

# IRJ

International Railway Journal

December 2021 | Volume 61 Issue 12  
[www.railjournal.com](http://www.railjournal.com) | [@railjournal](https://twitter.com/railjournal)

|| **Lumo launches**  
British open-access operator  
targets air passengers

|| **ATO live in Hamburg**  
S-Bahn network debuts  
automated operation

## A perfect storm

Australian inter-state freight surges

Alternative traction at COP26 ● US infrastructure plan confirmed





## Smart Infrastructure. Sustainable Railways.

As a leading global supplier of rail infrastructure, Vossloh is making a vital contribution to shaping tomorrow's mobility. More than 130 years of experience combined with great innovative strength and a healthy dose of passion are helping to shift more traffic to rail.

# Contents

December 2021 Volume 61 issue 12

## Contact us

### Editorial offices

**Post** 46 Killigrew Street  
Falmouth  
Cornwall, TR11 3PP, UK  
**Tel** +44 1326 313945  
**Web** [www.railjournal.com](http://www.railjournal.com)

### Editor-in-Chief

Kevin Smith  
[ks@railjournal.co.uk](mailto:ks@railjournal.co.uk)

### Consulting Editor/ Associate Publisher

David Briginshaw  
[db@railjournal.co.uk](mailto:db@railjournal.co.uk)

### Associate Editor

Richard Clinnick  
[rclinnick@railjournal.co.uk](mailto:rclinnick@railjournal.co.uk)

### News & Features Writer

David Burroughs  
[dburroughs@railjournal.co.uk](mailto:dburroughs@railjournal.co.uk)

### Production Manager

Sue Morant  
[sm@railjournal.co.uk](mailto:sm@railjournal.co.uk)

### Advertising sales office

**Post** 88 Pine Street, 23rd Floor  
New York, NY 10005  
United States  
**Tel** +1 732 887 5562

### Business development manager

Jerome Marullo [jmarullo@sbpub.com](mailto:jmarullo@sbpub.com)  
**Tel** +1 732 887 5562

### Print magazine subscriptions hotline

**Tel** +1 402 346-4740  
**Fax** +1 (847) 291-4816

International Railway Journal (Print ISSN 2161-7376, Digital ISSN 2161-7368), is published monthly by Simmons-Boardman Publishing Corp, 88 Pine Street, 23rd floor, New York, NY 10005, USA. Printed in Great Britain by Micropress and distributed in the USA by Mail Right International, 1637 Stelton Road B4, Piscataway, NJ 08854, USA. Periodicals postage paid at Piscataway, NJ and additional mailing offices. COPYRIGHT © Simmons-Boardman Publishing Corporation 2021. All rights reserved. Contents may not be reproduced without permission. For reprint information please contact Editor-in-Chief. For print magazine subscriptions, assistance & address changes, please call +1 402 346-4740, Fax +1 847 291-4816, Email: [internationalrailwayjournal@omeda.com](mailto:internationalrailwayjournal@omeda.com) or write to: International Railway Journal, Simmons-Boardman Publishing Corp, PO Box 239, Lincolnshire, IL, 60069-0239, USA



## News

- 4 This month
- 6 News
- 14 Transit news
- 16 Financial news
- 18 News analysis - COP26
- 20 News analysis - Lumo



18

## Australia

- 22 Australia's states spend big on rail  
Major projects are underway in four state capitals
- 26 Interstate rail freight booms despite challenges  
Disruption to shipping is benefiting rail freight volumes



22

## Signalling

- 30 DB and Siemens demonstrate automated S-Bahn  
The premiere of ATO GoA 2 over ETCS in Hamburg



30

## Track

- 33 Managing network-wide rolling contact fatigue  
Lessons learned from under-investment in Auckland's network
- 37 Maintaining metro track through milling  
A change of approach on the Barcelona metro



37

## Also in this issue

- 40 Rendezvous
- 41 Full contact list
- 41 Advertisers index
- 41 Fresh faces
- 42 The last word

### Front cover

Australian freight operators are experiencing a strong increase in demand for interstate rail freight, particularly east-west flows as trends in coastal shipping change. However, political policies could yet undermine this upturn. Photo: Mark Carter





## Quick wins are essential to meet modal shift targets

AUSTRIA's federal government has boldly declared the launch of the KlimaTicket, a universal public transport pass, which became active on October 26, as the dawn of a public transport revolution.

For just €1095 a year, or around €3 a day, KlimaTicket holders have unlimited access to all local, long-distance and commuter rail, metro, light rail and bus services. There is no discrimination by operator, geography, or network for the national pass. Cheaper regional tickets are also available along with discounted rates for students, families and seniors.

The government is aiming to reduce the number of private car journeys, which currently account for 60% of all transport in Austria, by making public transport "comfortable, easy and affordable." The government says this is essential for reducing its impact on the climate. And KlimaTicket has had a strong start. Nearly 130,000 KlimaTickets were sold by mid-November, equating to around €110m in revenue. Deloitte also became one of the first corporate partners to offer KlimaTicket as a perk to employees.

Transport minister, Ms Leonore Gesweller, says KlimaTicket is possible due to the wide availability and reliability of public transport services in Austria following substantial investments in infrastructure in recent years. This is set to continue in a five-year €18.2bn railway investment plan, which includes electrification of regional railways and improvements to existing lines (p16).

Another country investing vast sums in infrastructure is the United States. President Joe Biden finally signed the \$US 1 trillion Infrastructure Bill on November 15 (p6) following more than seven months of negotiation in Congress. Of the \$US 550bn in new spending, rail is set to receive \$US 66bn and public

transit \$US 39bn. Amtrak is the major beneficiary, and the funding will go a long way to reducing its maintenance backlog as well as lay the platform for an expansion of services (IRJ September, p22).

This is the most significant plan for infrastructure spending in the United States in decades. It is also indicative of the trend evident in Austria of tying rail infrastructure investment with reducing emissions. This is found in other recent announcements by governments as diverse as Vietnam, which has confirmed



**With only 30% of national climate action plans including any reference to public transport, there is work to do.**

a plan to build nine new and upgrade its seven existing lines (p12), and the Baden Württemberg state government, which is aiming to double public transport usage by the end of the decade (p7). Even Central American countries such as the Dominican Republic, El Salvador and Guatemala (p10) are exploring a railway revival to help meet their respective emissions targets.

Indeed, it was heartening to see some delegates pointing to modal shift as the best way to reduce emissions from transport at last month's COP26 climate summit in Glasgow. While the British organising committee failed to include rail in the main conference programme for Transport Day on November 10, a flurry of side events during the second week of COP argued that electric cars are not the only answer. European Commission president, Ms Ursula von der Leyen, even declared that "we must drastically shift transport from road to rail." Intervention from the EU also saw support for active travel and public transport added to a declaration on accelerating the transition to 100% zero emission cars and vans.

Government policy is clearly proving essential in directing more people and freight to use rail and public transport. Yet with only 30% of national climate action plans including any reference to public transport, there is work to do to convince all governments that they should be adopting similar strategies.

Unfortunately, big rail projects are expensive and time consuming, and not always attractive in four or five-year political cycles. Both Mr François Davenne, director general of the International Union of Railways (UIC), and Mr Mohamed Mezghani, secretary general of the International Association of Public Transport (UITP), observed that it is imperative

building new lines. Integrated ticketing and Mobility as a Service (MaaS) are also gaining traction to overcome the last mile issue. Operators can also improve the quality of their service and introduce effective marketing and branding strategies to convince people to leave their car at home. Britain's latest open-access operator, Lumo (p21), is aiming to lure people away from domestic flights and onto its trains by offering a fast, sustainable, and affordable service that is straightforward to use. Its early ticket sales are encouraging.

Private finance is another key resource. Institutions such as the European Investment Bank (EIB) are keen to back rail as part of their growing green portfolio of investments. Reassuringly, the US plan requires the exploration of using private finance on any project of \$US 750m or more.

The 2020s has to be a decade of action if the world has any chance of combating climate change. Rail is part of the solution, and a lot of great things are already happening to encourage modal shift, all of which should offer heart for others looking to follow suit.

*Kevin Smith*

ks@railjournal.co.uk





## For the urban rail

Rail grinding is essential for reducing traffic noise. With Plasser & Theurer's newly developed rail grinding machine for light rail and trams, rail traffic is easy on the ears: developed as a part of the Shift2Rail initiative, the Automatic Track Machine Oscillator, ATMO for short, is the first machine in the world to combine the use of eight grinding stones with oscillating grinding at low working speeds. The ATMO grinds at travelling speeds of up to 30 km/h in both travel directions. As it blends seamlessly into normal tram traffic, it turns line closures into a thing of the past.

**MACHINE**



## Congress passes \$US 1 trillion infrastructure bill



The package includes funding to remove Amtrak's maintenance backlog and expand services. Photo: Shutterstock/ Krtz07

UNITED States president, Mr Joe Biden, signed the \$US 1 trillion Infrastructure Investment and Jobs Act into law on November 15. The legislation, the most significant act of public spending on infrastructure in the US in decades and a major policy initiative of the Biden administration, includes \$US 550bn in new funding and significant spending on rail and public transit.

Passenger and freight rail will receive \$US 66bn in additional funding. The new cash will eliminate Amtrak's maintenance backlog, support projects to modernise the North East Corridor (NEC) and Amtrak's plans to expand service coverage to areas outside of the Northeast and Mid-Atlantic region. The package includes \$US 12bn in partnership grants for inter-city rail services, including high-speed rail.

Public transit is set to receive \$US 39bn, helping to expand as well as repair and upgrade existing infrastructure, improve accessibility, and introduce new fleets. Current transit programmes will also continue for five years as part of the surface transport reauthorisation, increasing guaranteed available funding to \$US 89.9bn over the next five years, which the White House says is the largest investment in public transit in US history.

The bill also includes nearly \$US 845m per year for level crossing safety and elimination projects and an average of \$US 5.55bn per year for discretionary infrastructure grant programmes, including \$US 1bn annually for the Consolidated Rail Infrastructure and Safety Improvement (CRISI) grant programme, which provides essential support to short line and

passenger railways as well as state departments of transportation.

The American Public Transit Association (Apta) hailed the agreement, saying the funding will build infrastructure that will make public transport faster, more modern, and more reliable, while tackling climate change, advancing equity issues and providing growing communities with sustainable mobility options. Amtrak also heralded the agreement for starting "a whole new era for improved and expanded Amtrak service."

"This bill will allow Amtrak to advance significant infrastructure and major station projects on the NEC, purchase new passenger rail equipment, and develop new rail corridors, bringing passenger rail to more people across the nation," says Mr Bill Flynn, Amtrak CEO.

## PJ Monitoring and Voith to develop coupler

VOITH and PJ Monitoring, Austria, have confirmed a collaborative project to combine coupler-assisted automatic train formation with remote controlled decoupling of freight wagons using an automatic coupler.

The work, which is expected to take place for several years, will explore the automation of Voith's CargoFlex coupler with a focus on remote-controlled decoupling processes. PJM is a developer and supplier of automation solutions for rail freight applications, including its WaggonTracker real-time fleet monitoring solution.

Information retrieved from WaggonTracker can also be used to automate complex processes, such as brake tests, and is the other key technology at the heart of the project.

The companies say they will pool their capabilities in digitalisation, automation and automatic couplers to develop a solution that will become the basis for highly digitised logistics management. They will jointly manage the development of key components such as safety-related applications, communication tools or protocols. They add that interoperability is a top priority for the development team and the key to the wider marketing and deployment of their findings. As a result, they will transfer the system into an industry platform during a later project phase to make it available to other participants.

## European Sleeper secures international paths despite challenges

THE co-founder of Dutch start-up European Sleeper, Mr Chris Engelsman, says the company is happy with the paths it has been allocated for its inaugural service from Brussels to Prague, but says the process of organising cross-border paths is still difficult.

"We are very happy with the paths that we got, it's not exactly the paths that we applied for but reasonable," Engelsman told IRJ. "One thing that we found quite difficult is the process because it's supposed to be a one stop shop but that really didn't work. There has been a lot of work and we found we had to do a lot of

the cross-border interaction ourselves."

European Sleeper announced on November 1 it had received the approval for the required train paths to operate a service between the Belgian and Czech capitals via Amsterdam and Berlin, after applying for the paths in the Netherlands.

"The idea is that in one country you apply for an international train path and then the country that you applied to is supposed to arrange the international paths," he says. "But that's not the case. It requires quite a lot of knowledge and we had to be persistent."

Engelsman says there is a willingness

from the individual infrastructure managers to approve the paths, but the varying standards between countries meant it was technically challenging, with European Sleeper staff required to complete some of this work.

The resulting service will take between 14 and 15 hours, which Engelsman says is a little slower than expected but still reasonable. While the timetable is still being developed, he says the service may arrive in Berlin at 06.00 which was earlier than hoped, but the return service would arrive in Amsterdam around 06.30, which could be more attractive for passengers.

## Italy limits speed of wagons fitted with silent brakes

ITALY's National Agency for Rail, Road and Motorway Safety (ANSFISA) introduced an urgent speed restriction from November 9 for all freight wagons equipped with LL blocks (IB 116\*), also known as silent brakes, after 29 incidents were recorded across the country over the past two years.

The decision reduces the permitted speed for the wagons carrying general freight from 120km/h to 80km/h, and to 60km/h for trains carrying dangerous goods.

In a Joint Network Secretariat (JNS) Urgent Procedure notification form submitted to the European Union Agency for Railways (ERA), ANSFISA said its analysis found that all 29 events involved vehicles equipped with organic low friction coefficient (LL) brake blocks.

The seized brake block events were mainly caused by malfunctions to the continuous automatic brake. This increased the temperature of the seized wheels, and the brake blocks were burned, affecting the wheel tread and starting fires.

Eight events concerned

trains transporting dangerous goods, and four events were detected by the hot axlebox detection system. In the other cases, the hot axlebox detection system was located at an average distance of about 23km before the point where the train stopped due to seized brake blocks.

On average, events occurred around 95km from departure and around 100km from the point of the last brake check carried out by the train crew. Emergency brakes intervened during operation in five cases around 60km from the point of brake block detection. In one case the seized brake block caused the derailment of one wagon, resulting in damage to wheelsets and brake components.

The notification says the risk of derailments and fires due to seized organic LL brake blocks is very high, especially if a train with dangerous goods is involved in the event.

ANSFISA issued a safety alert concerning LL brake blocks on February 9.

However, the CEO of Austrian Federal Railways (ÖBB) subsidiary Rail Cargo Group (RCG), Mr Clemens

Först, hit back at the restrictions, stating on Twitter that "once again" it was a "complete failure of the European rail system."

In a series of tweets, Först said Germany and Switzerland had forced the sector into "a hasty adoption of silent brakes" ahead of the European roadmap, while ignoring concerns from countries such as Sweden about safety issues in winter conditions. Först says European institutions were powerless and ignored during this process. He said complying with this requirement resulted in millions of euros required to retrofit and higher operational costs were incurred.

"Now Italy imposes severe restrictions for trains equipped with silent brakes within a couple of days' notice and, apparently, we have to be happy that silent brakes were not forbidden outright - again [with] no European alignment or relevance of European institutions in this process," he concluded.

RCG said that while its logistics experts have taken all possible measures in advance, delays could still occur for its TransFER connections.

## Baden-Württemberg to expand services



THE German state of Baden-Württemberg has approved and presented its 2030 Public Transport Plan for stakeholder consultation. The plan calls for the state to become "climate neutral" by 2040, five years ahead of the federal government's target for the rest of Germany.

The plan aims to double the number of passengers using public transport by 2030 and calls for "a massive expansion of public transport," detailing over 130 specific actions in 10

areas, development of which began in 2020. A key element is providing sufficient frequencies and availability of bus or rail routes to allow most people to avoid using their cars.

Following state government approval of the draft plan, the final consultation phase is underway and will last until April 2022. Local authorities across the state are focussed on how the plans will be implemented between 2022 and 2030.

## Plasser American orders hybrid rail milling machine

P LASSER American (PAC) has acquired what it says is the world's first hybrid rail milling machine which will be delivered by Robel and its partners Schwebbau International (SBI) and Vogel & Plötscher in summer 2022.

The three-unit machine is fitted with a hybrid drive system featuring a battery and an exhaust reduced diesel range extender. SBI has specifically developed the vehicle design, drive system and milling technology to meet the maintenance requirements of transit systems in North America.

The Romill CMS3e is fitted with the latest electric milling technology for reprofiling low quality track that could not previously be treated by rail milling.

## In brief

### Britain

The Rail Accident Investigation Branch (RAIB) says its preliminary examination of a crash between two trains in Salisbury on October 31 found that low adhesion between the train's wheels and the rails was "almost certainly" the cause. 13 passengers and a member of railway staff required hospital treatment as a result of the accident, which also caused significant damage to the trains and railway infrastructure.

### Czech Republic

Infrastructure manager SZ has signed an eight-year cooperation agreement with SNCF Network to develop the country's first high-speed lines, continuing an agreement with French National Railways' (SNCF) signed in April 2019. SZ says the existing agreement with SNCF has reduced the preparation time of the new lines by several years, and the new contract, worth up to €8.5m, will continue this cooperation.

### Denmark

Banedanmark has completed electrification at 25kV ac of the 24km line from Ringsted to Næstved. Electrification is part of the DKr 9.5bn (\$US 1.47bn) project to rebuild the 115km Ringsted - Holeby line as part of the Danish hinterland upgrade.

### Egypt

Egyptian National Railways (ENR) has signed a framework agreement with Thales for the modernisation of signalling and track upgrades and doubling on the 94km Qalyoub - Menouf - Tanta line and the 64km Qalyoub - Shebin El Qanater - El Zagazig lines. Thales will also explore both the possibility of implementing a national traffic management system for the ENR network and installing ETCS Level 1 on both lines.

### France

Cooperative enterprise RailCoop launched a freight service on the 160km line between Toulouse St Jory yard and Capdenac on November 15. The company has leased two



## HS2 Eastern Leg axed in Britain's Integrated Rail Plan

**T**HE British government has finally released its Integrated Rail Plan (IRP) for the North and Midlands, which confirms that the majority of the 198km eastern leg of HS2 will be axed in favour of upgrades to existing infrastructure.

Plans to build a dedicated high-speed line between Manchester and Leeds via Bradford as part of the Northern Powerhouse Rail (NPR) project have also been rejected.

While a disappointment to proponents of the eastern leg and NPR, including Ms Louise Gittins, interim chair of Transport for the North, the sub-national transport body, who describes the plan as "woefully inadequate," the government says the £96bn plan is an "ambitious and unparalleled programme" to overhaul inter-city links across the North and the Midlands.

Proposed commitments in the plan include:

- construction of the 82km Phase 2B western leg of HS2 from Crewe to Manchester, including new stations at Manchester Airport and Manchester Piccadilly. The government favours adding six surface platforms at the terminal Piccadilly station rather than an underground or through-station alternative. The western leg should include the Crewe Northern Connection, enabling trains to call at Crewe and re-join HS2
- a new high-speed line from the West Midlands to East Midlands Parkway, south of Nottingham. Plans to build a new high-speed station and line to Toton have been scrapped with a new regional



The IRP includes plans to build six new platforms at Manchester Piccadilly station as part of HS2 Phase 2B. Photo: Shutterstock/Markus Mainka

station at Toton proposed

- completion of electrification on the Midland Main Line from Market Harborough to Leicester, Nottingham and Sheffield via Derby
- upgrades to the East Coast Main Line, including the rollout of ETCS, power supply upgrades to support longer and more frequent trains, the increase of maximum speeds to 225km/h in some locations, and the removal of flat junctions and crossings
- construction of 64km of new high-speed line between Warrington, Manchester, and the Standedge Tunnel, near Marsden in West Yorkshire as the first phase of NPR. The remainder of the Manchester - Leeds - York Transpennine Main Line will be upgraded with "significantly longer" sections of three and four track, and electrified. Further electrification is proposed between Leeds and Bradford. ETCS will also be installed
- work to identify the best way to take HS2 trains to

Leeds station

- upgrades to the Hope Valley Line, including electrification, to improve services between Manchester and Sheffield
- £100m to start work on the West Yorkshire Mass Transit System, and
- £360m to introduce contactless tap in, tap out ticketing at 700 commuter stations in the midlands and the north.

The government says that the plans will more than double capacity between London and Manchester, and Manchester and Leeds, and more than treble capacity between Birmingham and Nottingham, Birmingham and Manchester, and Liverpool and Leeds. It adds that many of the improvements will offer similar journey times to those proposed by building HS2 in full but earlier and cheaper than planned.

Of the £96bn, the government says £54bn is spending on rail and local transport in the Midlands and the North with the remaining £42bn allocated for HS2 phases 1 and 2a.

## UIC: make rail the backbone of green mobility

**M**AKING rail the backbone of a sustainable mobility system by the end of the decade will help decarbonise transport and provide numerous benefits for society, the International Union of Railways (UIC) says in its 2030 vision published on October 29 ahead of the Climate Change Conference (COP26) in Glasgow.

In the vision, Design a Better Future, UIC also issues a call for action to policymakers and world leaders. UIC says that by 2030 railway stations and logistics depots will start to transform into multimodal mobility hubs and that car use will reduce by more effectively connecting cities.

"We are entering the decade of action for decarbonisation," says UIC director general, Mr François Davenne. "This vision sets out how the transport paradigm must transform. At the COP, I will be calling for the support of world leaders to back rail as an essential ingredient for a net zero carbon transport system."

The vision foresees a world that is implementing the actions required to achieve the goals of the Paris Agreement. High-speed passengers and rail freight volumes have doubled, conventional passenger numbers have recovered and increased by 50%, and millions of new green jobs have been created. Diesel trains are rapidly being phased out, with a large-scale programme of main line electrification continuing and bi-mode operation a common practice, establishing rail travel as the backbone of a sustainable mobility system.

While transport currently accounts for a quarter of all global emissions, the vision foresees these beginning to decrease - a scenario UIC says is only possible with a thriving railway.

## VLI plans \$US 2.7bn investment in new Brazilian lines

**V**LI Multimodal has applied to build more than 1000km of new railway in central Brazil across four lines in a Reais 15bn (\$US 2.68bn) investment.

The plans will allow VLI to prioritise the Arco Norte area of the country, enter new markets and expand in areas it already serves. VLI president, Mr Ernesto Pousada, says the investment will be carried out over the next decade.

The longest line is a 508km stretch from Água Boa to

Lucas do Rio Verde, in Mato Grosso. A second 276km line would connect Chaveslândia, in western Minas Gerais on the border with Goiás, east to Uberlândia. These plans are being challenged by Rumo, which is contesting the bill that currently gives priority to whichever company requests authorisation first for the Água Boa - Lucas do Rio Verde section.

The other two lines are a 230km section from Balsas northwest to Porto Franco in

Maranhão and a 9km line in Baixada Santista, which will connect the Perequê region to the Tiplam port terminal, in Cubatão.

Brazil's National Land Transport Agency (ANTT) and Ministry of Infrastructure (Minfra) have begun analysing the applications. Once that is complete, ANTT will send its decision to Minfra, which will analyse this before making a final decision on which company can take its plans forward.



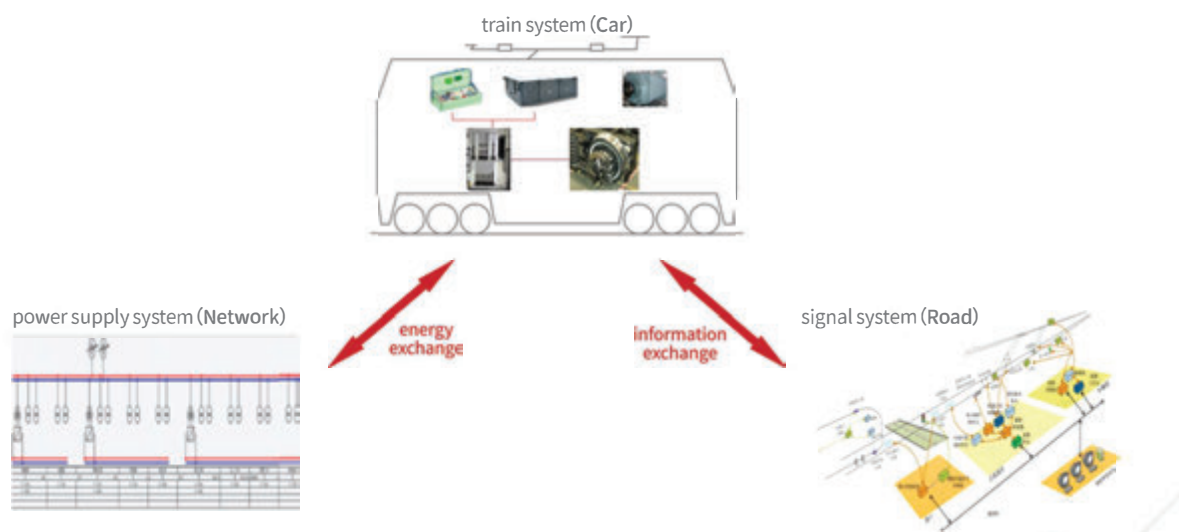


# THE SIMULATION PLATFORM

## Platform introduction

Times Electric has developed a platform based on many years of rail transit system design and application experience - "The integrated design simulation platform for road, network and vehicle." Road refers to the signal system, network refers to the power supply system, and car refers to the train system.

The platform covering the electrical, power, and signal systems of metro vehicles can realize the complete virtual presentation of all working conditions of the entire system, which is helpful to achieve resource sharing and information exchange, improve operating efficiency and reduce operating costs.



We can provide a one-stop mechanical and electrical integration solution



- Traction braking system
- Power supply + Signalling + Doors + Rail maintenance vehicles
- Intelligent operation
- **The simulation platform**



**ZHUZHOU CRRC TIMES ELECTRIC CO.,LTD.**

ADD: 169 Times Rd,Zhuzhou,Hunan China 412001

WEB: [www.tec.csrzic.com/en](http://www.tec.csrzic.com/en)

EMAIL: [overseas@csrzic.com](mailto:overseas@csrzic.com)

TEL: +86 73128492157




 Facebook



 Twitter



 LinkedIn

## CP and KCS combination moves a step closer

CANADIAN Pacific and Kansas City Southern have jointly filed a railroad control application with the US Surface Transportation Board (STB) to create Canadian Pacific Kansas City (CPKC).

The railways say the comprehensive control application provides an overview of the proposed operational integration of the CP and KCS rail networks, the impact of that consolidation on the companies' finances and labour needs, and the anticipated competitive and other benefits that will flow from providing shippers with new and better transport alternatives. Information in the filing outlines the public and customer benefits a CP-KCS combination would bring, including more efficient north-

south trade arteries to support the interconnected supply chains of the United States, Mexico and Canada.

CP has agreed to acquire KCS in a stock and cash transaction representing an enterprise value of approximately \$US 31bn, which includes the assumption of \$US 3.8bn of outstanding KCS debt.

The STB review of CP's proposed control of KCS is expected to be completed in the second half of 2022. Upon obtaining control approval, the two companies will be integrated fully over the ensuing three years.

The railways state that their customers will not experience a reduction in independent railway choices as a result of the combination, adding that the joint control application

reiterates the applicants' commitment to keep all existing freight rail gateways open on commercially reasonable terms, including the Laredo gateway between the US and Mexico. They also state the combined company will compete aggressively to attract traffic to its network via new single-line lanes between Canada, the Upper Midwest and the Gulf Coast, Texas, and Mexico.

While remaining the smallest of six US Class 1s by revenue, the combined company would have a much larger and more competitive network, operating approximately 32,000km of lines, employing close to 20,000 people, and generating total revenues of approximately \$US 8.7bn based on 2020 actual revenues.

## Private operators eye access to Tazara



The line carried 2,760,493 passengers in the last financial year. Photo: Mark Torkington

THE Tanzania Zambia Railway Authority (Tazara), which operates the 1860km 1067mm-gauge railway linking Dar es Salaam, Tanzania, with New Kapiri-Mposhi, Zambia, is in negotiations with two private operators to access the line.

The negotiations were announced following a virtual board meeting held on October 18. The board says more funding is needed for maintenance of the line, as traffic flows are expected to increase exponentially with the introduction of the two additional operators.

The railway carried 479,801 tonnes of freight in the 2020-21 financial year, which ended on

June 30, up 26.6% compared with 378,978 tonnes in 2019-20. This included 217,661 tonnes carried by Tazara, up from 182,302 tonnes in 2019-20, and 262,140 tonnes carried by private operator Calabash Freight, which already has access rights.

Passenger numbers on the line were steady despite the Covid-19 pandemic, with 2,760,493 passengers using the line in 2020-21, down 0.66% from 2,778,708 in 2019-20. Revenue for the 2020-21 year was \$US 31.044m, including \$US 12.689m from non-operational income and open-access fees, up from \$US 24.511m in 2019-20.

## Study finds Guatemala rail project feasible

COMBINED operation of freight and passenger trains are economically feasible on the proposed 274km double-track railway between Tecún Umán and Guatemala City, a group studying the project has concluded.

The Central American Bank for Economic Integration (Cabei), the Guatemalan Ministry of Public Finance, and Guatemala Railway (Fegua) are supporting the \$US 466,900 pre-feasibility study, which is funded by Korea, and is being executed by Korea Exim Bank under a contract awarded in January. This is the first such scheme under the Korean Ministry of Economy and Finance's Knowledge Exchange Programme (KSP) with Cabei. The preliminary findings were revealed during a KSP seminar held in Guatemala City on October 27.

The full pre-feasibility study will reveal the current conditions of railway infrastructure in Guatemala, which ceased operation of its 788km 914mm-gauge network in 2007, as well as the current and future demand for freight, connections with neighbouring countries and any legal issues.

## In brief

Vossloh G 1000 diesel locomotives from DB Cargo France and 24 bogie covered vans from Ermewa and has trained three drivers.

### Hungary

Work is underway to upgrade the Hungarian section of the 350km Budapest - Belgrade line. The upgrade of the 166km mostly single-track stretch from Soroksár on the outskirts of Budapest to Kelebia on the Hungarian-Serbian border involves rebuilding 339km of track and installation of ETCS Level 2 by 2025. This will increase line speeds to 160km/h.

### India

National High Speed Railway Corporation (NHSRL) has launched a tender to construct a 21km tunnel as part of the Mumbai - Ahmedabad high-speed project, which is funded by the Japan International Cooperation Association (Jica). The tunnel will run from Mumbai underground station at Bandra-Kurla Complex to Shilphata in the state of Maharashtra and includes a 7km undersea section beneath the Thane Creek inlet between Mumbai and Navi Mumbai. The tender is open to Japanese and Indian contractors.

### International

Berlin-Brandenburg Transport Authority (VBB) and the Lubuskie regional government have announced the resumption of passenger services on the cross-border railway linking Guben, Germany, and Gubin, Poland. Initially a weekend service will be operated as route RB92 Cottbus - Guben - Zielona Góra Główna from June 12 2022.

### Iran

Minister of roads and urban development, Mr Rostam Ghasemi, says the government is looking to engage with the private sector to continue construction of the Ardabil - Parsabad line to the Azerbaijan border after funding for the project became an issue.

### Netherlands

A €300m project has been completed at the Port of Rotterdam to alter the alignment





# More than 300 grinding trains successfully delivered worldwide

**Speno accumulated a massive rail grinding experience.**

We thank all the Railway Infrastructure Teams who have worked with us  
on so many challenging projects.

**SPENO INTERNATIONAL**

[speno.ch](http://speno.ch)



## Vietnam outlines plans to build nine lines by 2030



The country is aiming to increase rail freight to 11.8 million tonnes a year by 2030.  
Photo: Shutterstock/Nguyen Quang Ngoc Tonkin

**V**IETNAMESE prime minister, Mr Pham Minh Chinh, has approved the 2021-2030 rail network strategy, which envisages the construction of nine new lines at a cost of Dong 240 trillion (\$US 10.3bn). The strategy also includes plans to upgrade the country's seven existing railway lines.

The plan's goals include renovating and upgrading the existing network, improving international connections, building new lines and prioritising the north-south high-speed railway. There has been debate over the maximum speed for the north-south line, with both 200km/h and 350km/h put forward.

The plan foresees rail carrying 11.8 million tonnes of freight annually by 2030 accounting for 0.27% of the market, as well as carrying 460

million passengers, accounting for 4.4% of the market.

The nine new lines, which will total 2362km, are:

- the north-south railway from Ngoc Hoi to Thu Thiem in Ho Chi Minh City (double track, 1435mm-gauge, 1545km)
- Yen Vien - Pha Lai - Ha Long - Cai Lan (single track, dual-gauge 1000mm and 1435mm, 129km)
- a ring line in the east of Hanoi from Ngoc Hoi - Lac Dao - Bac Hong (double track, dual-gauge, 59km). This includes converting the Ngoc Hoi - Yen Vien and Gia Lam - Lac Dao sections for commuter services
- Hanoi - Hai Phong, part of the Lao Cai - Hanoi - Hai Phong line (double track, 1435mm-gauge, 102km)
- Vung Ang - Tan Ap - Mu Gia to the Vietnam-Laos border (single track, 1435mm-gauge, 103km)
- Bien Hoa - Vung Tau (double track Bien Hoa - Thi Vai, single track Thi Vai - Vung Tau, 1435mm-gauge, 84km)
- Ho Chi Minh City - Can Tho (double track, 1435mm-gauge, 174km)
- Ho Chi Minh City - Loc Ninh to the Cambodian border (double track Di An - Chon Thanh, single track Chon Thanh - Loc Ninh, 1435mm-gauge, 128km), and
- Thu Thiem - Long Thanh International Airport (double track, 1435mm-gauge, 38km).

The strategy foresees the network expanding to 6354km across 25 lines by 2050. The government will also maintain existing lines and upgrade them where necessary to meet freight and passenger demands.

*A full report on the plan will appear in the January issue of IRJ.*

## Renfe president says revenue will surge in 2022

**S**PANISH national operator Renfe anticipates a €1.05bn revenue increase in 2022 through an increase of almost 120 million passengers and 1.5 million tonnes of freight, president, Mr Isaías Táboas, told the Spanish government's Congress of Deputies Committee on Transport, Mobility and Urban Agenda on October 27.

Táboas said the expected increase in Renfe's turnover will follow a significant rise in passengers and a sustained increase in freight volumes. Renfe is expected to transport 463 million passengers in 2022, up from 345 million in 2021, a 34% increase. This includes an expected 34 million passengers on high-speed and long-distance services, a return to pre-pandemic numbers.

Regarding freight, Táboas told the committee that Renfe will carry 17.5 million tonnes in 2022, an increase of 1.5 million tonnes compared with the 16 million tonnes expected this year.

## Velim to support autonomous and hydrogen testing

**C**ZECH-based Railway Research Institute (VUZ) plans to install its own sources of clean energy and commence the production of environmentally friendly green hydrogen at its Velim test centre. VUZ will also upgrade tracks to allow it to test autonomous trains.

The most significant investments include equipping the shorter test track with ETCS, which is already fitted to the larger 13.276km 230km/h loop. VUZ is also preparing a study for the testing of autonomous rail vehicles, especially for urban and suburban systems. It says there are no plans to increase speeds on the larger test track.

In addition, VUZ has established a new Slovakian subsidiary which will provide assessment services in interoperability to the Slovakian railway market.

## Plans to introduce hydrogen in Britain as battery trials start

**E**VERSHOLT Rail has signed a Memorandum of Understanding (MoU) with Alstom aimed at delivering Britain's first brand-new hydrogen train fleet.

The rolling stock leasing company and Alstom have agreed to work together to share technical and commercial information required for Alstom to design, build, commission and support a fleet of 10 three-car hydrogen multiple units (HMUs).

Alstom told IRJ that details regarding delivery will be confirmed should the agreement be turned into a firm contract, which it says is expected early next year. "There is a significant market interest in new hydrogen trains and both companies are already talking

to a number of potential operators," Alstom spokesman, Mr Will Tanner, told IRJ.

The HMUs will be based on the Aventura platform and built by Alstom in Britain.

Meanwhile Hitachi has confirmed plans to fit a battery to one of its five-car 200km/h bi-mode class 802/2s used by TransPennine Express (TPE), with trials beginning next year. This will be similar to another trial already announced using a bi-mode Great Western Railway class 802/0.

The 6m x 2.2m battery fitted to both trains will replace one of the train's three 700kW MTU 12V diesel engines. The retrofitting will be undertaken at Hitachi's Newton Aycliffe facility where static testing will also take place. The battery packs will be supplied by Hyperdrive.



## Agreement signed to complete Adriatic Sea - Black Sea line

**B**ULGARIA, North Macedonia and Albania have signed an agreement to complete Corridor 8 of the Pan-European corridors, including a range of rail projects to be completed by 2030. The corridor runs from Durrës to Varna via Elbasan, Skopje, Pernik, Sofia, Plovdiv, and Burgas.

The 10 Pan-European transport corridors were defined at the second Pan-European transport conference in Crete in March 1994 as routes in Central and Eastern Europe that required major investment over the next 10 to 15 years.

Under the agreement signed on October 19, Bulgaria will complete the construction of the 2.5km line from Gyueshevo to the North Macedonian border, along with the modernisation of the Sofia - Pernik - Radomir - Gyueshevo line. A tender for the Pernik -



The agreement was signed by Albania's minister of infrastructure and energy, Ms Belinda Baluku, Bulgaria's minister of transport, information technologies and communications, Mr Hristo Alexiev, and North Macedonia minister of transport and communications, Mr Blagoy Bocharovski.

Radomir section was released at the end of October.

North Macedonia will complete construction of the 89km Kumanovo - Beliakovtse - Kriva Palanka - Deve Bair railway, which will extend the line to the Bulgarian border. Preparation of detailed designs for the modernisation and electrification of the 150km Kumanovo - Skopje - Kicevo line and the construction of the

70km Kicevo - Stuga - Lin line is also underway.

Albania has committed to the rehabilitation of the Tirana - Durrës line and the construction of a 34.7km branch line to Tirana International Airport. It will also rehabilitate the Duras - Rogozhin - Pogradec - Lin line and build a connection from Lin to the border of North Macedonia, totalling 137km.

## RZD and Siemens to develop HS train

**T**HE Engineering Centre for Railway Transport, a joint venture between Russian Railways (RZD) and Sinara Transport Machines (STM), has signed a cooperation agreement with Siemens Mobility for the development and production of a new high-speed train for Russia.

The partners plan to conduct technical consultations with

the aim of developing basic concepts for the preliminary design of the new 1520mm-gauge train. Results from this will be used at the next stage of the design process when it is planned to conclude other agreements.

RZD says it will consider RZD's general requirements as well as international standards when developing the various concepts for the train.

## DB and partners develop FRMCS system

**P**ROGRESS is being made on examining the options available to German Rail (DB) as it seeks to introduce the 5G-based Future Railway Mobile Communication System (FRMCS), with research suggesting that infrastructure owned by DB can support the digital technology.

DB's Digital Rail Germany (DSD), working with partners Ericsson, Kontron Transportation, Nokia and Vodafone, has undertaken research into how FRMCS can be used to replace the existing 2G-based GSM-R system which cannot meet the connectivity requirements of the digitised rail network, and

will be discontinued from the mid-2030s.

Ericsson and DSD found key design trade-offs were required while studies by Kontron Transportation and DSD found that a proactive approach to standardisation of FRMCS was required.

Nokia and DSD found that FRMCS will allow rail operators to increase efficiency, offer new services and decrease the total cost of ownership. Studies by Vodafone and DSD found that while DB intends to rely on its own FRMCS infrastructure, there remains the option of supplementing it with public networks as a fallback solution or capacity extension.

## CN purchases battery-electric locomotive

**C**ANADIAN National (CN) has ordered a 2.5MW FLXdrive battery-electric freight locomotive from Wabtec, the first 100% battery heavy-haul locomotive in North America.

Wabtec says the next-generation FLXdrive technology can reduce fuel consumption and emissions by up to 30%. The locomotive will be delivered in 2023 and the purchase is supported by Pennsylvania's Department of Environmental Protection (DEP) through the Marine and Rail Freight Movers Grant programme.

"As part of our sustainability strategy to reduce freight transportation emissions through innovation, we plan to continue to lead the sector by deploying low and no carbon technologies," says CN president and CEO, Mr J J Ruest.

## In brief

of the Havenspoor Line via a new 4km elevated section, which runs parallel to the existing railway but avoids the Calandbrug, a 345m-long road-rail lifting bridge which is disruptive to rail operation in the port.

### Slovenia

Infrastructure Directorate has completed the €230m upgrade of the 26.2km Zidani Most - Celje line in the east of the country, which forms part of the line from Zidani Most via Šentilj to the Slovenian-Austrian border. The axleload on the line has been increased to 22.5 tonnes, and capacity increased from 328 to 354 trains a day with freight capacity increased from 20.56 million tonnes to 24.41 million tonnes annually.

### Spain

CAF has signed an initial eight-year framework maintenance agreement with Knorr-Bremse covering braking (including friction materials), HVAC and entrance systems installed on various vehicles including metro and regional trains operating on several continents.

### Sweden

The first of 36 refurbished X2000 tilting inter-city trains resumed operation on the Stockholm - Gothenburg route on November 16. The trains feature a new interior and upgraded control system. ABB replaced traction converters, transformers, battery chargers, train control systems, passenger information and entertainment equipment while Swedtrac refurbished the interiors.

### United States

Brightline West has signed a Memorandum of Understanding (MoU) with the California State Transportation Agency (CalSta), California Department of Transportation (Caltrans), and California High-Speed Rail Authority, over access to a 77km of right-of-way within Interstate highway 15, which will link its proposed Victor Valley station and a new station at Rancho Cucamonga between San Bernardino and Los Angeles on the planned \$US 8bn Las Vegas - Los Angeles line. **IRJ**

## Two major Cairo Metro contracts awarded



CAF has been awarded a €180m contract to refurbish 23 trains that operate on Cairo Line 1.

**E**GYPT's National Authority for Tunnels (NAT) has awarded Alstom an €876m contract for the supply of 55 nine-car Metropolis EMUs and an eight-year maintenance contract for the upgrade of the 44.3km Cairo Metro Line 1, while Mitsubishi Corporation and Kinki Sharyo have won a Yen 40bn (\$US 351.2m) contract to supply 184 metro cars for Line 4 Phase 1.

Each nine-car Alstom train will have capacity for 2580 passengers. The trains will have a dedicated women's area, real-time passenger information screens and dynamic route maps.

Alstom will also supply its HealthHub predictive

maintenance system which it says will save up to 20% in labour costs and 15% in materials consumption.

The French government is funding the project together with nine associated schemes worth a total of around €1.8bn.

Mitsubishi Corporation is the main contractor for the 184-car order while Kinki Sharyo will supply the trains in phases between 2025 and 2028.

The 19km Line 4 Phase 1 will run from central Cairo to the Giza Pyramid Complex. The project is being funded by the Japan International Cooperation Agency (Jica) through an Official Development Assistance (ODA) loan. Mitsubishi

Corporation signed a Yen 90bn contract in November 2020 to deliver the railway systems, track and depot works for phase 1.

NAT has also awarded CAF a €180m contract to refurbish 23 Line 1 trains. Maintenance of the trains for two years is included in the contract, which is being financed by Spain's Enterprise Internationalisation Fund (FIEM).

The refurbishment, which will be completed in partnership with Mitsubishi Corporation, includes upgrading the traction system under CAF Power and Automation integration. The work will be carried out at the new Kozzika depot, which will be fitted out by CAF.

## Vancouver eyes major expansion

**T**RANSLINK has proposed quadrupling the size of Vancouver's existing 100km automated light metro network by constructing 310km of new SkyTrain metro, light rail or bus rapid transit lines in a 30-year Regional Transportation Strategy (RTS).

Input from the public will be used to update the strategy before it is sent to the TransLink board and the Mayor's Council for final approval in early 2022.

Seven routes are identified in the RTS:

- the already confirmed Surrey - Langley SkyTrain extension
- King George Boulevard rapid transit line serving a north-south corridor through Surrey City Centre to Newton
- Willingdon/Hastings Street/2nd Narrows rapid transit from downtown Vancouver to the North Shore to Brentwood Town Centre and Metrotown
- 41st Avenue and 49th Avenue rapid transit
- SFU Burnaby Mountain Gondola
- UBC SkyTrain extension from Arbutus to UBC, and
- Port Coquitlam SkyTrain 2km extension.

The aim of the strategy is to ensure 50% of all passenger trips are made by public transit, walking or cycling by 2050.

## East Rail Line extension to open mid-2022

**M**TR has released a progress report for the remaining section of the much-delayed Shatin - Central Link project in Hong Kong, with the 6km East Rail Line (EAL) cross-harbour extension from Hung Hom to Exhibition and Admiralty on Hong Kong Island due to open in June or July 2022.

MTR says critical works to connect the extension with the existing EAL have progressed well, with the main line closed between Hung Hom and Mong Kok East over six Sundays to allow the installation of switches and crossings north of Hung Hom. The installation of signalling and the introduction of new trains has also

progressed, along with works at Admiralty and Exhibition stations.

Following the completion of the connection between the two lines, full dynamic train tests will be conducted, followed by trial operation and eventually opening of the link.

The EAL extension was due to open in the first quarter of 2021, but this was subsequently postponed to the fourth quarter of 2021 and later to the first quarter of 2022. The project has faced serious setbacks during its construction, with the Tai Wai - Hung Hom section of the Tuen Ma Line delayed due to poor construction at Hung Hom station.

## Vietnam's first metro line opens

**S**ERVICES on Hanoi's Cat Linh - Ha Dong metro line, Vietnam's first metro, began on November 6, 10 years after construction began.

The 13km elevated line, which has 12 stations, runs from Cat Linh in the central Dong Da district to Yen Nghia in Ha Dong district in the southwest with an end-to-end journey time of 23 minutes.

Line 2A is the first of 10 metro routes totalling 417km planned for Hanoi. Line 3 from Nhon to Hanoi railway station, which will interchange with 2A at Cat Linh, is currently under construction.

Line 2A, built by China Railway Sixth Group, was approved in 2008 and was due

to open in 2013, but was delayed due to land acquisition difficulties, design changes and contractual conflicts. The total cost also increased by 57% from an original estimate of Dong 18 trillion (\$US 791.6m), with 77% of this funded through Chinese loans.

Services are initially operating every 15 minutes between 05.30 and 20.00. This will be extended to 22.00 after six months when a six-minute frequency will be introduced during peak periods.

The line will be served by a fleet of 13 four-car trains supplied by Beijing Subway Rolling Stock Equipment Company.



## Tehran metro trains out of service due to maintenance backlog



**T**HE CEO of Tehran Urban and Suburban Railway Operating Company, Mr Ali Abdollahpour, says a backlog in overhauling metro trains and double-deck push-pull trains operating on Line 5 has reached a critical situation which is affecting the operation of the network.

"By the end of October this year, 35% of metro trains and more than 75% of the Line 5 fleet has passed the permitted limit for overhaul," Abdollahpour says. "At present, 161 trains are active on the seven metro lines, some of which have accumulated more than 900,000km of operation and must be overhauled, but due to the lack of replacements, we

are continuing to use these trains."

Tehran metro estimates it needs Rials 7 trillion (\$US 166.5m) up to 2024 to catch up with the maintenance backlog. But Abdollahpour points out that Tehran Metro is unique in that the Iranian government only covered 1% of operating costs in 2020, with the Municipality of Tehran covering 85%, and passenger fares the remaining 14%. Abdollahpour fears this situation is unlikely to change as there is a lack of funds in the national budget, while Tehran Municipality cannot increase its payments, and passenger traffic has been adversely affected by the coronavirus pandemic.



## Cracks detected in Sydney LRVs

**S**YDNEY's 12.8km City - Dulwich Hill light rail line will close for up to 18 months after cracks were found in the wheel arches of the CAF LRVs.

The cracks, which are up to 30cm-long, were detected during routine inspections. The 12 LRVs are now being inspected by Transdev, which operates the line, and the Department of Transport.

New South Wales transport minister, Mr Rob Stokes, said the 18-month closure is the "worst-case scenario" while the issue, which is likely to be a "design flaw," is fixed.

## In brief

### Bangkok

State Railway of Thailand (SRT) has unveiled plans to add four extensions totalling 50.4km to the new Bangkok Red Line. The extension would be constructed through a PPP deal, with the private partner granted a 50-year concession to operate the line.

### Basle

Baselland Transport (BLT) has awarded Stadler a SFr 125m (\$US 140m) contract for 25 LRVs which will enter service between December 2023 and 2025. The seven-section steel-bodied vehicles will be 45.5m long and 2.3m wide and will have four powered bogies and one unpowered bogie.

### Berlin

A 2.7km light rail extension between Karl Ziegler Street and Schöneeweide S-Bahn station opened on October 30. The Adlershof II extension extends Line M17 from Schöneeweide S-Bahn station via Groß-Berliner Damm to Adlershof S-Bahn station while Line M61 services have been extended in the opposite direction. Line M63 will now terminate at Johannisthal Landscape Park.

### Buenos Aires

Argentina's Ministry of Transport has signed contracts worth Peso 2.74bn (\$US 27.6m) to upgrade the Buenos Aires Constitución - La Plata branch of the Roca Line to increase frequencies and reduce travel times. The project is being financed by the Inter-American Development Bank (IDB).

### Isle of Wight

The delayed £26m project to upgrade the 13.7km railway linking Ryde and Shanklin was completed in October allowing services to resume on November 1. Vivarail has supplied five refurbished former District Line two-car EMUs.

### Lisbon

Infraestrutura Portugal has invited bids to complete the design and environmental studies to quadruple the Lisbon Roma/Areeiro - Braço de Prata section of the Cintura

Line and modernise the Braço de Prata - Sacavém section of the North Line, as part of the 2030 National Investment Programme (PNI). The contract is worth €9.4m.

### Paris

A French National Railways (SNCF) audit of a €3.75bn Alstom order for 255 Next Generation EMUs for RER lines D and E has revealed that the new trains will enter service two years late. Testing of five pre-series trains is underway and 71 trains from the first part of the order were due to enter service by the end of this year. However, only one train is equipped for tests with the new NExTEO cab signalling system.

### Singapore

Land Transport Authority (LTA) has awarded two civil engineering contracts for the Cross Island Line Phase 1 (CRL1) metro line. Nishimatsu Construction has a \$S 446m (\$US 329m) contract for tunnelling between Tampines North and Defu stations, while Hock Lian Seng Infrastructure has won a \$S 320m contract to construct Aviation Park station and tunnels.

### Taipei

Taipei City government has awarded a £2.3m contract to Ricardo to provide independent verification and validation services for phase two of the Wanda - Zhonghe - Shulin driverless metro project. The 11km mostly elevated phase two is due to open in 2028.

### Tel Aviv

Tel Aviv Metropolitan Mass Transit System (NTA) completed its first full test run on the 24km Red Line on October 21, ahead of the light rail line's November 2022 opening.

### Wuhu

Operation of the 30.46km Line 1 monorail, which is equipped to run at GoA 4, began on November 3. Services are provided by a fleet of 28 six-car Innovia monorail trains supplied by CRRC Puzhen Bombardier Transportation Systems. **IRJ**

# Austria plans €18.2bn five-year investment in network

**A**N €18.2bn framework plan for the expansion and maintenance of Austria's rail network for the 2022-2027 period was approved by the council of ministers on November 3.

"The largest railway expansion package in the republic will be topped up again," says climate protection minister, Ms Leonore Gewessler. "This is an important building block for more climate protection. Because a modern network and a cheap KlimaTicket make public transport more attractive than ever before. And every kilometre by train protects our climate."

The plan also includes increasing rail freight capacity by operating longer and



The plan includes investments to increase freight capacity by operating longer and heavier trains. Photo: David Gubler

heavier trains, which Austrian Federal Railways (ÖBB) says will be more economical and

help rail to compete with road.

The plan offers a renewed focus on digitalisation of rail to

improve safety and efficiency, while mobile network coverage will be expanded.

## Aurizon to purchase One Rail Australia for \$A 2.35bn

**A**USTRALIAN rail freight operator Aurizon has signed an agreement with Macquarie Infrastructure and Real Assets (Mira) to purchase One Rail Australia (ORA) for \$A 2.35bn (\$US 1.76bn).

ORA's business includes bulk rail haulage and general freight assets in South Australia (SA) and the Northern Territory (NT), the 2200km Tarcoola - Darwin line, and a haulage business in New South Wales (NSW) and Queensland.

Aurizon will divest ORA's East Coast Rail (ECR) business in NSW and Queensland through a demerger or a trade sale, while merging ORA's bulk and general freight assets into the Aurizon business including the Tarcoola - Darwin line, regional infrastructure in South Australia, five rail yards, 68

locomotives, more than 1000 wagons and approximately 400 employees.

ORA, previously known as Genesee & Wyoming Australia (GWA), was renamed One Rail Australia in February 2020 following confirmation that the acquisition of the remaining 51.1% stake in GWA by Mira and Dutch pension fund PGGM from Brookfield Infrastructure had been completed. At the time, Aurizon brought legal action over the sale of GWI's Australian assets to Mira and PGGM. Mira and PGGM previously acquired the other 48.9% share of GWA in 2016.

The purchase of ORA by Aurizon is subject to several conditions, including clearance from the Australian Competition and Consumer Commission (ACCC). Aurizon

will commit to divesting ECR following the completion of the ORA transaction, to address potential competition concerns from the ACCC arising from the transaction. Until then, ECR will be operated independently from the Aurizon Group with a separate CEO and management team.

The acquisition of ORA will be funded through a combination of Aurizon's existing debt facilities and underwritten by new committed debt facilities. ORA has an aggregate estimated Ebitda of \$A 220m for 2021.

Aurizon aims to complete the ORA acquisition by April 2022, subject to regulatory approvals and other conditions. The divestment of ECR, also subject to regulatory approvals, is targeted for completion in 2022.



The remaining 51.1% stake in One Rail Australia, previously known as Genesee & Wyoming Australia (GWA), was purchased by Mira and PGGM in February 2020. Photo: Shutterstock/Dorothy Chiron

## Siemens Mobility records €12.69bn in orders in 2021

**S**IEMENS Mobility recorded €12.69bn in orders in the 2021 financial year, which ended September 30, up 38% from €9.16bn in 2020. Revenue increased 2% from €9bn in 2020 to €9.2bn. Adjusted Ebita was €847bn, up 8% from €822bn the previous year, with an adjusted Ebita margin of 9.3%.

In the fourth quarter, the company recorded €2.75bn in orders, up 33% from the €2bn received in the same period the previous year. Revenue also increased from €2.44bn for the quarter to €2.51bn. Adjusted Ebita was €227m, down 6% from €241m the previous period, for an adjusted Ebita margin of 9%.

Revenue growth came primarily from the rail infrastructure business, including significant growth in mainline activities, although operating restrictions related to Covid-19 held back overall revenue growth.

Adjusted Ebita was held back by a less favourable mix in particular in the maintenance business following lower ridership in public transport in recent quarters.



## Queensland to invest \$A 7.1bn in fleet

**Q**UEENSLAND has confirmed its \$A 7.1bn (\$US 5.28bn) rolling stock expansion programme to manufacture trains in the state as it gears up to host the 2032 Olympic Games.

The state's Labor government announced that 65 six-car passenger trains will be built at a new purpose-built manufacturing facility owned by the state government at Torbanlea near Maryborough, 270km north of Brisbane. The new trains will be used on the southeastern Queensland

network and the first sets are expected to enter service in 2025.

Three manufacturers - Alstom, CAF and Downer Rail - are competing for an existing tender to build 20 trains and will have an opportunity to bid for the increased order for 65 sets when a request for proposals is issued by the end of this year. The preferred supplier is expected to be named in the second half of 2022, with construction of the Torbanlea manufacturing facility to follow.

## Morocco allocates \$US 852m to renew network and fleet



The funding will be used to renew the existing network. Photo: Shutterstock/oldbalaklava

**T**HE Moroccan government has allocated Dirhams 7.72bn (\$US 852m) to renew the country's rail network and rolling stock between 2022 and 2024.

The funding, outlined in a report on Public Establishments and Enterprises (EEP) as part of the 2022 finance bill, includes Dirhams 2.9bn in 2022, Dirhams 2.22bn in 2023 and Dirhams 2.6bn in 2024. The report says the

government invested Dirhams 50bn in rail infrastructure between 2010 and 2020.

The report also outlines the impact of the Covid-19 pandemic on Moroccan National Railways (ONCF), with passenger numbers dropping by 98% between March and May 2020. A contingency plan has been implemented to preserve ONCF's financial stability and ensure operation can continue.

## Sweg to take over Abellio contracts

**T**HE Baden-Württemberg state government has approved a plan for state-owned Southwest German Transport (Sweg) to take over contracts in the state currently held by Netherlands Railways' (NS) subsidiary Abellio.

Sweg has also submitted a purchase offer to the administrator for Abellio's insolvent Abellio Rail Baden-Württemberg GmbH (ABRB) subsidiary, including the depot at Pforzheim.

Assuming the offer is accepted, Sweg will operate the contracted trains while paying employees their agreed Abellio salaries. If the takeover is agreed, ABRB will receive a temporary transport contract for two years as part of an emergency measure under European procurement law. This contract will guarantee full cost coverage of the operation.

## In brief

### Brazil

The National Land Transport Agency (ANTT) has approved the renewal of MRS Logistics' concession for another 30 years from November 2026, moving the process a step closer to completion after the technical and legal studies were finalised during October.

### Britain

The government has provided almost £11bn to support franchised operators to mitigate financial impacts resulting from the Covid-19 pandemic and to maintain operation of rail services from March 1 2020 until July 24 2021.

### Egypt

Egyptian National Railways (ENR) has awarded Wabtec a contract to supply 100 ES30ACi Evolution Series locomotives, along with a multi-year service agreement. The 140km/h, 135-tonne six-axle locomotives will be delivered to ENR in 2023.

### France

Alstom recorded €9.7bn in new orders and €7.4bn in sales in first half of the 2021-22 financial year between April 1 and September 30, the first complete half-year period following the acquisition of Bombardier Transportation.

This compares with combined orders of €5.3bn and sales of €6.5bn prior to the merger year-on-year. Alstom's order backlog was €76.36bn as of September 30, compared with €40bn on September 30 2020.

• The Pays de la Loire region has called for tenders to operate two groups of regional passenger services, branded TER, under 10-year contracts that will commence in December 2024. The winning bidders will be revealed in mid-2023.

### Germany

Germany's Upper Elbe Transport Association (VVO) has finalised a 10-year contract with DB Regio to operate four regional diesel services in the Dresden area. DB Regio will take over from the start of the new timetable on December 11.

### Israel

Israel Railways (IR) will take

delivery of 36 new 6MW 25kV 50Hz electric Traxx locomotives from Alstom between April 2023 and October 2024 as part of a framework agreement signed with Bombardier Transportation in 2015.

### Italy

Regional operator Ferrovienord has signed a contract with Hitachi Rail to receive another 50 3kV dc double-deck Caravaggio regional EMUs. The deal is worth €451.85m. Delivery is scheduled to begin in October 2022.

• Autostrada del Brennero has agreed to buy a 75% stake in open-access rail freight company InRail via its STR subsidiary. The deal was structured as a capital increase leaving InRail's founder shareholders with 25% and increasing capital available to the business.

### Kazakhstan

Silkway Transit has ordered 22 two-section 2ES7 Black Granite electric locomotives from Sinara Transport Machines (STM), Russia, which will be delivered within nine months. Ural Locomotives will build the units, with the first due to be handed over before the end of 2021.

### Spain

New entrant Ilsa has awarded Hitachi Rail Spain a €737m, 30-year maintenance contract for 20 new ETR 1000 trains which are due to enter service in the second half of 2022.

### Sweden

SJ has awarded CAF a SKr 3bn (\$US 348.2m) contract to supply 25 new regional EMUs, which have been ordered after passenger numbers more than doubled over the past two decades. The 200km/h trains will enter service in 2025.

### Switzerland

Alstom has lodged an appeal with the Swiss Federal Administrative Court after Swiss Federal Railways (SBB) awarded Stadler a SFr 2bn (\$US 2.15bn) contract for 286 single-deck Flirt EMUs. SBB says it is unsure whether the appeal will delay the purchase of the 286 trains. **IRJ**

# Making the case for rail at COP26

The rail lobby worked hard to make its voice heard at last month's COP26 held in Glasgow. Kevin Smith reflects on the key messages and takeaways from the event.

COP26, which was held in Glasgow from October 31 to November 14, closed to a mix response. Some hailed the Glasgow Declaration for keeping the promise of the Paris Agreement to limit global emissions alive. Others lamented the outcome for not going far enough to secure commitments from the world's largest carbon emitters to curb their damaging practices.

Transport was under the spotlight during the second week. The decision by the British government's organising committee to omit rail from the official conference proceedings meant that electric cars stole much of the focus. However, delegates from the rail lobby and governments backing modal shift were keen to talk up its credentials. Demonstrations of the HydroFlex hydrogen multiple unit and Vivarail battery multiple unit to delegates ranging from British prime minister, Mr Boris Johnson, to Prince Charles, were some of the defining images of the event.

Ms Ursula von der Leyen, the president of the European Commission (EC), boldly pronounced modal shift from road to rail as essential during her address. A speech from Mr Matthew Baldwin, the EC's



Participants in a conference session onboard the HydroFlex debated the importance of rail to carbon-neutral future.

leading automotive companies.

As official observers, the International Association of Public Transport (UITP), had the opportunity to address global transport ministers during a roundtable discussion on November 9. Secretary general, Mr Mohamed Mezghani, reiterated a familiar message that transport should move people and not cars, and investment in public transport is essential for the future economic vitality of the world's urban centres.

To coincide with Transport Day on November 10, UITP and the International Union of Railways (UIC) issued a joint

statement without immediate action, its share of emissions could reach 40% by 2030. "Solutions already at hand can halt the rising emissions from transport this decade but these are too low down the agenda at COP26," the statement says. "By focusing on only switching to electric cars, there is a real risk that our roads will remain unsafe and congested, with persistent particulate air pollution issues. Cities are better when people can move around them, and are not stuck behind a steering wheel."

Mezghani and UIC director general, Mr François Davenne, underlined these messages during a special debate held onboard HydroFlex, which IRJ attended, on November 9.

Davenne said definitive action is required in the next 10 years to meet the objective of limiting global warming to 1.5°C. For rail he says frugal solutions are available to achieve this, pointing to the HydroFlex project, and stating that the UIC 2030 Vision (p8) attempts to demonstrate how quick transformation can have a powerful impact.

"For rail to become the backbone of mobility, we need to increase our modal share and for that to happen we need support from policy makers," Davenne says. "That

is why it is absolutely crucial we are here at COP to demonstrate that we need the support and that we deserve the support."

Mezghani underlined the importance of collaboration to tackle climate change and said that meaningful progress won't be achieved by working separately. When asked what message he would like to convey to policy makers, Mezghani said that he would like to see public transport and rail included in every national decarbonisation plan. "Right now only 30% of countries have public transport and rail in their decarbonisation plans," he said. "Public transport is a major solution to the climate crisis and therefore it should appear in all of them."

When asked by IRJ about how rail and public transport might become a more attractive proposition that compels modal shift, Davenne said the emphasis should be on delivering door-to-door services that are simple and integrated. He said it is very important to get rid of the cumbersome aspect of public transport and move away from separate local and national visions.

Mezghani similarly argued that it is essential that public transport advocates speak the same language as politicians,

**“For rail to become the backbone of mobility, we need to increase our modal share and for that to happen we need support from policy makers.**

**François Davenne**

deputy director general for mobility and transport, was also credited with the addition of a reference to the importance of active transport, public and shared transport to the Glasgow Declaration on Accelerating the Transition to 100% Zero Emission Cars and Vans, signed by 30 countries and some of the world's

statement arguing that contrary to debates on developing electric cars, shifting traffic to rail and public transport is the quickest way to decarbonise transport.

Transport is responsible for 23% of global greenhouse gas emissions, second behind energy and the only area where overall emissions are going up. The UIC and UITP say that



who are largely focused on securing re-election. He said unfortunately growing public transport does not always align with these objectives; big projects for example take years, and something that starts under the leadership of one individual may very well conclude while their successor or even their successor's successor is in power.

Mezghani added that such measures can include integrated and simplified ticketing, improvements to stations, and offering compensation to retailers impacted by disruption. He said Strasbourg and Montpellier in France are good examples of cities that have adopted this approach.

"We need to show them the short-term improvements they can offer their citizens, their voters," Mezghani says. "It is important to show them quick wins during their mandate, so at the different steps of the project they can gain credibility and acceptance from the population."

UITP left Glasgow optimistic but clear that a lot more work needs to be done. It says the final agreement reached involved compromise for some sides but does not include nearly enough on sustainable active mobility. This is a message it will continue to push as countries are compelled to develop and implement policies that will deliver their nationally determined contributions. Expect another push at next year's COP27 in Egypt.

## Vivarail presents battery train at COP26

**Richard Clinnick**  
Associate Editor

**V**IVARAIL, Britain, demonstrated a three-car battery-powered former London Underground class 230 D-Train to COP26 delegates and says its smart technology offers a cheaper option to other alternative power solutions.

Demonstrations took place on the 11.8km Glasgow Central - Barrhead line. IRJ visited on October 29 during which Vivarail design director, Mr Neil Bates, explained that using assumptions for a two-car train operating on a 160km line, battery technology will cost £1.37 per kilometre compared with £2.49 for diesel and £2.58 for fuel cell hydrogen.

The D-Train is equipped with six batteries, with three fitted to each driving car. During operation four batteries are in use with two as resilience. Vivarail chair, Mr Adrian Shooter, explained that should two batteries fail, the train can still reach its destination maintaining its planned timings.

The battery train is limited to 96km/h. However, Bates explained that studies of comparative DMUs operating at a 120km/h maximum speed on journeys of around one hour show that the battery train can complete the journey around five or six minutes faster than the DMU. This is due to the better performance

of the battery train when accelerating combined with the fact the train has four doors per coach meaning boarding and alighting is quicker.

When in traffic, the train is fully charged at the start of the day's operation and is recharged through the day using Vivarail's Fast Charge system, which can fully recharge the train in 10 minutes. Use of Fast Charge does, however, require approval from British infrastructure manager Network Rail (NR). While supporting the introduction of the technology, NR wants to conduct a minimum year-long assessment and has stipulated that it must be compatible with all manufacturers' technology and not just Vivarail's.

Shooter explained that the Fast Charge technology is transferable to other manufacturers. He said discussions have taken place with operators of EMUs that would see them

fitted with batteries supported by the Fast Charge technology to support operation on non-electrified lines. Negotiations are also underway to fit the technology to locomotives for shunting operations. It is also conceivable to supply the technology to manufacturers of new trains. "We're not just a rolling stock supplier," Shooter said.

Mr Martin Frobisher, NR group safety and engineering director, said he sees "huge potential" for battery trains in Britain, especially on branch lines where they could serve as an alternative to expensive electrification schemes. Frobisher also suggested that battery technology could offer a last-mile solution for freight trains in terminals and would reduce the cost of electrification by facilitating partial electrification on certain routes, helping to avoid expensive demolition or modification of structures.



*The converted former class 230 D-Train is equipped with six batteries.*

## Porterbrook shows HydroFlex demonstrator to delegates

**Kevin Smith**  
Editor-in-Chief

**C**OP26 delegates had the opportunity to take a trip on the Hydroflex four-car hydrogen-electric multiple unit that was developed by Porterbrook at the Long Marston Rail Innovation Centre in just 10 months.

As well as hydrogen fuel cells, the retrofitted class 319 unit, now reclassified as class 799, is equipped with a pantograph to support electric

operation. Trips took place in electric mode on the Cathcart Circle from Glasgow Central. However, the hydrogen-based traction system can support operation at up to 160km/h and a range of around 480km.

The hydro chamber housing the traction equipment has been installed in the majority of one of the four coaches and is insulated to maintain a stable temperature. Three banks of 12 hydrogen fuel cell tanks for a total of 36 150kg tanks, with total capacity for 277kg of green hydrogen

sustainably sourced through green energy, are neatly positioned in a row on one side of the car. The aluminium tanks have been supplied and commissioned by Luxfer Gas Cylinders, a subsidiary of Luxfer Canada, and each is coated in Kevlar with one end fixed into position and the other allowed to "float" to maintain the system's flexibility.

Hydrogen is stored in the tanks at 350 bar, which is regulated to meet the fuel cell at 16 bar. Each of the four fuel

cells has an output of 125kW, and as is the case in other hydrogen trains, a process of electrolysis combines the hydrogen with oxygen taken from the air to produce electricity in the fuel cells. Water is a by-product of this process and is released through a pipe from the bottom of the train. The fuel cells are located in the adjacent section of the hydro chamber and charge a 240kW lithium-ion battery which provides all power for the train, including the 750V dc traction motors

with two fitted to each powered bogie, as well as auxiliary power. A specially developed control system ensures the right amount of power is released at the right time.

Two hydrogen refuelling points are situated on either side of the train, matching the set up on a DMU. A mobile hydrogen refuelling unit has been utilised for HydroFlex with various nozzle designs available depending on the speed of the refuelling process. The train is also compatible with a future stationary refuelling unit at a depot.

The hydro chamber is equipped with heat and hydrogen sensors, which in the event of an emergency or if gaseous hydrogen is detected, is able to prompt the safe release of the hydrogen gas from the train and into the atmosphere via vent lines or scavenge fans which pull the air through. A solenoid system is also in place to close off the tanks to prevent any further gas seepage.

Work to equip the train with hydrogen fuel cells and associated equipment to support operation took around three months. The remaining time was taken up by securing the necessary regulatory and safety approvals, which was completed in time to demonstrate the vehicle in Glasgow.

A team of 16 from Chrysalis Rail supported Porterbrook with the work at Long Marston. Installing the hydrogen tanks required the development of a bespoke crane for the process of lifting and positioning the tanks in the car. The 48-tonne overall weight of the hydrogen train is comparable to the loaded weight of a fully occupied DMU and complies with RA4 standards.

## Trials

Ms Helen Simpson, Porterbrook's innovation and projects director, says further trials with the train were set to commence immediately after COP and the goal for the project is to secure a trial with a mainline operator. "I really hope that we are able to take this to different parts of the country so we can demonstrate the potential that hydrogen and HydroFlex has to as many people as possible," Simpson says.

HydroFlex originated as a research project at the University of Birmingham, which under a partnership formed with Porterbrook in September 2018, led to the development of the first-generation prototype. This was unveiled at the Rail Live event in June 2019. Mainline demonstrations with this vehicle took place in September 2020.

Simpson says collaboration was key to successful delivery of the subsequent demonstrator project. One of the key partnerships was with the Railway Safety and Standards Board (RSSB) to incorporate findings from their research into hydrogen fuel cell technology as well as the safety of using hydrogen as a fuel for transport. Porterbrook also worked in partnership with infrastructure manager Network Rail as it navigated the approvals process. Simpson says this was a particularly challenging element as the project was effectively setting the benchmark for hydrogen operation in Britain. "Nothing

like this had been done before," she says.

Simpson says unlike the prototype, the demonstrator is designed to show that the train can conceivably accommodate passengers and be used in commercial operation. This is an objective shared by Ms Mary Grant, Porterbrook CEO.

"Electric supply has its limitations so we must look at other things," Grant told IRJ. "There are prospective customers in the northeast of England interested in this type of train. It is important for us to show that the technology is viable. To have done this in 10 months is a great achievement." **IRJ**

## Lumo hopes to attract new passengers to rail

Kevin Smith joins the open-access operator for the inaugural trip on Britain's East Coast Main Line and learns about its inventive approach to customer service.

**F**IRST Group's latest venture into the British open-access market commenced on October 25 with the launch of Lumo with the launch of Lumo between London King's Cross and Edinburgh Waverley.

Lumo is initially offering two daily return trips on Sunday - Friday, and one train each way on Saturdays, calling at Stevenage (on one southbound journey Sunday - Friday), Newcastle, Morpeth, and Edinburgh for an approximate 4h 30min journey time. This will increase to four return trips this month and five daily return trains in May 2022.

Lumo is aiming to create an additional 13 million passenger rail journeys in the next decade and has reported an encouraging start with 90% of its initial tickets already sold.

Ms Helen Wylde, Lumo managing director who was speaking to IRJ onboard the inaugural service on October 21, said it is the company's objective to sell as many of the 1 million tickets that will be available in its first year as possible. She says that with just 8% of the British population a regular rail user, the brief for the new service was to find out

why and to come up with an offer that can "reimagine rail" and realise this potential to grow use.

Attracting people who might be inclined to take a domestic flight rather than the train is at the heart of Lumo's pitch. Each of the station stops is located close to a regional airport - Stevenage near Luton, Newcastle, Morpeth near Newcastle, and Edinburgh - and early marketing campaigns are targeting people who might use these airports. Lumo will also operate the first and last London - Edinburgh train each day with its early morning service the only direct train to arrive in the Scottish capital before 10.00. Discussions are also underway with Network Rail to deliver improvements in journey time, including a potential 15-minute reduction in May 2022.

Lumo's emphasis on sustainability extends to its menu options and its entirely electric fleet. The fourth of five five-car class 803 EMUs built by Hitachi Rail in Newton Aycliffe was delivered on October 22 and the fifth train is scheduled to be handed over on December 22. The £100m



The hydro chamber features three banks of 12 hydrogen fuel cell tanks for a total of 36 150kg tanks, with total capacity for 277kg of green hydrogen.



fleet is financed by Beacon Rail and the trains are the first of the 80X series with no diesel engine, with an auxiliary battery able to offer four hours of hotel power should the train fail.

Each train has 398 seats and four tip seats and there is a single class, reflecting the operator's desire to offer a high level of service to all passengers. Free Wi-Fi and at-seat USB and plug sockets are available while the seats supplied by Transcal are ergonomically designed to offer added comfort to passengers with more legroom than on comparable sets. There is also good lighting, and a table at each seat that is large enough to easily accommodate a laptop.

"We don't have a first class because we don't need it," Wylde says. "We want everyone to travel well, not just a handful of people. The seats are set out the same in each coach. We spent a lot of time on the design on this train with our colleagues at Hitachi and FirstGroup and user groups to make sure the design is appropriate."

Affordability is another central focus: 90% of the initial batch of tickets for the first six weeks of operation were available at a discounted rate of £19.90 if purchased through the Lumo App. Beyond this opening offer, 60% of all tickets will be available for £30 or less. The most expensive walk-up dedicated tickets will be £69 and one unreserved coach will be available for passengers.

Lumo is also seeking to improve its offer by extending the window for booking tickets to 12 months instead of 12 weeks and understanding and responding to the needs of specific passengers; Wylde says the first thing a prospective passenger is asked when purchasing a ticket online is the reason they are travelling.

This extends to onboard staff. Lumo "Ambassadors" are trained to offer a friendly and personalised service to each passenger akin to a flight attendant. Each has a tablet, which offers up-to-date journey information as well as information specific to a certain passenger such as details of pre-booked meals from reputable high-street outlets with which Lumo is



Lumo currently operates two return services a day, with this planned to increase up to five by May 2022.

partnering. Wylde says this is helpful to meet the needs of disabled and elderly passengers who need extra assistance.

"One of the reasons people don't travel at the moment is that they are worried about it," Wylde says. "We are looking at who we have got onboard today and thinking about how we can make the service as good as possible for them."

Lumo has recruited Ambassadors from inside and outside the rail industry, and is enrolling staff on an apprenticeship scheme, offering a career path.

## Challenges

The pandemic inevitably presented challenges to Lumo as it went about building the team and working towards the launch date. Wylde says the requirement to work remotely may have actually helped the operator with its digital transition and the adoption of new working processes, including online training.

Wylde says more than £15m has been spent on IT for the project and describes Lumo as a completely digital operation. Getting new backend systems to work and overlay with the industry systems was a major part of this process. And while recognising that some passengers will always want a paper ticket, the operator is pushing digital engagement by encouraging passengers to buy tickets or order food via its website or smartphone app.

FirstGroup Rail managing director, Mr Steve Montgomery, told IRJ that First is fortunate that the Lumo launch is taking place towards the backend of the

pandemic. He reports that the cost base of the "heavy set-up costs" for Lumo have not really changed that much as a result of the pandemic, and that the launch was on target.

Montgomery adds that First is looking to adopt some of the practices implemented by Lumo into the wider company. However, he stops short of confirming any planned expansion. Wylde also says the focus remains first and foremost on making a success

of the initial operation, but is hopeful that if it works, there will be a case to grow.

"People are price conscious, but people will also pay where they have a good service and that is what we see with Hull Trains [First's other ECML open-access operator], and I think that is what we will see with Lumo," Montgomery says. "We will be selling very good value for money fares, but they will also see a high level of service." **IRJ**

# RAWIE®

SINCE 1882

BARRIER  
SYSTEMS

BUFFER  
STOPS

ACCESS CONTROL  
SYSTEMS

## RAILWAY SAFETY WORLDWIDE.

A. Rawie GmbH & Co. KG

Dornierstraße 11  
49090 Osnabrück  
Germany

Fon +49 541 912070  
bufferstops@rawie.de  
www.rawie.de

# Australia's big-spending rail construction boom



Melbourne's suburban loop will allow passengers to transfer to other lines without transiting through the city centre. Photo: Shutterstock/Kummeleon

Australia is in the middle of an unprecedented rail infrastructure boom with major projects underway or planned in four of the country's six capital cities as well as a major national project. **Tony Duboudin** breaks down the projects and considers the challenges they face.

**A**FTER decades of neglect with few new rail projects undertaken and low levels of investment by government, there has been a shift over the past 12 years to implement rail and light rail schemes to address the problems of increasing road traffic congestion and sprawl in Australia's major cities. While many industry observers welcome the increase in spending there is a feeling that this is only catching up.

Dr Philip Laird, associate professor at the University of Wollongong in New South Wales (NSW), says he believes that the total spend on projects now underway, planned and proposed is in the order of \$A 100bn (\$US 74bn). While welcoming the recognition of the importance of rail, he believes that there

are still several projects that need attention.

"There is still no plan of how they are going to better connect many cities in NSW to Sydney," Laird says. "The NSW government has ordered a new fleet, which is innovative bi-mode (electric and diesel), so you have significant investment in rolling stock. However, the lack of investment in track upgrades to get higher speeds just does not add up.

"This is where I think projects can be better scoped. What we want is more projects like the Perth Mandurah urban rail project, which was well conceived, well planned, well developed and well received."

Laird says he does not believe the investment in rail is excessive and

predictions that post-pandemic demand would make some of the projects less relevant are not correct.

"Sydney's commuter system was under stress before the pandemic," Laird says. "Even if the traffic doesn't fully return to pre-pandemic levels, the investment will still be valid."

He also believes that the current infrastructure boom could last for at least a decade.

Sydney and Melbourne are the major focus of the boom with both cities building metro systems and planning to build more with eye-watering cost estimates. The cost of these major projects has soared and almost all have exceeded their original budget estimates.

The Grattan Institute, an independent think tank, says in its 2020 report *The*



*Rise of Megaprojects - Counting the Cost* that the era of mega-projects has arrived. The report points out that it is 10 years since Australia's first \$A 5bn transport infrastructure project, whereas now there are 10 such projects under construction. Before the pandemic, the value of transport infrastructure (including road) under construction for Australian governments reached \$A

The project, when completed, will cut 200km off the existing coastal route between Melbourne and Brisbane and offer transit times of less than 24 hours making it competitive with road transport.

Sydney's Metro City and Southwest metro project was costed at \$A 11bn in 2015 but by 2020 the NSW government announced that the cost had risen to \$A

The institute also questioned whether Australia's engineering construction sector has the capacity to manage so many projects on such an enormous scale. Projects worth more than a couple of hundred million dollars can only be taken on by Tier 1 contractors, of which there are just three in Australia: CPB, John Holland and Acciona.

Industry players, large and small, are calling for large and mega-projects to be split into smaller work packages, so that mid-tier firms can tender for them. But even if this happens in future, it will not change what is already underway.

There is also a skills shortage which prompted one industry figure jokingly to observe that there was not "one half-good railway engineer" in Britain who has not had a job offer from Australia.

Despite these challenges, several major rail projects are underway in Australia's largest cities.

- **Sydney:** Australia's largest city led the charge in terms of rail infrastructure by building a standalone metro system. The 36km Sydney Metro and Southwest Line between Tallawong and Chatswood opened in 2019 at a cost of \$A 8.3bn.

The second part of the line will run from Chatswood via a tunnel under Sydney harbour to Central in the city centre and then west to Bankstown with nine new stations. This is Australia's largest infrastructure project officially costed at \$A 12bn but it is tipped to end up costing double that figure.

The Western Sydney Airport metro



What we want is more projects like the Perth Mandurah urban rail project, which was well conceived, well planned, well developed and well received. Philip Laird

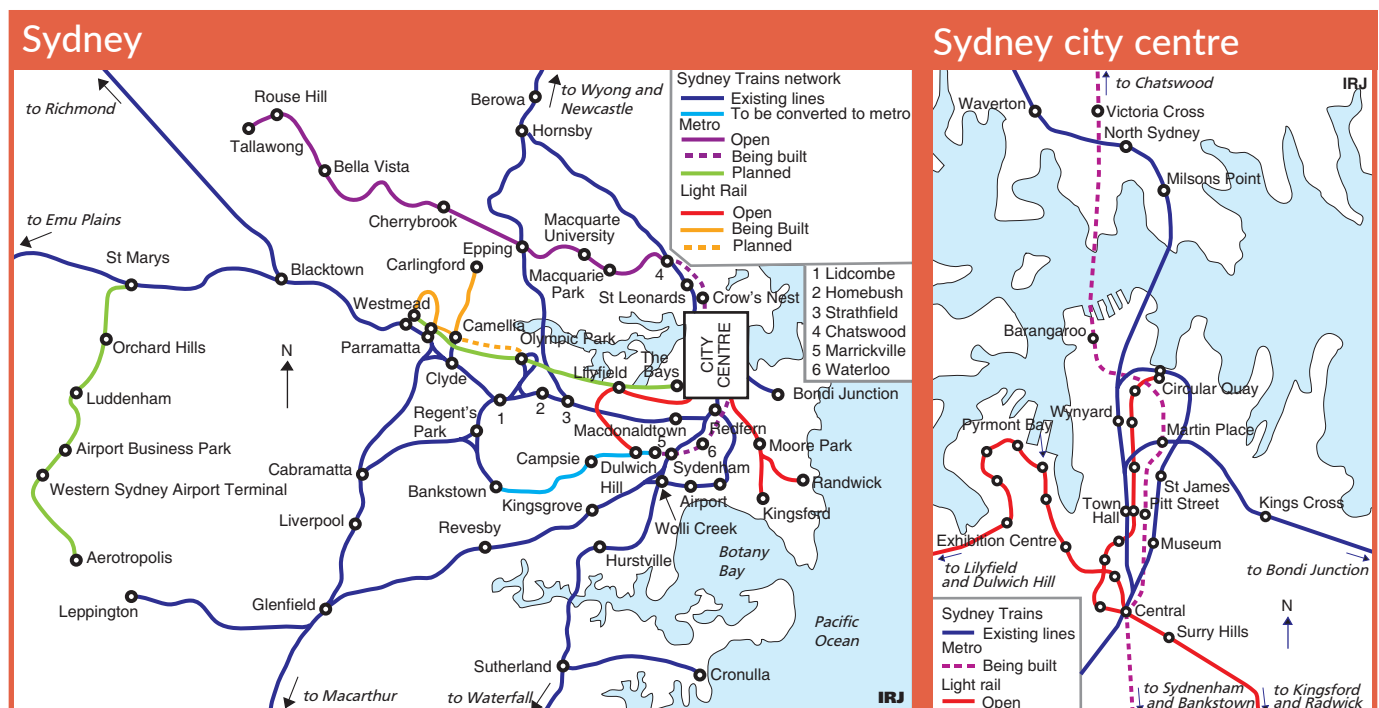
125bn for the first time, and two-thirds of that was on projects worth \$A 5bn or more. Billion-dollar projects are no longer unusual. The Grattan report points out that the 2020 Australia budget upped the transport spend to one-and-a-half times the usual level.

Australia's mega-projects have already broken records for cost overruns, so far totalling \$A 24bn on just six projects, the report says. Inland Rail was originally costed at \$A 4.4bn in 2010 but this has now grown with the federal government this year making another \$A 5.5bn available taking the total cost to more than \$A 15bn.

15.5bn, and that figure has again risen to an estimated \$A 26.6bn. Even before the mega-projects era, cost overruns were a major problem.

Over the past two decades, Australian governments spent \$A 34bn more on transport infrastructure than initially announced. Grattan Institute's analysis of all projects valued at \$A 20m or more and built over the past 20 years shows that the actual costs exceeded the forecast costs by 21%.

The institute points out that of the 10 projects worth \$A 5bn or more, seven are rail projects while the others involve roads or road tunnels.



line has been given the go ahead. The 23km line will have six stations linking the airport with western Sydney.

Sydney's 12km, 19-stop CBD and Southeast light rail line was completed in 2020 at a cost of more than \$A 3.1bn.

Another light rail project under construction is the Paramatta light rail, officially costed at \$A 2.4bn. The 12km line with 16 stops is scheduled to open in 2023. Stage 2, which will add another 10km and 10-12 stops, has not yet been costed. The NSW government is considering the business case and has committed \$A 50m to preliminary planning and development works.

- **Brisbane:** The Cross River Rail line will be 10.2km long of which 6km will be underground including a tunnel under the Brisbane River. There will be six stations of which four will be underground in the city centre. Completion is scheduled for 2024 well in time for the Olympic Games in 2032 and the increased demand this will place on public transport in the city.



The Queensland state government is funding \$A 5.4bn of the cost of the project while a private consortium is funding the remaining \$A 1.499bn cost under a contract that will deliver a financial return. However, the cost is believed to have increased to \$A 7bn, although this has not yet been confirmed by the Queensland government.

Queensland is also home to one of the country's major mining railway construction projects. The Carmichael Coal Mine rail link involves building a new, 200km 1067mm-gauge railway from the Galilee Basin in Central Queensland to link with the existing network to transport coal to the Abbot Point export terminal for shipment to India.

Bravus Mining, a subsidiary of India's Adana Group, while declining to give the exact cost of the railway, said that it had so far awarded contracts worth more than \$A 2.2bn for the railway. "Completion of the Carmichael mine and rail project is on track to export coal to market this calendar year," a Bravus spokesperson says.

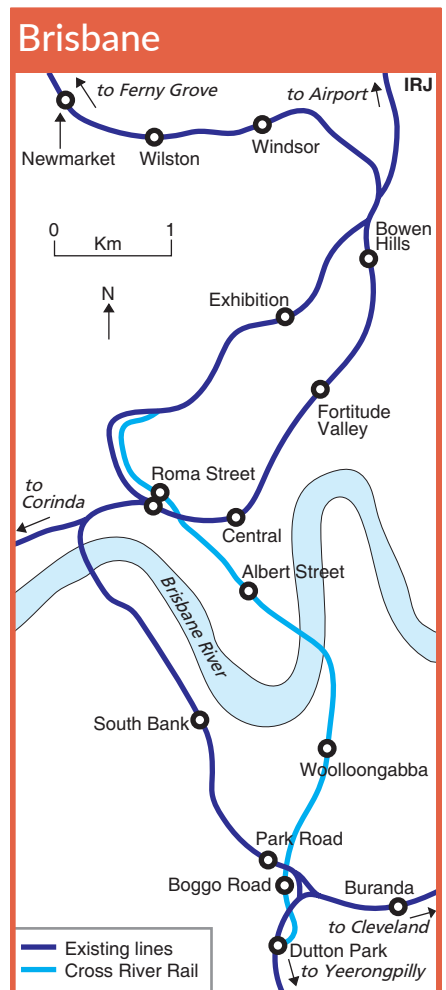
- **Gold Coast:** The city's first light rail line opened in two stages for the 2018 Commonwealth Games between Helensvale and Broadbeach and is now being extended by 6.7km to Burleigh Heads at an estimated cost of more than \$A 1.04bn. Three levels of government are providing funding and the extension is scheduled to open in 2024. Planning is now underway for a 13km Stage 4 extension to Coolangatta and Gold Coast Airport.

- **Perth:** The Western Australian city's Metronet project involves building about 72km of new line and 22 stations and making more than 8000 hectares of land around stations available for commercial development.

The major parts of stage one of Metronet comprise 21km of new line linking Morley and Ellenbrook with five stations; extending the Joondalup line by 14.5km to Yanchep; and completion of the 8km Forrestfield - Airport line, including three stations. The Melconnx Consortium was awarded a \$A 700m contract in October 2020 to build the Morley - Ellenbrook line.

Metronet will also include station upgrades across the network, a new station on the Mandurah line and level crossing removals and upgrades.

Alstom will supply and maintain 246 C-Series EMU cars that will be built at a new facility at Bellevue in the eastern suburbs of Perth, with the first train due



to be delivered in 2022.

The estimated cost of the project is currently \$A 7.9bn shared between the Western Australian and the federal government.

- **Adelaide:** The South Australian capital is electrifying the 42km Gawler suburban line at a cost of \$A 715m. The project has been delayed several times but now has a completion date of 2022. The work involves the purchase of 121 three-car EMUs, replacement of the signalling system with an Automatic Train Protection system, improved pedestrian safety at level crossings and fencing of the entire rail corridor.

- **Canberra:** The city's initial light rail line opened in 2019 and has proved so popular that work has started on a second stage: a 10.7km extension with 12 new stops to be undertaken in two stages. Stage 2A will run from the city centre to Commonwealth Park covering 1.7km while the 9km stage 2B line will connect Commonwealth Park with Woden. The cost is budgeted at \$A 265m with a completion date of early 2026.

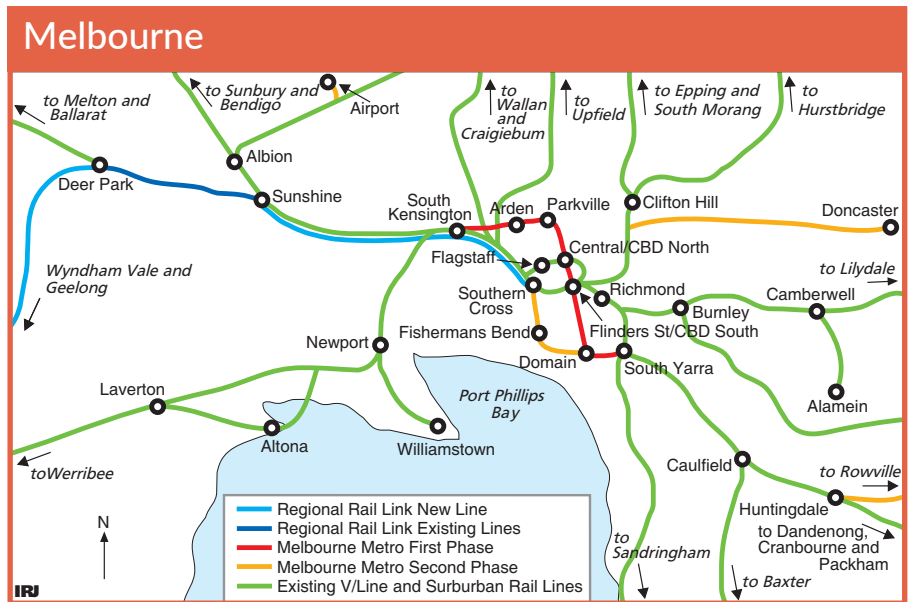
- **Melbourne:** The city's five-station metro project will cost the state of



Victoria nearly \$A 14bn with a scheduled completion date of 2025. The state is still completing the removal of the first 50 of 85 level crossings in the greater Melbourne area.

The most ambitious project in Victoria, and possibly Australia, is Melbourne's 90km suburban loop of which 25km will be underground with a price tag of \$A 50-100bn. Melbourne's suburban network currently features lines radiating from the city centre forcing passengers to travel into the centre in order to access another line. In contrast, the suburban loop is an orbital line linking suburbs between 15 and 25km from the city centre. It will have an estimated daily patronage of 400,000. The project started in 2020 with geotechnical work and has a projected completion date of 2050 with sections being completed and opened progressively.

The Victorian and federal governments have each committed \$A 5bn to build a rail link to Melbourne's international airport, although the project's final cost is not known. Work is scheduled to start in 2022. Trains will run from Melbourne Airport through to Sunshine station which will double in



size, then into the metro tunnel and through the city centre, before continuing to the Cranbourne and Pakenham lines. It will include about 2km of elevated track.

Completion of these projects come with the caveat of a skills shortage, which has been exacerbated by Covid-19 restrictions on immigration. Many of

the major schemes are now expected to struggle to meet their completion deadlines, meaning that the already high budgets are likely to be extended. Australia might be in the middle of a railway construction boom, but it appears inevitable that many of these projects will experience a few bumps along the way in the coming years. **IRI**

## LONG-TIME EXPERIENCE. SHORT-TIME TRAVEL.

Our overhead conductor rail system (OCR), like the one in the Swiss Ceneri high-speed tunnel, helps you reach your destination at a top speed of 250 km/h.

We have been getting public transport rolling for almost 100 years with our overhead contact line systems, which we develop, plan, deliver, construct and maintain – and now with our charging stations for buses and trains too. Are you looking for well-established or new individual solutions? We will support you across the board.

# Interstate rail freight booms despite challenges



Disruption to global shipping and container supply brought about by the coronavirus pandemic has created a remarkable turnaround in inter-state rail freight volumes in Australia, especially on the east-west transcontinental corridor, reports **Mark Carter**.

**J**UST over a year ago inter-state rail freight's rapidly falling market share in Australia was making national headlines, a major factor being the use of single and continuous voyage permits that allow foreign container ships to carry coastal domestic cargo in between their international voyages to and from Australia.

But changes in shipping patterns brought on by the pandemic have seen a significant, though possibly temporary, reduction in the number of ships seeking these permits with containers carried dropping by around 40%.

Ships that would call in Melbourne or Sydney and then carry on to Perth with a part load of domestic containers, now turn around and head straight back to the United States or China carrying more lucrative cargoes.

In the last year, a surge in demand for rail capacity to compensate has resulted in Australia's two main inter-state rail freight operators, Pacific National and SCT Logistics, having to increase services to keep the supply chain moving.

Pacific National alone has had to introduce three additional weekly return intermodal services between Sydney, Melbourne and Perth to keep pace with demand.

The company's chief commercial

officer, Mr Andrew Thomson, points out that the increase is also due in part to the shift from road to rail driven by pandemic related challenges brought on by strict state border crossing restrictions for inter-state trucking.

"Overall average monthly volumes across our intermodal network have risen by almost 15%, compared with pre-pandemic levels, in less than three years and we are committed to increases of 10% by March 2022 and a further 5% by September 2022.

"Pacific National will have increased its capacity for container movements on rail by more than a third, compared with pre-pandemic levels, in less than three years and we are committed to increases of 10% by March 2022 and a further 5% by September 2022.

"Overall, additional capacity will be boosted by another 25% over the next four years, representing a significant commitment of capital and resources to the growth of freight on rail."

Pacific National recently announced that it will take delivery of 50 new C44 Evolution locomotives from local supplier UGL in a deal worth \$A 297m (\$US 220m) over seven years. The first locomotives will be delivered in late 2023 and will be initially deployed on intermodal trains to support the planned capacity increases.

The issue of single and continuous coastal shipping permits was raised by

SCT Logistics in 2012 when federal government regulations surrounding these voyages were significantly relaxed. Figures provided by SCT show that in 2019 a total of 69,291 20ft equivalent containers (TEU) were moved around the Australian coastline under the permit system, a 465% increase on the 2012 figure.

The 2019 total is the equivalent of approximately five fully-loaded 1.8km-long double-stack freight trains per week on the east-west corridor.

With the disruption to global logistics chains, comparison of figures for Q1-Q3 in the 2020 and 2021 calendar years have shown a significant drop of 41% in the number of TEUs moved under the permit system.

SCT Logistics managing director, Mr Geoff Smith, says whilst his company has enjoyed greater volumes through the pandemic, operating costs and business risk have increased following the capitulation of the shipping lines.

"I feel we've used this time well to lay the foundations for our future," Smith says. "Clearly, the rail network is under capacity pressure as foreign shipping companies continue to drop domestic volumes in favour of more lucrative international markets. To the extent that rail's current volume surge is artificial, customers have indicated they may well return to foreign



shipping when capacity is available again. We are focussing our investment on existing customers and improved service levels."

Generating rail capacity is capital intensive with the larger investment often in terminal capacity. Out of a total committed investment of \$A 200m, SCT will be investing \$A 80m to expand capacity at most of its rail terminals

"Our investment programme also includes 12 new locomotives, along with new rolling stock," Smith says. "We have also invested recently in bringing our fleet maintenance and engineering facilities in-house which has brought about improvements in locomotive performance and reliability."

The question remains as to whether the Australian rail industry has the ability to capitalise on these recent gains and retain them once shipping and logistics patterns return to pre-pandemic norms?

Conflicting transport policies of both the federal and state governments also continue to be major obstacles for the industry to overcome.

Road transport continues to benefit from government largesse with heavier

and longer truck limits frequently approved without any sustainable increase in road user charges.

### Rail vs road and sea

In the last two years approval has been given for the roll-out of 105-tonne, 36.5m-long B-Quad road trains on selected routes, while elsewhere 42m, B-triple road trains, with a gross combination mass of 82.5 tonnes, have been approved for the run to Western Australia.

The New South Wales government only recently approved the use of 36.5m long road trains to operate over 1000km of the Newell Highway, which parallels the planned Inland Rail route for much of its length.

The coastal shipping policy that continues to be promoted by the federal government is also totally at odds with its own \$A 14.3bn investment in the Melbourne - Brisbane Inland Rail project.

The Rail Tram and Bus Union (RTBU) says that the federal Department for Infrastructure, Transport and Regional Development has prepared a discussion

paper that recommends even further relaxation of the rules surrounding the single and continuous voyage permit system.

"If inter-state containerised freight services along the east-west corridor and Inland Rail are undermined by unfair competition from foreign shippers, then these rail lines will wind up as stranded assets for the federal government, and Australia's domestic transport security will be outside our control," says RTBU national secretary, Mr Mark Diamond.

This viewpoint is shared by Mr Peter Smith, owner and founder of SCT Logistics, who is very concerned about the Australian government's transport policy. "We've been advising rail authorities and governments for years of the threat posed by the coastal shipping policy," Smith says. "No other country in the world allows international ships to decimate their domestic landside logistics companies. The advantage of free access on sea and avoidance of paying taxes in Australia is a policy that if it remains unchecked, could eventually push freight trains to the west out of existence." **IRJ**

### SPECIALISED FBW TEAMS OPERATING HOLLAND ENGINEERED, BUILT AND SUPPORTED EQUIPMENT

The H650 Welderhead and Puller-Lite external rail puller feature the unparalleled Intelliweld® control system.

An Intelliweld MobileWelder® offers real-time weld monitoring, automated data collection, low consumption weld capability, plus remote access to ensure a quality weld every time.

Perth, WA  
[Hollandco.com/au](http://Hollandco.com/au)



# Scaling the decarbonisation mountain, one step at a time

Decarbonisation of our railways is a complex and often daunting subject and because the pathways are largely yet untrodden, it is tempting to procrastinate. However, a failure to act promptly will make tomorrow's target even larger because a kilo of carbon saved today is a kilo we will not compound into tomorrow's target.

Historically, the railway compares favourably with the carbon intensity of other transport networks, but today other sectors are making rapid strides to improve their carbon performance and the rail sector must evolve to become the preferred transport mode of the future.

Ricardo is well known within the rail industry as experts in critical and complex railway systems. From asset optimisation to systems engineering to assurance and certification, our teams can help you, whatever your railway challenge. What is perhaps less well known amongst the rail world, is that the wider Ricardo group have specialist teams covering all possible areas of transport, energy and the environment so whether you need specialist input on advanced propulsion, batteries, hydrogen, clean air or hybrid technologies we have a team who have been working on it for years. Having a footprint in so many sectors, gives us a unique, technology-agnostic perspective which our customers can trust and use for their own competitive edge.

Our infographic (right) gives a few clear pointers to help you on your individual decarbonisation journey.

## Know where you are starting from

It is impossible to plan a long and difficult journey without knowing exactly where you starting from. How can you demonstrate improvements to your key stakeholders if you cannot quantify the impact? Everyone is starting their decarbonisation journey from a unique position; some will choose the steep climb and others may prefer a slower, more methodical route or even a slightly different end point, but for sure, each journey will have its unique set of challenges.

## Make a difference

The longer we wait, the greater the compounding carbon challenge. Quick wins and actionable change early on are vital to ensure the later route does not become too steep. Simple low-cost changes such as our DriveSmart technology which can reduce traction costs by up to 25%, is just one of the very easy quick wins which creates a carbon reduction immediately. Look at the things which will make a difference and cost the least so that you can demonstrate progress to stakeholders, inspire further change and build momentum for your longer-term ambition.

## Agree the route

On a new and difficult climb, nothing beats an expert mountaineering guide who has tackled all the difficult parts before and knows the terrain



Ricardo worked on the viability of low-carbon battery-powered trains in the Netherlands.



*Riding Sunbeams is a unique project supported by Ricardo which explores the potential for solar power as an alternative energy source for the rail sector.*

Photo: Andy Aitchison / 1010 Climate Action

intimately. Our Ricardo experts keep their route knowledge current so that you can avoid pitfalls and technology dead-ends.

Net zero involves accounting for your supply chain. Electrifying a new line or purchasing a new locomotive involves steel and concrete, all with their own carbon footprints. Counter-intuitively, in some cases, it may actually be more environmentally friendly to do nothing rather than replace something non-ideal with a better version with a large production footprint when a more viable/lower impact solution may be available a few years down the timeline. It is about fully accounting for the carbon impact and making the best possible decision, dependent on your end goal.

## Agree your end goals

Decarbonisation destinations are individual to our clients and the environments they operate within. Getting to net zero by 2040 or 2050 are different goals and will have a different set of intermediate steps. In the short term, improving air quality in inner cities may be a more important driver than decarbonisation which, for example, might lead to the decision that hybrid technology might be the most suitable choice in the short term. People may have different summits in mind and that is also OK.

## Constant Evolution

The only certain thing about the future is that it is uncertain. As technologies are invented and evolve, as government policies shift and the social environment around us alters, our Ricardo teams always keep a weather-eye on the horizon. Whilst we cannot fully control all aspects of the environment, we are already at the table, shaping the environmental policy of the future. For example, at the recent COP 26 climate conference, Ricardo supported 17 countries in development of their legally binding climate commitments.

Climbing a mountain is challenging and the best guide in the world can't remove these challenges, but we can help to navigate this path with you, avoiding the worst of the obstacles and finding the most effective route to the top. Harry Ricardo, our founder, born in 1885, set out "to maximise efficiency and eliminate waste". We have been doing this ever since to provide railways and a planet that are truly fit for the future.

To speak to one of our experts please email [ricardorail@ricardo.com](mailto:ricardorail@ricardo.com)



# Getting to Net Zero with Ricardo

Working at the intersection of transport, energy and environmental agendas for more than 100 years.

**2021**

## Know where you are **starting from**

Ricardo have supported and guided corporations, governments and industry bodies in developing validated carbon baselines for decades.

## Agree a **roadmap**

Developing strategy in an uncertain world without knowing future policy and legislation is difficult but we can help you to eliminate the risk with a range of expertise and tools.

**2050**

## Agree your **end goals**

- Are your objectives carbon net-zero or wider sustainability?
  - Are you looking at your company in isolation or across the entire supply chain?
- Different objectives will lead to different choices.

## Make a difference

Start with the quick wins to drive the biggest impact immediately. For example advanced energy optimisation tools can reduce energy consumption with minimal technical intervention.

## Navigate the options while looking to the future

Batteries or hydrogen?  
Alternative fuels? On-board or off-board energy storage?  
Transition now or wait for the technology to mature?  
The choices are never black and white and decisions today may be seen in a different light tomorrow.

## Constant evolution

This is not a story written once and fixed for time, rather it is an evolutionary journey. With our unique combination of rail expertise, environmental science and ability to create technical solutions, we have the experience to guide you safely along this path.



Size of pie slice = '000 tonnes carbon dioxide emitted



Reduce Carbon  
Content Fuels



Reduce Energy  
Demand



Sustainable  
Propulsion



Energy  
Efficiency

For a discussion on the sustainability in the rail sector email [info@ricardo.com](mailto:info@ricardo.com) or call +44 (0)1273 455611 or visit [rail.ricardo.com/net-zero](http://rail.ricardo.com/net-zero)



# DB and Siemens demonstrate automated S-Bahn



Two class 474 S-Bahn trains arrived at Hamburg Dammtor. These carried passengers to Bergedorf using ATO over ETCS Level 2 at Grade of Automation 2 for part of the journey.

DB and Siemens Mobility hosted the world premiere operation of an S-Bahn train using ATO over ETCS on October 11. **Richard Clinnick** reports from Hamburg, Germany.

**P**ASSENGERS walking up the stairs to the platforms at Hamburg Dammtor mid-morning on October 11 could have been forgiven for being confused by the destination “Weltpremiere” (world premiere) showing on the information screen.

But that is indeed what was due at platform 2 at around 11.00 that morning. The procession of German Rail (DB) S-Bahn trains was interrupted by a pair of white class 474 EMUs that were about to make history. The six-car train was being used by DB and Siemens Mobility to demonstrate the first S-Bahn to operate autonomously by using ATO over ETCS Level 2 at Grade of Automation 2 (GoA 2).

DB and Siemens invited guests to travel on the train between Hamburg Dammtor and Bergedorf. During this journey, the train demonstrated both highly-automated and fully-automated operation on the 23km section of Line

S2/S21 from Berliner Tor to Aumühle. Before it reached Bergedorf (the final station on the route), the train transitioned from manual operation to highly-automated operation with ATO between Berliner Tor and Rothenburgsort. This was achieved simply by the driver pressing the ATO button in the cab.

This demonstration was part of a project to deliver the world’s first standalone 5G system for automatic train operation in Hamburg as part of DB’s highly automated S-Bahn operation project.

An agreement to develop a fully automated S-Bahn line by 2021 was signed by DB, Siemens and the city of Hamburg on June 12 2018. DB board member for infrastructure, Mr Ronald Pofalla, called the agreement a “milestone” and that “it marked the launch of the biggest technological change in years.

“This project will be an important reference for designing and developing the intelligent and climate friendly rail networks that we need, especially in large cities,” he said at the time of the contract award.

DB followed this announcement by selecting Nokia in December 2019 to test and implement what the telecommunications company says is the world’s first 5G network for a mainline rail automation project. The 5G system has been developed using 3GPP standards.

The need to improve the digital aspect of railway operation is driven by asset-intensive industries such as railways increasingly looking at opportunities created by mobile broadband as a way to enable digital transformation. This has pushed the International Union of Railways (UIC) to actively develop the 5G-based Future Railway Mobile Communication System



(FRMCS) to replace GSM-R, which is based on 2G technology, by the mid-2030s when GSM-R will be obsolete.

Introducing this technology on the S-Bahn network in Hamburg enables up to 30% more trains to operate on the existing tracks, says Mr Jan Schröder, DB project leader. He also claims these trains will operate in a more punctual and even more energy efficient way.

When the initial contract was awarded, 750,000 passengers per day were using the Hamburg S-Bahn system. Currently there are around 1.84 million people living in Hamburg and this is expected to reach 2 million by 2040.

### Automatic operation

ATO calculates an optimal speed, controls the train's drive system and brakes based on the current timetable situation and lineside data. The vehicle receives the distances it is allowed to drive and its permissible speeds via radio signals and makes sure these are maintained. Data is exchanged between the train and block control centre via a radio link. Under GoA 2 the driver remains on board to monitor operation



The destination screen greeting passengers as they walked onto the platform at Hamburg Dammtor on October 11.

and will only intervene should there be a disturbance in the operation. At the same time, ETCS monitors train movements and speed limits thus allowing trains to operate safely at shorter headways and making optimum use of track capacity.

The initial aim of the trial is to demonstrate driverless shunting of

trains at Bergedorf station, which is conducted based on the transmission of train control information over the 5G network. The operation involves trains leaving one platform and running back into another covering a distance of 1000m. This process takes place at GoA 4, meaning there is no driver onboard the train.



**Proudly offering a complete line of  
New and UX Power Assemblies  
and Related Components**

- Machined and Assembled in USA
- Raw materials meet or exceed current OEM Specifications
- Proven Field Approvals with multiple OEM Builders, Class I, Regionals, Short Lines and Internationally
- Water jackets are thoroughly inspected via bore scope to ensure no debris or casting sand remains
- Over 39 checkpoints are measured and documented to ensure quality conformance
- State of the art casting techniques reduce porosity and maintain adequate coolant flow
- EPA emission compliant equivalents available



**WWW.ePowerRail.Com™**

## Worldwide Supplier of AAR Quality Power Assemblies and Components



The 23km section used for the demonstration was modified in three sections. First, the existing electronic interlocking in Bergedorf was equipped with technology from Siemens Mobility for deployment over ETCS. This protects the track. Secondly the ETCS trackside equipment comprises technology that has been integrated with the track bed and an ETCS block control centre located in the Bergedorf interlocking building which monitors the trains. Finally, for the automated driving functions, another computer is located in Bergedorf that transmits the timetable and line data to the trains.

During the demonstration journey, when the train arrived at Mittlerer Landweg station, the automatic opening and closing of the train doors was demonstrated. The ATO system opens the doors automatically after ETCS indicates that the train has stopped safely in the correct area. ATO also closes the doors before the train restarts its journey.

### Service disruptions

On-board the train, Schröder explained that the additional capacity results in greater reliability because disturbances can be better compensated for. He said delays can be returned to punctual operation much more quickly, albeit with limitations. If there is a problem, then the impact is not as damaging as it might be currently because the technology is able to get the service up and running again quickly using the data from the planned timetable.

Mr Boris Dickgiesser, Siemens Mobility project lead - digital S-Bahn, pointed out that what makes the

Hamburg trial different is that it is an open system instead of an island solution.

Dickgiesser explained that the technology fitted to the class 474 EMU is based on the latest European standards. He also said that through the introduction of this technology trains will be able to learn to optimise their own operation.

Ahead of the train performing its shunt at Bergedorf, Siemens Mobility CEO, Mr Michael Peter, told IRJ that the next step was to secure additional orders. He said the train was chosen deliberately because it was not built by Siemens but Alstom (formerly

approval was received from the German Federal Railway Authority (EBA).

Further deployment will take place from 2025 when Alstom is scheduled to begin delivery of a fleet of 64 class 490 S-Bahn trains equipped with ETCS Baseline Release 2 and ATO at GoA 2 under a contract signed in September. This will be the first time that ATO has been installed in new S-Bahn vehicles.

Beyond Hamburg, DB's goal is to equip its entire network with the technology. Other S-Bahn networks in Stuttgart and Cologne are set to follow, while Siemens Mobility hopes to sell it across the globe. "Our plan is to go to



**Our plan is to go to every country where we have the requirements for such a solution to optimise the railway networks. This is a solution which is available for the whole benefit of mainline railway traffic.**

Boris Dickgiesser

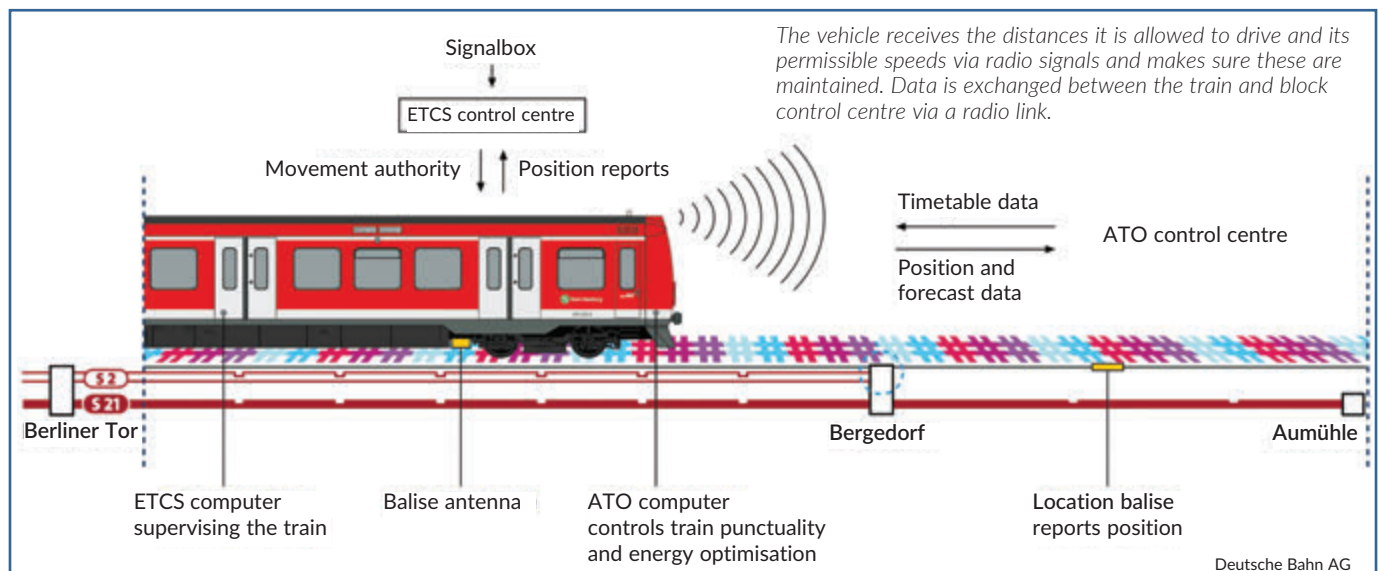
Bombardier), demonstrating the technology's compatibility in all operating scenarios - the set in question is 15 years old.

The ATO equipment is housed beneath the vehicle to optimise space. This design also facilitates straightforward retro-fitting and means there is no need to reduce capacity on-board the train. Schröder says the technology can be deployed on ICE high-speed trains and any urban train, independent of type and line conditions.

Four trains equipped with ATO over ETCS are set to begin operating in passenger service this month after

every country where we have the requirements for such a solution to optimise the railway networks," Dickgiesser says. "This is a solution which is available for the whole benefit of mainline railway traffic."

At a time when the rail industry is clamouring for more capacity, while trying to meet its decarbonisation targets and having to contend with tightening budgets following the Covid-19 pandemic, this solution being trialled in Hamburg could yet help revolutionise rail travel. The international rail community will certainly be watching with interest. **IRJ**





# Managing network-wide RCF

Severe rolling contact fatigue was identified across the Auckland Metro Rail Network in 2019, necessitating the implementation of a temporary speed restriction the following year. **David Burroughs** analyses the report commissioned to determine the causes of the track issues and its recommendations for how it can be avoided in future.

**T**HE identification of rolling contact fatigue (RCF) across the Auckland Metro Rail Network (AMRN) in 2019 prompted the implementation of a blanket 40km/h temporary speed restriction in 2020 and the establishment of a working group to determine the cause of the issue and to make recommendations of how this could be avoided.

The group found it was a combination of the sub-optimal condition of the infrastructure and the introduction of new EMUs across the network, which contributed to the propagation of RCF.

RCF is the damage created in rails and wheels due to high contact stresses. In the rail, this damage usually appears first on the surface with cracks forming in the direction of travel. If untreated, the cracks then dip downwards as they propagate, eventually creating a risk of sudden failure, although they can be removed through grinding before they reach this stage.

The requirement to bring the AMRN infrastructure up to standard was identified in 2014, when Auckland Transport (AT), which is granted rights to the network by

national railway KiwiRail (KR), engaged Network Rail Consulting to evaluate the overall state of the infrastructure. The study was commissioned prior to the introduction of AM class EMUs delivered by CAF, which are operated by Transdev Auckland under a concession from AT. A small number of DMUs operate on the 19km non-electrified section of the passenger network between Papakura and Pukekohe, although these are due to be phased out from September 2022 and replaced with buses until the second half of 2024 while the line is electrified.

The 2014 evaluation concluded that an investment of \$NZ 100m (\$US 71.1m) was required in the AMRN's track assets to ensure they were fit for purpose ahead of the introduction of the EMUs. While there was significant investment in installing additional track, including track doubling and branch lines, stations, signalling, overhead lines, and the rolling stock, there had been no investment to

upgrade the existing track and civil infrastructure.

However, the investment was not approved by the government and AT and KR instead decided to rely on increased inspections and speed restrictions for safety while accepting that the infrastructure would provide lower levels of service.

In March 2019 AT engaged consultants WSP to review the AMRN infrastructure prior to planned increases in services following the opening of the City Rail Link (CRL) in 2024. WSP concluded that following a 250% increase in rail patronage between 2010 and 2019, "the existing network infrastructure maintenance programmes, particularly those for track and civil assets, are struggling to support the level of traffic growth that has occurred on the network in recent years and are unlikely to be able to support forecast traffic growth."

The WSP report concluded that the AMRN was not fit for purpose to deliver the planned increases in service and patronage, and noted



*New CAF EMUs, operating on track that was not fit for purpose, combined to exacerbate the rolling contact fatigue issue on the Auckland network. Photo: Shutterstock/Emagnetic*



KiwiRail has replaced 130km of rail across the network, and is now working through the progressive remediation and replacement of turnouts, sleepers, ballast and drainage across the network. Photo: Shutterstock/Philip Armitage

emerging RCF and the accelerated spread of rail internal defects.

The rapid propagation of both early stage RCF and late-stage internal rail defects, initiated by RCF, in a significant percentage of the rails in the Auckland network necessitated the imposition of a network-wide 40km/h speed restriction on August 17 2020 while urgent rail replacement was undertaken. The accelerated growth of RCF and internal defects was found on all metro routes in Auckland, including:

- those that predominantly carry EMUs
- those with a mix of EMUs and freight trains, and
- on the DMU operated Papakura - Pukekohe section.

The findings indicate that a significant underlying cause was most likely aged track on historic formation, which had high accumulated million gross tonne (MGT) passing with insufficient levels of maintenance, including grinding, and insufficient renewals. However, the presence of unusual wear on relatively new track in areas where only EMUs operate, as well as comparisons with the Wellington network which has a low occurrence of RCF despite similar track conditions and low levels of rail grinding, and New Zealand's freight routes which also have low occurrences of RCF, also pointed to the likelihood of a vehicle-track interaction that is unique to Auckland's EMUs.

A RCF working group was established in August 2020 to identify the root cause of the problems. The working group was led by Mr Ted

Calvert, an independent coordinator with experience in managing multidisciplinary rail designs and projects, and included experts from KR, AT, CAF and Transdev. This was overseen by an oversight group including AT chief engineer, Mr Murray Burt, KR chief engineer, Mr John Skilton, KR executive general manager - rolling stock asset services, Mr Adam Williams, and CAF New Zealand general manager, Mr Israel Gomez.

In the *Auckland RCF Working Group Root Cause Assessment Report* released on August 16, the group said relying on inspect and manage "for a longer period than appears to be prudent" had necessitated the 40km/h speed limit and urgent rail replacement works.

Ultimately, there was no single outlier cause of the high propagation of RCF across the AMRN, but rather a widespread set of localised causes which stemmed from track that was not "fit for purpose" prior to the commencement of a more frequent, more demanding modern EMU operation.

The key track-related causes were identified as historic under-investment in the track asset between 2014 and September 2020, as well as insufficient rail grinding from 2015 to 2020. There were also multiple sites where the track condition was sub-optimal in engineering factors known to accelerate the growth of RCF, including:

- track geometry and gauge exceedances including at welds and bolted joints
- aged timber sleepers unable to hold rail in place adequately

- historic wheel burns/squats causing sudden dynamic loads
- sub-optimal application of cant, mainly from uncorrected past practices, and
- significant sections of the network with low track modulus (low combined stiffness of rail, sleeper, ballast, and formation), at times aggravated by poor drainage.

Auckland's wet climate was also likely a partial contributor to the accelerated growth.

"The closest single root cause could therefore be stated as a missed opportunity between 2014 and 2017 to implement the recommendations of the 2014 Network Rail Consulting report," the report says.

The group found the EMUs operating on the network also contributed to the high incidences of RCF.

The AM class EMUs were designed with a high primary yaw stiffness to improve passenger ride comfort, which coincidentally increases a vehicle's propensity to cause RCF. The modelling commissioned when these were purchased did not fully assess the "RCF damage index" relating to this class of vehicle.

The wheel profile on the AM EMUs was also modified from KiwiRail's standard profile, which is classified as TRA-1. Modelling shows that changing the AM unit wheel profile to TRA-1 would have reduced the vehicle's propensity to cause rail RCF. However, the report says TRA-1 is unlikely to be the optimal profile and a change to TRA-1 would come at the expense of flange wear and rail side wear,



requiring the use of existing on-board lubricators or trackside lubrication to mitigate this phenomenon. Modelling showed that in terms of RCF generation, the TRA-1 profile on the intermediate rail profile is preferred to the current AM class EMU wheel profile, but it is unlikely to be the optimal combination.

### Recommendations

The report released by the working group outlines eight recommendations.

The group says that from a safety and TCO perspective it is unwise and unsafe to manage RCF and its consequential internal defects through monitoring and just-in-time removal. Instead it recommends that the strategy for RCF management in the AMRN be altered from management of internal defects to prevention. This is best achieved through planned RCF grinding at sufficient frequency to remove defects at their planer stage before they reach the downward stage.

“ There was no single outlier cause of the high propagation of RCF, but rather a widespread set of localised causes which stemmed from track that was not “fit for purpose” prior to the commencement of a more frequent, more demanding modern EMU operation.

The report also recommended that by December 2021, the entire AMRN should be free of internal rail defects, all emerging RCF should have been removed, and the intermediate profile should have been established on all wheel-rail interface (WRI) surfaces.

A KR spokesperson told IRJ that KR and AT are making good progress in addressing the recommendations in the report, including securing the funding needed to address the historic under investment which led to the poor track condition across the wider network.

As part of the Rail Network Growth Impact Management (RNGIM) project, KR replaced 130km of rail in seven months, and is now working through the progressive remediation and replacement of turnouts, sleepers, ballast and drainage across the network.

A minimum rail grinding capability should be established in New Zealand, which needs to include:

- remedial grinding
- full network preventative grinding

with all rail, including new rail, to be ground to an agreed uniform profile

- grinding an artificial 1:20 rail inclination on all existing track structures in the AMRN
- any new track structure proposed be purchased with a factory applied 1:20 inclination head profile or site ground after installation
- a peer review of the AMRN grinding programme before completion, and
- a review of the process of specifying, planning and delivery of grinding which appears to be somewhat fragmented between the National Grinding Programme team, professional head of track, the Network Services Team, and the Auckland Metro Recover (AMR) and Rail Network Growth Impact Management (RNGIM) projects.

The fourth recommendation is that the AMRN grinding programme should be managed to a formal plan that at a minimum should include:

- the experience gained during the current National Grinding Programme
- a philosophy for grinding, noting that

the AMRN is heavily dominated by one vehicle type and one-wheel profile

- documenting and justifying the approach to be taken for identifying timing for grinding, with a mix of visual inspection, internal rail flaw detection, and accumulated MGT since last grinding
- the approach to grinding newly installed rail
- procurement of grinding equipment
- a 30-year grinding programme with a budget prorated on the 2020-23 contract
- a lubrication philosophy and plan
- assumed wheel profiles coming onto the network, including existing freight vehicles and future freight or passenger vehicles
- wayside inspection systems to ensure wheel profile compliance, noting that the EMU trains are in the depot often enough to achieve profile management without trackside systems
- vehicle mounted rail profile measuring systems to ensure rail profile compliance, and

Keep your rails  
perfectly maintained  
with  
**LINSINGER.**  
The only customer  
approved  
high performance  
rail milling  
technology.

Trust the Inventor  
[www.linsinger.com](http://www.linsinger.com)



Linsinger Maschinenbau GmbH  
Dr. Linsinger Straße 23-24  
4662 Steyrermühl  
Austria

Tel: +43 7613 8840  
E-Mail: [office@linsinger.com](mailto:office@linsinger.com)



## Track | rolling contact fatigue

- emerging technologies such as vision systems for inspection of early stages of RCF.

In order to reposition the AMRN to reduce RCF, the report recommends removing the key localised track contributors to accelerated RCF in the AMRN, including:

- the removal of all situations that can lead to rail roll, including the removal of aged timber sleepers
- the removal of all causes of sudden vertical or lateral dynamic forces, including out of specification welds, historic wheel burns and squats
- remedial work to remove areas of low track modulus
- removal of all areas of tight gauge, noting this will probably occur as part of the replacement of aged timber sleepers as the tight gauge is a legacy of historic track design on straights
- correction of all areas of suboptimal cant
- progressive removal of bolted joints, and
- identification and removal of the reasons that have created a culture of reactive maintenance practices that allow out-of-code situations in track geometry and gauge exceedances, with these often caused by under-funding, limited windows for inspection and maintenance, and training issues.

The report also recommends that the AMRN infrastructure asset is managed to a formal asset management plan (AMP), which should sit alongside the AMP for transport assets owned by AT. This will enable the exchange of knowledge and transparency of asset management and performance between KR and AT.

Recommendation seven is optimisation of the AM class vehicle wheel and the AMRN rail profile along the lines of recommendations of an inter-stakeholder technical WRI group. These profiles might be unique to AMRN. The group will also agree wear limits. Finally, the report recommends that the AM class vehicles be progressively modified to reduce their primary yaw stiffness, balanced against ride quality for customers.

### Remedial work

KR says the recommendations have been taken onboard, and it has already begun to implement the changes required to address the issues raised in the report.

“How KiwiRail undertakes its inspection and maintenance regime is under constant review as and when

new technology becomes available and this will continue,” the KR spokesperson says. “In the case of RCF, KR in conjunction with the regulator and other stakeholders, will continue to develop and fine tune its response to the identified root and contributing causes.

“KiwiRail and AT are also developing a long-term, 30-year asset management plan for the Auckland metro network, to ensure the situation that led to RCF is not repeated. A wheel-rail interface technical group continues to establish the best methods to optimise the interaction between the EMU wheels and the track.”

A rail grinding programme is underway in Auckland to mitigate the potential of RCF reoccurring on the replaced assets, and to remediate turnouts. This has been in operation since 2018 and will continue until well into 2024.

To ensure it has the required rail grinding capacity, KR is currently leasing two Speno hi-rail rail grinders, one of which has been solely operating on the Auckland network for the past 14 months. A procurement process is also underway to lease a mainline grinder. **IRJ**



**ZTR is committed to clean technology.**

Through our core systems and telematics technology, we're helping to reduce idling, lower emissions, improve efficiencies and increase utilization rates.

**Because we believe in engineering a sustainable future for everyone.**

railwayinfo@ztr.com • 1-519-452-1233 • ztr.com





# Maintaining metro track through milling



Barcelona Metropolitan Transport is detecting more wear and damage to rails and other track components as it increases train frequencies to meet growing demand. Photo: Shutterstock/BearFotos

Voestalpine and PJ Messtechnik have developed a new concept of rail maintenance in plain track and turnouts which uses a combination of rail milling and monitoring. The process is explained by **Hubert Oberhuber** and **Dr Johannes Neuhold** with Voestalpine, **Jordi Orta Roca** with Barcelona Metropolitan Transport (TMB), and **Dr Daniel Brandl** and **Benedikt Schönhuber** with PJ Messtechnik\*.

**V**OESTALPINE Railway Systems and its Austrian partner PJ Messtechnik have developed a unique method of rail maintenance specifically for metros comprising smart rail monitoring and subsequent milling of rails in plain track and turnouts. This holistic concept is being applied for the first time on the Barcelona metro operated by Barcelona Metropolitan Transport (TMB).

Metro networks are being subjected to increasing train frequencies leading to ever shorter time slots for maintenance. Metro services usually start at around 05.00 and finish approximately at midnight, but some cities are already running 24/7 operations, particularly at weekends. For track inspection and maintenance teams, this means important track work needs to be carried out within very tight timeframes. The main drivers for rail maintenance in metros are operational damage such as rail wear, corrugations and rolling contact fatigue defects (head checks) as well as system-caused defects such as squats.

The total service life of rails as well as maintenance demand throughout the entire lifecycle is mainly determined by the initial quality and the chosen maintenance strategy. A high initial quality is the basis for a long service life and can be achieved by considering heat treated premium or super premium rails in critical track segments,

such as curves and stations. Rail maintenance is at least as important as the initial rail quality in order to achieve a satisfactory rail service life.

Due to its long history - the first line opened in 1924 - and the high service quality, the Barcelona metro is a best-practice reference for metros on the Iberian Peninsula as well as in Latin

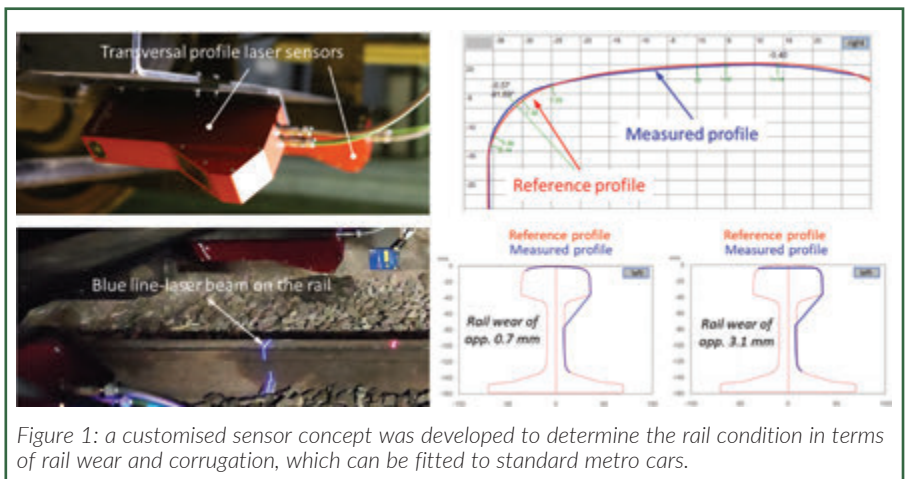


Figure 1: a customised sensor concept was developed to determine the rail condition in terms of rail wear and corrugation, which can be fitted to standard metro cars.

America. Currently, the network comprises eight lines, mainly in tunnels. The lines reflect the development of metro designs throughout the past century - from the 1668mm-gauge Line 1 to the tight tunnels on Line 5 and the fully automatic operation on lines 9 and 10. The metro is electrified using overhead catenary rather than third rail to ease track maintenance and the exchange of superstructure components. Particular challenges for TMB are the different and changing soil conditions, subsoil waters, and the steady requests and guidelines made by different district administrations. Additionally, local residents complain about noise and vibrations in their homes.

Due to increasing passenger demand, TMB needs to steadily increase train frequencies, leading to more wear and damage to rails and other track components. The Covid-19 pandemic has increased pressure on TMB as it is required to comply with social distancing rules for passengers and consequently is running more trains.

As traditional rail maintenance procedures including rail grinding could no longer meet these increasing challenges, TMB decided to look for new technologies. The main objective was to re-profile the rails as poor rail-wheel-contact geometry not only results in temporary speed restrictions but also increases wheel wear. TMB also wanted to eliminate corrugations, which are a major driver of vibrations and noise. Therefore, TMB decided to tender rail treatment services for 50km of track, several turnouts and additional track measurement campaigns in order to analyse the rail conditions before and after the intervention.

To determine the rail condition in

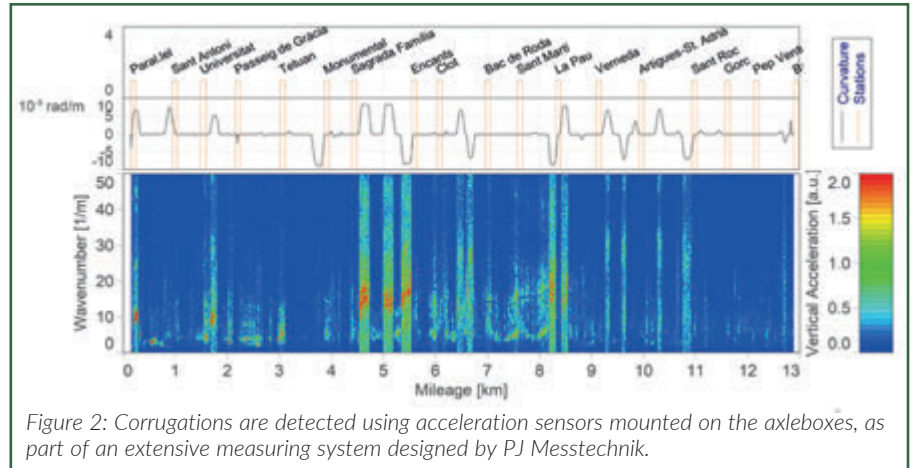


Figure 2: Corrugations are detected using acceleration sensors mounted on the axleboxes, as part of an extensive measuring system designed by PJ Messtechnik.

terms of rail wear and corrugation, a customised sensor concept was developed that can easily be fitted to standard metro cars.

For this task, a sophisticated line-laser measurement system is used, which can be installed easily beneath a TMB maintenance vehicle (Figure 1). This system allows the transversal rail profile to be analysed according to the European Standard EN 13231-3 as well as the track gauge with a resolution of 25cm or more. The transversal profile as well as the track gauge must be within a certain limit to ensure proper contact between wheel and rail. The upper diagram on the right in Figure 1 illustrates an example of the comparison between the measured (blue) and nominal (red) rail profile. Vertical rail wear can be derived from the measurement data which is important when deciding whether a worn-out rail should be re-profiled or replaced. The two bottom diagrams in Figure 1 provide an example of the vertical rail wear determination.

Corrugation plays a significant role in

ride quality and the length of rail and vehicle life. Corrugations are detected using acceleration sensors mounted on the axleboxes, as part of an extensive measuring system designed by PJ Messtechnik. Corrugations lead to measurable vibrations on the vehicle, and this type of detection is highly efficient due to a high measuring rate combined with a conveniently small amount of data. A Campbell diagram of the accelerations illustrates the results. An example of this for an entire line is shown in Figure 2. The localisation of the measuring data is mainly achieved by using signals from hall effect sensors combined with a pole wheel.

Short pitch corrugations typically occur between 25mm and 80mm, with an amplitude of up to 100µm. Segments with strong vibrations and possible occurrence of corrugation are indicated in red. On the analysed line in Figure 2, this becomes particularly clear in the curves between Kilometer 4 and 6.

The PJ Messtechnik measurement concept installed on a maintenance vehicle together with the rail profile measurement system contains many more sensors, for example to determine track twist or superelevation, which can be used for future applications.

### Measuring strategy

At Barcelona metro, the measuring concept is applied twice network-wide. One measuring run is performed prior to rail milling in order to determine areas where maintenance should be executed and to deliver information for an optimal execution of the task itself. The second measuring run is performed after milling to control its effectiveness.

Due to the special conditions in metros, tailor-made approaches for rail maintenance are required. To meet these demands, rail milling provides an optimal solution. In contrast with



The MG11 machine can be fitted with special module to allow it to mill turnouts.



conventional rail grinding, the milling process introduces a much lower amount of energy into the rail itself and the rail heats up only to a small extent, thereby avoiding material transformation in the rail surface. In addition, milling does not produce either dust or sparks thereby reducing the fire hazard to a minimum which is especially relevant in metro tunnels.

Voestalpine Railway Systems is using its MG11 rail milling machine, built by Linsinger, in Barcelona. This machine is well suited for use in metros due to its compact design that enables it to fit into even the smallest profile tunnels. It is possible to remove between 0.3mm and 1mm of rail material per pass and to reach a track milling speed of up to 600m/h. The waste product of the milling process are chips that are collected and stored on the machine for subsequent recycling.

The machine can be transported to the customer by truck or inside a 40ft container. The MG11 can be self-propelled on the metro network at speeds up to 50km/h. The track gauge is adjustable and can be varied between 1000mm and 1668mm. The MG11 includes a cross play limitation which also makes it possible to mill in superelevated tracks. Additionally, a special module allows rail milling in turnouts (see photo opposite).

During deployment in Barcelona, milling was executed on around 50km of track and several turnouts. The effectiveness of the milling is shown by an example of transversal (Figure 3) and longitudinal rail profile (Figure 4) before and after milling.

As the diagrams illustrate, milling achieves a nearly complete removal of rail defects in the transversal and longitudinal directions and establishes a “like new” rail condition. This creation of a precisely defined rail condition



Figure 3: transversal rail profile before and after milling.

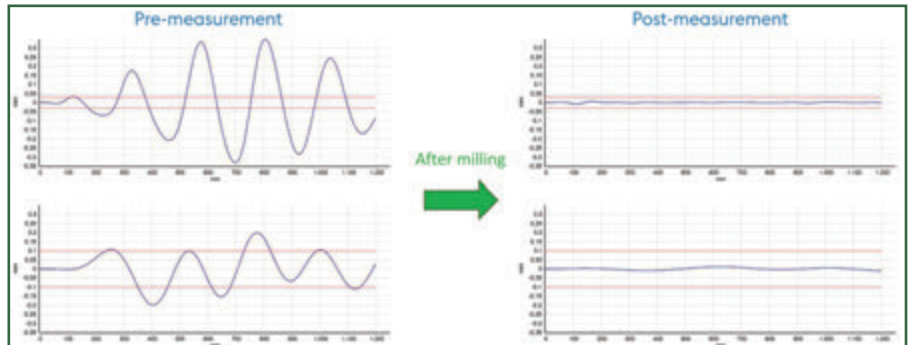


Figure 4: longitudinal rail profile before and after milling.

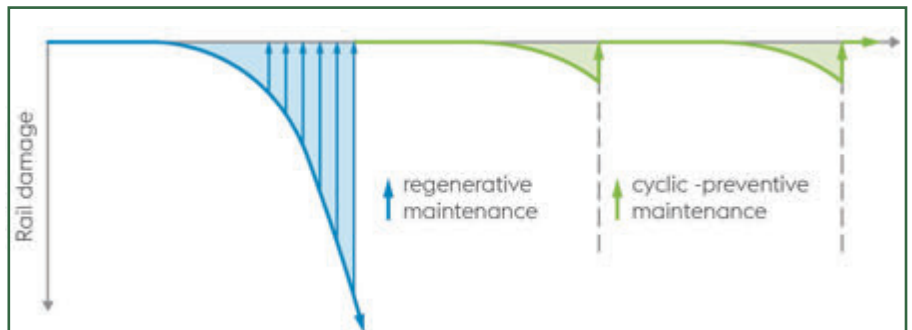


Figure 5: failure-free rail is the basis for a successful application of a cyclic-preventive maintenance regime, which retains an accurate rail condition for as long as possible to maximise rail service life.

regardless of the initial state is called regenerative maintenance. This is quite different from the classic approach of corrective maintenance, where the initial rail quality plays an elementary role and, in most cases, residual rail damage remains. A failure-free rail is

also the basis for a successful application of a cyclic-preventive maintenance regime. This approach retains an accurate rail condition for as long as possible to maximise rail service life (Figure 5) and can also be applied optimally with the milling technology.

This measuring concept makes it possible to determine the rail condition of the entire network in a short time and with manageable effort. The results form an optimal basis for rail maintenance planning and checking the effectiveness of maintenance actions. **IRJ**

**About the authors:** Hubert Oberhuber is project manager, rail milling, with Voestalpine Track Solutions, Germany; Dr Johannes Neuhold is solution consultant with Voestalpine Railway Systems, Austria; Jordi Orta Roca is with TMB's track projects unit, and Dr Daniel Brandl and Benedikt Schönhuber work in PJ Messtechnik's measurements and data analysis unit in Graz, Austria.



The milling is completed with a MG11 rail milling machine.

## Rendezvous

### February 2022

6-8—Dubai, UAE  
UITP MENA Transport Congress & Exhibition  
▶ UITP, Brussels, Belgium.  
[www.menatransport.org/website/3387](http://www.menatransport.org/website/3387)

15-17—Berlin, Germany  
11th International Railway Summit  
▶ IRITS, London, Britain.  
[www.irts.org](http://www.irts.org)

28-Mar 2—Brisbane, Australia  
AusRAIL Plus  
▶ Informa, Sydney, Australia.  
[www.ausrail.com](http://www.ausrail.com)

### March 2022

8-10—Karlsruhe, Germany  
IT-TRANS Conference & Exhibition  
▶ UITP, Brussels, Belgium.  
[www.it-trans.org/en](http://www.it-trans.org/en)

8-10—Utrecht, Netherlands  
Railtech Europe Conference & Exhibition  
▶ ProMedia, Rotterdam, Netherlands.  
[www.railtechlive.com](http://www.railtechlive.com)

17-19—Jakarta, Indonesia  
Railway Tech Indonesia  
▶ GEM, Jakarta, Indonesia.  
[www.railwaytech-indonesia.com](http://www.railwaytech-indonesia.com)

### May 2022

17-18—Cologne, Germany  
The Rise of IoT & Big Data in Rail Conference  
▶ Rotaia Media, Ashford, Britain.  
<https://iotandbigdatainrail.com>

31-Jun 2—Münster, Germany  
28th IAF International Exhibition on Track Technology

▶ VDEI, Frankfurt, Germany.  
[www.iaf-messe.com/en](http://www.iaf-messe.com/en)

### June 2022

1-2—Sydney, Australia  
Sydney Infrastructure Expo  
▶ Oliver Kinross, Sydney, Australia.  
[www.sydneytransportexpo.com](http://www.sydneytransportexpo.com)

6-10—Birmingham, Britain  
World Congress on Railway Research  
▶ RSSB, London, Britain.  
▶ University of Birmingham, Birmingham, Britain.  
[www.wcrr2022.co.uk](http://www.wcrr2022.co.uk)

14-16—Ostrava, Czech Republic  
NEW DATE: Czech Railways Exhibition  
▶ Czech Railways, Ostrava, Czech Republic.  
[www.czech-railways.cz/en/2022/veletrh.php](http://www.czech-railways.cz/en/2022/veletrh.php)

22-24—Kuala Lumpur, Malaysia  
NEW DATE: Rail Solutions Asia Conference & Exhibition  
▶ TDH, Cranleigh, Britain.  
[www.tdhrail.co.uk/rsa](http://www.tdhrail.co.uk/rsa)

28-Jul 1—Beijing, China  
The 11th World Congress on High-Speed Rail  
▶ UIC, Paris, France.  
[www.uic.org/com/enews/article/save-the-date-uic-and-china-state-railway-group-co-ltd-cr-are-preparing-for-uic](http://www.uic.org/com/enews/article/save-the-date-uic-and-china-state-railway-group-co-ltd-cr-are-preparing-for-uic)

### August 2022

22-25—Montpellier, France  
The Fifth International Conference on Railway Technology: Research, Development and Maintenance  
▶ Elsevier, Exeter, Britain.  
[www.railwaysconference.com](http://www.railwaysconference.com)

### September 2022

20-23—Berlin, Germany  
NEW DATE: InnoTrans Exhibition  
▶ Messe Berlin, Berlin, Germany.  
[www.innotrans.com](http://www.innotrans.com)

### October 2022

5-7—Prague, Czech Republic  
NEW DATE: International Rail Forum & Conference (IRFC)  
▶ Itis, Olomouc, Czech Republic.  
<https://irfc.eu/en>

### November 2022

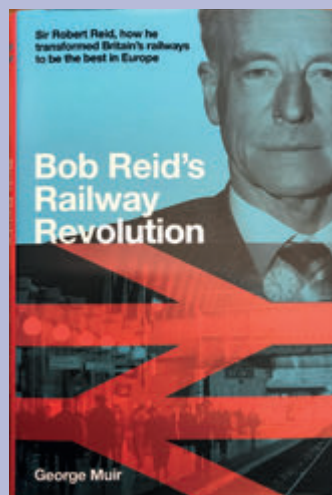
9—Stockholm, Sweden  
Scandinavian Rail Optimisation Conference  
▶ Rotaia Media, Ashford, Britain.  
[www.scandinavianrail.co.uk](http://www.scandinavianrail.co.uk)

23-24—Johannesburg, South Africa  
NEW DATE: Africa Rail  
▶ Terrapinn, Johannesburg, South Africa.  
[www.terrapinn.com/exhibition/africa-rail/index.stm](http://www.terrapinn.com/exhibition/africa-rail/index.stm)

## Book review

Bob Reid's Railway Revolution, George Muir.  
Unicorn Publishing, 351 pages.

George Muir charts the history of Britain's railway since nationalisation through the lens of the life and career of Sir Robert Reid. Bob Reid One, as he was affectionately known, was a career railwayman who served as British Rail (BR) chief executive from 1980 and chairman from 1983 to 1990. Reid is credited by Muir for providing new and different leadership and impetus, helping to turn BR into a successful and growing railway, and one of Europe's best. Reid's reforms are described as revolutionary as he instituted a disciplined attention to detail and a focus on delivery. The book also reflects on Reid's predecessors, who worked through three decades of reform as Britain's railway struggled to find its place in the post-war period.



## Rail Systems Protection Solutions

Wayside: System controls • Base stations • Switching & Signaling equipment  
Onboard: High Speed Intercity • Light/Metro Rail • Locomotives



### SEAL-FAST™ EDGE SEALS AND TRIMS

- ★ Environmental protection
- ★ 100s of profiles & custom available
- ★ Film bonded one piece assemblies
- ★ Meets US content requirements

### SPRING-FAST® WIRE PROTECTION GROMMET EDGING

- ★ Snap on design saves 49% installed costs
- ★ 9.5x productivity gain
- ★ Best in class performance
- ★ Qualified to indoor/outdoor, flame retardant, high vibration environments

Visit us at APTA Booth #3780

### CONTACT US FOR FREE SAMPLES



North America  
+1.508.229.2000 ext 210  
[www.devicetech.com/rail](http://www.devicetech.com/rail)

EMEA  
+49 40 350 85 128  
[www.dti-devicetech.eu](http://www.dti-devicetech.eu)

EN45545-2, NFPA 130 and FST Compliant. STP/IGES files available



## Contacts | editorial

46 Killigrew Street, Falmouth, Cornwall TR11 3PP, UK  
Tel +44 1326 313945

**Editor-in-Chief** Kevin Smith MA  
**Consulting Editor/Associate Publisher**

David Briginshaw CMILT  
**Associate Editor** Richard Clinnick  
**News & Features Writer** David Burroughs  
**Production Manager** Sue Morant

ks@railjournal.co.uk

db@railjournal.co.uk  
rcclinnick@railjournal.co.uk  
dburroughs@railjournal.co.uk  
sm@railjournal.co.uk

### Regional editors

**Australia** Tony Duboudin  
**Chile** Ian Thomson Newman  
**France** David Haydock  
**Germany** Keith Fender  
**Italy** Marco Chiandoni  
**Japan** Yoshihiko Sato  
**New Zealand** Richard Worrall  
**Spain** Ferran Torga  
**USA/Canada** William C Vantuono

movingwords@bigpond.com  
ian.thomson.newman@gmail.com  
David.Haydock@platform5.com  
kdfender@hotmail.com  
Tel +39 347 4413235 mchiandoni@gmail.com  
Tel +81 3 5721 6616 y-sato@sato-rail.co.jp  
rworral@themainreport.co.nz  
ferran.torga@gmail.com  
Tel +1 212 620 7240  
wvantuono@sbpub.com

### Correspondents

**Austria** Erwin Reidinger  
**Brazil** Renata Passos  
**Denmark** Denis Bowers  
**Eastern Europe** Roma Nazarov  
**Hungary** Ferenc Joo  
**India** Srinand Jha

**Israel** Jeremaya Goldberg  
**Korea** Andy Tebay  
**Netherlands** Quintus Vosman  
**Pakistan** Rashid Ali  
**Poland** Mykola Zasiadko  
**Ukraine** Alexander Kava

### Executive offices

Simmons-Boardman Publishing Corp  
88 Pine Street, 23rd Floor, New York, NY 10005, USA  
Tel +1 212 620 7200 Fax +1 212 633 1165

**President & Chairman** A J McGinnis  
**Publisher, Rail Group** Jonathan Chalon  
**Circulation** Maureen Cooney mcooney@sbpub.com

## Contacts | advertising

For all areas except those listed below contact:

**Jerome Marullo, Business Development Manager**  
Tel +1 732 887 5562 jmarullo@sbpub.com  
88 Pine Street, 23rd Floor, New York, NY 10005, USA

**Austria, Germany, German-speaking Switzerland, Latvia, Lithuania, Estonia, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia and Serbia.**

Simone and Simon Fahr,  
Fahr Verlags + Presse Büro eK  
Breitenbergstrasse 17, Füssen 87629, Germany  
Tel: +49 8362 5074996 sfahr@railjournal.com

#### ITALY & Italian-speaking Switzerland

Dr Fabio Potestà,  
Mediapoint & Communications srl, Corte Lambruschini,  
Corso Buenos Aires 8, V° Piano, Int 7, 16129 Genova, Italy  
Tel +39 010 570 4948 Fax +39 010 553 0088 info@mediapointsrl.it

#### JAPAN

Katsuhiro Ishii, Ace Media Service Inc  
12-6, 4-chome, Nishiiku Adachi-ku, Tokyo 121-0824, Japan  
Tel +81 3 5691 3335 Fax +81 3 5691 3336 amskatsu@dream.com

#### CHINA and AL, KY, TN

Jon Chalon, 88 Pine Street, 23rd Floor, New York, NY 10005, USA  
Tel +1 212 620 7224 jchalon@sbpub.com

**AK, AR, AZ, CA, CO, IA, ID, IL, IN, KS, LA, MI, MN, MO, MS, MT, ND, NE, NM, NV, OH, OK, OR, SD, TX, UT, WA, WI, WY, Canada (Alberta, British Columbia, Manitoba, Saskatchewan)**

Heather Disabato (Chicago Office) Tel +1 312 683 5026 hdisabato@sbpub-chicago.com

**CT, DC, DE, FL, GA, MA, MD, ME, NC, NH, NJ, NY, OH, PA, RI, SC, VA, VT, WV, Canada (Ontario, Quebec & Eastern Canada)**

Jerome Marullo, 88 Pine Street, 23rd Floor, New York, NY 10005, USA  
Tel +1 212 620 7260/732 887 5562 jmarullo@sbpub.com

**Classified Advertising and IRJ Pro Sales**

Frank Rose (New York) Tel +1 917 856 1808 frose@sbpub.com

**IRJ December 2021**

## Fresh faces



Spanish new entrant Ilsa has appointed Mr Simone Gorini as CEO, replacing Mr Fabrizio Favara who has been appointed chief strategy corporate officer at Italian State Railways (FS). Gorini has more than 20 years' experience with FS, and since 2017 has been responsible for the Lazio region.



Ms Rikke Lind has been appointed SJ Norge CEO and will start her new role on January 10 2022. Lind was previously secretary general of the Norwegian Rescue Society. She has also served as state secretary in the Norwegian Ministry of Trade and Industry. Lind replaces Ms Lena Angela Nesteby who had been acting CEO.



Ms Lorie Tekouris has been appointed CEO and president of Greenbrier, effective March 1 2022. Currently chief operating officer (COO) and president, Tekouris will replace the company's co-founder, Mr William A Furman, who will assume the newly-created role of executive chair. Tekouris joined Greenbrier in 1995 and was appointed COO in 2019.



Mr Neil Ethell has been appointed as chief operating officer at DB Cargo UK. He was previously the company's head of operations and service delivery and has taken up his new role with immediate effect. Ethell joined English Welsh & Scottish Railways (EWSR) in 2002 before the company was bought by German Rail (DB) in 2007.



Iran has appointed Mr Seyed Miad Salehi as deputy minister and chairman of the board and managing director of the Islamic Republic of Iran Railways (RAI) for a four-year term. Salehi will oversee growth of the country's rail capacity, upgrade technology and productivity and remove monopolies from the supply, assignment and management of current and future rail projects.



Canadian National (CN) has appointed Ms Jo-ann dePass Olsovsky to serve on its board of directors with immediate effect. Olsovsky brings 35 years of technology, infrastructure operations and railway experience to the Class 1. She is currently executive vice president and chief information officer of Salesforce and spent 12 years at BNSF.

## Advertisers Index

Device Technologies	40
Furrer + Frey	25
Goldschmidt	BC
Holland	27
Linsinger	35
Plasser & Theurer	5
PowerRail	31
Rawie	21
Ricardo	28-29 and IBC
Speno	11
Vossloh	IFC
Zhuzhou CRRC Times Electric	9
ZTR	36
	41

# Researchers respond to new post-Covid challenges

Luisa Moio, director of research and development at RSSB, and Professor Clive Roberts, head of the School of Engineering at the University of Birmingham and director of the Birmingham Centre for Railway Research and Education (BCRRE), outline their views on the direction of post-Covid research, and their expectations for the 2022 edition of the World Congress of Railway Research (WCRR) to Kevin Smith.

**B** RITAIN's strong pedigree in railway research is synonymous with the former British Rail Research Division. BR Research's ground-breaking work covered many areas, but it is perhaps best known for vehicle dynamics, most notably the InterCity 125 HST and Advanced Passenger Train.

The slow disintegration of this arm of the national railway in the mid-1980s and its eventual sale after privatisation was a body blow to research and development for both the British and global rail sectors. British researchers continued to play an important role. But with the foundation of the UK Rail Research and Innovation Network (UKRRIN) in 2017, the country's fractured railway research apparatus has been stitched together and is arguably returning British railway research to its influential position on the global stage.

The original consortium of 8 universities and 13 industrial partners has since grown to 16 universities and 19 industrial partners. The network is working to provide meaningful collaboration between academia and industry, focusing on three core areas: digital systems, led by the University of Birmingham; rolling stock, led by the University of Huddersfield; and infrastructure, led by the University of Southampton.

UKRRIN's lead is Professor Clive Roberts, who is also head of the school of engineering at the University of Birmingham and director of the Birmingham Centre for Railway Research and Education (BCRRE). Roberts says there is a "perfect storm" in Britain of background academic capability, international suppliers, and a customer in the railway, and in key areas such as digitalisation, decarbonisation, and asset management, UKRRIN members are now able to build partnerships and collaborations

and make notable contributions to improving the railway.

"We've always done lots of good academic research, but it's always taken a long time to get that into the industry," Roberts says. "There are a number of flagship projects where UKRRIN has accelerated things out of the lab and into the real world and it is beginning to make a real difference."

Delivering outcomes is consistently underlined in Europe's Shift2Rail research initiative. Roberts says this emphasises the shift more generally in railway research with Shift2Rail and its successor Europe's Rail having the scale and capability to tackle the big challenges much faster than was achieved before. In contrast, UKRRIN might tackle challenges from a "point to point" approach where one academic institution works with a single company to take the work forward.

This is a point echoed by Ms Luisa Moio, director of research and development at the Railway Safety and Standards Board (RSSB), both a UKRRIN and World Congress of Railway Research (WCRR) founding member. "There is a space for local innovation driven by local needs as well as international innovation pursued via big consortia. They are generally the ones with the money and the scale to go after those big radical changes that can transform the railways way of working."

## WCRR 2022

RSSB and the University of Birmingham, will jointly host the 2022 edition of WCRR on June 6-10 in Birmingham.

A global pandemic and national lockdowns are not conducive with fostering the close collaboration and knowledge sharing necessary for ground-breaking research. Holding the conference in



Luisa Moio

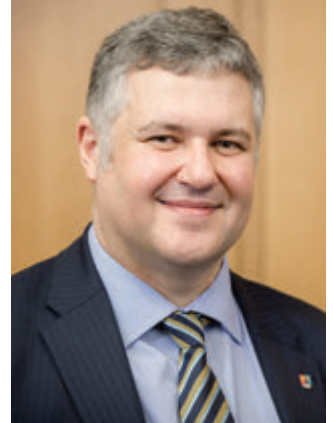
person, with people in attendance for the full five days, was therefore a key objective according to Moio, who is chairing the WCRR Organising Committee.

Moio says the pandemic has arguably changed the railway sector, with new challenges emerging that researchers must tackle. She says this is emphasised in the theme of the event, "Reshaping our railway post pandemic: research with an impact" and in the roughly 625 abstract papers submitted for the conference, which will be whittled down by around half for the final programme. The opening plenary session will also tackle this topic.

Roberts says he expects research to increasingly focus on driving value for money, especially in areas such as track maintenance and on railway construction where he says there "is an awful lot to do."

"The changes that we are going to see around our railway in the next 10 years are mainly around digitalisation, how our railway is powered, and customer experience, specifically how passengers interact with the railway," he says.

Moio says that in the post-Covid world funding is likely to become more of an issue. It



Professor Clive Roberts

is essential therefore to leverage private finance for research, and UKRRIN is testament to this approach. Collaboration with other industries is another theme likely to emerge in research and will be reflected in some of the WCRR papers.

Despite the difficulties of the last 18 months, Roberts says research has not stood still in the three years since WCRR 2019 in Tokyo, in fact some things have moved quite rapidly. This is apparent in the conference location and enthusiastic response to its call for papers. The University of Birmingham is now Europe's largest university-based provider of railway research and education and is doing some commendable work to promote railway education in developing areas, notably Africa, the Middle East and East Asia. Birmingham is also home to HS2, and Moio says work is underway for this vast infrastructure project to play a big role at the event.

"It is clearly a place that we want to bring to the attention of the international community," she says. "It is also a chance to refocus and re-energise the sector. And that is what we are aiming to do." **IRJ**

To register for WCRR 2022, visit [www.wcrr2022.co.uk](http://www.wcrr2022.co.uk)



# WE KNOW YOU NEED A PARTNER YOU CAN TRUST



## WE KNOW RAIL

Contact [ricardorail@ricardo.com](mailto:ricardorail@ricardo.com)

[Rail.ricardo.com/weknowrail](http://Rail.ricardo.com/weknowrail)



# SAFETY IS MEASURABLE

**Measuring & testing solutions from Goldschmidt:  
smart inspection for enhanced safety and quality of your rails**

A detailed diagnosis of the track condition is the basis for predictive maintenance, which guarantees the long-term economy and reliability of your track infrastructure. Measuring and testing technology on inspection trains, trolleys and hand-held devices from Goldschmidt enables you to carry out detailed evaluations to identify deviations and take preventive maintenance measures.