the past the company would simply deliver completed turnouts to the railway and hand over all responsibility for maintenance at that point. Today, he says, it is ‘all about asset management through the whole life cycle’.

Thanks to a transparent relationship with its principal customers — both Trafikverket in Sweden and Bane NOR



in neighbouring Norway — Vossloh has access to a lot of condition monitoring data in near real time, Gryspeert explains. ‘So we can understand what happens, and avoid guessing’. That in turn feeds back into the design of new turnouts for more efficient installation and less disruptive maintenance.

Vossloh Nordic has recently undertaken a ‘deep dive’ for the 100 ‘most painful’ places in Sweden to provide Trafikverket with asset management advice. The company collected a lot of data which could be used to identify potential failure modes, and this was mapped onto critical



## ‘Our goal is to be a catalyst for digitalising the rail industry in Sweden’

Karrar Ibrahim, BIM specialist, Trafikverket

# 95%

Average punctuality SJ is aiming for across its whole business

locations. Combining asset condition and train performance data, along with the value of delay-minutes, has helped to make a strong business case for investing in more robust infrastructure.

However, Gryspeert suggests that ‘the digital transformation journey has only just begun’. The next step will be to develop a ‘feedback loop’, with continuous monitoring of critical assets.

In December 2020 Trafikverket awarded a multi-year contract to Vossloh and DB Systemtechnik to provide remote condition monitoring for 1 000 turnouts across the country. This includes the retrofitting of accelerometers to existing turnouts as well as the supply of new turnouts that are already digitally enabled. The sensors continuously record vibration data, which is transmitted automatically to a cloud-based platform for processing. Vossloh then provides Trafikverket with regular condition reports and recommendations for maintenance interventions.

Meanwhile, Vossloh is increasingly using BIM in the design and manufacture of its turnouts. According to Head of Digitalisation Niklas Nilsson, digital planning for the renewal project was a ‘continuous process’, starting with site surveys to inform the design of the track layout, as every turnout has a unique identity. Vossloh developed the design in three levels of detail, informing the procurement of sub-assemblies, manufacturing of each turnout, its shipping to site and installation. With the advent of condition monitoring, the same digital files can then be used to record degradation and support Trafikverket’s proactive maintenance regime, he explains.

Looking ahead, the company’s Head of Asset Management Björn Lundwall says Vossloh is looking to master the ‘ecosystem of turnouts’, and sees data and information becoming an increasingly important part of its business plan. Using BIM will allow the company to focus on more function- or performance-based contracts, where it can partner with infrastructure managers and principal contractors to develop its expertise and deliver across the whole value chain.

Björn Lundwall from Vossloh Nordic Switch Systems completes the installation of a turnout sensor as part of the Trafikverket remote monitoring contract.



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# Connected workers inspect catenary

A novel workflow tool has been trialled by Network Rail on the East Coast Main Line in northeast England to combine the benefits of monitoring overhead lines using drones with the elimination of paper-based processes at the worksite.

## Hannah Bailey

Business Development Director  
Intoware

**M**aintaining 25 kV 50 Hz overhead line equipment remains a constant challenge for Network Rail's works delivery teams. When inspecting live overhead wires, maintenance staff are still required to climb catenary masts to be close enough to conduct audited asset inspections.

For obvious reasons, this brings significant risks for the maintenance team, and NR has been looking at options to reduce the scale of the safety challenge related to this activity. The result has been a 'connected worker' approach to ensure staff safety, while also reducing asset failure rates and costs.

### Minimising human intervention

In 2021, visual intelligence provider Cyberhawk partnered with workflow automation specialist Intoware to provide an integrated tool that combines drone imagery and visual platforms with digital workflows. Cyberhawk and Intoware demonstrated that by combining robotics (unmanned aerial vehicles), wearables and digital workflows into one 'single source of truth' known as iHawk, NR could deliver a more robust maintenance plan leading to fewer track possessions.

Using drones, maintenance staff are able to collect highly detailed visual data without putting themselves in harm's way. UAVs can make routine inspections safer and faster because running lines do not need to be closed. The need to work at height is significantly reduced, and fewer staff are needed 'on the ballast'.

However, to fully realise the potential benefits of UAV monitoring, NR's own workflows also have to change significantly. Its ECML works delivery teams still relied on paper-based legacy tools for asset audit inspections, often leading to delays as manual reports would often be written up days later.

NR agreed that a 'connected worker' model would be developed to enable engineers to combine aerial imagery with ground level inspection data made accessible in a central repository. This was intended to deliver faster and more accurate real-time asset reporting across these teams.

Intoware's WorkfloPlus had shown a 70% productivity improvement when trialled by track renewals teams at NR's Aston Depot in July 2020, and this success prompted NR's electrification maintenance team to adopt it as part of the connected worker trial that started in July last year at Belford near Newcastle on the East Coast Main Line.

With Intoware's support, NR's team digitised a series of legacy, paper-based inspection processes. This meant working with frontline staff on the ground to fully understand their activities, assess issues and challenges and design, digitise and standardise workflows to meet existing needs while also seeking to unlock time, safety and sustainability benefits.


### Unlocking drone data

The four-month trial combined Cyberhawk's iHawk visual intelligence tool with the WorkfloPlus software to support the catenary inspection task. WorkfloPlus draws on the cloud-based visual data to give site engineers step-by-step work instructions on tablet PCs. iHawk's map-based interface is integrated into WorkfloPlus to provide detailed 360-degree images of the overhead wires and related assets.

The user also receives accompanying trend data from previous audits. This approach means warnings or anomalies can be highlighted at one specific location, and NR gains a record of who was responsible for each inspection. The teams can also see how interventions and inspections over time have affected the assets at that location, facilitating better and earlier decision-making.

As Intoware's platform provides standardised and consistent workflows, NR's teams knew what data needed to be collected as they were guided through the process. The instructions showed what to check, the nature of the photographic evidence needed, and how to report asset condition. This meant that the data was always 'right first time', significantly reducing the need to make further re-assessments on site because of incomplete records.

This trial demonstrated that frontline engineers can save time, with the setting-up, running and reporting of each wire run inspection taking just 1 h to complete.

WorkfloPlus was also shown to increase both the accuracy and visibility of data as the results were uploaded on-site and shared instantly with colleagues. The number of staff required to go trackside was also reduced as envisaged at the outset. Discussions are now underway within NR to deploy the connected worker approach across the works management teams on the rest of the ECML. 

# 70%

Productivity improvement resulting from use of 'connected worker' model at NR's Aston Depot in July 2020

*The ECML catenary monitoring trial combined the use of unmanned aerial vehicles with digital auditing and reporting tools to speed up Network Rail's inspection processes.*





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# Snow blowers await the winter season

**N**ext winter Swedish transport infrastructure manager Trafikverket will have three snow blowers from Swiss supplier Zaugg available to keep key lines open when there is heavy snowfall. Trafikverket took delivery of the third machine at the end of last year in time for it to enter service after 200 h of winter testing in the north of the country.

Like its predecessor, which was first deployed in October 2020 in central Sweden, the latest addition to Trafikverket's snow clearing fleet is an updated version of a Zaugg ZRR10000M machine delivered in 2016. This was allocated to the heavy haul iron ore line between Abisko and the Norwegian border at Riksgränsen, perhaps better known as a ski resort.

The three machines have a hydrostatic drive acting on three of the four axles; this met the customer's requirement for optimal power distribution between the traction drive and snow clearance equipment. Two C18 Caterpillar diesel engines, each rated at 470 kW and compliant with Stage V emissions standards, provide traction power. The drive and related equipment was supplied by Matisa of Crissier near Lausanne, which also had responsibility for obtaining certification for the machines to be used in Sweden.

## Rotating superstructure

The superstructure, which houses the two snow cutting units, the traction equipment and the driving and control cab, rotates by 180° on the underframe when a change of operating direction is needed; this takes about 2 min.

Each snow blowing and cutter unit can be moved horizontally and vertically using programmable joystick controls, and the direction and angle of the snow ejection chutes can also be individually adjusted. Compared to fixed centrifugal snow cutters with extendable guide plates, the adjustable design offers faster operation requiring less power.

During trips to and from worksites the snow cutter units are positioned

Swiss specialist Zaugg has supplied a batch of snow clearance machines for use by Swedish infrastructure manager Trafikverket.



Trafikverket now has a fleet of three Zaugg snow clearing machines.

## Main details of ZR-R10000M snow blower

Gauge mm	1435
Overall length mm	16470
Distance between bogie pivots mm	7790
Bogie wheelbase mm	1800
Weight in working order tonnes	71
Mass of superstructure tonnes	47
Mass of underframe tonnes	20
Fuel capacity litres	3000
Minimum curve radius m	90
Snow clearing capacity tonnes/h	7500
Maximum speed km/h under power	80
in operation	20
when hauled	100
Temperature range	-40°C to +35°C

just above the rail surface to fit within the Swedish gauge clearance profile.


Fitted at the rear of the superstructure is a hydraulically adjustable snow plough which can be raised or lowered from the driver's cab. The plough can be swivelled to left or right or aligned in the forward direction in a wedge shape.

To ensure even weight distribution, the two diesel engines are mounted at the rear of the superstructure with the fuel tank in the centre. An auxiliary diesel generator provides power for the onboard electrical systems, which includes kitchen equipment for the crew. The main engines can be pre-heated either via a small diesel genset or from an external electrical source.

## In the cab

The fully sprung cab and electronic component modules are mounted on dampers which ensure that the cab remains quiet when the snow cutters and impellers are operating. The cab offers two identically equipped operating positions offering good forward vision. Typically, one position will be used for driving and the other for control of the snow blowing equipment. Before the driver is able to start the machine, he or she must blow into an electronic alcohol testing device. The cab contains a table with two fold-down seats as well as a refrigerator, microwave oven and coffee machine.

In order to comply with updated standards, the second and third machines incorporate a number of changes over the first unit used on the iron ore route. These include new software, safety systems and ETCS equipment, while a notable improvement is the ability to fold down the extendable side blades so that overhanging snowdrifts can be cut.

The second machine was ordered in January 2019, and assembly occupied 3 000 h of work; it entered service in October 2020 and was based at Duved, west of Åre on the Mittbanan in central Sweden. Its successful deployment led Trafikverket to order the third machine. 



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# Generational change will transform travel

A multi-billion dollar investment programme will change the way people use public transport in Canada's most populated area, with GO Expansion bringing frequent all-day electric train services to routes across the Toronto region.

**Matt Clark**  
Chief Capital Officer  
Metrolinx

**T**oronto is a city on the move. Canada's biggest city is one of the fastest growing in North America, and the Toronto region attracts more migrants from other countries than any other metropolitan area, according to a study by Toronto Metropolitan University's Centre for Urban Research & Land Development. The booming city is

*GO Transit uses double-deck push-pull trainsets, but the current development phase will determine the fleet strategy for the future electrified network.*

home to some of the world's biggest companies, leading universities and a dazzling entertainment and sports scene. No wonder that it is frequently ranked one of the most livable cities in the world.

Toronto is now working on the continent's largest public transport expansion programme. Led by Metrolinx, the province of Ontario's regional transit agency, new heavy rail, light rail, subway and bus rapid transit projects are reshaping travel across the region. Our vision is to create a future where people and communities are connected like never before.

Popularly known as the Greater Golden Horseshoe, Toronto and the communities spreading out from it form one of the largest clusters of public transport in North America. But the network needs to grow, and it needs improvement — there are gaps in the fabric that require attention.

Toronto Transit Commission's subway network has only seen one extension and a short new line built in the past 30 years. GO Transit's commuter rail network has focused on those travelling in and out of the city centre at peak periods. But times change, and so should the transit system that travellers rely on.

Metrolinx has not just been thinking about today's trains or buses, but planning what will be needed to serve our children's children. And how best to stitch the whole system together. It is about creating opportunity and growth, with flexible routes and trip options



that open up new journeys — getting riders to jobs, entertainment or just a favourite deli on a Saturday afternoon.

Population growth has already bounced back to pre-Covid rates, and Metrolinx is planning for 2051, by when this large, densely populated region is projected to be home to 14.9 million inhabitants, up from 9.8 million today.

In conjunction with our partners at Infrastructure Ontario, Metrolinx has embarked on an historic programme valued at more than C\$70bn to deliver an interconnected network which will transform public transport across the region.

Construction is about to conclude on the Eglinton Crosstown light rail line, a key east-west connection that is set to change travel patterns significantly. Many other projects are underway or in the planning phase. When the programme has been completed, the region will have an electrified regional rail network, four new or extended subway lines and four light rail systems all working together to do more than just move people.

### Regional rail backbone

GO Expansion is the biggest and most important element in this programme. It will transform today's commuter rail service into an all-day rapid rail network, tying all of the other systems together.

GO Transit services radiate from Toronto to the west, north and east. In



the west, one route serves the booming metropolises of Mississauga and Hamilton — Canada's seventh and 10th largest cities respectively, and stretches all the way to Niagara Falls. Trains also roll through the expanding tech hub of Kitchener-Waterloo to London, Ontario.

To the north, GO Transit serves some of the fastest growing towns and cities in the entire region, as far as Barrie, 100 km from Toronto. And the population of Durham to the east is also growing.

Historically, the network has been focused on meeting the needs of commuters to and from downtown Toronto, with most services concentrated in the peak hours. Going forward, it will become a regional backbone connecting high-growth communities across the Greater Golden Horseshoe.

Regional express networks are not new, of course. Fast and frequent electric trains support economic prosperity in more than 60 cities around the world, including London, Tokyo, Paris and Sydney. These have developed progressively over the past century or more, extending far beyond the city boundaries and yet integrating closely with metro and light rail networks.

Such cities enjoy frequent all-day services in both directions, with four or more trains/h offering a walk-up service on most routes. Electric trains can operate at higher speeds, with fast acceleration and braking rates helping to reduce journey times. With more frequent services and shorter journey times, this type of railway gives people the opportunity to choose public transport for much more than just their daily commute.

The GO Expansion programme is intended to address both shorter and longer-term mobility needs, and includes all the work necessary to transform Toronto's commuter rail system into a regional express network providing frequent two-way, all-day and weekend services. Later phases will include service

“Metrolinx has embarked on an historic programme ... to deliver an interconnected network that will transform public transport across the region”

*Above: Trackwork on the south side of Toronto Union Station is currently being remodelled as part of the work to provide higher and wider platforms for the regional rail services.*

expansions and extensions to places like Bowmanville and Kitchener-Waterloo.

Metrolinx is currently working through a proposed timetable for this future rapid rail network and determining the associated infrastructure that will be required. Our aim is that GO Train services will run at least every 15 min on the core network from Union Station to Burlington on the Lakeshore West Line, Bramalea on the Kitchener Line, Bradford on the Barrie Line, Unionville on the Stouffville Line and Oshawa on Lakeshore East.

The outcome will be a significant increase from 3 500 trains per week in the last pre-pandemic financial year of 2019-20 to potentially more than 10 000. This will require an estimated 687 track-km of 25 kV 60 Hz electrification, 205 km of new track and extensive signalling works, as well as the remodelling of Union Station to increase its throughput.

By 2040, the regional rail network is projected to be carrying more than 200 million passengers a year. That is almost three times the 76 million carried on GO Transit services in 2019-20. Meanwhile, the new train fleet is forecast to cut operating costs per train-km by half.

### Phasing the projects

The GO Expansion programme has been split into three main elements, designated as early works, off-corridor



works, and the on-corridor work — the final piece in the jigsaw.

Early works and off-corridor projects are already well underway, with projects totalling more than C\$11bn in construction. The first service increases resulting from this work will come online in 2025, and the system will be fully realised by the early 2030s.

Works now underway include the renovation of 16 GO stations, the expansion of two more and the recent opening of a new station at Bloomington. Another 29 GO stations are receiving customer service, accessibility and safety improvements, including passenger information systems, new display boards and tactile paving on the platform edges.

Work has started on six corridor expansion projects, including the laying of additional tracks to accommodate the increased service. Tunnels and bridges are being rebuilt, and four grade separations are underway — three level crossing removals and a bridge to carry GO Transit's Barrie Line over the CP rail corridor at the Davenport Diamond. Two new depots are also under construction to accommodate and maintain the expanded rolling stock fleet.

**11**  
C\$bn

Value of early works and off-corridor projects already underway

## On-Corridor Works

Metrolinx and Infrastructure Ontario recently selected the ONxpress Transportation Partners consortium of Aecon, Alstom, FCC Construcción and Deutsche Bahn International Operations as the winning bidder for the On-Corridor Works package (RG 6.22 p8). This fully integrated contract

is the largest and most complicated element in the entire programme.

Under an agreement signed on April 19, ONxpress will design, build, operate and maintain the new infrastructure and trains for 25 years, a massive, multi-billion-dollar undertaking. The package includes:

- design, construction and integration of the various railway corridors, (civil infrastructure, tracks, electrification, signalling and other systems);
- the reconstruction of track and platforms at Toronto Union Station;
- maintenance and rehabilitation of the new railway corridor assets and selected existing assets;
- construction of rolling stock maintenance and train stabling facilities;
- the operation of train services, including the provision of crews;
- timetable planning and train control for all operators across the GO-owned rail network;
- maintenance, servicing and cleaning of all rolling stock.

All of these new works must be integrated with the existing stations

and lines in order to run the enhanced services.

The chosen delivery model is a progressive Design-Build-Operate-Maintain contract. As a result of changes to the commercial landscape and Covid-19, Metrolinx and Infrastructure Ontario found that there was a reduced appetite in the market for major projects to be delivered under single Design-Build-Finance-Operate-Maintain contracts.

The planned private financing element was therefore replaced by performance-based incentives. Clear segments of work were defined, and the team structure was adapted to allow the private sector proponents to manage the transferred risks better, as well as sharing any residual risks among the consortium members.

This progressive DBOM model suits the scale and complexity of the project, and will ensure that the right team is in place to deliver the project at the best value for both taxpayers and passengers. However, in a progressive model, the project needs to start before all the risks can be finalised.

Now that the contract has been



‘Under an agreement signed on April 19, ONxpress will design, build, operate and maintain the new infrastructure and trains for 25 years, a massive, multi-billion-dollar undertaking’



awarded and commercial close achieved, the project has moved into the development phase. This is a multi-stage design process, whereby the consortium will work closely with Metrolinx to finalise the project scope, risk allocation and the pricing of the various elements in the package.

This approach allows for greater collaboration between the project owner, the successful bidder, other project partners, and the wider communities. The complexity of the On-Corridor Works package requires a two-year development phase; costs, delivery timescales and other details are due to be agreed by mid-2024.

## Remodelling Union Station

Central stations play a critical role in both regional and inter-city rail networks, and Toronto Union Station plays a key role in the modernisation of the GO Transit network.

This through station is used by all of the city's passenger rail services, both commuter and long-distance. Unlike cities like New York, London or Paris which have two or more major stations and often require travellers to make transfers across the city, Union Station allows easy interchange between GO Transit and VIA Rail long-distance trains.

Also providing connections to buses, the TTC subway and streetcar networks and the Union Pearson Express airport trains, Union Station is well placed to act as the hub for Toronto's integrated network.

For many years, the station saw only limited improvements, but as the city's



waterfront area began redeveloping, the City of Toronto launched the Union Station Revitalisation project in 2009. Much of the station's interior has since been refreshed. Two passenger concourses have been completely overhauled and a new glass atrium in the centre of the trainshed allows light to flow onto the platforms. A new bus terminal was opened in December 2020, improving the interchange experience for passengers in a safe, weather-controlled environment.

The next and final step is to

*A programme of turnout renewals on GO Transit's busy Lakeshore West Line was undertaken over several weekends in 2021.*

modernise the GO concourses, trackwork and platforms for completion around 2032, at a cost of approximately C\$2.5bn. This may seem like a lot, but the station already sees more trains every day than it has at any point in its history, and that figure is expected to quadruple by 2032. The increased throughput simply would not be possible without a major enhancement programme.

Work has already started on renewing the trackwork and replacing the signalling to accommodate more trains. And a programme to expand the station platforms was launched on February 16 this year. The narrow low-level platforms will be widened and raised to allow level boarding, matching the standards that are common in major European hubs. This small but essential change will improve accessibility, enhance passenger comfort and allow for safer, faster boarding, reducing dwell times and enabling trains to get in and out of the station quickly.

## Build it and they will come

The final element in our vision goes beyond transport and into regional development. An urban renaissance has been taking place in many Canadian cities in recent decades, but perhaps only Vancouver can rival the trend-setting transformation of Toronto's central district.

For years, GO Transit stations were typically surrounded by parking lots and giant parking garages — a legacy that led to Metrolinx becoming one of the largest parking operators in North America. Even Union Station was largely devoid of



*Renewal of the Bloor Street bridge forms part of the Davenport Diamond grade separation project.*

people living nearby — the St Lawrence neighbourhood being an exception.

The growth around Union Station in recent years has been extraordinary. It has created new destinations, offices and retail, that have attracted people to the downtown core — along with tens of thousands of places for people to live.

This has set the standard for the kind of development that is now taking place around other rail and subway stations across the region. Existing GO stations are attracting commercial developments, while stations being planned at King-Liberty and St Clair-Old Weston will take advantage of growth already underway.

Metrolinx has started to leverage the demand for property next to GO stations through its Transit-Oriented Communities programme. This will see developers covering the cost of new or improved station facilities in exchange for better transit access, and ultimately provide more housing options well served by public transport.

The new station at East Harbour and the upgrading of Mimico are being delivered through this programme. Metrolinx is also exploring opportunities to use TOC to fund the construction of four stations along the Bowmanville Extension and another at Park Lawn.

Development patterns don't change overnight, however. Projects take time to design, approve and build. It is likely to be at least two decades before the full impact of development around GO stations is seen. But every new home that goes up within walking or biking distance will almost certainly add ridership. Every rapid transit line that feeds a GO station makes taking the train that much more convenient.

The TOC development plan has the potential to bring more than 1 million additional people within walking distance of a GO station by 2040. If all those people took just two round trip rides on a GO Train each month, that alone would boost ridership by 48 million passenger journeys a year. It may sound far-fetched to some, but this scale of growth is actually quite likely.

## Not just downtown

While Toronto's historic transport networks were focused on travel to and from the city centre, today there is much more orbital movement between suburbs and surrounding towns. And that is something else that Metrolinx is addressing.

Before 2008, municipal agencies such as TTC or Durham Transit, which oversaw buses, streetcars and local rapid transit, were entirely separate from the provincially managed GO Transit which provided the regional trains and buses.



*Top: Extra tracks will be required on some routes to accommodate more frequent electric trains.*

*Above: Rutherford station is benefiting from improvements as part of the early works programme.*

As the Greater Golden Horseshoe has evolved, the different municipalities could no longer remain separate and independent when it came to public transport. Toronto's main north-south subway line was expanded north of the city boundary. To the west, Toronto's international hub at Pearson Airport is actually in Mississauga, but it needed to be well connected into the Toronto transit system.

That is essentially why Metrolinx was created as a regional transit agency with a broad mandate. As well as assuming the operation of GO Transit, it took over responsibility for orbital projects such as the Eglinton Crosstown and Finch West light rail routes, as well as the Hurontario and Hamilton light rail networks further afield.

In line with this big picture, Metrolinx has paid close attention to integrating these projects. For example, the Eglinton Crosstown LRT included construction of new interchange stations on the GO Train Kitchener and Barrie lines.

The upcoming Ontario Line subway will connect to the regional rail network at the future East Harbour Transit Hub, just east of Union Station. Another subway station will be integrated into an overhauled Exhibition station to the west.

Metrolinx is well placed to facilitate the region's interest in connecting up public transport. This includes more links to Toronto Pearson Airport,


better co-ordination with VIA Rail long-distance trains, and connectivity with local transit services run by the various municipalities.

Under what Metrolinx CEO Phil Verster calls 'the network effect', increased connectivity creates many more and better travel options for customers, and the whole network becomes greater than the sum of its parts. This co-ordinated approach is already helping to open up new travel options, such as enabling people to make weekend trips to Hamilton and Niagara.

Someone living next to Kennedy station could opt to take a couple of subway lines to get to a sporting event downtown, but in future they will be able to take GO as an equally viable, and likely faster option.

GO trains will become part of the local travel mesh in the same way as streetcars, subways and light rail. And this will fundamentally change the value of the regional rail service to many more people.

Ticketing integration is already well advanced across the region. The PRESTO Card is managed and operated by Metrolinx, and used by GO Transit, UP Express, and most local transit agencies including TTC. At present UP Express is running a contactless payment pilot allowing customers to pay by tapping their credit or debit card, and Metrolinx is looking to expand this to GO Transit and beyond.

GO Expansion is on course to transform the region in ways greater than previously imagined. It will bring a generational change to transit that has never been seen in North America. But we need skilled people to help deliver the programme. Metrolinx is always looking for more transit builders to jump on board and help transform Canada's largest metropolitan area. It is an exciting prospect, so why not join us in Ontario? 

**48**  
million

passenger  
journeys a  
year  
potential  
ridership  
boost from  
transit-  
oriented  
development  
around GO  
stations



# Are hydrogen locomotives the next big thing?

Several US and Canadian railroads have teamed up with suppliers to investigate the potential for hydrogen as an alternative to diesel traction for heavy freight operations. **Dave Lustig** investigates.

In their ongoing quest to lessen dependence on fossil fuels, and particularly diesel traction, several freight railroads and major suppliers are investigating the potential of hydrogen fuel cells as an alternative power source for their locomotive fleets.

'For a long time, we have been on this journey of energy management', explains Alan Hamilton, Wabtec's Vice President, Engineering, in Erie, Pennsylvania. 'Whatever technology we look at, it's got to be safe, suitable for

railroad applications, and stand the test of time. We're looking at hydrogen. What are the benefits it could bring and how can we take advantage of it? Realistically it might be the end of the decade until the start of adoption. There are multiple avenues how hydrogen might play out on the railroad.'

## Canadian Pacific goes H2OEL

One of the first movers is Canadian Pacific, which announced in December 2020 that it intended to develop North

*Unveiled earlier this year, Canadian Pacific's H2OEL fuel cell demonstrator has been converted from a former SD40-2F diesel locomotive.*

America's first main line hydrogen-powered locomotive, converting an existing diesel-electric locomotive. This would be fitted with fuel cells to trickle-charge a battery pack, which in turn would power the existing traction motors.

CP teamed up with Ballard Power Systems, which had previously supplied fuel cells for buses and light rail vehicles in various countries. Under an agreement finalised in March 2021, Ballard was to deliver six 200 kW fuel cell modules and provide support for the integration of the traction package into the converted locomotive. The railway would then conduct service trials and qualification testing to evaluate the technology's readiness for revenue application in the freight rail sector.

Dubbed H2OEL for 'Hydrogen Zero-Emissions Locomotive', the demonstrator has been converted from a former SD40-2F wide-bodied freight locomotive. It was unveiled in late January, with CP expecting to begin dynamic testing shortly afterwards.

Even before the first demonstrator had taken to the rails, CP announced in November 2021 that its fledgling Hydrogen Locomotive Programme would be expanded, thanks to C\$15m in funding support from Emissions Reduction Alberta. The project would be extended from one locomotive to three, for which Ballard would supply another eight fuel cell modules.

# NORTH AMERICA Alternative Traction

The railway has decided to modify three different locomotive types, which collectively represent the majority of locomotives in use throughout North America. By converting the demonstrators from existing diesel locomotives, CP says it will avoid the embedded carbon cost of fabricating new chassis. Doing several conversions will also help to refine the process, it believes. Insiders confirm that technical development of the other two locomotives is now underway.

The ERA funding will support the installation of hydrogen production and fuelling facilities at CP's yards in Calgary and Edmonton, using different technologies. The Calgary plant will use electrolysis to produce hydrogen from water, while Edmonton will have a small-scale steam methane reformation system to generate hydrogen from local natural gas sources.

'In expanding this groundbreaking project, CP is demonstrating its commitment to combating climate change through transformative technology', explained President & CEO Keith Creel. 'I am very pleased that Emissions Reduction Alberta selected this programme for a grant, and I eagerly anticipate seeing a hydrogen-powered locomotive move CP customer freight in the near future.'

## BNSF bounces back

In December 2021, Progress Rail, BNSF, and Chevron announced a memorandum of understanding to develop a hydrogen fuel cell demonstrator locomotive to assess the viability of using hydrogen as an alternative to diesel for main line freight operations.

Progress Rail will design and build a prototype fuel cell locomotive for line haul and/or other types of rail operations. Chevron will develop the fuelling concept

*Converted at the railroad's Topeka shops, BNSF's original fuel cell shunting locomotive demonstrator was tested at Commerce City in California during 2010.*



Photo: Dave Lustig

and related infrastructure, while BNSF will demonstrate the unit in revenue service for a specified period of time.

This is not BNSF's first venture into hydrogen. Back in 2009, the railroad developed an experimental fuel cell powered shunting locomotive at its Topeka workshops in Kansas, using the shell of a RailPower Green Goat. Developed in partnership with Denver based engineering company Vehicle Projects LLC and the Department of Defense, the demonstrator was tested at various locations across the BNSF network, coupled to a traditional diesel shunter, and operated as far west as Commerce City in Los Angeles.

Following the trials, it was sent to a Vehicle Projects facility in Utah for analysis, but it never returned to its home rails.

'Caterpillar has made great strides in moving our advanced power technology forward', said the company's Group President of Energy & Transportation Joe Creed. 'Our Progress Rail team will leverage that knowledge and experience

toward a hydrogen fuel cell locomotive. Working with Chevron and BNSF will allow us to advance hydrogen technology across the industry.'

'Chevron is dedicated to scaling up its hydrogen business to help meet the needs of customers who want to reduce the life-cycle carbon emissions of their operations', added Jeff Gustavson, President of Chevron New Energies. 'Our work with Progress Rail and BNSF is an important step toward advancing new use cases for hydrogen in heavy duty transport, as we seek to create a commercially viable hydrogen economy.'

Other Class I's that have shown interest in fuel cell technology include Union Pacific and Norfolk Southern, both of which have previously experimented with alternative power sources such as batteries. But smaller railroads are also getting involved.

## Switching ports to hydrogen

Last year, the California Energy Commission awarded Sierra Northern Railway and GTI Energy, a specialist decarbonisation consultancy, nearly \$4m to fund the design, integration and development of a fuel cell shunting locomotive to be demonstrated at the port of West Sacramento. The public funding will be used to retire a Tier 0 diesel shunter and replace it with the zero-emission hydrogen locomotive, which like the original BNSF demonstrator is being rebuilt from the remains of a RailPower genset.

The project is intended to show the potential for fuel cell technology to reduce air pollutant and greenhouse gas emissions. It involves the integration of an advanced hydrogen fuel cell, a hydrogen storage system, an advanced battery pack, and control systems technologies. If the plans work

*Under a project funded by the California Energy Commission, Sierra Northern Railway and GTI will rebuild this redundant genset as a fuel cell demonstrator for shunting at the port of West Sacramento.*



Photo: Dave Lustig



out, the zero-emission locomotive will reduce the operator's diesel fuel consumption by an estimated 37 500 litres per year.

'We are pleased to partner with this great team to build and test this innovative zero-emission switching locomotive', said Kennan H Beard III, President of Sierra Northern Railway. 'We believe this project will help lead the switching locomotive industry to an emissions free pathway in all ports in the state of California.'

Sierra Northern Railway is the technical lead, and partnered with GTI as the formal applicant to the commission. Other technical partners are Railpower Tech, Ballard Power Systems, Optifuel Systems, UC Riverside, Valley Vision, Velocity Strategies, Southern California Gas Co and the Sacramento Metropolitan Air Quality Management District.

Meanwhile, Sierra Northern has partnered with Shell, which received a matching \$4m grant

Short line and shunting locomotives account for a significant share of the total locomotive energy use within the state, as they carry a significant portion of freight while operating first and last mile feeder services to the national freight network. The commission therefore felt that short line operations provided an excellent testbed for zero-emission technologies.

Shunting locomotives in California currently use an average of almost 200 000 litres of diesel per year, offering a potential reduction of more than 45 million litres if all are converted. This is approximately equivalent to the annual amount of fuel used by 20 000 light-duty road vehicles.

'The rail sector and goods movement in ports are challenging applications for low-carbon energy because they often require near-continuous operation and high-power levels', explained Ted Barnes, Director of R&D at GTI. 'This project directly addresses those issues as we seek to advance technologies that can enable ports as



to develop a multimodal hydrogen fuelling station as the first of its kind in North America.

## California's climate concern

According to the commission, California needs to encourage all transport modes to decarbonise their operations, if the state is to achieve its environmental goals. Demonstration and validation of the fuel cell technology is expected to establish a platform for widespread commercialisation in the immediate future.

The potential market for new hydrogen locomotives in California alone is estimated at more than 260 shunters and up to 500 intrastate main line locomotives. But because locomotives are federally regulated, incentivising railroads to implement new environmental technologies is proving challenging.

high-throughput clusters for affordable, low-carbon hydrogen and achieve scaled demand across multiple applications.'

## Hydrogen is not a panacea

However, there is also an issue of diminishing returns. According to the Association of American Railroads, the rail freight sector is already significantly more fuel efficient than over-the-road trucking. By using relatively new diesel technology and zero-emission cranes, freight railroads consumed 2 500 million fewer litres of fuel and emitted 6.9 million tonnes less CO<sub>2</sub> than they would have if their fuel efficiency had remained constant since 2000.

A widespread switch to electric power — be that through the use of hydrogen fuel cells, batteries or some form of fixed electrification — could deliver big improvements in greenhouse gas emissions. The questions then focus on how 'green'



'There is a place in the future for battery electric and fuel cell locomotives, but to what extent?'

Mike Iden, Founder, Tier 5 Locomotive

*In June 2021 Wabtec signed an MoU with General Motors to collaborate on the development of hydrogen locomotives, using GM's Ultium battery technology and Hydrotec compact fuel cells developed through a joint venture with Honda.*

the generation of the hydrogen and the provision of hydrogen transport and fuelling infrastructure is, compared to advances in battery technology and the ever-expanding electric charging infrastructure.

## No time to waste

Various professional engineers have confirmed to *Railway Gazette* that they are keen to see the development of hydrogen technologies for railroad locomotive propulsion, but urge that 'we should not get too excited over hydrogen being "the next big thing"'. They are calling for a degree of cautious realism over how quickly the emerging technology might be readied for large-scale commercial applications.

'When was the first commercially successful diesel locomotive in the United States?', asks industry consultant Mike Iden of consultancy Tier 5 Locomotive. 'It was 1925. That was an experimental prototype, and it took another two decades of research and development, tinkering, thinking, breaking, and redesigning until the first really good, really reliable road freight locomotive, EMC's FT of 1939, was ready for marketing.'

'There is a place in the future for battery electric and fuel cell locomotives, but to what extent? When will they be commercially available? How much are they and their attendant infrastructure going to cost? How they will fit into the railroad industry must still be addressed.'

Looking ahead to the internationally agreed 2050 Net Zero deadline, Iden warns that 'the rail industry has only 27 years to accomplish what took 40 years with dieselisation.'

However, others are more optimistic. 'We must look and learn from the mistakes and successes of past experiments, and not get overly buoyed or deflated as we search for alternatives to fossil fuels', suggests another leading engineer. 'We'll get there. And when we do it, it will be done right.'

760

Number of potential new hydrogen shunters and main line locomotives estimated to be needed in California

# Attracting shippers to freight rail

AAR subsidiary Railinc has developed an intuitive software platform aimed at making it easier for freight shippers to choose rail over other modes, as Product Manager **Danny Dever** explains to **Nick Kingsley**.

Confidence is the key to growing rail freight. Following the sweeping changes of the Precision Scheduled Railroading revolution (RG 9.19 p45), the question of how to attract and retain shippers on rail remains at the forefront of the debate over the future of the industry in North America.

The key to success is customer service, believes Danny Dever, Product Manager at Railinc's TransmetriQ business unit — Railinc is the data and IT arm of the Association of American Railroads. In terms of service reliability, real-time track-and-trace and estimated arrival time, rail has struggled in comparison with other modes. But now, advanced IT tools and telematics mean that much more transparency can be offered to end users, increasing confidence that the railroads can win more business from truck and air cargo.

This concept of transparency lies at the heart of TransmetriQ's newly launched Rail Management System. Dever explains that railroads sometimes struggle to win market share because of the ubiquitous GPS tracking devices now used by all road haulage providers. 'The biggest thing shippers want from rail operators is a reliable Estimated Time of Arrival', he reports. RMS is Railinc's response, offering what it hopes will be a 'one stop shop' for rail shipping visibility in the same way highway shippers use Transportation Management Systems.

The key benefit of RMS is that it is able to leverage Railinc's existing array



*Railinc has worked with around 50 existing rail users and wagon owners via an advisory council to develop RMS, which seeks to address the key pain points raised by shippers seeking to access rail services.*

of railroad data. 'We have taken knowledge that we already possess and asked, can we bring it together in one place for the benefit of customers?' The tool's ETAs have been developed using two to three years of historical wagon movement data supplied by AAR members. By applying machine learning techniques, Railinc's data science team has analysed reports from all reported origin-destination pairs, before adding in any information about interchange points and waiting times.

These ETAs 'don't have to be the best, they just have to be reliable and consistent', Dever believes. While the individual railroads have their own 'extremely high quality tracking data', the problem comes when shipments are exchanged between individual railroads, whether at yards or under trackage rights. 'Around 60 to 70% of US carloads are interlined, so this is an absolutely critical metric', Dever emphasises.

## Developed with shippers

In order to develop RMS, Railinc worked with around 50 existing rail users and wagon owners via an advisory council. 'Folks want to know where their car is, how it's feeling and what they need to do with it', Dever says. 'After talking to the shippers, we realised there were quite a lot of pain points that we could address.'


An early objective was to go beyond 'basic location data' and incorporate more information from the Railinc ecosystem. This could help shippers get more rapid information on how to repair a defective wagon, for example, facilitating quick decisions on the nearest maintenance workshop and associated repair costs. This builds on the condition monitoring data that railroads already provide.

RMS is also intended to help shippers make better commercial decisions. Future enhancements to the software could include a 'rate and route optimisation dashboard', which would use historical data to analyse the best routing plan for a given wagon. 'Shippers could see that if they select route B over route A, that would historically be a less congested choice — while the wagon may take longer to reach its destination, its arrival time would be more consistent', Dever says.

Railinc is also working to add an automated waybill creation function to support the switching out of carloads mid-journey if required. Shippers are often given a choice of interlining routes, and this option could in future include a trend-based recommendation.

Further iterations of RMS are likely to include a fleet management module and more applications that use AI and machine learning. But perhaps the most profound advantage according to Dever is that RMS helps 'everyone understand rail a bit better'.

The challenge in modal shift, he says, 'is that it's just so straightforward to call up a truck and say "pick my load up". Rail is rarely that simple. We are hoping RMS can take a lot of the complexity out of the access process for rail shipments.' He cites the need to overcome jargon as another potential benefit. 'It needs to be intuitive — shippers don't necessarily need to know what the back office terms all mean. Who knows what a SPLC [Standard Point Location Code] is? Chicago has 200 of them. Someone who doesn't know railroading can use this software, and it's our job to take care of the specific domain knowledge.'

'The customer just types in their request to move a shipment from Chicago to Los Angeles. That's how we can help rail compete better with trucks', he concludes. 

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# Making more use of urban railways

Over the past few decades, many of Brazil's regional cities have been growing steadily, and along with increased use of road vehicles this has led to significant traffic congestion. More and more regions are now looking to rail as a way to improve urban mobility, but many cities have limited access to the resources needed to build new lines. One notable exception is the relatively wealthy state of São Paulo, where various large projects are taking shape (RG 1.22 p46).

As a more cost-effective alternative, several regional state capitals and other cities are looking to make use of disused or under-used main line tracks

Better utilisation of under-used main line railways is seen as key to developing cost-effective urban and suburban rail networks that can relieve road congestion in Brazil's fast-growing cities. **Benjámín Zelki** investigates.

to host urban and suburban services. With a few exceptions, all regular inter-city and long-distance passenger trains in Brazil had been withdrawn by 1999, following the privatisation and break-up of the former national operator RFFSA.

Between 1984 and 2014, urban or suburban rail services were launched in

Natal, Fortaleza, Maceió, Teresina, Recife, Crato, João Pessoa and Sobral, making use of existing metre-gauge alignments and building new stations.

Some of these are operated by local agencies and others by the federally owned Companhia Brasileira de Trens Urbanos (Table 1). Services are mostly worked by Mobile 2, Mobile 3 and Mobile 4 DMUs, manufactured by domestic supplier Bom Sinal.

Frequencies are not very intense, with the various routes seeing between six and 26 trains each way per day.

Natal is now expanding both of its suburban lines, while Fortaleza, Teresina, Maceió and Recife have also announced plans to develop their networks.

## Natal grows north and south

The northeastern city of Natal currently has the longest commuter rail system outside the major conurbations, with a two-line network totalling 60 km serving 25 stations. The North Line links Natal with Ceará Mirim, while the South Line initially ran to Parnamirim. The network carries an average of

## Bus builder unveils prototype railcar

Brazilian bus manufacturer Marcopolo has unveiled a prototype lightweight rail vehicle branded as Prosper VLT, which it says can be supplied for urban, suburban, inter-city or tourist applications.

Having identified the potential of the urban rail market, the company revealed at the NT Expo trade fair in São Paulo in March 2019 that it was planning to move into the production of urban rail vehicles under the Marcopolo Rail brand.

Despite a hiatus caused by the pandemic, the company presented its Prosper VLT prototype at this year's NT Expo in March 2022. Developed by the

Marcopolo industrial complex at Caxias do Sul in Rio Grande do Sul, it had been shown to local press in nearby Bento Gonçalves in September 2021.

Able to operate in formations of up to four cars, the Prosper VLT can be built for 1000, 1435 or 1600 mm gauge. It can be powered by a low-emission diesel engine, or supplied as an electric unit, electro-diesel bi-mode or a hybrid equipped with batteries or supercapacitors.

Each bidirectional vehicle is 18 m long and 2700 mm wide, and can be fitted with up to three 1100 mm wide doors per side. The vehicles can be

fitted with a variety of interiors, depending on the application. A four-car urban trainset would be capable of carrying 760 passengers, while the inter-city equivalent would provide seats for 280 passengers.

'With this launch, we advance in our new business front related to the metro railway sector, in line with current mobility demands in Brazil', explained Marcopolo CEO James Bellini. He added that the company was 'promoting high-capacity displacements with speed, efficiency and comfort, expanding our modal portfolio.'



Photo: Marcopolo

Table 1. Brazil's 1000 mm gauge suburban railways

City	Network km	Lines	Operator
Natal	60.0	2	CBTU
Maceió	34.0	1	CBTU
Fortaleza	327	2	Metrofor
Recife	315	2	CBTU
João Pessoa	30.0	1	CBTU
Sobral	13.9	1	CCTM
Crato	13.6	1	Metrofor
Teresina	13.5	1	CMTF



Photo: George Antony



Photo: Fernando Rodrigues

13 200 passengers per day, and both routes are now being extended.

The South Line is being extended by 24 km from Parnamirim to Nísia Floresta, using the existing main line alignment and adding six new stations. Work started in March 2021, using a R\$58.3m contribution from the federal government.

An initial 3.5 km with two stations has already been put into service. The first station, Boa Esperança, was inaugurated on February 8, and revenue services were extended to Cajupiranga on May 10. Completion of the whole six-station extension is scheduled by the end of the year, and is projected to increase ridership by 6 800 passengers/day. This would increase ridership on the network by more than 50%.

In September 2021 work began on a 4.2 km branch off the North Line in the municipality of Extremoz to serve Vicunha. This will have three stations and is expected to attract around 2 000 new passengers per day. The federal government is contributing R\$14.8m to the project cost. In the longer term, the

*Top: Most Brazilian diesel light rail lines are operated by VLT railcars manufactured by Bom Sinal.*

*Above: Natal has two commuter rail lines totalling 60 km, both of which are being extended.*

*Recife has two diesel lines which connect with the city's metro network at Cajueiro Seco.*

branch is to be extended to the nearby Natal International Airport.

To operate the extensions, CBTU has taken delivery of some second-hand rolling stock as a donation from Fortaleza operator Metrofor. An agreement signed in July 2020 covers three diesel locomotives and 30 coaches.

Meanwhile, work has already started on expansion of the diesel-operated Southeast Line in **Fortaleza**.

Construction of a 2.4 km branch to Pinto Martins Airport began in August 2021, and the line is forecast to be completed in the second half of the year.

## Further plans

Moving inland from the northeast coast, plans have been announced for a second suburban service in **Teresina**, in the state of Piauí. The city's single 13.5 km north-south line currently transports around 15 000 people a day, while the long-planned second line would serve

the neighbouring town of Altos to the east. Running for around 37 km, this is projected to carry 3 000 passengers a day. Two additional DMUs would be needed to operate the proposed service.

In the state of Alagoas, CBTU has presented proposals to expand its suburban operations serving the state capital **Maceió**. The city's single 34 km line currently starts from Jaraguá near the port to the east of the city, and runs on street tracks through the city centre to the main station before turning north to Lourenço de Albuquerque. Serving 16 stations, it carries an average of 11 000 passengers/day.

CBTU is promoting the construction of a 3.7 km branch to Maceió Shopping, north of Jaraguá, which would add a further three stations. Serving this important retail outlet is projected to take the total ridership to over 40 000 passengers/day, more than a three-fold increase. However, no source of funding has yet been identified.

In Pernambuco, CBTU has started work on expanding the diesel light rail lines to the southwest of **Recife**. Two outer-suburban routes were launched in 2012, running from Curado and Cabo de Santo Agostinho to connect with the South Line of the Recife metro at Cajueiro Seco. The Cabo line is 31.5 km long, and serves eight stops. As the first step in an ambitious project to double-track this route, a second bridge over the Rio Pirapama at Pontezinha was completed in December 2021, at a cost of R\$13.5m. According to CBTU, double-tracking the line would increase capacity and allow it to bring down the journey time from 51 to 23 min.

Although the municipality of **Sorocaba** announced plans to develop a light rail line using disused rail alignments through a build-operate concession (RG 9.19 p61), this project does not seem to have made any progress to date. 📌



Photo: CBTU

# Accelerating the national rail investment programme



Among RFI's investment programmes is a modernisation of the Adriatic Corridor down the eastern side of the country.

covering maintenance and investment projects, as agreed between the ministry and RFI in 2022-26. These contracts set out what must be done to further develop the rail freight and passenger businesses. They also set out detailed plans for enhancing the national network, at the same time identifying criteria for evaluating environmental, economic and social sustainability (RG 8.21 p44). Further, they specify standards of safety and resilience, including those relating to climate change.

The first two Programme Contracts have already been signed off by the ministry. According to Fiorani, together they represent about €55bn for investment and network development, plus €11bn for maintenance.

Fiorani went on to say that 'RFI's investment portfolio has expanded by €31.8bn, intended mainly for extension of the high speed network, digitalisation, technological development and regional systems'. In all, projects worth €104.2bn confirm the fundamental role that RFI intends to play in the revival of rail transport in Italy through completion and maintenance of major strategic works.

Managing Director of Rete Ferroviaria Italiana Vera Fiorani and Enrico Giovannini, Minister of Infrastructure & Sustainable Mobility, have confirmed plans to meet sustainability targets and accelerate investment in railway infrastructure as part of Italy's post-Covid economic recovery programme. **Christian Scasso** reports.



**F**undamental to implementation of Italy's ambitious post-Covid rail infrastructure investment programme is the Strategic Document for the Mobility of Rail Passengers & Goods. This document was the focus of interest when Vera Fiorani, Managing Director of Rete Ferroviaria Italiana and Enrico Giovannini, Minister of Infrastructure & Sustainable Mobility, appeared before the Senate's Public Works Committee at the beginning of June.

The Strategic Document is designed to accelerate the process of defining and approving 'Programme Contracts'



RFI says its latest investment programme has grown by €30bn, with expansion of the national AVIAC high speed network still a priority.

Fiorani also described plans to use hydrogen for rail traction. Trials are planned on non-electrified lines in Abruzzo and Umbria between Sulmona and Terni. 'We have analysed routes which could be converted to hydrogen traction and we have identified about 2000 route-km', she said.

## Long-term vision

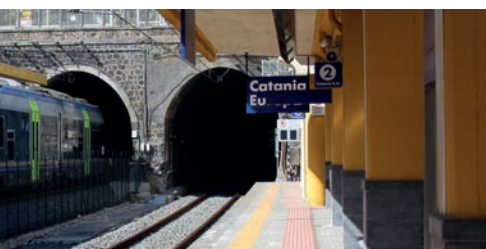
Giovannini's contribution at the hearing was to underline the importance of the long-term outcomes of the investment programme. He said that technical and economic project

feasibility plans should include a sustainability report with an assessment of greenhouse gas emissions. He also proposed a new model for evaluating projects on an economic, social and environmental level as well as the use of new financial instruments for investing in environmentally friendly infrastructure and transport.

The ministry's strategic vision is expected to 'revolutionise' the design and implementation of major public works. Currently, infrastructure and transport projects worth around €230bn are envisaged over the next 10 to 15 years. 'These resources', said Giovannini, 'must be directed towards making existing infrastructure more resilient to the climate crisis as well as sustainable in the long term, accelerating the ecological and digital transition.'

The ministry had put the concept of 'doing no significant harm' as set out in the European Union's Next Generation programme at the heart of its plans, the minister said. It had also taken on board the principles relating to sustainable development agreed by the G20 intergovernmental forum and the 17 Sustainable Development Objectives in the United Nations 2030 Agenda. These were now incorporated in regulations, guidelines and technical documentation defining the criteria for design and evaluation of works in ecological terms.

*Construction of an inland cut-off on the Catania – Siracusa line is being overseen by Special Commissioner Filippo Palazzo.*



Thanks to these changes, it was possible to obtain precise information about the impact on the climate of major projects and to estimate their environmental impact over their full life cycle.


The ministry's vision of favouring sustainable infrastructure and transport also strengthens Italy's position as an issuer of green bonds. 'In this context, it is essential to anchor decisions on scientific evidence', Giovannini said. 'That is why, to guide present and future decisions, we have published three reports about the impact of the climate crisis on infrastructure and mobility, the

decarbonisation of transport and new financial instruments to invest in sustainable infrastructure', he continued. The reports were based on contributions from internationally recognised specialists, he concluded.

Giovannini's priorities for railway infrastructure are:

- improving long-distance passenger services;
- integrating and improving regional transport;
- expanding rail freight with a view to

- cutting greenhouse gas emissions;
- connecting ports, airports and warehousing zones;
- integration with other modes of transport.

In line with these priorities, the contract programme now being drawn up between the ministry and RFI reaffirms proposals to complete the TEN-T Corridors, improve railway safety, increase resilience to climate change and expand and improve the national high speed network. 

## Agreement cements infrastructure investment plans


The Italian government has announced a series of initiatives related to the accelerated programme of rail infrastructure investment projects launched as part of the National Recovery & Resilience Plan intended to drive economic post-Covid recovery.

The initiatives are intended to ensure that projects in the programme will be completed safely and in a timely manner, respecting all legal requirements. Details are set out in a Protocol signed at the end of May by the Special Commissioners who have been allocated responsibility for project management and delivery and three trade unions, Feneal UIL, Filca CISL and Fillea CGIL. The Protocol covers 31 rail projects divided among the eight Special Commissioners (Table I).

The agreement provides for continuous monitoring of worksites to ensure compliance with regulations relating to site safety, working hours, training, standards and the 'prevention of interference in public procurement'.

Minister for Infrastructure & Sustainable Mobility Enrico Giovannini said that 'for the first time, the protocol involves all government Commissioners and representatives of construction workers, with the aim of creating a relationship with social and institutional players so that the works are carried out with maximum speed and transparency'. Under the Protocol each Commissioner will agree terms with the trade unions before any work begins and ensure that all involved are made aware of the completion plans.

Regular meetings will be held to ensure agreement on working hours, rosters, logistics, training and safety. By working with the bodies responsible for procurement, the Commissioners will ensure application of regulations covering occupational safety, safety planning and public health requirements.

The ministry notes that all worksite staff must have completed work safety training certified by the relevant agencies. In terms of work quality, the protocol reaffirms the application of collective labour agreements, including those involving subcontractors. This will include certain payments for workers in the event of non-compliance by contractors. 

**Table I. Projects assigned to Italy's Special Commissioners in rail investment Protocol**

Project	Commissioner responsible
Bussoleno – Avigliana – Orbassano and Orbassano freight terminal	Calogero Mauceri
Doubling Codogno – Cremona – Mantova	Chiara De Gregorio
AV/AC Palermo – Catania – Messina	Filippo Palazzo
Trapani via Milo line	Filippo Palazzo
Augusta bypass on Catania – Siracusa line	Filippo Palazzo
Completion of Pontremolese doubling	Mariano Cocchetti
Upgrading of Fortezza – Verona main line	Paola Firmi
Val de Riga variant and Bressanone improvements	Paola Firmi
Works linked to AV/AC Napoli – Bari project	Roberto Pagone
Completion of Pescara – Bari doubling	Roberto Pagone
Lamezia Terme – Catanzaro Lido – Ionian dorsal	Roberto Pagone
Ferrandina – Matera La Martella line	Vera Fiorani
Upgrade Salerno – Reggio Calabria	Vera Fiorani
Completion of Roma ring route	Vera Fiorani
Upgrade for high speed of Taranto – Metaponto – Potenza – Battipaglia line	Vera Fiorani
Ponte San Pietro – Bergamo – Montello doubling	Vera Fiorani
Gallarate – Rho line	Vera Fiorani
Bergamo – Orio al Serio airport new line	Vera Fiorani
Milano Rogoredo – Pavia quadrupling	Vera Fiorani
Brescia – Verona – Padova AV/AC work	Vincenzo Macello
Venezia – Trieste upgrade	Vincenzo Macello
Genova – Ventimiglia doubling	Vincenzo Macello
Orte – Falconara upgrade	Vincenzo Macello
Roma – Pescara line	Vincenzo Macello
Venezia airport link	Vincenzo Macello
Tortona – Voghera quadrupling	Vincenzo Macello
Pigneto area station works with AV/AC link	Vincenzo Macello
Lunghezza – Guidonia doubling	Vincenzo Macello
Ciampino – Capannelle quadrupling	Vincenzo Macello
Cesano – Bracciano doubling	Vincenzo Macello
Empoli – Siena doubling and electrification	Vincenzo Macello

# Capacity directive could be a real game-changer

With legislation being considered to enhance capacity on Europe's rail network, **Murray Hughes** asks Forum Train Europe Managing Director **Edgar Schenk** and Senior Project Manager **Sebastián Čarek** how this would improve rail's ability to compete against road and air.



Rail's share of the freight market has been held back by a lack of pan-European capacity planning.

June 22 was the closing date set by the European Commission for a 12-week period of public consultation on its proposals for 'International Freight and Passenger Transport — Increasing the Share of Rail Traffic'. Described at this stage as an 'initiative', the proposals are likely to lead to some form of new or revised regulation governing the management of railway capacity across Europe.

Driving the likely changes is widespread concern about the collective failure of Europe's rail businesses to make the best use of line capacity across much of the international network. Forum Train Europe Managing Director Edgar

Schenk told participants at a special event on June 8 in Switzerland marking 150 years of timetable conferences that rail remains 'trapped by national boundaries, struggling with a plethora of different national rules and processes'.

Schenk sees a 'window of opportunity' opening up to influence forthcoming changes in European regulation — possibly with new EU legislation on capacity management — to reset the international regulatory framework so that Europe's railways really do become more competitive.

New capacity management legislation could potentially be a real game-changer for Europe's railways,

remarks Schenk's colleague, Senior Project Manager Sebastián Čarek. 'We are promoting a single standard for capacity management, which is currently a disaster', he says. 'There are 35 different markets, each of which has its own rules, and we need to reach a level where they are aligned.'

## Elusive target

It is telling that, despite decades of EU regulatory reforms intended to enhance rail's competitiveness, market share in both the passenger and freight sectors is not growing as intended, with freight in particular remaining stubbornly static. So much so that the ambitious target of rail reaching a 30% share of Europe's freight transport market by 2030 is looking increasingly elusive.

'We want to influence [the rule changes] in a market-oriented way, and once concrete proposals are on the table, we will be looking for good ideas, working for the railway undertakings', says Schenk. 'But we cannot wait until the law changes', he continues. Noting that the FTE's European Timetable Redesign Programme — launched in 2014 and now jointly managed with RailNetEurope (RG 11.21 p40) — is 'moving from conception to implementation', he says 'we need a harmonised concrete implementation strategy for the next three years, country by country'.

FTE is aiming to bring about the use of a common standardised 'IT eco-system' allowing rail businesses to request a path and manage it with one process. Čarek says this will allow 'visualisation of capacity' in a simple form whereas at the moment there is a need 'to check individually by country'.

FTE is currently acting as a business adviser to railway undertakings for the web-based path co-ordination system which is owned by RailNetEurope. FTE is also advising on the European Capacity Management Tool, another web-based system that is expected to serve as 'the European capacity hub'; the tool is also owned by RailNetEurope with FTE acting as business advisor for software development.

90%

of all rail freight in Europe is managed by FTE members

## Better consultation needed

Of particular concern to FTE are Temporary Capacity Restrictions. 'We want improvements in the consultation process so that infrastructure managers are obliged to consult railway undertakings' when TCRs are proposed, says Schenk. 'There needs to be a process and a European overview — this doesn't exist at the moment, but there is a





lot of pressure to resolve this.' RNE is currently developing a Temporary Capacity Restriction IT tool.

Čarek adds that 'failure to co-ordinate TCRs and plan them well in advance works to the railways' disadvantage as passengers cannot book journeys well in advance', in contrast to airline and coach bookings. The objective is for passenger operators to have stable paths that would allow them to open their booking systems six months before a timetable change.

Čarek reports that in Switzerland capacity planning is managed with a long-term view of 10 to 15 years, but he comments that this is relatively rare elsewhere. Co-ordinating TCRs, for example when investment projects

*Edgar Schenk, Managing Director of Forum Train Europe, warns that Europe's railways are 'trapped by national boundaries, struggling with different national rules and processes'.*



**'We need a harmonised concrete implementation strategy for the next three years, country by country'**

*Edgar Schenk, MD, Forum Train Europe*

involving major engineering works are involved, means that much better timetable planning should be possible. Not that this is an easy process, as 'different market segments need different capacity at different times.'

### Short-term freight capacity

The freight business suffers because more flexibility than is currently possible is needed to compete effectively against road haulage. Apart from anything else, freight contracts do not correspond to the annual timetable year that currently applies to both passenger and freight services.

It may well be that an operator winning a freight contract may need to commence the service at short notice, which clearly flies in the face of the need to book paths well in advance. This, suggests FTE, can be resolved by reserving a number of paths in the timetable for short-term use in what is termed a 'rolling planning' process.

Asked about the need to co-operate in organising the capacity planning process when different operators are working in competition, Čarek asserts that competing operators 'now realise

they have to co-operate and to speak with a single voice' in their dealings with infrastructure managers.

The Covid-19 pandemic meant that FTE's timetable planning conferences were held online rather than at face-to-face meetings. Usually, there is an initial conference in January, followed by a meeting to discuss path requests and a July conference to discuss the draft timetable offer.

Schenk says that FTE recently asked its members if they still needed to have physical timetable planning conferences. The answer was very clear: 'more than 90% of members wanted face-to-face meetings'. He put this down to the usefulness of informal discussions resolving many of the issues outside the formal sessions.

While FTE members are responsible for around 90% of all rail freight in Europe, Schenk is anxious to secure more active participation from FTE members in central and eastern Europe, noting that there are more severe problems with relationships between infrastructure managers and railway operators than in western Europe. 📍

## Co-ordinated bookings have a long way to go

If co-ordinated booking of freight and passenger train paths is far from perfect, the need for simpler booking processes for international passenger journeys by rail in Europe appears to be in need of even more drastic improvement.

Daniel Haltner, Head of International Business & Debt Collection, Train Path Usage Fees, at Switzerland's path allocation organisation in Bern, relates how he recently booked a rail trip back from a meeting in Luxembourg to Basel through SNCF Connect. It turned out that three separate tickets were required for the journey, one of which could only be retrieved four days before travel.

Verdict: far from simple and hardly designed to encourage international rail travel. 📍



*Stephan Pfuhl, FTE President (left) and FTE Managing Director Edgar Schenk hosted a trip on a charter train from Olten to Yverdon-les-Bains, Murten and Bern for FTE guests on June 8 to mark 150 years of European timetable conferences. The RAe TEE11 Trans Europ Express trainset dating from 1961, able to operate with four different electrification systems, was chosen to symbolise the ability to travel easily across European borders.*


## On your bike

### POLAND

Regional operator Koleje Dolnośląskie says it is the first in Poland to offer dedicated bicycle transport, attaching bright yellow vans to its DMUs between Wrocław, Sobótka and Świdnica with effect from July 2.

Each van can carry up to 38 bicycles, which can be loaded and collected at the three main stations. Tickets can be booked from the KD booking office in Wrocław or via the KOLEJO online portal up to 30 min before departure.

The service attracted 15000 enquiries in the first week of operation. The region has many attractive cycle tracks, including a popular 10 km route from Sobótka Zachodnia to the summit of the nearby Ślęza massif.

The pilot scheme will run every weekend during the summer holiday period, and KD President Damian Stawikowski says the operator will then look at introducing bicycle vans on other routes. 




## Desert inspiration

### SAUDI ARABIA

A 50 km light rail network has been proposed to connect urban areas, archaeological sites and tourist destinations around the ancient city of AlUla.

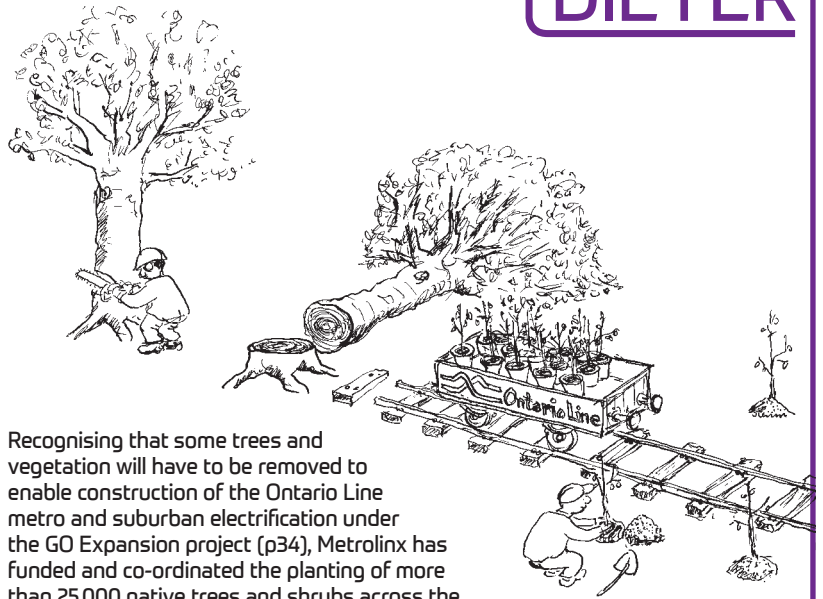
The Royal Commission for AlUla has commissioned Systra to act as lead design consultant for the project, which forms part of the 360 Mobility programme to reduce car dependency by developing 'alternative transport' options. Design studies are due to be completed next year.

The 21 km Red Line would run north from the former station in AlUla to the Hegra UNESCO World Heritage Site, serving 15 stops, each of which would have a hub for bicycles and on-demand electric vehicles. A second phase would run 33 km south to the international airport.

Systra said the 'modern and prestigious' trams would offer visitors and residents a 'reinterpretation' of the 1050 mm gauge Hedjaz Railway, which once ran through the AlUla valley en route from Damascus to Madinah. 



## DIETER



Recognising that some trees and vegetation will have to be removed to enable construction of the Ontario Line metro and suburban electrification under the GO Expansion project (p34), Metrolinx has funded and co-ordinated the planting of more than 25 000 native trees and shrubs across the Greater Toronto region. It has recently given away more than 1 000 free trees and shrubs to local residents at a series of community events.

## CONTACT & SUBSCRIPTIONS



**Railway Gazette**  
INTERNATIONAL

DVV Media International  
1st Floor, Chancery House  
St Nicholas Way  
Sutton, SM1 1JB  
Great Britain

Phone: +44 20 8652 xxxx using extension as shown right  
E-mail: [firstname.lastname@railwaygazette.com](mailto:firstname.lastname@railwaygazette.com)

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