

wascosa infoletter

Latest news for the freight wagon industry

Exclusive Pre-Version
for Wascosa Circle Members



The best way to avoid CO₂? Switch to rail!

The debate about climate policy is in full swing right across Europe. Burning fossil fuels indisputably contributes to global warming, irrespective of whether a small proportion of this warming might actually be part of a natural process. The transport sector in particular needs to play its part. Shifting goods to the railway network would be the quickest and most effective solution.

By Professor Markus Hecht, PhD-Ing., TU Berlin

CO₂ emissions have shown a marked decline since 1990 in most of Europe's business sectors, except in passenger and freight transport, where emissions have actually increased. Transport is well on its way to becoming the dominant source of emissions.

A comparison of the efficiency of the individual transport modes measured by tonnes of emissions per kilometre in fact reveals a very low level for rail transport. Where trains are pulled by electric locomotives, emissions are even classed as zero, as any emissions from electricity generation are attributed to the energy

sector. In addition, the rail industry tends to directly favour renewable energy, thus supporting the energy sector¹, however trivial this might seem when calculating total emissions. Diesel propulsion is controversial, however, as it is associated with three types of emission: greenhouse gases, nitrous oxide and soot particles. On top of that, the degree of efficiency is much lower, and the braking energy of the entire train is always lost, while in the case of electric locomotives, the train's braking energy is increasingly converted into electrical power that can be recuperated².

Continued on page 2



Retrospective: innovative Wascosa Village at transport logistic 2019

4



Revised ECM regulation: extended to cover safety-critical components

6



One year on: successful integration of Nacco Germany

8



Dear Reader

Everyone is talking about climate change. The transport sector can – indeed must – play its part. There is no need to reinvent the wheel: rail has traditionally been the greenest form of transport, and still is. But as Professor Markus Hecht, PhD-Ing, explains in his lead article: there needs to be an even greater political effort to create the appropriate conditions for the bulk of goods to be shifted from road to rail across the whole of Europe, just as has already happened with the transalpine NEAT route through Switzerland.

In addition to creating the right overall conditions, however, quality standards need to be improved on the rail network through innovation. Such innovations were the main theme in the trade show recently held in Munich, transport logistic 2019. In our review of the trade show on page 4 you can read all about the exciting new concepts we showcased together with our partners under the banner “More wagons – More ideas!”. These innovations are also set to enable a further reduction in emissions and to make rail freight transport even more efficient and attractive.

Having a stronger voice in the current debate and addressing new demands is certainly an advantage. The takeover of Nacco Germany at the end of 2018 was a big leap forward in our growth strategy, making us Europe’s fourth largest freight wagon leasing company. Our Chief Sales Officer, Yann Bonguardo, looks back over the successfully completed integration in an interview on page 8. We will use our stronger position to ensure that the railway finally plays the prominent role it merits in goods transport, while also supporting climate protection.

I hope you enjoy reading the latest edition of our infoletter!

Philipp Müller
Chairman of the Board of Directors

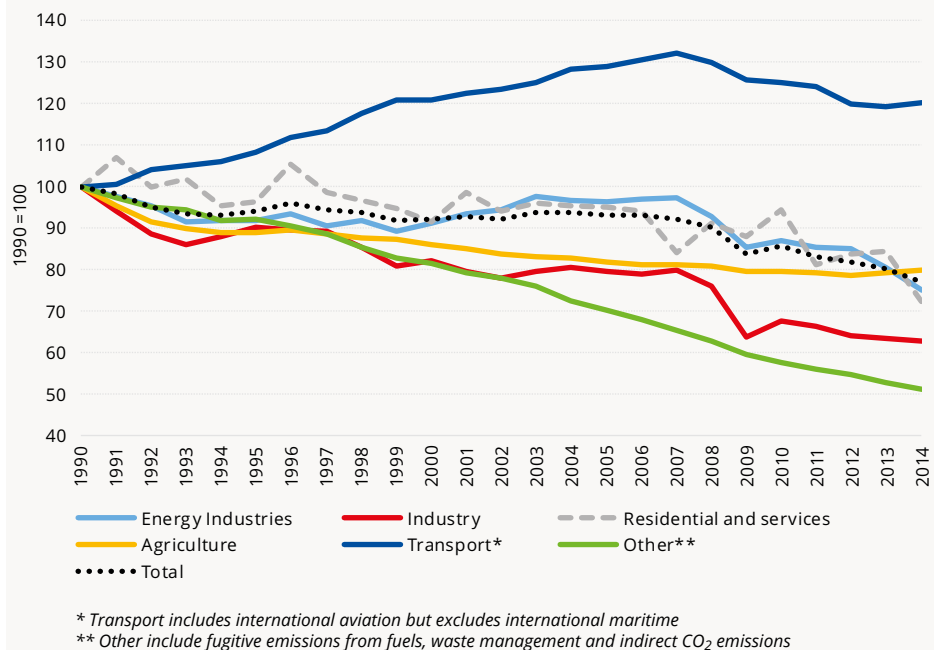
Continued from page 1

Using alternative propulsion ...

To address environmental concerns, the rail freight industry needs to pursue two key goals. First, existing diesel locomotives need to be replaced with alternative forms of propulsion. Preference should be given to locomotives powered by electricity from overhead lines, or at least hybrid powertrains capable of using existing lines.

Second, air and road traffic need to be switched to a carbon-neutral rail network. The second goal can be 20 times more effective than the first in mitigating global warming^{3,4}, as every litre of diesel consumed produces around 2.7 kilos of CO₂⁴ and alternative powertrains on roads are much less cost efficient than those on the railway. Modern exhaust gas treatments for diesel engines, such as Adblue and particulate filters, only improve nitrous oxide

Greenhouse gas emission trends in the EU since 1990, by sector



Source: European Commission, https://ec.europa.eu/clima/policies/transport_en



Dirk Flege,
Executive Director
of Pro-Rail Alliance
(Allianz pro Schiene)

Recently, both hydrogen- and battery-powered trains in German-speaking countries have been carrying passengers on routes without overhead power lines. This sends out the right signal: alternative powertrains have become a routine part of the rail network. In this way, the railway industry is creating the technical prerequisites to extend its lead in environmental and climate protection. The railways have made great progress and are well prepared for the end of the diesel era. The Pro-Rail Alliance campaigns not only for electrification, but also for the use of alternative technologies on the rail network. Last year Pro-Rail Alliance worked with the rail industry to produce a vision for banning diesel locomotives over short distances by the end of 2024.

“The pioneering role in climate protection is part of the railways’ DNA.”

The technical solutions for climate-neutral transport are available in the rail sector, but this potential has still not been realised in every case. To date, the German government has been extremely slow to promote alternative drive systems in rail transport. However, decisive political support is essential given the technological challenges ahead.

and particulates emissions, but not overall carbon dioxide discharge. The new type of diesel used in locomotives, Stage V quality, produces just as much CO₂ emissions per litre of fuel burned as a 40-year-old diesel engine.

... and attracting new types of goods onto the railways

According to a study commissioned by the Network of European Rail Companies (Netzwerk europäische Eisenbahnen, NEE), shifting traffic over to the rail network would save 10 million tonnes of CO₂ every year in Germany alone³. But this can only be achieved if new types of goods can be attracted to the railways.

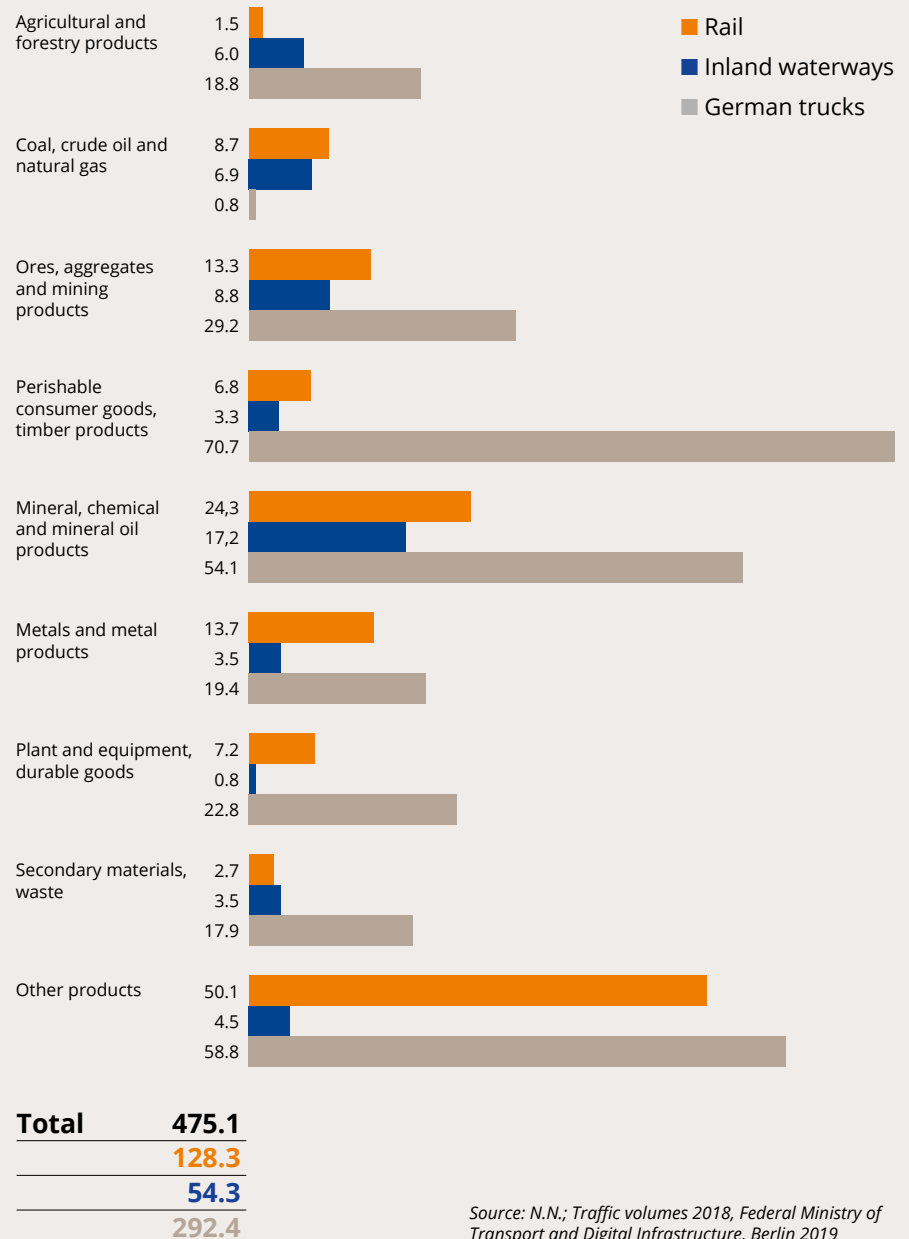
At present the rail industry is very heavily dependent on goods for which the transport volumes are set to shrink rapidly in future, such as coal, mineral oil and ores. In order to grow, the industry needs to offset this decline by breaking into the markets of the future, such as consumer goods, forestry and agricultural products, especially foodstuffs. However, this is only possible with improved quality⁵. Trucks and planes are currently setting the quality standards here. But there are also windfall effects: improvements that cost nothing. These include rapid transport with very little change in the rolling stock on ETCS routes⁶. These opportunities now need to be exploited.

Quality has to be improved

A reliable rail network is an essential requirement. Here improvements are needed in Germany especially. The seven-week closure of the Rheintal route⁷ is still causing major problems. One major problem is the lack of responsibility for the quality of the infrastructure (DB Netze in Germany), which is the subject of repeated criticism from the German Monopolies Commission⁸. As part of its climate protection programme, the German government has at least recently announced its intention to invest EUR 86 billion in the railway network up to 2030.

The rail freight industry is standing at a crossroads: either it stays more or less as it is today and its traditional types of goods will gradually tail away, leading to a sharp contraction in business volumes. Or it embarks on an ambitious growth path to the benefit of the environment, by further developing and exploiting its systemic strengths such as a high degree of automation, punctuality, predictability, reliability, low noise levels, etc. Automatic coupling, automated brake testing, synchronised timetables, GC gauge wagons, hybrid locomotives, remote diagnostics, route tracking and customer proximity would provide a good foundation for growth⁹.

Freight volumes broken down by three modes of transport and nine types of goods in Germany, 2016



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Greenhouse gas emissions by mode of transport, in tonnes per km, see page 16 (back cover).

transport logistic 2019: innovations draw the crowds to Wascosa Village

In June 2019 Wascosa attended the annual trade show transport logistic in Munich for the ninth consecutive year. Exhibiting under the motto “More Wagons – More Ideas!” and in the knowledge that the best solutions are often produced by collaborating with strong partners, Wascosa presented its innovations in the redesigned “Wascosa Village” with its co-exhibitors BASF, Hoyer and Van Hool, as well as partner companies InRoll, Sersa and Sternico.

The collective appearance in the Wascosa Village was a great success for all those involved and provided an ideal opportunity to make many new contacts. One innovation which really attracted visitors was the new BASF Class Tank Container (B-TC) for pressurised gases. With a volume of 81,300 litres and a test pressure of 27 bar (P27BH), it is the biggest tank container for compressed gases approved to date as ADR/RID compliant. The stand also exhibited a 45-foot B-TC (63,000 L - L4BH) on a newly developed 48-foot container wagon based on the Wascosa flex freight system®, and a 52-foot B-TC (73,500L - L4BH) for bulk goods on an Automated Guided Vehicle (AGV) for driverless transport of the tank container at BASF’s Ludwigshafen site.

“Many visitors were keen to find out more about our innovative concept for inter-modal transport with the BASF Class Tank Containers (B-TC) and the Automated Guided Vehicle (AGV), which is already in service at BASF’s Ludwigshafen site. Many customers – as well as companies that we have not previously worked with – were able to experience the product first-hand and talk to us directly about opportunities for introducing this concept in their own business,” says Harald Schlegel from BASF SE’s Projects & Terminals, commenting on a very successful trade show.

Wascosa flex freight system®: even more applications

Together with Sersa, Wascosa exhibited in the Wascosa Village the new infrastructure train modules for railway-connected construction site logistics, giving visitors a chance to see an entirely new field of use for the Wascosa flex freight system®: the 54’ container wagon, Sgmmns, was equipped with a tunnel element manipulator and a tunnel repair unit, each one housed on a 20’ container flat bed. “These

two elements allowed us to showcase the very diverse use of Sgmmns in rail-borne construction site and hopper wagon logistics,” says Rudi Hoz, Head of Customer and Market Support at Sersa. The relatively short four-axle container wagon with a high carrying capacity is ideally suited for transporting bulk goods with a high specific weight such as gravel, sand and excavated material, as well as for aggregate containers or mobile crane modules.



Extension of Wascosa flex freight system® for infrastructure train logistics.

Digital data exchange optimises maintenance work

At an event organised especially for repair workshops and manufacturers of freight wagons on the theme of “Digitisation of freight wagon maintenance”, Sternico presented its new COMAP platform. This not

only enables but also streamlines electronic data transfer between wagon keepers and workshops for integrated maintenance management. Digital networking and standardisation provide significantly better data quality for the maintenance and operation of freight wagons. In short,



Wascosa Village from the air: BASF, Hoyer, Van Hool, InRoll, Sersa, Sternico and Wascosa were all exhibiting together.

an efficiency gain for ECMs and freight wagon owners, and greater competitiveness of rail freight transport as a whole. Wascosa also uses COMAP software as a central asset management system (see edition 31 of our infoletter, May 2019).

New bulk freight wagon Tanpps – a wagon for central and lateral unloading

Another innovation showcased in the Wascosa Village was the Tanpps bulk freight wagon developed together with Kali + Salz. The wagon is designed for the transport of fertilisers and salts and offers an optimum ratio of maximum payload and minimum wagon length with the best possible product unloading performance. It is very versatile and the loading and unloading equipment is robust and easy to operate. Its innovative discharge system means it can be unloaded both sideways and centrally. In addition, a special internal coating protects the wagon from corrosion. Thanks to the innovative DRRS 25L bogie with compact brakes and non-corrosive double rubber rolling springs, the Tanpps also has excellent running characteristics resulting in energy savings and much lower noise emissions.



A magnet for visitors: the Wascosa flex freight system® for chemical products with new container wagons and with the BASF tank containers B-TC.

New ECM regulation covers the handling of safety-critical components

The latest Commission Implementing Regulation 2019/779 passed in May 2019 also addressed, in Article 4, the handling of safety-critical components. The entity in charge of maintenance (ECM) must in future meet very exacting requirements.

By Markus Vaerst, Chief Operations Officer, Wascosa

Safety-critical components require special attention and priority during maintenance. However, because the critical nature of a component is related to the specific design of the vehicle and the specific functions of the component, when designing a new vehicle type the manufacturer should establish the criticality of the components through a risk-based analysis and include this in the technical documentation – although it remains to be seen whether this will develop into a list of safety-critical components in future. The ECM should have access to the documentation and take into consideration the specific maintenance instructions issued by the manufacturer.

If, during the maintenance of a vehicle, an ECM discovers that a component not previously classified as safety critical may nevertheless be considered safety-critical, it should immediately inform the manufacturer of the component (as well as the holders of the vehicle type approval and the vehicle approval). The manufacturer

must in turn carry out an immediate risk assessment. Depending on the result, the ECM must adapt its maintenance procedures.

At the same time, the ECM will inform the railway sector or suppliers about new or unexpected safety-relevant findings if the associated risks could be relevant for several actors and the resulting risk is not adequately controlled. The Safety Alert Information Tool (SAIT) of the European Railway Agency is to be used for this purpose.

In the case of **safety-critical components**, it can be assumed that a single defect will cause a serious accident. In accordance with the EU Safety Directive (2016/798), in addition to events causing considerable damage to vehicles, infrastructure or the environment, especially train collisions or derailments with at least one fatality or at least five seriously injured persons are also classed as **serious accidents**.



Most actors classify the wheel set as a safety-critical component.

Kirsten Trost new Chief Investment Officer at Wascosa



On 1 July 2019, Kirsten Trost (55) joined Wascosa AG as Chief Investment Officer (CIO) leading the expansion of the wagon fleet managed by the company. Kirsten has been involved in the rail leasing industry since 1997 when she started at GATX in San Francisco. She then moved to Europe in 2001 where she continued with GATX, before working with AAE and most recently at her own consultancy firm, Respicio GmbH.

She brings her considerable know-how to Wascosa where as a member of the Man-

agement Team she will lead the growth initiatives with a primary focus on service offering and investment opportunities to their investor base. Together with the Investor Relations Team, she looks forward to participating in Wascosa's further expansion in the European market.

Peter Balzer, CEO Wascosa:

"We are delighted to have Kirsten Trost on board. She is an absolute expert who will actively support the shaping of our future growth."

“Feel free to touch!” – tank wagon training days at Wascosa

The first series of training days for tank wagons at Wascosa in Lucerne gave staff from all sides of the business the chance to update or expand their theoretical knowledge and gain hands-on experience of tank wagons using a dedicated training wagon. The positive feedback shows the training went down extremely well.

By Markus Vaerst, Chief Operations Officer, Wascosa

Well qualified and motivated staff make a difference and provide the backbone of Wascosa's business. To provide more support and professional development for employees, a training day on tank wagons was held in Lucerne for the entire workforce in August 2019, organised by the firm

Railtraining GmbH. Individually tailored sessions were held for different groups of staff with varying levels of knowledge and experience. They focused on different wagon components, the function of various fittings, sealing technology and how to avoid operating errors and malfunctions.

Hands-on was the highlight

The practical part of the tank wagon training was all about hands-on experience so it was a case of “Feel free to touch!”. All three types of hazardous goods systems – oil, pressurised gas and chemicals – were explained and compared using the example of the training wagon. Components and equipment such as the base valves, dome connections and caps are fitted as original parts in the training wagon and the trainees are free to operate them. They were especially impressed by a door in the bottom of the tank that allowed them to crawl in and inspect the interior – which was an experience that many of them had never had before.

Positive feedback shows the training day was a big hit

Not only were the spontaneous reactions during the training extremely positive: an anonymous online survey carried out afterwards confirmed the success. 97% rated the training as good or very good, and 98% said it met their personal expectations. This feedback encourages Wascosa to hold similar events in future and above all to put the focus on practical experience.



One year on: Wascosa benefits from the Nacco acquisition

A year ago Wascosa announced the acquisition of around 4,400 Nacco/CIT freight wagons, marking a significant acceleration in its growth. Now Wascosa has successfully completed the integration of the freight wagons and of the team based in Hamburg, Germany. This team has fitted seamlessly into the Wascosa family: everything is on track on the sales side, and the technical data migration to Wascosa's existing IT system is already working well. The acquisition has raised Wascosa's profile and positioned the company even more strongly in the European market, much to the delight of Yann Bonguardo, who became Chief Sales Officer in January 2019 and is now also a member of Wascosa's management team.



Yann Bonguardo in discussion with Thomas Jakob Ernst, Post CH, (left) and Ole Nygaard, Wascosa, (right) at transport logistic.

The acquisition has boosted Wascosa's fleet to more than 14,000 wagons. What does this mean for the company?

The acquisition means that Wascosa is now Europe's fourth biggest freight wagon leasing company. Given our size and geographical footprint, we have become far more important for our customers, suppliers and workshops, as well as our service partners.

What does that mean in concrete terms?

All our customers benefit from the fact that we are now able to offer virtually every type of freight wagon. In addition to tank wagons and intermodal wagons, as well as other existing types of wagon, there are a number of strategically important wagon types that are included in our fleet. These include covered wagons (Shimmns)

for the steel industry, open freight wagons (Eanos) and also different types of hopper wagon (Tanoos, Falns, Tadns) for all types of bulk goods. Almost all the wagons acquired from Nacco are leased to companies in Germany. This has allowed us to significantly strengthen our position in the important German market. As far as suppliers and workshops are concerned, the acquisition has expanded our network of contacts and strengthened our standing as a business partner.

How have market conditions developed since the acquisition?

Consolidation continues to be a key theme. On the manufacturing side, the companies Waggonbau Niesky (WBN), Legios and Titararh AFR – had to file for bankruptcy. Waggonbau Niesky was acquired by Ta-

“As an independent and flexible market player, Wascosa benefits from its new size as a trading partner and is also well organised, efficient, innovative and committed to quality, which is what our customers value.”

travagonka. The ongoing consolidation and the increasingly challenging general conditions, especially in the field of safety, for example, along with the associated costs, make it extremely difficult for smaller providers to survive in the marketplace. However, consolidation is also causing bot-

tlenecks at the manufacturers and pushing up wagon prices, even though there has been no increase in steel prices. As an independent and flexible market player, Wascosa benefits from its new size as a trading partner and is also well organised, efficient, innovative and committed to quality, which is what our customers value.

Is it fair to say that the integration is now complete?

Yes, basically. Our new team in Hamburg has blended in smoothly with the Wascosa family. A series of meetings were needed to achieve this, but everything worked out very quickly. The process is more or less complete on the sales front. Data migration has also gone very smoothly: everything was seamlessly integrated into Wascosa's existing IT systems. We held training courses to ensure that every employee is familiar with all the wagon types. The technical staff from the former Nacco business perfectly complement our own skill set. In the area of operations, the integration will be finished by the end of 2019.

How did you ensure that all the processes ran smoothly?

The working methods of our new Hamburg colleagues have given fresh impetus to our team in Lucerne regarding the optimisation of our processing and support for service partners. At the same time, the Hamburg team was able to benefit from

the innovative expertise, high quality and precision that are the hallmarks of Wascosa. However, the smooth completion of the integration was also due to the fact that the corporate cultures and processes of Nacco and Wascosa were very similar from the start. The only aspect we needed to harmonise was the difference in processing, and in the summer of 2019 both Wascosa in Lucerne and our subsidiary in Hamburg were successfully audited to ISO 9001 / ECM standard.

Changes were made to the management team following the Nacco acquisition. How well is the new team working together?

We soon found our feet. Each one of us brings a wealth of industry and management experience, which has enhanced

“The ongoing consolidation and the increasingly challenging general conditions, especially in the field of safety, for example, along with the associated costs, make it extremely difficult for smaller providers to survive in the marketplace.”

“We want to continue to expand in Europe, not only in Germany but also in neighbouring countries such as the Netherlands, Belgium and France.”

Wascosa's expertise as a provider of integrated solutions and also a provider of freight wagon systems. On the sales side, this is an important strength for us which is also reflected in rapid decision-making processes so that we can continue to move forward in tandem with our customers and further broaden our international reach.

You mentioned progress: what are your team's sales goals?

We want to continue to expand in Europe, not only in Germany but also in neighbouring countries such as the Netherlands, Belgium and France. But in Poland and the Czech Republic as well, innovation and quality are becoming increasingly important and even essential – exactly the characteristics associated with Wascosa. On top of that, we want to continue to grow in the following three areas: tank wagons (in the chemicals industry), bulk wagons and intermodal wagons. No single area is a priority: we are aiming for healthy, evenly balanced expansion.

Liability insurance cover for CRSC workshops, CRSC wagon keepers, manufacturers and suppliers

With the termination of siding contracts, the «General Contract of Use for Wagons (GCU)» based on the international convention COTIF 1999 and Annex CUV in 2006, the liability situation for wagon workshops and wagon keepers has radically changed, and not only in Germany.

By Peter Schenkendorf, GAYEN & BERNS • HOMANN GmbH

By publishing documents in three languages (English, French and German) the GCU Bureau sets out a European solution known respectively as the “General Contract of Use for Wagons (GCU)” or “Contrat Uniforme d'Utilisation des Wagons (CUU)” or “Allgemeiner Vertrag für die Verwendung von Güterwagen (AVV)”.

In addition, a new “Entity in Charge of Maintenance” (ECM) was created in 2011 for rail companies and wagon keepers in Europe.

In 2016, a European directive to create a single European railway area was implemented in Germany with the Railway Regulation Act (ERegG). At the same time,

the German Railway Liability Insurance Ordinance (EBHaftPfIV) was repealed and the “Allgemeines Eisenbahngesetz (AEG)” (General Railway Act) increased the minimum insurance sum for railway undertakings, railway infrastructure undertakings, vehicle keepers and wagon keepers to EUR 20 million per event, maximised up to double that amount for each insurance period.



The amendment to Article 27.1 of the GCU also stipulated that wagon keepers shall be liable for damage caused in cases where they can be shown to be at fault under the provisions stated.

In addition to the very diverse services it offers its members, the Cargo Rail Service Center e.V. (CRSC), a European self-help organisation registered in Germany (see www.crsc.eu.com), also takes into consid-

eration the developments described above as much as possible from an actuarial perspective.

For European workshops that are members of CRSC e.V. – as the extended arm of the wagon keeper under liability law – the syndicate maintains mastercover liability insurance for up to EUR 50 million as a lump sum for personal injury and/or property damage, taking into account the



member's basic liability cover. This insurance cover is available to CRSC workshops as a whole and relates exclusively to technical services for CRSC wagon owners as an additional quality feature. At the same time, balance protection is ensured in this way, individual purchasing of the relevant capacity is unnecessary and thus also gives a substantial cost advantage. In tandem, minimum requirements for basic liability cover for CRSC workshops are defined.

For members of CRSC e.V., participating wagon keepers can be covered by a collective freight wagon liability insurance cover of up to EUR 100 million as a lump sum for personal injury and/or property damage, taking into account the member's basic liability cover of up to at least EUR 50 million.

Manufacturers and suppliers can if necessary (under the heading "extended product liability" receive individual advice at no extra cost.

Shelter Module by Wascosa

The protective shield or shelter module covers the insurance solutions. Liability risks and insurance solutions have to be agreed between and with the partners, and must be constantly optimised. This module offers solutions that let you sleep peacefully.

- Insurance concepts
- Liability/physical damage
- For all partners



Calendar of events

Date	Event	Location	Website
2019			
04.12.2019	RNE RailNetEurope General Assembly	Vienna, AT	rne.eu/calendars
10.12.2019	UIC Digital Awards 2019	Paris, FR	uic.org
11.12.2019	RFG Xmas Lunch	London, UK	rfg.org.uk/allevnts
2020			
13.01.2020	VPI New Year reception	Hamburg, DE	vpihamburg.de/de/veranstaltungen
14.01.2020	10th VPI Symposium	Hamburg, DE	vpihamburg.de/de/veranstaltungen
24.01.2020	14th VAP-ECM Get Together	Olten, CH	cargorail.ch/verbandsarbeit
04.02.2020	RFG Member's Party	London, UK	rfg.org.uk/allevnts
11. - 12.02.2020	13th BME/VDV Rail Freight Transport Forum	Berlin, DE	vdv.de/Termine.aspx
18.02.2020	European Railway Award 2020	Brussels, BEL	cer.be/events
19. - 21.02.2020	9th International Railway Summit	Warsaw, PL	irits.org
17. - 20.03.2020	SITL Europe (Semaine Internationale du Transport et de la Logistique)	Paris, FR	sitl.eu
21. - 22.03.2020	Railtech Track Access Charges Summit 2020	Riga, LV	events.railtech.com
March 2020	VPI Austria, General Assembly	Vienna, AT	vpirail.at
April 2020	IBS Spring Convention	not yet confirmed	ibs-ev.com
01. - 03.04.2020	International Rail Forum & Conference (IRFC)	Prague, CZ	irfc.eu/en
02.04.2020	Rail Freight Conference	not yet confirmed	rfg.org.uk/allevnts
21. - 24.04.2020	Intertraffic 2020	Amsterdam, NL	intertraffic.com/amsterdam/
23. - 24.04.2020	Talent and Expertise Development Platform	Valencia, ES	events.uic.org
27. - 30.04.2020	Transport Research Arena (TRA)	Helsinki, FIN	traconference.eu
12. - 14.05.2020	13th International Railway Infrastructure Exhibition (Infrarail)	London, UK	infrarail.com
13.05.2020	RFG Spring Group Meeting	not yet confirmed	rfg.org.uk/allevnts
13. - 14.05.2020	UIRR General Assembly	Brussels, BEL	uirr.com
27. - 29.05.2020	International Transport Forum (ITF)	Leipzig, DE	itf-oecd.org/summit
02. - 05.06.2020	UIC Global Rail Freight Conference (GRFC)	Riga, LV	events.uic.org
11. - 12.06.2020	AFWP / UIP General Assembly	Nice, FR	afwp.asso.fr
16. - 17.06.2020	VPI General Assembly and Technical Information Event	Bonn, DE	vpihamburg.de/de/veranstaltungen
16. - 18.06.2020	Multimodal Exhibition	Birmingham, UK	multimodal.org.uk
17.06.2020	EMC & 30th European Regional Assembly	Paris, FR	events.uic.org
24. - 26.06.2020	29th annual UNIFE General Assembly	Berlin, DE	unife.org/events/unife-events.html

Impressum

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Comparison of the environmental impact of different modes of transport



Mode	CO ₂ emissions		Noise emissions			
	Freight transport CO ₂ equivalent gramm per tonne km	Passenger transport CO ₂ equivalent gramm per tonne km	Freight transport noise level of various sources in dB(A)	Passenger transport noise level of various sources in dB(A)		
 Rail	Propulsion		Propulsion			
	Diesel	50	150	Diesel	83	81
	Electric*	0	0	Electric	82	80
	Hybrid	30	80	Hybrid	83	80
 Road	Diesel	105	120	Diesel	80	74
	Hybrid	80	100	Hybrid	80	74
 Marine	Heavy fuel oil	15	40	Heavy fuel oil	90	90
 Air (start 100 m)	Kerosene	2000	400	Kerosene	95	95

* Any CO₂ emissions from electricity generation are attributed to the energy sector.