

BALANCED LOGISTICS



APPLYING THE DIGITAL LEVER

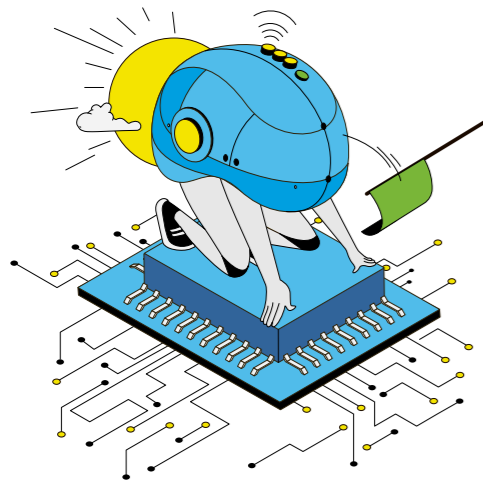
Can data really make international trade more sustainable?

→ *Page 4*

AN UNBEATABLE COMBINATION

Ships meet rails in the Port of Hamburg. Why does this have environmental advantages?

→ *Page 10*



4

DIGITALISATION AT THE STARTING LINE Though AI is in the starting blocks, logistical data still isn't linked well.



42 ON THE GREEN TRACK



18 PROTECTING THE OCEANS



10

INTERMODAL PORT HAMBURG
Here, ships and rails are combined in a unique way.

Our ideas, our strategy, our commitment

...help ensure that sustainability is not just a buzzword at HHLA. Read more about these topics on the marked pages.

Angela Titzrath:

"With our logistics solutions we play a key role in the sustainable transformation of the industry."

→ Page 8



Tatjana Meichsner:

"When people are in crisis, work can give them a sense of stability and normality. But the focus is always on the person and their health."

→ Page 22



Peter Rosenzweig:

"One large roof and an ice storage unit in the cellar could be enough to supply heat to an entire block of the Speicherstadt historical warehouse district."

→ Page 34



Robert Groiss:

"Transport naturally produces a lot of emissions. But at Metrans, we launched a project that sets us apart from the competition in terms of climate protection."

→ Page 42



Contents BALANCED LOGISTICS 2024

4 Applying the digital lever

Digital platforms not only result in more efficiency; they are also expected to make logistics more sustainable.

8 "Way above average"

CEO Angela Titzrath on the challenges facing future generations and how HHLA is meeting them.

10 An unbeatable combination

Hamburg, the world's largest railway port, is making a unique contribution to achievement of EU climate targets.

18 Ideas for protecting the marine environment

Four start-ups are leading the way.

22 With an open ear and empathy

Social and addiction counsellor Tatjana Meichsner

25 Hamburg Port Scouts

Children on a journey of discovery

26 Alternative drive technology

Will it be hydrogen for fuel cells, or will huge batteries provide the drive for motors?

30 Always upstream

If you want to achieve climate-neutral production, you need a lot of energy from renewable sources.

32 Thinking more internationally

An essay on the different perspectives on sustainability in other regions of the world.

34 Saving the grey energy

Refurbishing in a climate-neutral manner? A project in the Speicherstadt historical warehouse district is investigating.

40 Taxono-what?

A complicated set of rules, the EU Taxonomy, is meant to ensure greater sustainability in commerce. We explain them.

42 "Don't just talk, act!"

Robert Groiss on climate-friendly transport through Metrans and the investments required for more rail transport.

46 Retrofitting on a grand scale

A future project steeped in history: a historic floating crane is being retrofitted for the years ahead.

50 What gives us hope?

Hope is important if we are to avoid despair. And there are good, fact-based reasons to be hopeful.

52 Social media / Imprint

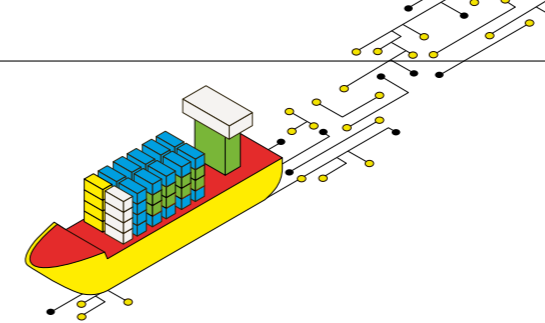
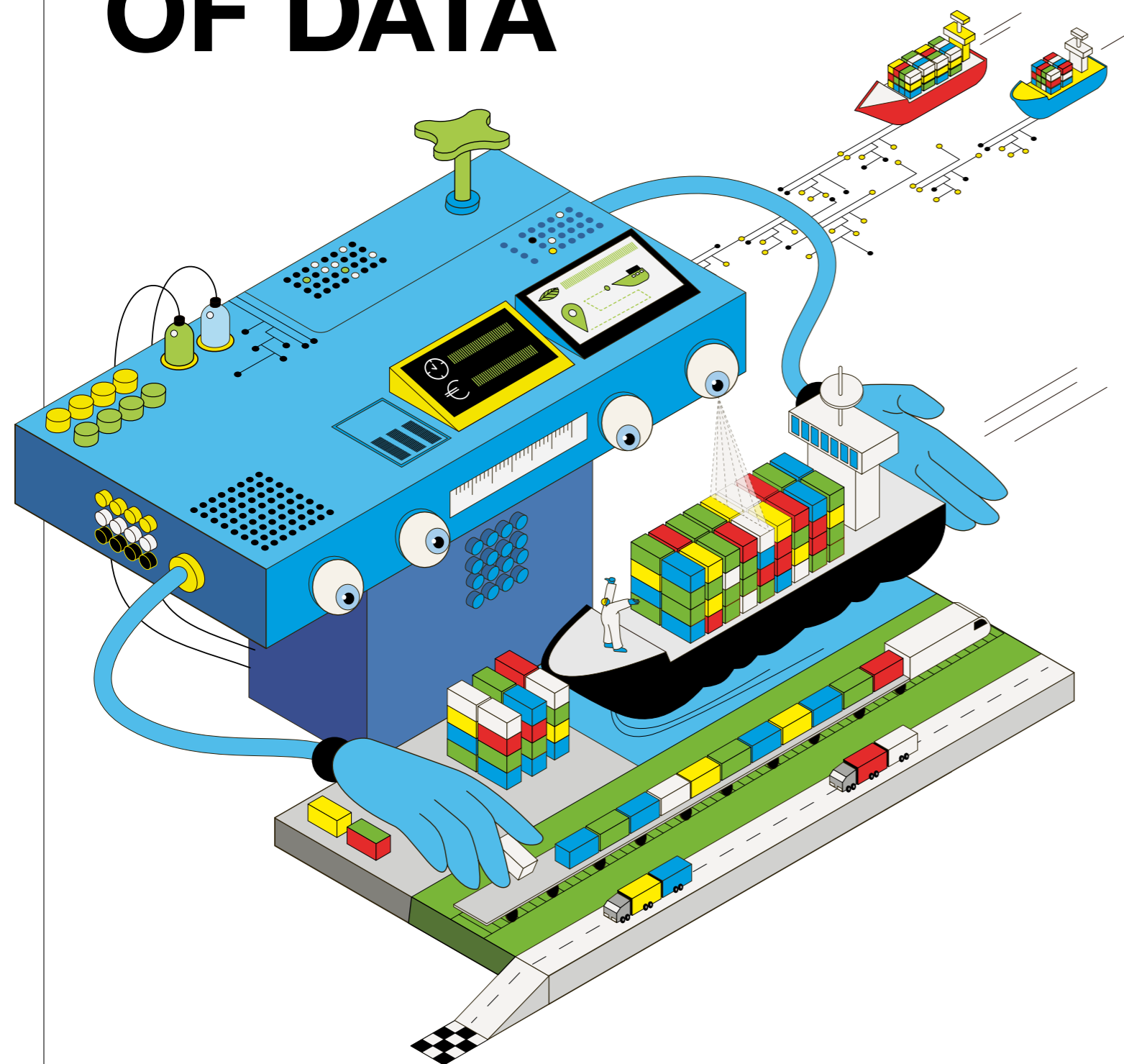


34 FROM A WORLD HERITAGE SITE TO A HEAT RESERVOIR



26 WHICH DRIVE ENERGY WILL WIN THE RACE?

LEVERAGING THE POWER OF DATA



Data is the “oil of the future” in logistics, too. Used with care, it could help make the global flow of goods more sustainable. However, it is often unavailable and requires standardisation. Transparency, networking and open standards make it easier to use.

A line appears on the screen with the first field “Origin” filled in with “Jena, DE”. This is followed by a whole row of technical details, coloured time slots and finally you get to the cell containing the entry “Destination: Pasir Gudang, MY”. The subject is a container carrying optical devices. The trained specialist studying the screen ensures that it is transported from Germany to Malaysia. To do this, she looks for the ideal ship connection with onshore pre-carriage and on-carriage, at the best possible price, of course. However, something that the standard software rarely has an overview of is how much CO₂ is emitted along the scheduled route.

Climate-friendly or even certified climate-neutral transport is something that is being requested by an increasing number of carriers. The consumer goods conglomerate Beiersdorf also pursues an ambitious sustainability agenda. To achieve its goals, it has expanded the digital platform offered by Ulm-based company Transporeon to include all of its global sea freight. This plays “a key role in maintaining sustainable, around-the-clock operations to support our global logistics network,” says Malte Schulz, Vice President, Supply Chain EU & NA at Beiersdorf. All participants along the transport chain can continue to work with their various IT systems because the digital documents are automatically sent out with the container and can be accessed via the shared platform.

Transporeon’s AI-controlled transport logistics platforms also include a sustainability hub, which is of particular interest to eco-conscious companies. There, they can calculate their CO₂ emissions down to the last pallet and then also reduce them in a targeted way. The “Carbon Visibility” solution combines the data from carriers, logistics service providers and freight forwarders and, according to the manufacturer, offers “access to all emissions data in one location in order to identify trends and inefficiencies, and to make informed decisions”. Transport man-



“We integrate primary consumption data from transport and logistics service providers in order to calculate precise and validated CO₂ values.”

Martin Jakobs,
Director Client Solutions
at Shipzero

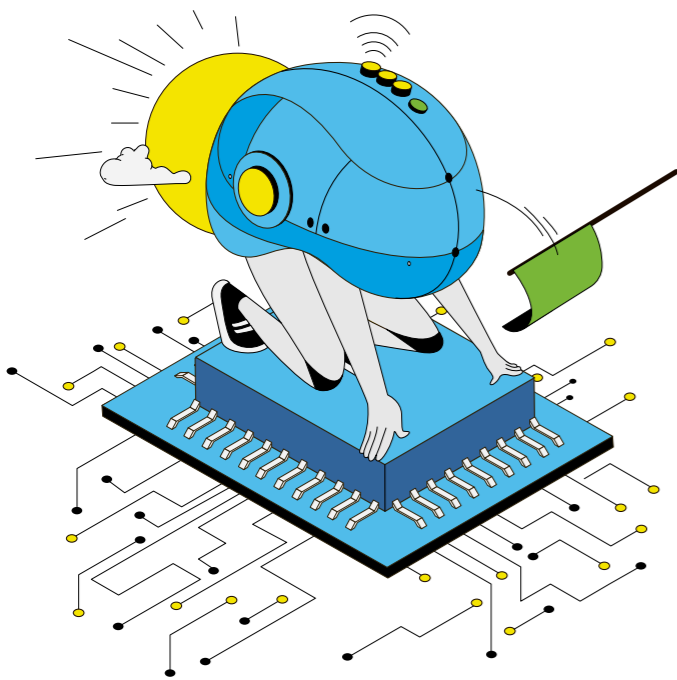
agement systems and telematics data can be interfaced via the application programming interface (API).

Data interfaces with poor connectivity are a hindrance

Various interfaces with poor connectivity are, however, still a hindrance to data communication – for example, for the forwarder of the optical devices from Jena. This is where the emissions data platform Shipzero comes in – which is in no way restricted to the shipping industry. Zero represents its mission “to support our customers in the decarbonisation of logistics,” says Martin Jakobs, Director Client Solutions of the Hamburg-based start-up. “There is a significant backlog in the industry, alongside the requirement to comply with lots of new regulatory standards.”

On behalf of our paying customers, around 40 employees work first and foremost to consolidate and harmonise the various data resulting from a logistics or transport order. “CO₂ reporting isn’t a plug-and-play model,” warns Jakobs. Sometimes simply comparing internal data from different departments is a challenge – let alone considering the national differences within a global supply chain. Shipzero can be integrated into the control and scheduling systems of its customers and receives modelled emission factors for all carriers and global transport routes. This enables the customer to work out where leverage can be applied and where there is the scope to reduce the carbon footprint of a transport. “In many cases, assumptions have to be made,” explains Jakobs. “At the same time, we are continually collecting data in order to get a more accurate picture. To do this, we integrate primary consumption data from transport and logistics service providers in order to calculate precise and validated CO₂ values.” He names Sovereign Speed as an example, which uses biofuels that comply with the new HVO 100 standard. In such cases, the vehicle telematics enable precise calculations to be made re- →

AI IS IN THE STARTING BLOCKS, READY TO OPTIMISE EVEN COMPLEX PROCESSES



→ regarding how high the CO₂ reductions would be in comparison to standard diesel on a specific route and for a specific order.

Making it simpler to book intermodal transport online

Booking and placement websites can also help to make transports more environmentally friendly. At least they do when they facilitate intermodal transport, as is the case for modality, an HHLA tech start-up. For every search request, the modality system displays a list of different transport options along with the amount of CO₂ savings they can achieve in comparison to heavy goods vehicles. Forwarders can integrate rail transport more easily because they can use the platform to find more than 800 intermodal connections from 55 operators before planning and booking them online directly from the provider. "And if a consignment doesn't arrive on time for whatever reason, a booking can be postponed to a later departure time directly via our portal," explains Nils Funke, marketing expert at modality. "Since our platform went live, the CO₂ savings from all rail transports booked via modality equate to the amount that would be captured by 172 hectares of forest per year," he says. In future, Funke can imagine submitting extensive sustainability reports. In the lon-

ger term, the intermodal platform also wants to "draw on various funding options" to integrate inland waterway shipping and ferries throughout Europe into short sea shipping, as these are also more environmentally friendly carriers.

Ambitious goals are also the focus for Singapore, the biggest maritime location in the world and Hamburg's third largest trade partner for container handling. The port hub in South East Asia handles around one seventh of all global transshipments and is responsible for 0.11 percent of global greenhouse gas emissions. By 2050, the terminals are to achieve net zero emissions. The digital networking of the many companies operating in the port aims to help with this. The main objective is to minimise idle times for ships and vehicles, as well as to achieve shorter port calls in order to reduce the amount of pollutants entering the air of the ecosystem. The Maritime Port Authority of Singapore (MPA) launched the Maritime Single Window "digitalPORT@SG" as its central platform. It is embedded in a just-in-time (JIT) planning and coordination system. This not only allows for more efficient planning of ship calls but also services such as handling and refuelling.

Singapore is growing with breathtaking speed: By 2040, the Tuas mega port, with a capacity of 65 million TEU, is set to become the largest fully automated port in the world. To achieve this, the MPA is currently testing a ship management system equipped with artificial intelligence (AI). This futuristic technology can draw on huge amounts of data to calculate future values, i.e. practically make predictions. This could also help to make complex port logistics processes more sustainable. The Port of Singapore is working at full speed and wants to launch the AI-based Next Generation Vessel Traffic Management System (NGVTMS) platform in 2025. The MPA is building the world's largest 5G network spanning a port to serve as data infrastructure. "It's not just about establishing digital systems but also good connectivity between the systems," says David Foo, Assistant Chief Executive of Operations Technology at the MPA. This aims to "lead to more efficient use of fuel and reduce unnecessary carbon emissions". To do this, terminal operators, transshippers,

freight forwarders, customs, shipping companies, rail companies and truckers all need to work together effectively. "This is already happening in ports around the world," says Sven Daniels, Partner at the HHLA consultancy subsidiary HPC Hamburg Port Consulting. In his experience, digital platforms are no longer being used to boost productivity: "Now, sustainability targets are what it's all about." But he highlights one of their weaknesses: "In Western Europe alone, there is a port community system in every port, but linking them up is very difficult." He finds overarching systems, such as a Singapore-style Maritime Single Window, the more logical choice for sustainable logistics.

Overall picture for ship calls in the Port of Hamburg

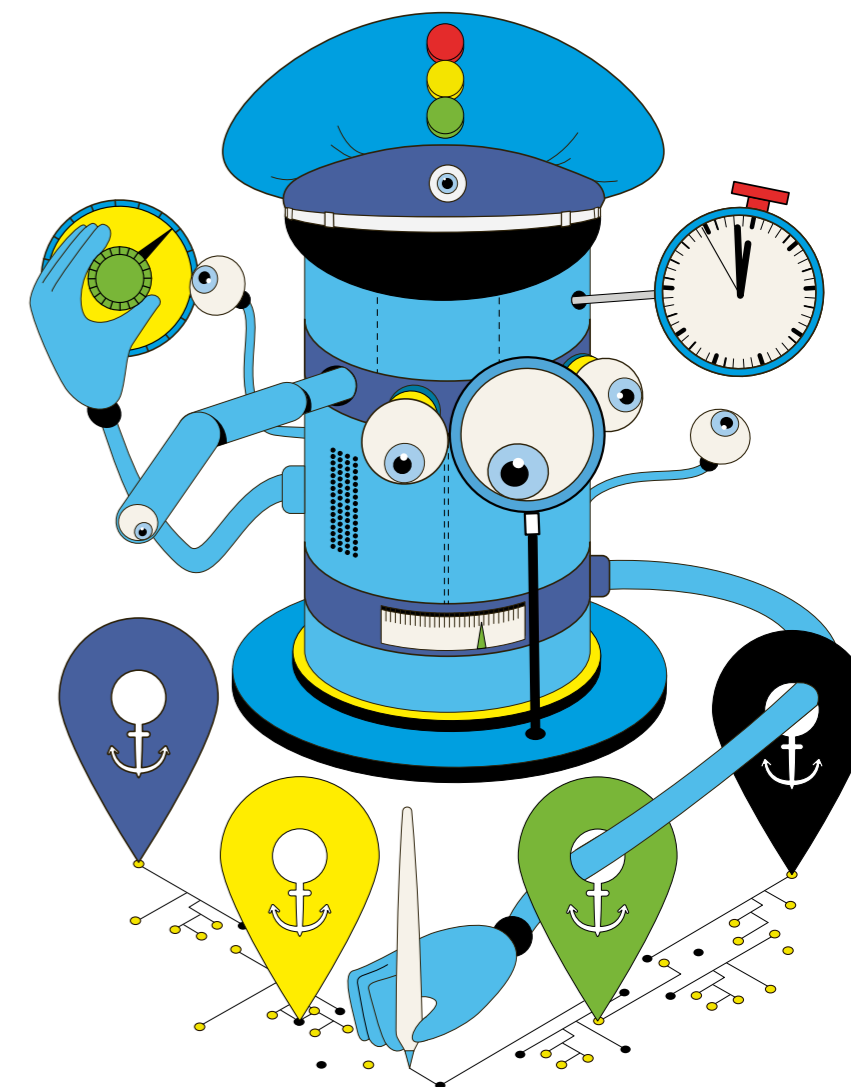
The Port of Hamburg is an industry pioneer when it comes to networking and data communication. One excellent example of the inter-company exchange of information is the HVCC Hamburg Vessel Coordination Center. Years ago, this joint venture of HHLA and Eurogate developed a similar method for managing ship calls as the one in place in Singapore. The HVCC is the central coordination point for mega-ship, feeder and inland waterway vessel traffic. Before, lots of information in the shipping industry and port business was exchanged by phone or email. "Using digital processes we aggregate data, build an overall picture of the port and plan ship calls days in advance," explains HVCC Managing Director Gerald Hirt. When platforms such as these deliver the right data at the right time, they can make logistics more sustainable. Hirt makes a calculation: "If an 18,000-TEU ship travels from Rotterdam to Hamburg at the optimised speed of just 14 knots instead of 18 knots, we can save more than 22 tonnes of fuel and 66 tonnes of CO₂."



"In Western Europe alone, there is a port community system in every port, but linking them up is very difficult."

Sven Daniels,
Partner at HPC Hamburg
Port Consulting

According to HPC expert Daniels, Hamburg and other European logistics hubs are already far ahead when it comes to sustainability, while there are "hardly any platforms and barely any data exchanged" in the USA. The same could be said of transport along the central corridor of the Iron Silk Road. The EcoTransIT World Initiative (EWI) platform does enable CO₂ calculations for partial routes, but the Global Shipping Business Network (GSBN) is of the opinion that it is essential for a low-carbon future that "data for reducing emissions across the entire supply chain must be measured and tracked". For this reason, the independent technology consortium in Hong Kong is developing a digital platform and concluded an information-sharing partnership with the Global Centre for Maritime Decarbonisation (GCMD) in Singapore in June 2023. The mutual goal is "to close the gaps in transparency between digitalisation and decarbonisation". This is true for the whole logistics sector, which could drastically reduce its significant impact on nature and the environment if this succeeds.



DYNAMIC DATA EXCHANGE

Patrick Alexander Rugenstein juggles nautical and many other types of data every single day. In the HVCC team, intelligent software is used to coordinate most ships calling at or sailing from Hamburg for the current and following day. Which explains the many monitors. The idea of sustainable use of resources was the driving force when HHLA and EUROGATE established their joint venture in 2009. Read this article to find out why HVCC manages this with great success, and how.



“OUR PERFORMANCE IS WAY ABOVE AVERAGE”

AS CHIEF EXECUTIVE OFFICER OF HHLA, ANGELA TITZRATH is also responsible for the sustainability department.

With size comes responsibility. A company history going back nearly 140 years also means responsibility. But we feel most responsibility towards the future, which depends more than ever on protecting the climate. It's a simple equation: If we destroy the climate, we destroy our world. Here at HHLA, sustainability has long been the driving force behind what we do.

After the energy industry, it is the transport sector that still emits the most CO₂ – also because the volumes being transported have continually grown over time. However, we are now living in an era of closely networked, international flows of goods that not only need an efficient logistics strategy, but also – and increasingly urgently – a climate-friendly one.

In the mobility sector, HHLA is a pioneer of sustainable logistics. In 2023, 79 per cent of our sales volume met the high climate protection requirements of the EU Taxonomy, while the European industry average for mobility companies was just 7 per cent (2022). In terms of our capital expenditure (CapEx), the proportion complying with the Taxonomy was around € 350 million (2023) – that's nearly 87 per cent! This clearly shows that our business model is one of the most sustainable in the mobility sector.

And we're very proud of that! We want to take on a key role in shaping the sustainable transformation of our industry and support other companies as a strategic partner. As such, our focus is on climate-friendly logistics chains and hubs. Our expertise has been confirmed by TÜV Nord on several occasions: We operate the world's first certified climate-neutral port handling facility (see also page 42). That facility is the Hamburg container terminal Altenwerder (CTA), where almost all vehicles are powered by electricity from renewable energy sources.

Our intermodal logistics make sustainable supply chains possible

But our climate-friendly logistics solutions extend far beyond quayside handling. With HHLA Pure we offer our clients a certified climate-neutral service package that includes both port handling and transport between the container terminals in the ports of Hamburg, Bremerhaven and Koper on the Adriatic and their respective hinterlands. Our rail subsidiary Metrans handles transportation within Europe almost exclusively using electric locomotives, which are

“We want to take on a key role in shaping the sustainable transformation of our industry.”



In 2023, **79 per cent** of HHLA's sales volume met the high climate protection requirements of the EU Taxonomy, while the European industry average for mobility companies was **just 7 per cent.**

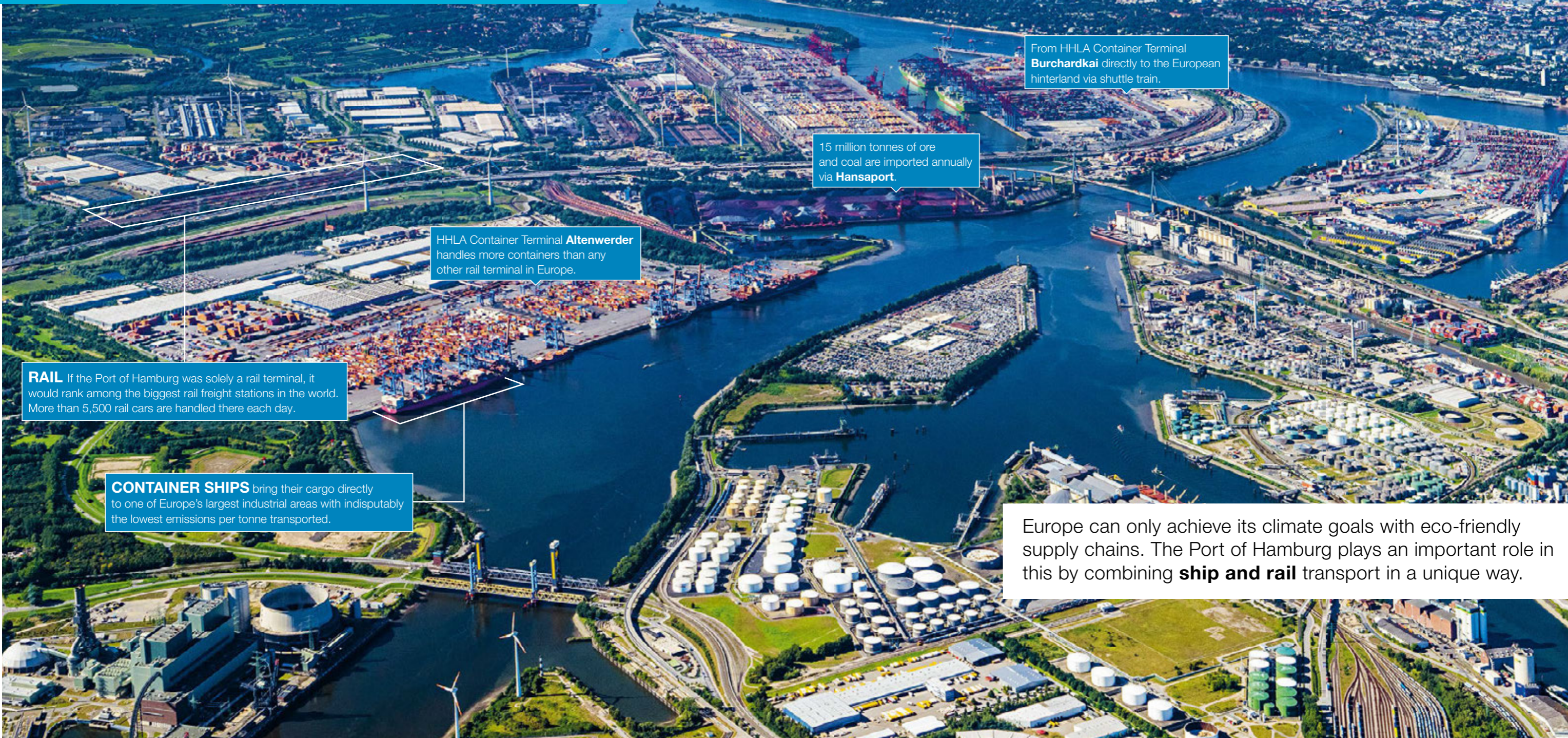
compatible with the electric power systems in seven European countries. The Metrans network is experiencing continual and dynamic growth. Around 650 connections a week encourage even more customers to switch their goods transports over from road to rail, which is the more environmentally friendly choice. Our strength in intermodal logistics safeguards sustainable and efficient supply chains. And we are already using e-trucks for “last mile” logistics. Because, after all, we want to keep improving with time!

CO₂ emissions already reduced by 38 per cent compared with 2018

In order to make our networked supply chains even more sustainable, we will be drawing on zero-emissions solutions both at our terminals and in rail transport. We want to achieve carbon-neutral production by 2040 and reduce our CO₂ emissions by at least half by 2030. By late 2023, we had already slashed our CO₂ emissions by 38 per cent compared with the baseline values from 2018. In Hamburg, we are currently working intensively on a project to switch to shore-side power. It will be used to supply container ships with energy so that the ship's engines can be switched off in port and they can further reduce their CO₂ and pollutant emissions. But this is just one example of the many projects all around Europe that we could mention. They show that sustainability is firmly anchored in our corporate governance and management processes. We are working confidently towards our vision for HHLA as a strong European logistics company with sustainable, innovative solutions for the logistics of the future.

But at our heart, we are guided by a very old idea that originated in Germany: “Don't fell more trees than are able to grow back.” This original concept for sustainability came from forestry. We used this as our inspiration and want to use the resources available in such a way that they are preserved over the long term, including for future generations. Because we have a responsibility towards the future.

AN UNBEATABLE COMBINATION



From HHLA Container Terminal **Burchardkai** directly to the European hinterland via shuttle train.

15 million tonnes of ore and coal are imported annually via **Hansaport**.

HHLA Container Terminal **Altenwerder** handles more containers than any other rail terminal in Europe.

RAIL If the Port of Hamburg was solely a rail terminal, it would rank among the biggest rail freight stations in the world. More than 5,500 rail cars are handled there each day.

CONTAINER SHIPS bring their cargo directly to one of Europe's largest industrial areas with indisputably the lowest emissions per tonne transported.

Europe can only achieve its climate goals with eco-friendly supply chains. The Port of Hamburg plays an important role in this by combining **ship and rail** transport in a unique way.



METRANS SHUNTERS at CTA. The HHLA intermodal subsidiary runs mainline locomotives in Germany on green power.

AS THE WORLD'S LARGEST RAIL PORT, HAMBURG IS AN ENVIRONMENTALLY FRIENDLY HUB.

Is Hamburg really the world's largest rail port? That cannot be said with the absolute certainty required by official statisticians. The data is inconclusive, as there is no clearly defined, internationally accepted parameter for port rail throughput. However, when it comes to the number of containers moved between ship and rail – the key indicator for seaports – Hamburg is unquestionably among the global leaders. In Europe, Germany's largest seaport is the undisputed number one.

The Hamburg port railway, operated by the Hamburg Port Authority (HPA), is the link between the port's many terminals and the Euro-



32%

of the containers transported by rail in Germany pass through Hamburg

pean rail network. It provides 290 kilometres of track for handling around 210 freight trains comprising more than 5,500 rail cars every day. No other port offers its customers nearly as many rail connections throughout Germany and Europe. Hamburg has 1,891 connections. An impressive 13 per cent of all of Germany's rail freight transport begins or ends in the Port of Hamburg. In terms of national container traffic, a full 32 per cent of boxes transported by rail in Germany pass through Hamburg. If the Port of Hamburg was solely a rail terminal, it would rank among the biggest rail freight stations in the world.

First of all, trains are much more energy-efficient than heavy goods vehicles and emit fewer harmful substances. Converted to tonne-kilometres (the number of kilometres travelled multiplied by the quantity of goods transported in tonnes), a truck emits 110 times more CO₂ than a train. Additionally, rail requires only 1.2 hectares of land for one kilometre of route, while road freight requires 3.6 hectares – three times as much land use!

Why is a rail port especially environmentally friendly?

Rail, already an eco-friendly mode of transport, is combined with large vessels at the Port of Hamburg. Container mega-ships, massive ore carriers and supertankers bring their cargo almost 110 kilometres inland along the river Elbe. Such "channel navigation" is beneficial from an overall environmental perspective. Why?

There are various interrelated reasons for this. Firstly, no other form of transport manages to keep its energy consumption and carbon footprint per tonne of cargo carried even remotely as low as mega-ships. What's more, container (and other) ships bring their cargo directly to one of Europe's most important economic regions, as the Port of Hamburg is Germany's largest contiguous industrial area, covering 4,226 hectares of land.

Lastly, a disproportionately high level of the goods destined for (or coming from) other regions are moved by rail. In 2023, almost 46 million tonnes of goods were transported via the Hamburg port railway's tracks. In particular the containers transported by rail covered significantly longer distances than those carried by road. Container mega-ships with a capacity of 20,000 standard containers (TEU) ensure plenty of activity. In Hamburg, an average of around 9,000 TEU are lifted from ships (unloaded) and loaded. Of these, 6,000 come from or head to the hinterland, while the remaining 3,000 or so containers are transshipments. Transshipments are transfers between the container mega-ships and smaller feeders, which are used to transport the boxes onwards by sea, primarily to the Baltic region. All of the HGVs, trains and ships needed for this would have to cover much greater distances if the Port of Hamburg did not serve as a hub.

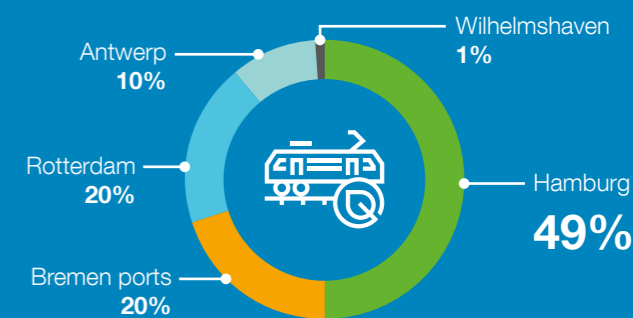
Rail is also indispensable for many bulk goods. Trains loaded with potash arrive at the K+S AG Kalikai site from the Werratal region, to be shipped from here to all around the world. And in the Port of Hamburg's fuel depots, tens of thousands of tank cars are processed every year. Transported by rail, they ensure the supply of a wide range of mineral oil products →

Key Northern European ports (North Range)

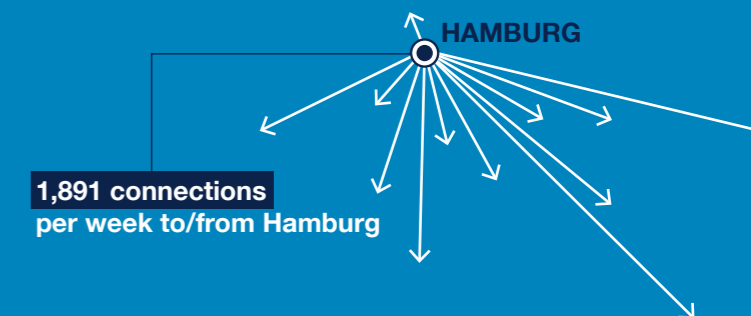


Hamburg puts by far the most boxes on the tracks

Share of overall rail traffic with the hinterland by port (total volume: 5.6 million standard containers)



No other port offers as many rail connections as Hamburg





“More than half of the steel industry’s transports are via rail. We rely on efficient logistics for the supply of raw materials and shipment of finished steel products.”

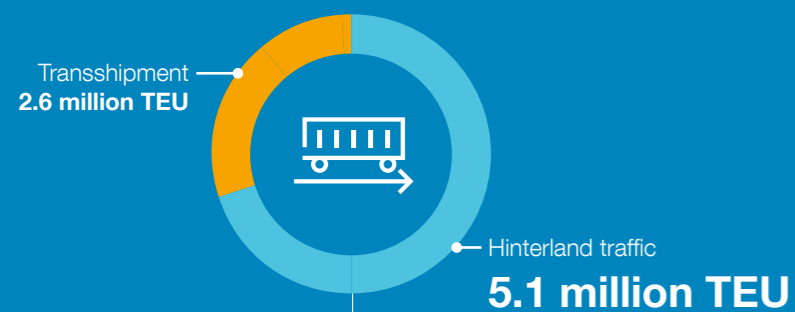
Kerstin Maria Rippel,
CEO of the German
Steel Association

→ and chemicals. The block trains that carry up to 6,000 tonnes of iron ore and coal to the Salzgitter and Eisenhüttenstadt steelworks are the heaviest trains operating in Germany. They are loaded by HHLA subsidiary Hansaport by means of an automated process. Quantities that could only be transported by rail are handled at the Hamburg terminal. Nobody could be in favour of having heavy goods vehicles transport up to 15 million tonnes of ore and coal on Germany’s roads each year.

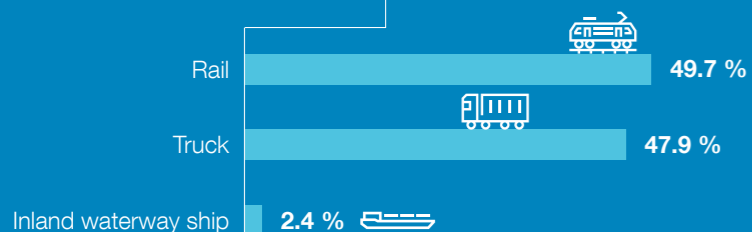
Almost everything apart from bulk goods (such as coal and mineral oils) is transported in containers. The colourful boxes are mainly handled in the western part of the port at the HHLA and Eurogate container terminals. The rail terminal at HHLA Container Terminal Altenwerder (CTA) holds the record with around 900,000 TEU per year, making it Germany’s largest rail terminal and Europe’s biggest container terminal. Such quantities mean that every hour of operation and every square metre of space

Container volumes by carrier (modal split)

7.7 million TEU (2023) were handled in the Port of Hamburg



Hinterland traffic by mode of transport



TRAIN LOADING AT HANSAPORT
The block trains loaded here by automated means with up to 6,000 tonnes of iron ore and coal are the heaviest trains operating in Germany.



must be optimally used. Everything runs extremely smoothly here and the four rail gantry trains are constantly in motion. The nine tracks, each 720 metres in length, are occupied around the clock. The annual track capacity is divided into slots of equal duration that are assigned to the trains of the rail operators. Each slot is 4.5 hours long, during which time the CTA employees must unload and load the entire train.

Metrans makes rail transport attractive

Without smart rail operators like HHLA’s intermodal company Metrans, there would be no high-frequency connections between the port and hinterland. Metrans runs modern electric locomotives that move the company’s own block trains throughout large parts of Europe, while its environmentally friendly hybrid locomotives perform shunting work at the Port of Hamburg. But the company is more than just an operator of technology. Metrans has developed a well-organised hub & shuttle system that works in a similar way to large airports, where passengers on their way from Leipzig to New York, for example, change planes in Frankfurt. Such pooling of intermodal traffic, just as in air transport, connects smaller and medium-sized locations to the efficient Metrans network. Regular shuttle services reliably move the containers in a carbon-neutral way (more on this on page 40) between Hamburg and the hub terminals. The HHLA terminals at the seaport load the import containers from the vessels onto the Metrans block trains in any order. Sorting only takes place then in Prague, Ceska Trebova or Dunajska Streda. The reverse is the case for export containers.

However, this system is not suitable for every connection. Flexibility is therefore a must. Metrans must try to coordinate the volumes at the individual terminals, which vary on a daily basis, with the respective destination and the imbalance in import and export. To this end, so-called multi-group trains are used. Metrans puts together block trains from rail car groups of varying strength that are loaded at the individual terminals and then travel to Munich, for instance. Such logistically and economically viable logistics solutions make rail transport an option for a large group of customers. This in turn has a positive effect on transport prices. The benefits of rail as a mode of transport already mentioned can only be fully exploited through this kind of optimised interplay exemplified at Hamburg’s rail port.



DRY BULK HANDLING
The up to 15 million tonnes of ore and coal imported by Hansaport are transported away from the port by rail and inland waterway.

POWERING THE FUTURE SHIPPING INDUSTRY: WHICH ENERGY SOURCE WILL WIN THE RACE?

Shippotting is a popular hobby in a maritime city like Hamburg. The many marine buffs keen to take photos eagerly awaited the maiden voyage of the Ane Maersk in early 2024. The 350-metre-long, 53.5-metre-wide container ship has an unusual shape, with the container gantry crane at the bow. This leaves space for two tanks: one bunkering bio-diesel and the other **methanol**. This exceptional vessel was even powered by biomethanol for its trip along the river Elbe. According to Danish shipping company Maersk, the resulting emissions are 65 per cent lower than those of fossil fuels. Diesel is still needed to ignite the engine and in case the methanol runs



152

methanol-powered ships with a total capacity of 1.75 million TEU are on shipyard order books

out. A great many shipping companies are now opting for the energy-rich compound CH_3O . Shipyards currently have orders for 152 methanol-powered ships with a total capacity of over 1.75 million TEU. In addition to the low emissions, methanol is not poisonous to marine life (unlike ammonia, which produces toxic fumes, and heavy fuel oil or diesel, which can devastate entire stretches of sea). In the event of accidental spillage, methanol is no longer detectable in water after an hour.

Unfortunately, it is not possible to grow sufficient energy crops to obtain enough methanol for the some 100,000 vessels all over the world. Industrially produced alcohol is not a solution either. **Ammonia**, methanol's competitor in the race to find alternative fuels, has similar issues. NH_3 is a compound of hydrogen and nitrogen. While nitrogen, as the main element in the air we breathe, can be made available everywhere, consumers from a multitude of different industries are vying for the coveted "green" hydrogen. But ammonia in gaseous form is poisonous and has a pungent smell. It needs to be kept at a temperature of below mi-



METHANOL IN THE BLOOD

The Ane Maersk has an unusual shape, with the container gantry crane at the bow. This leaves space for an additional methanol tank.

nus 30 degrees Celsius to stay liquid. Nevertheless, many experts believe it will play a major role in future ship propulsion.

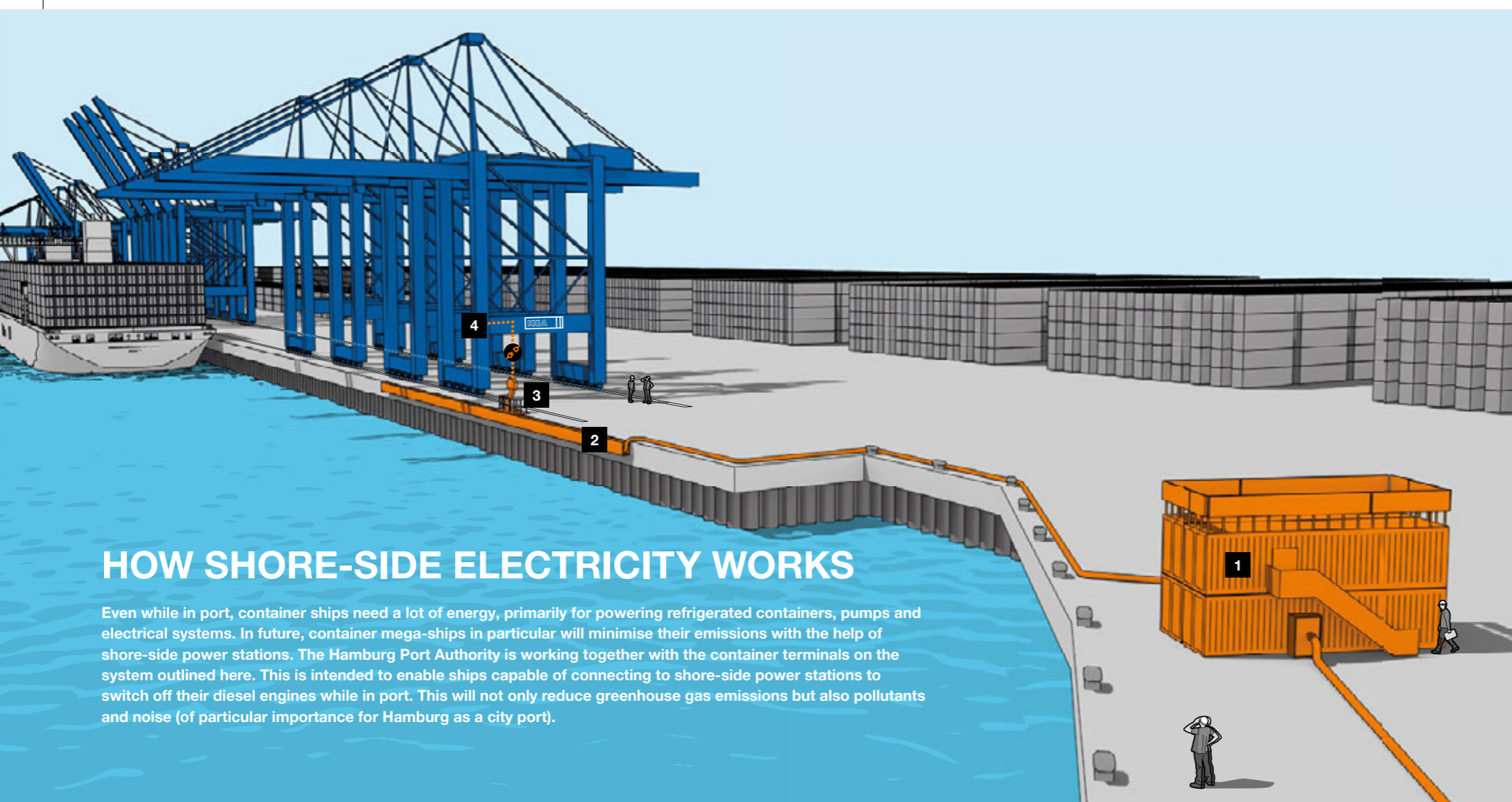
Will ammonia replace liquefied natural gas?

Many have recently pinned their hopes on **liquefied natural gas (LNG)**. German shipping company Hapag-Lloyd has equipped two container mega-ships with suitable dual-fuel technology to enable them to be powered with non-fossil fuels at a later point as well. Hapag-Lloyd is aiming to reduce current CO₂

emissions by a quarter with LNG. Industry leader MSC, which operates almost 800 vessels, also has 100 dual-fuel ships on the way as part of its fleet renewal strategy.

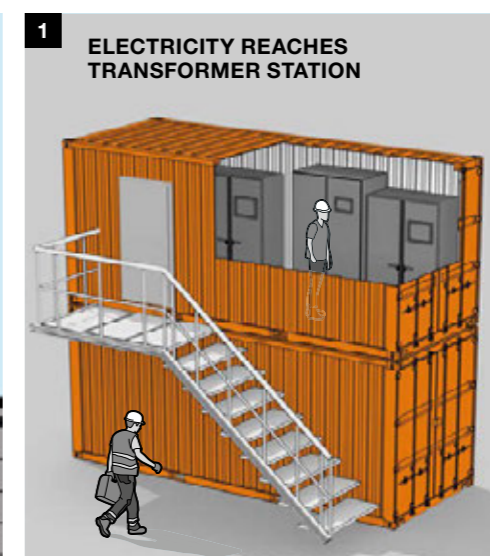
Hartmut Beyer from HPC Hamburg Port Consulting is convinced: "In the long run, significantly greater importance will be attached to methanol and ammonia in its green version as marine fuel, which will replace LNG due to their reduced CO₂ emissions. Next-generation synthetic fuels will then gain in significance in the shipping industry when it becomes cheaper to produce and process green hydrogen. This would be the ideal scenario, as it would enable continued use of the existing maritime supply infrastructure and established engine technology."

All of these efforts and the competition between energy sources are necessary because the International Maritime Organization (IMO) has adopted a strategy for a gradual lowering of greenhouse gas emissions which envisages a reduction of at least 20 per cent by 2030 and 70 per cent by 2040, compared with 2008 levels. It has set a target of zero-emission shipping by 2050.

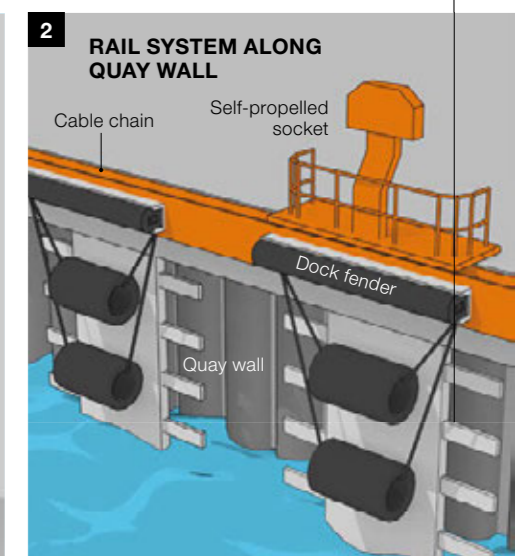


HOW SHORE-SIDE ELECTRICITY WORKS

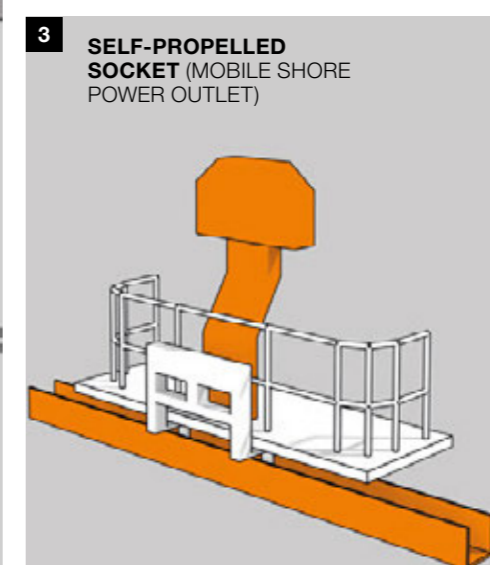
Even while in port, container ships need a lot of energy, primarily for powering refrigerated containers, pumps and electrical systems. In future, container mega-ships in particular will minimise their emissions with the help of shore-side power stations. The Hamburg Port Authority is working together with the container terminals on the system outlined here. This is intended to enable ships capable of connecting to shore-side power stations to switch off their diesel engines while in port. This will not only reduce greenhouse gas emissions but also pollutants and noise (of particular importance for Hamburg as a city port).



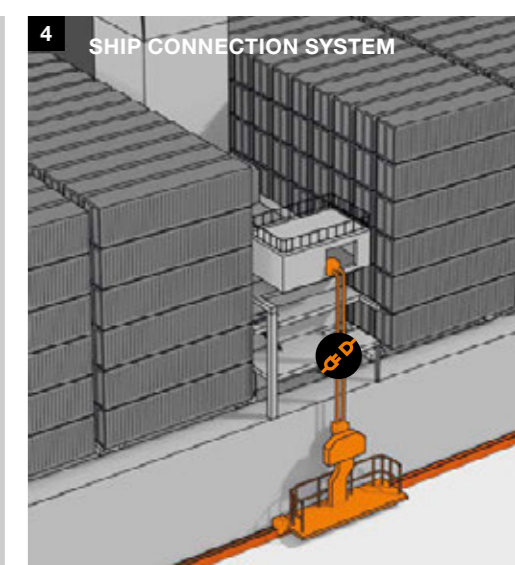
1 ELECTRICITY REACHES TRANSFORMER STATION



2 RAIL SYSTEM ALONG QUAY WALL



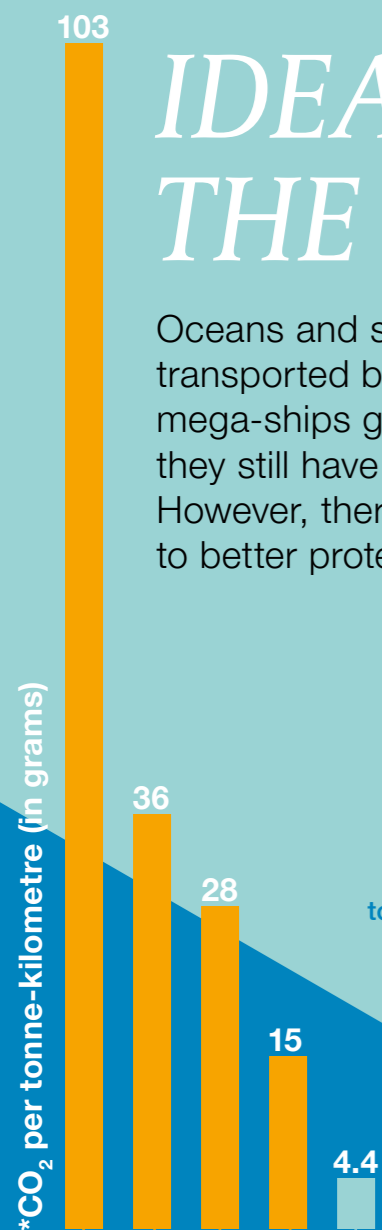
3 SELF-PROPELLED SOCKET (MOBILE SHORE POWER OUTLET)



4 SHIP CONNECTION SYSTEM

IDEAS TO PROTECT THE MARINE WORLD

Oceans and seas are essential to logistics. Most of the world's trade is transported by water and this has always been the case. Even though mega-ships generate the lowest carbon emissions per tonne transported, they still have a significant impact overall on all marine water bodies. However, there is also awareness of this issue, and a lot is being done to better protect our oceans. Four start-ups are leading the way.



3%

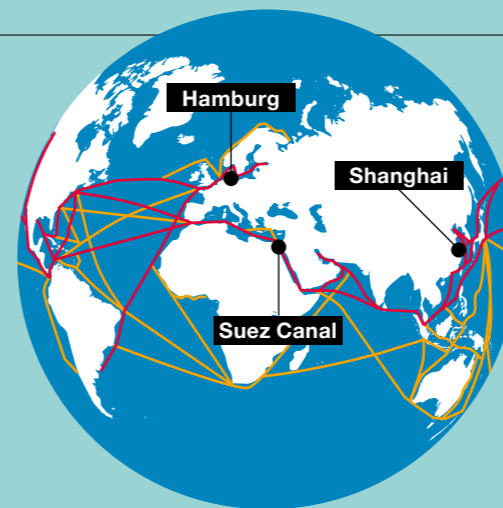
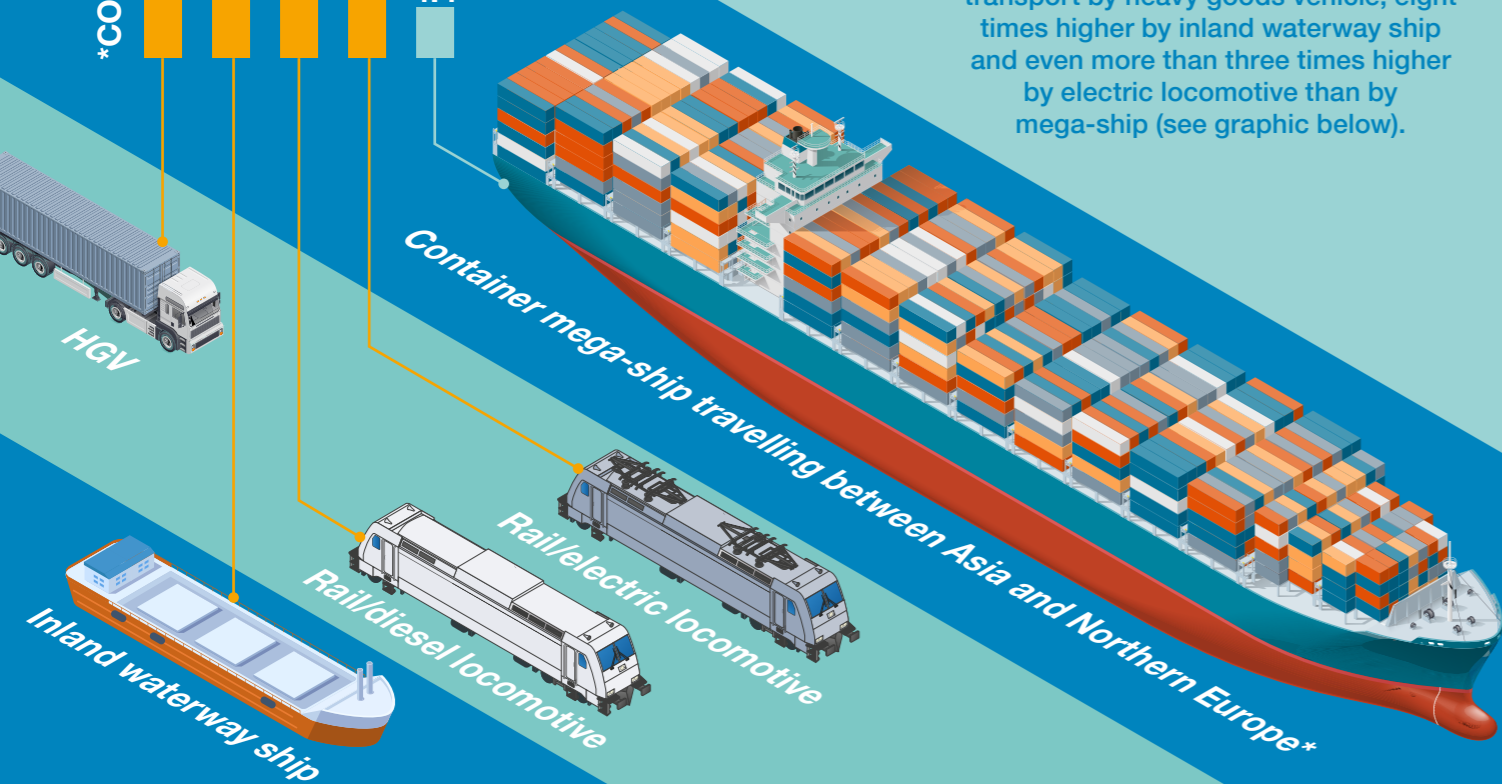
Shipping emits 1,000 million tonnes of CO₂ annually, equivalent to 3% of global CO₂ emissions.



4.4

grams of CO₂ per tonne-kilometre

However, no other form of transport manages to keep its energy consumption and carbon footprint per tonne of cargo carried even remotely as low as mega-ships. By comparison, emissions are around 20 times higher for transport by heavy goods vehicle, eight times higher by inland waterway ship and even more than three times higher by electric locomotive than by mega-ship (see graphic below).



— Primary maritime trade routes
— Secondary routes

According to the United Nations Conference on Trade and Development (UNCTAD), there were almost

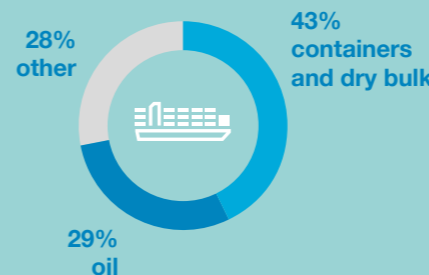
100,000

cargo, container, tanker, ferry and passenger ships operating worldwide in 2020.



32,000,000

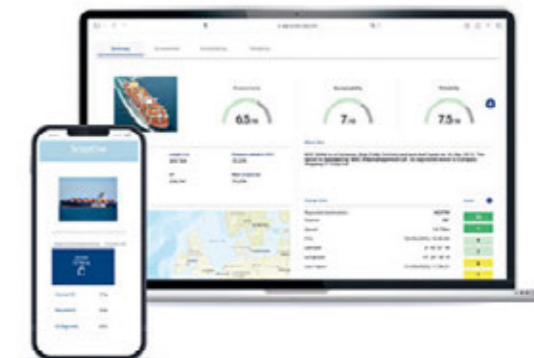
cruise passengers travelled the seas in 2023 – almost two million more than before the coronavirus pandemic.



43%

of all vessels transport containers or loose dry bulk (e.g. cement, coal and grain), 29% oil. The cargo volume has doubled within 20 years.

* STANDARD CONTAINER (SOURCE: GERMAN ENVIRONMENT AGENCY (UBA) 2022; TREMOD 6.51, CLEAN CARGO WORKING GROUP 2020; OWN CALCULATIONS)



DATA, DATA AND MORE DATA

An extensive network of knowledge and information allows transit times to be shortened, route management improved and CO₂ emissions reduced.



OceanScore & Searoutes

The problem: The EU wants to slash shipping-related greenhouse gas emissions by 2050. This is a challenge for the shipping companies operating the more than 100,000 relevant commercial vessels worldwide. Which ship should be used? In which port should it be loaded? Where will it be unloaded? What is the most cost-effective route? And increasingly: what is the most environmentally friendly route?

The idea: Knowledge is power. Shipping companies need as much information as possible to minimise the burden placed by shipments on the seas, air and wildlife. OceanScore ensures precise environmental analyses of trade routes by collecting data about time zones, climate, traffic densities, ports, anchorages, flora, fauna and wildlife. Under founder Pierre Garreau, Searoutes has developed an algorithm for its navigation software that takes account of the environmental factor when calculating routes.

The result: Companies like HHLA subsidiaries OceanScore and Searoutes can help to dramatically reduce transit times and CO₂ emissions. Potential savings in CO₂ emissions of 25 to 30 per cent per container are achievable with data-driven analyses.

→ oceanscore.com → searoutes.com

Wildplastic

The problem: There are billions of tonnes of plastic in nature and our seas. In addition to emerging and developing countries, parts of Europe are also affected. Wild plastic in nature, rivers and seas is a global problem.

The idea: In an effort to rid our planet of plastic waste, founder Christian Sigmund introduced the first plastic bag made of recovered plastic in 2019. The "Wildbag" could hold 35 litres. Conventional refuse sacks made of recycled plastic did have a better carbon footprint than the bags from Wildplastic. However, unlike competitors who obtain their raw materials from households and industry, Wildplastic also aimed to rid the world of plastic in the wild. And in countries without recycling structures, such as Haiti, Malaysia and India, it wanted those collecting the plastic to be fairly remunerated.

The result: Wildplastic has recovered 490,000 kilos of plastic to date, thereby saving around one million kilos of CO₂. The Otto Group has been cooperating with the start-up in Hamburg's Speicherstadt historical warehouse district since 2020 to replace its shipping bags made of industrially manufactured plastic. With half of all goods being shipped in alternative packaging by late 2022 already, the retail giant then announced it had reached the 100 per cent mark at the beginning of this year.

→ wildplastic.com



WASTE DESTROYS HABITATS
There are 80 to 150 million tonnes of plastic in our seas. Christian Sigmund (pictured below) founded a company to collect this plastic and turn it into "Wildbags" – bags made from recovered plastic.



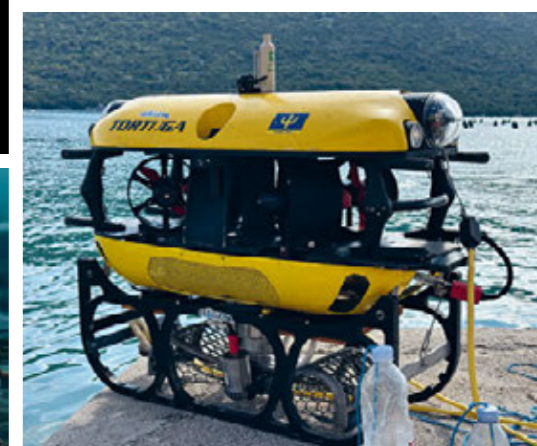
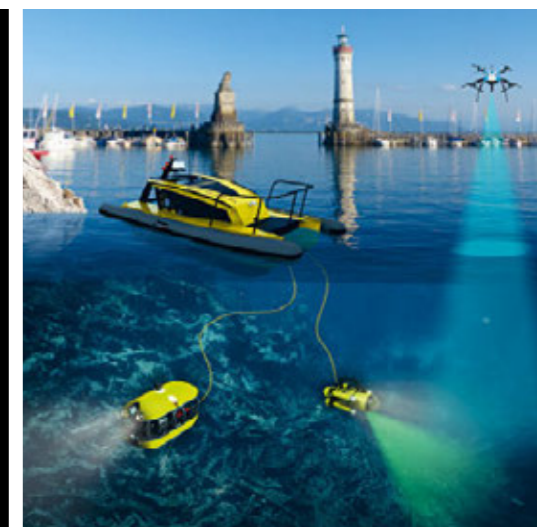
SeaClear

The problem: Much of the waste produced worldwide eventually ends up in our seas. 20 per cent of the waste in our water bodies comes from marine traffic.

The idea: Researchers at the Fraunhofer Center for Maritime Logistics and Services (CML) have developed robots that can clear waste from the seabed. The system consists of a "mothership" that serves as the central unit. This controls two remotely operated underwater vehicles. The smaller vehicle scans the area while the larger one collects the waste and deposits it in a basket.

The result: The SeaClear system can collect up to seven kilos of waste in water bodies with a depth of up to ten metres. It works even in murky waters and will operate at 70 per cent less cost than divers.

→ cml.fraunhofer.de/de/forschungsprojekte1/SeaClear.html

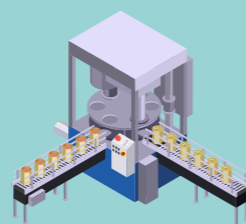


BE A DEAR AND BRING UP THE WASTE?
When divers reach their limits, robots step up. Even in the murkiest of waters, they can find waste on the seabed.

SEAS AND PLASTIC



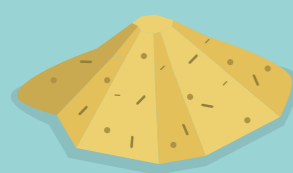
Plastic waste floating on the water's surface only accounts for a small proportion of such pollution – for the most part, it disintegrates into fine particles of less than five millimetres in size.



Sooner or later, much of the plastic produced worldwide ends up in our seas and oceans, which now hold between 80 and 150 million tonnes of plastic waste.



Products from takeaway food and drink, such as cups, cutlery and packaging, constitute the largest part of the plastic waste in our seas.



1,600

microplastics per kilogramme of soil have already been found in seabed sediment samples.



20%

of all plastic waste in our seas comes from marine-going vessels.



In 2018, 115 undigested disposable cups were found in the stomach of a dead sperm whale.

Natural, turbocharged "plastic eater"



Conventional plastic packaging takes hundreds of years to decompose naturally. The German Environment Agency states that the volume of such packaging doubled between 1995 and 2018. Conventional recycling involving shredding, melting or the like could not alleviate the problem. For years, researchers

have therefore been looking for enzymes that can degrade polyethylene terephthalate (PET). In the course of their methodical search, scientists at Leipzig University have now discovered the enzyme PHL7. It "eats" at record speed, decomposing the plastic by 90 per cent within just 16 hours. In an aqueous environment and at a temperature of 65 to 70 degrees Celsius, the enzyme breaks down the plastic into its components terephthalic acid and ethylene glycol, which can then be usefully fed back into the recycling loop. A special component of the enzyme is responsible for its fast-acting effects: the amino acid leucine. Using protein engineering methods, it is hoped the enzyme may even do its good work more efficiently over a long period of time.

<https://lmy.de/IDNWi>



KEEPING EARS AND HEART OPEN

As a social and addiction counsellor, **Tatjana Meichsner** often hears moving, frequently complicated testimonies. But generally she works with people to find a way forward.

Lending a sympathetic ear is the most important tool in my work, says Tatjana Meichsner. “Along with a box of tissues,” she adds immediately. “Because emotions are often finding their way into my office.” Tatjana meets them with an impressively cheerful, optimistic nature. Although she often hears moving, difficult or complicated testimonies as a social and addiction counsellor, “my job is to show people that there is a way out. That’s why I take a very solution-oriented approach.”

The first thing she does is to really listen, not just keep her ears open. The people coming to her drop-in sessions find an open and approachable person sitting across from them. You can

feel her empathy and her gaze is full of compassion. “Sometimes all my clients need is someone to really listen to them. They understand that their problems are taken seriously and their situation can be seen in a different light.” In most cases, listening is just the start of a much longer journey. And Tatjana is there to show the way.

In her conversations with her clients, they discuss together what the next step should be on this journey. “Depending on the situation, I recommend various avenues,” she explains. “Working with our company doctors, I can refer them to specialists – usually psychiatrists or professional clinics dealing with addiction. In cases of bullying, our HHLA compliance or anti-discrimination officer can help. And then

there’s also the debt counselling service offered by the Hamburger Verbraucherzentrale (Hamburg Consumer Organisation) if the problems are financial in nature.”

HHLA works with a wide range of institutions to ensure that appointments are available as quickly as possible. The partnership with the intervention agency “Insite” means that psychological assessments can be conducted very quickly – usually within 14 days – which is otherwise unheard of. The employer even pays for up to five sessions. The social counsellor’s advice almost always takes the form of recommendations. Clients attend her drop-in sessions voluntarily, which alternate between being held at the HHLA port terminals and in the Speicherstadt historical warehouse district. There is no pressure on them to take any particular course of action and Tatjana has a legal duty of confidentiality. Certain cases relating to addiction are the exception. If the addiction is evident at work or it impacts the employee’s ability to work, the employee may be required to attend addiction counselling. The supervisors then have to become actively involved, including in order to protect colleagues. In such cases, there are precisely defined interventions that have been developed in partnership with the codetermination bodies. Tatjana also has a clear role in this action plan.

Counselling requirement only if addiction is evident in the workplace

Addiction counselling actually makes up a large part of what she does. Alcohol continues to be the number one drug, while the consumption of cannabis, cocaine and other drugs is on the rise. The most important topic for the people sitting opposite Tatjana, however, is increasing psychological stress. This is also reflected in the latest statistics from the health insurance association (see next page). Stress can have very different causes. Tatjana’s clients may describe that they are no longer able to sleep, or that they have lost all motivation. Sometimes they have taken on too much, or they are not being treated fairly in the workplace. In other cases, terrible life events or all-consuming anxiety have led to their problems.

There’s almost nothing that Tatjana Meichsner hasn’t heard and seen in her long career. Born in 1970, she studied Social Education at the University of Kiel, followed by Family Therapy. In her role, it’s important that she continues learning, which is why this was followed by training in coaching and mediation. HHLA is currently paying for her course in “Guiding



“When people are in crisis, work can give them a sense of stability and normality.”

Tatjana Meichsner

Mediation Processes Within Organisations”. This is important, Tatjana explains, because she is increasingly asked by teams to help them improve their internal cooperation and chemistry. After completing her studies, she worked for a long time as a psychosocial counsellor in the professional rehabilitation of people with mental illness. With this experience already under her belt, she switched to working at a specialist social counselling agency. The agency had a contract with HHLA. This is how she became familiar with the logistics company and how, in 2020, she was able to successfully apply for the position she holds today.

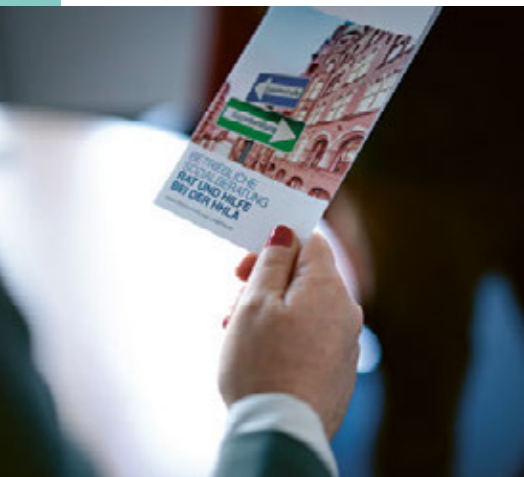
Not many companies offer such in-depth counselling services

Unlike HHLA, not many companies provide a standing social and addiction counsellor. A company is only as good as its employees, which is why we ensure they have access to the best-possible medical care. This brings a lot of advantages for both sides. After all, HHLA staff are the ones who are responsible for ensuring that logistics processes run seamlessly for the customers and are processed efficiently within the company. That’s why the company should not have to go without their abilities and valuable experiences for long. “We also want to make the legally mandated assistance for the reintegration of employees after a period of illness lasting more than six weeks as professional as possible. When people are in crisis, work can give them a sense of stability and normality,” Tatjana explains. “It’s in everyone’s best interests to keep time off to a minimum.” →



COMPASSIONATE LISTENER Tatjana’s clients come to her regular drop-in sessions voluntarily and anonymously. They are the ones who decide what will happen next.





PRESENT AND MOBILE
Drop-in sessions alternate between being held at the HHLA port terminals and in the Speicherstadt historical warehouse district.

Management staff require training in how to handle cases of addiction.

→ To make this happen, she may also talk to the employee's team leader or manager. Could shifts be planned differently because only one parent is available for childcare after a difficult divorce? Or does a new job need to be found and do conditions need to be monitored?

For the social counsellor, the person and his or her health is always the focus. No one is forced to do anything; almost all assistance is completely voluntary. The appointments for her drop-in sessions are organised in such a way that clients do not bump into each other in front of her door. Everything is anonymous. Tatjana also offers training sessions for management staff. They learn, for example, how to handle instances of addiction, or when they must initiate the prescribed intervention chains. Tatjana certainly has a lot of tasks with great responsibility. "Sometimes it's a lot but I do have time to relax from time to time," she says. "It's a great, very multifaceted job. I never know what I'm going to be faced with next. I'm usually able to maintain the required distance, despite feeling empathy." If, despite her experience, she can't see a way forward or needs assistance with dealing with difficult experiences herself, she can draw on a broad professional network and talk to the right people.

When having a difficult week, she is motivated by bumping into former clients who are now feeling much better. "Most of them, I never hear from again, which is totally OK," she says. "It's not easy for everyone to accept help or be reminded of hard times. But sometimes someone shakes my hand in the corridor to my office, or smiles at me in the canteen. And that's a lovely reward!"

MENTAL ILLNESSES

...are only the **fifth most common type of** diagnosis after respiratory illnesses (predominantly caused by coronaviruses), musculoskeletal conditions and other infections.

...However, they result in by far **the most amount of time off work**. Between 2002 and 2022, time off in German companies as a result of psychological and behavioural disorders increased by **220 per cent** – more than for any other diagnosis!

Lost days per case for psychological disorders:



For comparison: Lost days per case for cancer (neoplasm):



PORT SCOUTS

...ON A DISCOVERY TOUR

For young people, the Port of Hamburg is an exciting place. Huge ships, unusual vehicles and interesting logistics processes are all there, ready to be discovered. This is why HHLA has been working with the German Port Museum and the Hamburg State Institute for Teacher Training and School Development since 2015. Thanks to the Port Scouts project, more than 10,000 fourth-grade pupils from Hamburg have already taken part in tours of the port.

One-day excursions give the Port Scouts insights into Germany's biggest seaport, its history and modern port logistics. Specially trained guides accompany them through the day and boost the children's enthusiasm with stories, quizzes and games. HHLA actively supports the project as part of its sustainability strategy.

"The 'Port Scouts' educational project is very near to our hearts", says Ines Booleke, who manages the project within HHLA Corporate Communications. "We want to vividly show the visiting pupils how incredibly important the Port of Hamburg is for the global transportation of goods. Throughout the tour, they learn how everyday products come from all over the world to end up in our shops and supermarkets."



ADVENTURE IN THE PORT MUSEUM

Who can push the hand truck the fastest? In the Port Museum, Port Scouts can experience for themselves how tough work can be. The primary school pupils can enjoy plenty of highlights on their excursion. In the outdoor area and in the viewing depot, they can come into contact with technology that is no longer in use anywhere in the world. But they also get to know the cutting-edge Container Terminal Altenwerder during a bus tour.





BATTERY-POWERED automated guided vehicles (AGV) have played a major role in the CTA being certified climate-neutral several times now.



ELECTRIC ROAD TRAFFIC
At 300 kilowatts, vehicles can be charged with enough green electricity in 45 minutes to travel around 200 km. The first 600 kilometres of motorway between Dortmund and Schegenheim have been equipped for e-trucks. Many more will be needed in future.

FUELLING HOPE

New drive technology for trucks and ground-handling vehicles:

Alternatives to diesel drives are already being used and some are still in the field-testing phase.

The terminals are becoming “greener” behind the quayside – regardless of the season. We’re talking about environmentally friendly drive systems. Ground-handling vehicles in the port need them just as much as heavy goods vehicles on the roads. We need new technologies so that HHLA can achieve climate-neutral production throughout the Group by 2040 and so that Germany can achieve the government’s target of greenhouse gas-neutrality by 2045. We are currently working at full speed to develop and test alternatives to diesel – from battery-powered propulsion using hydrogen to alternative fuels for existing vehicles equipped with internal combustion engines. Whether a new fuel or drive technology becomes viable, or whether several will continue to be used side by side, is an exciting prospect. As a result, HHLA is testing them in parallel.

Battery-powered propulsion has already proven itself for automated guided vehicles (AGV). They transport steel boxes between the quayside and container storage blocks without emitting any carbon, soot or nitrogen oxide. It

takes around 90 minutes for them to charge their battery for an entire day’s work at one of 18 specially equipped rapid-charging stations. They have made a significant contribution towards the drastic drop in greenhouse gas emissions of the HHLA Container Terminal Altenwerder (CTA) in recent years. 5 million litres of diesel are saved every year because the fleet of 100 AGVs has been powered by battery and green electricity since late 2023. Tractor units are also being retrofitted for this, and the 14 container gantry cranes for seaborne handling, the 52 portal cranes in the container storage blocks and the four rail gantry cranes have also been powered by green electricity for quite some time.

E-trucks require a comprehensive charging infrastructure

A similar comprehensive charging infrastructure would be necessary for battery-powered drive systems to become successful in road freight. According to Alexander Junge, E-Mobility Director at Aral/BP, it is still the case that electric trucks “generally have to return to their

home depot for charging”. To change this, the oil company set up ten 300-kilowatt charging stations in 2023 along the 600-kilometre Rhine-Alpine Corridor to charge electric heavy goods vehicles, among others. Each charging station is capable of charging 20 heavy goods vehicles every day for 45 minutes each, providing them with enough green electricity to travel up to 200 km. Their partner in this endeavour is commercial vehicle manufacturer Daimler Truck, which has been offering the battery-powered Mercedes Benz eActros for heavy-duty delivery transport since 2021 and has announced that its counterpart for long-distance routes will be ready for series production in 2024.

There are also various approaches to using e-trucks within the HHLA Group. For example, the HHLA intermodal company Metrans has already presented its first e-trucks for container transport in Hungary and Slovakia.

Some manufacturers of heavy goods vehicles – as well as HHLA – are pursuing a dual approach when it comes to new forms of propulsion. Daimler Truck is working with the Linde industrial group to develop liquid hydrogen refuelling technology for trucks running on fuel cells. The performance is similar to that of a diesel heavy goods vehicle. Daimler Truck and BP, along with other energy companies, are planning additional hydrogen refuelling stations along major transport routes in Europe. The manufacturer is even working together with competitors as part of the H2Accelerate (H2A) interest group in order to ensure the European breakthrough of this drive system and founded the fuel-cell joint venture in partnership with the Volvo Group in 2021. →

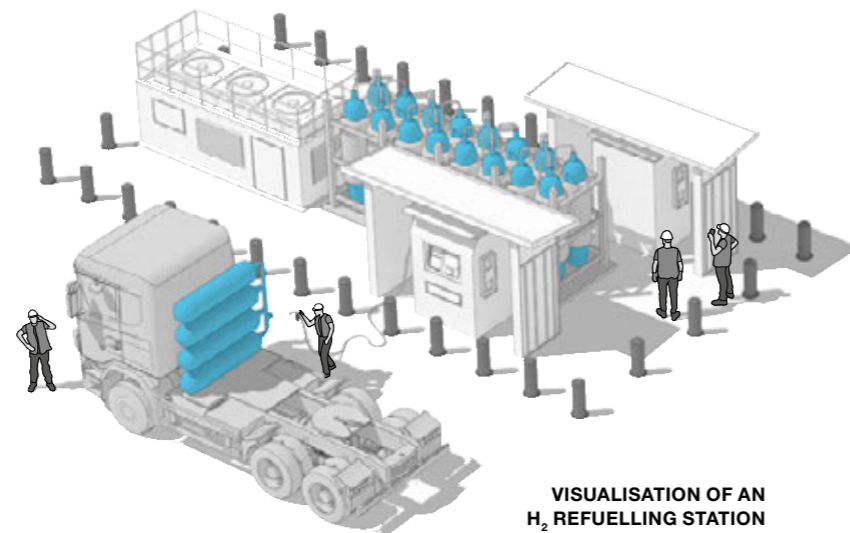


ANOTHER APPROACH Hydrogen as a fuel source for fuel cells could also become a zero-emission alternative for heavy goods vehicles travelling long distances.

→ The fuel cell prototype Mercedes-Benz GenH2 Truck has been undergoing testing since 2021. The next target is to create a mass-produced vehicle with a range of up to 1,000 kilometres from 2027. Online retail giant Amazon, the Geislingen-based forwarders Wiedmann & Winz and other partners aim to start gathering their initial experiences in zero-carbon long-distance transportation from mid-2024. To do so, five articulated lorries will be used on specific routes through Germany. Wiedmann & Winz will transport shipping containers in pre-carriage and on-carriage to industrial and retail customers for the logistics service provider DP World. The test fleet uses sLH2 (sLH 2 = sub-cooled liquid hydrogen) technology as a new refuelling method. The partnership with Linde resulted in the development of a simpler refuelling method for liquid hydrogen that only takes between 10 and 15 minutes.

Currently no catalogue with production vehicles

In Hamburg, HHLA is testing how hydrogen could drive decarbonisation forward. At its Container Terminal Tollerort (CTT), straddle carriers transport steel boxes from the container gantry cranes to the yard and transfer them onto heavy goods vehicles or transport them to the rail terminal. “Low-emission alternatives to diesel hybrids are still rare among straddle carriers. As a result, we are testing hydrogen as another possible option,” explains Janne Oeverdiek. He is coordinating the project together with an interdisciplinary team representing various



VISUALISATION OF AN H₂ REFUELLING STATION

Whatever solution catches on, HHLA will be part of it because it invests in various new “green” drive systems.

HHLA departments, such as purchasing, technical engineering (TE) and occupational safety.

“We’re constructing a test area at CTT with a hydrogen refuelling station that is compatible with a wide range of heavy equipment,” Oeverdiek explains. Manufacturers such as Hyster are providing the heavy equipment. According to Oeverdiek, the challenge for HHLA is “that there is currently no catalogue of production vehicles that we can use to order and test hydrogen straddle carriers, reach stackers or empty container stackers”. The respective ground-handling vehicles are not yet available on the market, just pilot vehicles and prototypes. Key manufacturers are using the hydrogen test facility at CTT to put their equipment through its paces under real-life conditions. They want to find out what can be fine-tuned with regard to the drive technology and HHLA is gaining experience with its operation. The conditions at a port terminal are tough: very heavy loads need to be moved around the clock and at a high frequency. How well can the equipment manage to do this?

Oeverdiek and the project team can hardly wait for the hydrogen refuelling point established in partnership with Linde at CTT to go into operation: “A terminal tractor unit made by Hyster-Yale is to be used as the first test unit, followed by an empty container stacker.” While the stacker is powered by a single 60-kilowatt fuel cell, the terminal tractor unit requires 45 kilowatts. Other prototypes, such as straddle carriers, will be moving around the test area in future. If the results are positive, “the experiences with the technology could be used to inspire possible changes to the fleet,” Oeverdiek says. For Jan Willem van den Brand, Director Global Market Development Big Trucks at Hyster, “our commitment to HHLA is about being able to



A HYDROGEN REFUELLING STATION is being built at the HHLA Container Terminal Tollerort for heavy port equipment and trucks.



“We’re constructing a test area at CTT with a hydrogen refuelling station that is compatible with a wide range of heavy equipment.”

Janne Oeverdiek
Coordinator of the H₂
test area at HHLA

supply large quantities of hydrogen-powered fuel cell units”.

While hydrogen is a realistic option for only some of the handling equipment at the port, its potential could be very different for the many heavy goods vehicles travelling short distances. Will the environmentally friendly fuel source be available in sufficient quantities?

Germany is dependent on importing hydrogen in large quantities. Because cost-effectiveness is a challenge, sustainably produced hydrogen derivatives, such as methanol and ammonia, as well as synthetic fuels made from sustainable residues and waste products, will play a – yet to be determined – role alongside hydrogen in the energy mix.

Specific solutions for different drive systems

The German cabinet has already paved the way for HVO100 (hydrotreated vegetable oils) – diesel fuels made from 100 per cent used oil from commercial kitchens or other waste. According to data from Zieglmeier Tankstellen, HVO diesel reduces emissions of particulate matter and nitrogen oxide by around one quarter in Euro-6 engines. The German Association of Independent Petrol Stations and Independent German Oil Traders (bft) assumes that 80 per cent of

HVO users will be from the commercial sector. In Baltic ports such as Gothenburg in Sweden, some vehicles are already being operated with biofuel such as this and their numbers are set to increase. So that HVO100 can be used, the manufacturer Hyster is replacing the nitrile rubber seals in the fuel systems of industrial forklifts, empty container stackers and reach stackers with fluorinated rubber.

There will likely be very specific solutions for the various drive systems. According to the German Federal Association of Road Haulage, Logistics and Disposal (BGL) “battery-powered commercial vehicles are better suited to cities, local and regional markets”. The association sees the benefits of hydrogen-powered trucks in long-distance transportation. Manufacturers are looking at how much space is required in the vehicle’s tanks so that the payload can be maximised. “Customers in different regions around the world need different solutions and fuel cell technology could be one of these solutions,” the experts at Scania say. In Japan, South Korea and California, for example, they observe that “hydrogen-based solutions are being heavily promoted and more hydrogen refuelling stations are being built”. Whatever solution catches on, HHLA will be part of it because it invests in various new “green” drive systems on land.



ELECTRIC TRUCKS are already being used by HHLA’s intermodal company Metrans. A truck can be seen at its terminal in Budapest.

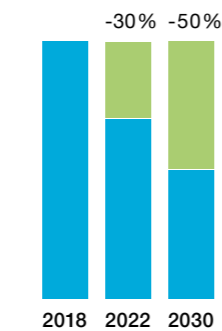
ALWAYS UPSTREAM

If you want to achieve climate-neutral production, you need energy from renewable sources. HHLA uses green electricity at all Hamburg sites and is also working on photovoltaic systems, battery storage solutions and the expansion of the power grid.



JEAN-PIERRE BEZIAT is making electricity greener.

When I look out of my office window onto Burchardkai, I now see wind farms where there was once just industry,” enthuses Jean-Pierre Béziat, Energy Management Officer at HHLA. “It is certainly possible that the green energy they produce flows into our network.” HHLA has been using electricity generated by renewable sources at all of its Hamburg sites since early 2024. HHLA started using green electricity for Container Terminal Altenwerder (CTA) back in 2010. From then on, the number of consumers of green energy within the company has grown steadily. CTA was joined by the container terminals Burchardkai and Tollerort, the multi-function terminal O’Swaldkai, HCCR’s container depots and workshop, and Fischmarkt Hamburg-Altona. The green electricity – of which the logistics company requires around 135 million kilowatt-hours every year – is supplied by the municipal energy supplier Hamburger Energiewerke. It



HHLA wants to halve its carbon emissions by 2030 in comparison to 2018. It is already well on the way to achieving this and had already slashed its emissions by **30 per cent** by 2022.

also operates some of the wind farms near the port.

“Our container terminals are already consistently electrifying their equipment and systems,” explains Jan Hendrik Pietsch, Head of Sustainability and Energy Management at HHLA. “In conjunction with making the switch to 100 per cent green electricity, this is a major component of becoming climate-neutral throughout the Group by 2040.” HHLA wants to halve its carbon emissions by 2030 in comparison to 2018 and it had already achieved a decrease of 30 per cent in 2022.

Electricity from our own photovoltaic systems

HHLA not only uses green electricity but also helps to generate green energy itself. For example, it is currently constructing a new workshop at Burchardkai and plans to install a photovoltaic system on the roof that will generate enough energy to feed it back into the grid. In the Port of Muuga near the Estonian capital of Tallinn, our subsidiary HHLA TK Estonia has installed its own solar park, which provides an entire area of the terminal with its own green electricity. “That’s just not possible here in Hamburg,” Béziat says, “because we just don’t have enough suitable space available”.

Despite this, HHLA is continuing to work on innovative solutions for generating its own electricity. For example, in order to remain more flexible when faced with fluctuating energy prices. Specifically, it uses the batteries from

its automated guided vehicles (AGVs) as a temporary way to store electricity at CTA. “We have 95 vehicles and therefore more than enough in order to balance out peaks. The AGV batteries that we don’t need for handling are made available to a service provider as a control reserve,” explains Béziat, the Head of Electrical Engineering. “This is used to balance out any unforeseen fluctuations in power in the electricity grid.” HHLA has already been certified to enable it to feed electricity into the grid and it has also received approval from the local distribution network operator.

Continuing to expand a robust grid

HHLA is also continually upgrading its own power grid in order to keep pace with the increase in demand owing to electrification. As such, HHLA is currently equipping the CTA substation with a third power transformer. It ensures that sufficient electricity will be available for replacing diesel-powered equipment, and for future expansions of the terminals.



THE BALTIC SUN provides some of HHLA TK Estonia’s electricity.

“Our container terminals are already consistently electrifying their equipment and systems”

Jan Hendrik Pietsch, Head of Sustainability and Energy Management at HHLA.

Energy management at HHLA: Certified



ELECTRIC CHARGING STATION: A battery-powered container transporter is more energy-efficient than one with a diesel engine.

The fact that HHLA not only uses green electricity but also uses energy in a highly efficient way has been confirmed by the leading independent audit association for management systems, GUTcert. Since 2015, it has certified that HHLA’s energy management system complies with ISO 5000 in every respect. The certified energy management system forms part of HHLA’s sustainability strategy. The focus is on the efficient use of energy and the adaptation of processes, equipment and systems so that the company uses less electricity, diesel and gas. “With the optimisations put in place and initiated at our various sites in Hamburg, we were able to save 1.2 million kilowatt-hours in comparison to 2022. This corresponds to the electricity consumption of 400 four-person households,” says Jan Hendrik Pietsch. And the energy management teams in the various companies are already planning further energy-saving initiatives.



What is sustainability?

When it comes to sustainability, acknowledgement is the first step. Launching sustainability endeavours without realising the nature of the problem can quickly derail into impactless, disposable actions.

The first thing to acknowledge is that, in its essence, sustainability is a wicked problem that does not have a stopwatch. Just like start-ups pivot their business model to adapt to evolving market signs, sustainability mutates throughout the times. This makes it both challenging and exciting.

Most companies have the net zero emission goal on their agenda, and boards discuss how to measure, track, report, and improve their scope 1, 2, and 3 emissions, showing that corporations are increasing their accountability over their impact on the environment. Nevertheless, net zero is not the destination; it is the first stop along quite a long way. If we could make every single economic player net zero with a finger snap, we would simply have halted a downward spiral.



Net zero will likely spin off to “climate positivity” since, at some point, we will have to detox our planet from the harm done over the last 100 years – net zero will not be enough for that.

The second acknowledgement is reckoning how geographical, political, and economic factors influence the overall understanding of the term “sustainability”. A study by Capital Group in 2022 revealed that when addressing ESG, environmental concerns account for 48% of the focus of companies in Europe but only 41% in North America. Political division on the importance of decarbonisation and a sequence of financial and crypto scandals (recent ramifications of Wells Fargo, Robinhood, Bonnie & Clyde, and FTX, amongst many others) make governance much more prominent in that region of the globe.

Finally, sustainability has evolved from philanthropic ventures to become the core of organisational strategies. Ikea has run a forestry department since the 1990s and is actively pursuing the goal of becoming forest-positive. Back in 1990, I was still a kid, but I clearly remember people asking for plastic bags in supermarkets instead of paper ones for the sole purpose of saving trees. How much have things changed in just a few decades?

Global Sustainability Trends: Pathways to Green Logistics and Climate Positivity



NUNO NUNES, Deputy Vice President Europe at HPC Hamburg Port Consulting, has got to know many of the world's harbours and it's strategies as a consultant.

How is sustainability perceived across the globe?

It is fair to assume the epicenter of sustainability is in **Europe**, with the EU making a firm commitment to triggering change with the launch of the Corporate Sustainability Reporting Directive and the upcoming taxonomy on scope 1, 2, and 3 emissions. Sustainability in Europe is no philanthropy – it is a matter of compliance, cost avoidance, and, ultimately, survival. Companies are bringing sustainability to the centre of their board discussions, pivoting their strategies and reshaping their operations to continuously support their customers while leaving a positive environmental footprint.

Georgia, for example, in the Caucasus region, an EU candidate since November 2023, has recently approved a 19 million US dollar green transportation fund to develop green logistics corridors and establish the grounds to foster road-to-rail transition. While 80% of the country's electricity is generated based on renewables, carbon-intensive fuels still account for 75% of the country's energy expenditure. The transportation sector has the most significant footprint, accounting for 30% of the total expenditure. With the World Bank forecasting a three-fold increase in trade volumes and the halving of the transportation times in the region by 2030, there is a need for structural measures to reshape the country's logistics infrastructure.

India, one of the countries with the lowest sustainability score awarded by Morning Star, has an extensive environmental law framework covering environmental protection, wildlife protection, forest conservation, control and prevention of water and air pollution, spearheaded by the Ministry of Environment, Forest & Climate Change. For ports, though, the sustainability focus is on ensuring safe operations, ramping up the automation of heavy machinery and handling equipment, minimising incidents, and eliminating fatalities during operations. While the environment is at the core of India's government's strategy, the social factor has a much more prominent role in the logistics sector.

The remaining **Asia Pacific region** has a growing appetite for climate development endeavours and much less regulatory restrictions. Compared to Europe, we see a similar interest in bringing sustainability to the core of the company's value propositions but a much simpler regulatory framework that can accelerate new ventures and business models.

As a consultant, I see a particular focus on the supply chain, driven mainly by the fact that, in the past years, all industries started to tame their emissions, except the transportation sector.



The pandemic has reshaped consumer behaviour, and last-mile delivery plummeted from a ratio of 4 packets delivered per stop to an astonishing 1.1 packets delivered per stop, which undercuts efficiency, increases costs, and, consequently, boosts carbon emissions. We see ports, terminal operators, authorities and logistics companies intensifying cooperation and exploring joint ventures and partnerships to test new concepts. Ultimately, we see energy clusters and green corridors developing in cross-industry collaborations to pursue climate positivity.

What are the future challenges in our industry?

Much has yet to be unveiled, but some trends look like they are here to stay, and ports, shipping lines, and logistics companies generally embrace them. We expect an overall increase of regulatory frameworks to seek the necessary data precision to enable meaningful decarbonisation-inducing policies and taxonomy that will, ultimately, affect investor confidence and behaviour and influence the rating of companies based not on their carbon footprint but on the feasibility of their plans to reshape that footprint.



In this scenario, sustainability reporting is no longer a matter of complying with the minimum thresholds featured in the applicable regulation. Sustainability becomes the lever to generate trust in the investment markets.

It gives players a good grasp on their business processes from an energy expenditure perspective and build an event-centric data architecture that logs, tracks, and reports detailed figures throughout the supply chain, enabling significant improvements.

In ports, energy management will become crucial, and terminals will eventually pay much more attention to energy requirements. Besides the natural transition of energy supply to machinery and handling equipment, focusing on shaving consumption peaks, harmonising expenditure, and connecting energy demands with service levels will become increasingly crucial in port facility planning, management, and operations. Sustainable fuels are at the heart of the upcoming transformation towards a greener future for shipping lines, which means transitioning or retrofitting fleets into alternative fuels. However, due to differences in energy density, the existing route networks will likely see adjustments to fulfill new bunkering requirements. At the same time, the speed of conversion will likely be a synchronised waltz between shipyard retrofitting capacity and energy generation capacity.

For logistics companies, last-mile route optimisation, digitalisation, and customer intimacy will become vital. AI-powered optimisation technology will likely target and optimise last-mile deliveries by consolidating routes and deliveries across significant players that will evolve from fierce competitors to diligent collaborators to unlock efficiencies and reduce the climate footprint.

SAVING THE GREY ENERGY

Specialists from universities are conducting research together with experts from HHLA in a pioneering project: How does the energy-efficient refurbishment of existing properties go together with strict monument protection? If it works in the Speicherstadt, with stringent landmarked building protection requirements that apply to the UNESCO World Heritage Site, then it could serve as a model for all other office buildings.

THE ROOFS of the Speicherstadt historical warehouse district can be used to generate solar energy, even in winter, for storage in keeping with these buildings' tradition.

Germany's office buildings are outdated. Almost 70 percent of these existing properties are at risk of obsolescence, as the industry magazine "Platow Immobilien" wrote in April 2023. For many owners, full refurbishment would appear to be a virtually incalculable risk, not least due to increasingly stringent energy norms and standards. This is why many opt for the seemingly more straightforward approach of demolition and new construction – a decision that is often made prematurely, as the latest research suggests. This is because every demolition means wasting large quantities of still functional material and "grey energy". This is stored in the building until it is demolished and accounts for an average of 50 per cent of the energy used over its entire life cycle. The longer a building is therefore used, the better it is for the climate.

THE PROJECT: "CARBON-NEUTRAL WORLD HERITAGE SITE SPEICHERSTADT"

A pioneering nationwide research project is aiming to find out whether or not, and how, this can be achieved for office properties, even subject to the more stringent conditions that apply to landmarked buildings. The collaborative project is called "Carbon-neutral World Heritage Site Speicherstadt Hamburg".

Constructed in the period between 1885 and 1927 over an area that is 1.1 kilometres long, the Speicherstadt historical warehouse district is the largest contiguous storage block ensemble in the world. It has enjoyed landmarked site status since 1991 and has been a UNESCO World Heritage Site since 2015, meaning that it is subject to the particularly stringent requirements for historical landmarks. But the Speicherstadt historical warehouse district, projecting Hamburg's Hanseatic image to the world in millions of tourist and media photos, is far from just a museum. Commercial businesses, agencies, start-ups and restaurants are all vying for space in the world-famous district. Landlord HHLA Real Estate currently lets 300,000 square metres of the total gross floor space of 450,000 square metres. Many of the storeys in the 15 warehouse blocks are home to open-plan offices in their historical red brick walls.

In addition to its letting activities, however, HHLA Real Estate is also pursuing an ambitious climate target: the Speicherstadt historical warehouse district is to be converted into an energy-efficient, climate-neutral district by 2040. Together with the Hamburg Ministry for the Environment and Energy, the companies that →



40,000

square metres is the total roof area covering the Speicherstadt that could be used for solar thermal systems.



14

gigawatt-hours of heat could potentially be generated every year by these usable roof areas.



up to **93%**

of this heat output would cover the current annual heating demand of the not yet energy-refurbished Speicherstadt



9

hours of sunshine per day grace Hamburg on average between May and August



1,000

MWh of required heat could be avoided by innovative interior insulation every year

Landmarked building requirements mean that the appearance of the roofs cannot be altered

→ run the district are looking for ways to generate renewable energies locally and use them efficiently, all while respecting the landmarked building requirements and taking economic viability concerns into account. The collaborative project “Carbon-neutral World Heritage Site Speicherstadt Hamburg”, which was launched back in 2021, is initially set to run until the end of 2024.

The project is funded by the German Federal Ministry for Economic Affairs and Climate Action, with Forschungszentrum Jülich acting as the project sponsor. The research network includes three university partners: the University of Stuttgart with the Institute of Construction Materials, the professorship for design and analysis of load-bearing structures at HafenCity University Hamburg and RWTH Aachen University with the Institute for Energy Efficient Buildings and Indoor Climate.

Historical Warehouse Block H, also known as the Sandtorkaispeicher, will serve as a pi-



“One large roof and a storage facility in the cellar could be enough to supply heat to an entire block of the Speicherstadt historical warehouse district.”

Peter Rosenzweig, HHLA Immobilien



By 2040, the Speicherstadt historical warehouse district is to have been refurbished to make it climate-neutral and energy-efficient based on HHLA's concept.

lot project. The project will investigate how an entire block of the UNESCO World Heritage Site can become self-sufficient and achieve a zero-emissions heat supply simply by utilising the existing roof areas - without changing the appearance of the historical roofs. The research project includes the generation of solar power and solar thermal energy, the heat storage in the basement using various methods and the distribution and control of the energy generated in the building using a heat pump. The efficiency of the test facility will be tested and measured in the research workshop on the ground floor. Meeting rooms and hallways will be equipped with state-of-the-art insulation and heating technology as model open-plan offices.

ENERGY GENERATION: AN INNOVATIVE AND CONSIDERATE WAY TO MAKE USE OF OLD ROOFS

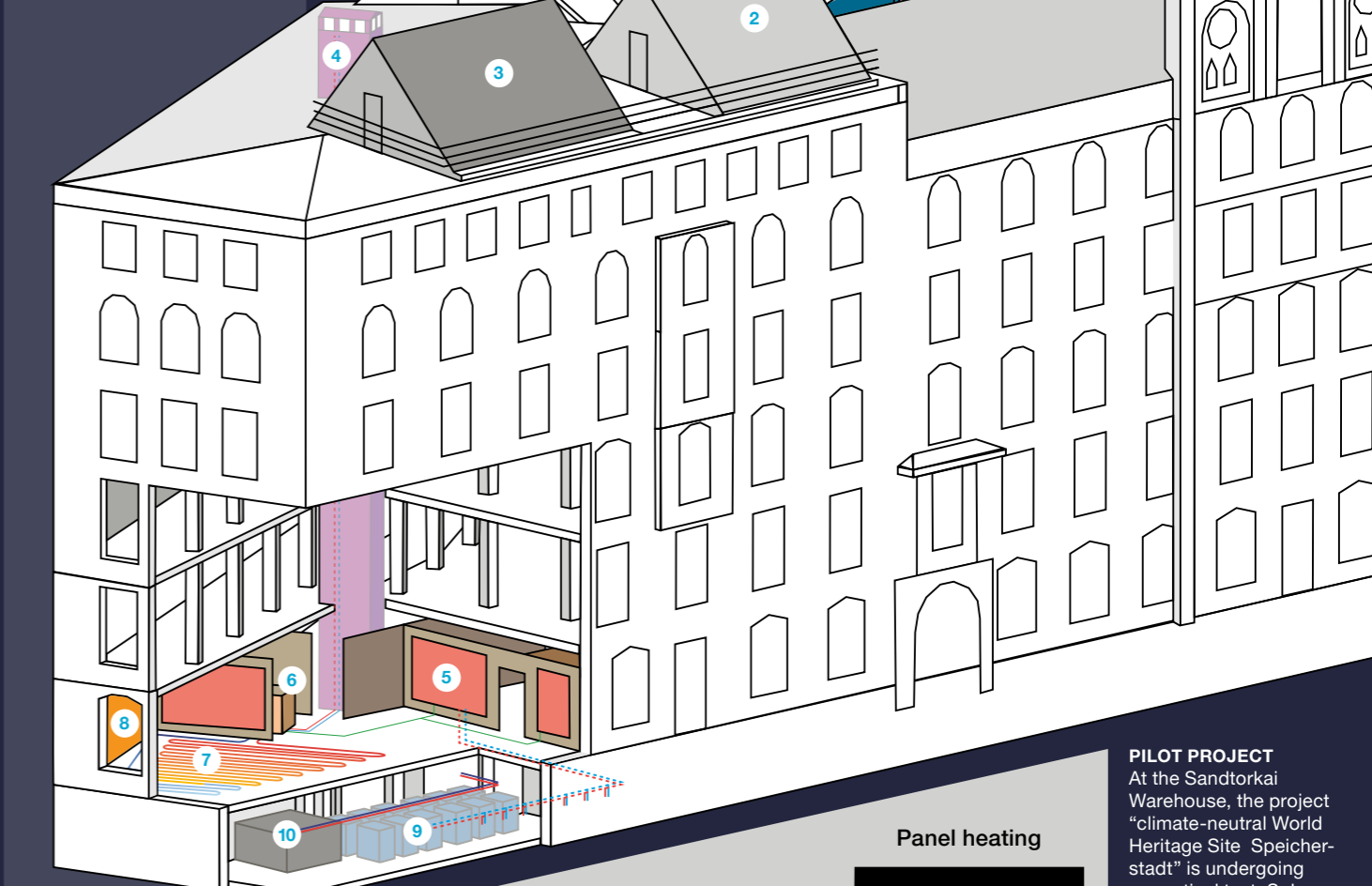
ON THE ROOF OF the historical Warehouse Block H, two gable roof structures made of timber rafters were erected on a tubular steel frame and covered with “hybrid solar roof-mounted systems”. These modules generate both solar power and solar heat. The Speicherstadt historical warehouse district is subject to stringent landmarked building requirements. The roofs are traditionally covered with either sheet copper or slate shingles, typical features of the world-famous brick buildings. As a result, the hybrid solar roof-mounted systems were not allowed to distort this appearance with the light reflections and colour effects of conventional transparent solar cells. This is why the modules on the two newly erected roof gable structures, each spanning an area of 70 square metres, were designed as completely novel imitations of slate shingles or sheet copper. From the street and the surrounding buildings, it is impossible to tell them apart from the original roof elements with the naked eye.

“In actual fact, they are not made of slate or copper, but of glass,” explains Professor Harald Garrecht from the University of Stuttgart. UV rays from the sun penetrate a transparent layer to generate both electricity and solar thermal energy. Each module is connected to a system of copper pipes running underneath the module. A frost-proof mixture of water and glycol flows through these pipes and transports the heat to the block's interior. At the same time, cold liquid is added to the circuit from below for heating. The emissions-free electricity produced by the hybrid roof-mounted modules is used →

HISTORICAL WAREHOUSE BLOCK H

Energy production

- 1 Glass roof
- 2 Slate covering
- 3 Copper covering
- 4 Cable shaft

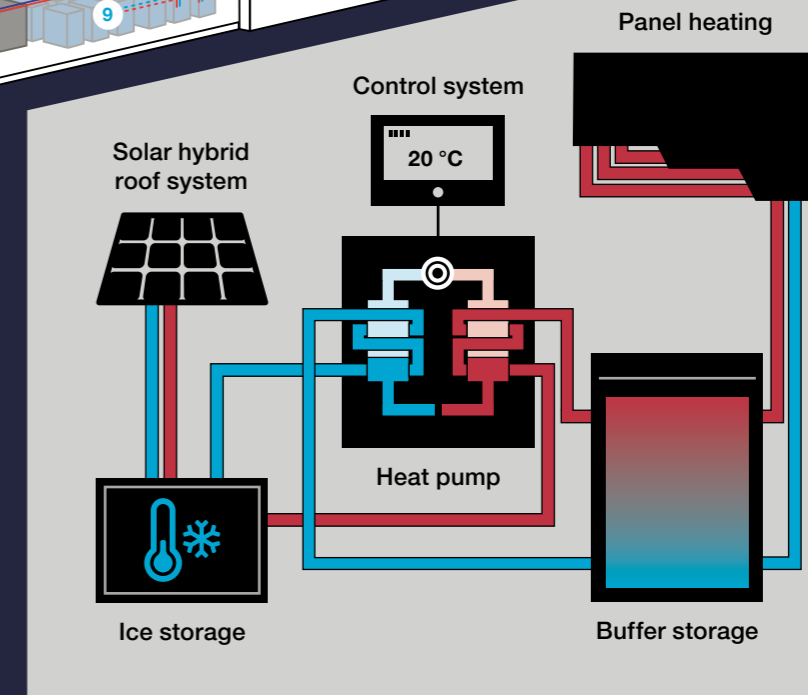


Energy consumption

- 5 Wall heating
- 6 Heat pump
- 7 Floor heating
- 8 Internal insulation

Energy storage

- 9 Ice storage
- 10 Concrete storage



PILOT PROJECT At the Sandtorkai Warehouse, the project “climate-neutral World Heritage Site Speicherstadt” is undergoing a practical test. Solar-hybrid roof modules with a slate and copper look, together with ice and concrete storage tanks in the basement, supply the building with emission-free thermal energy, while a heat pump unit controls the complex copper pipe connections and the heating elements in the floors and walls. The energy-refurbished Speicherstadt of tomorrow can already be experienced here today.



THE DISTRIBUTION POINT ensures the optimum mix of heat media in the energy system as a whole.

→ to enable the climate-neutral operation of the entire test facility. In addition to the control electronics, the biggest consumer is a heat pump at the centre of the system. The first stage for the period running up to the end of the year will involve measuring and analysing the electricity and heat output in different weather conditions and seasons.

STORAGE: PREPARED NO MATTER WHAT WITH AN ICE AND CONCRETE STORAGE UNIT

THE CELLAR OF THE WAREHOUSE BLOCK houses two thermal energy storage units that operate based on completely different physical principles: an ice storage unit and a concrete storage unit. The hybrid concrete storage unit features a solid core through which water is circulated and which is very well insulated. Once the core has been heated up, it can store heat of



3

Universities are collaborating on the “Carbon-neutral World Heritage Site Speicherstadt historical warehouse district Hamburg” research project.



“A particular challenge”

Three questions for Hamburg's Chief Construction Officer Franz-Josef Höing

Why does Hamburg need to make one of its most exposed historical landmarks climate-neutral?

Like HHLA, the City of Hamburg is aiming to turn the Speicherstadt historical warehouse district into a vibrant inner-city neighbourhood in the long run. The Speicherstadt is a piece of “living port history” and an important link between the city centre and Hafencity district. The use of these buildings in the future is essential in order to preserve the landmarked warehouses. The research project is investigating the possible refurbishment options in detail and evaluating the opportunities together with the local monument preservation office and the Department of Urban Development and Housing.

Is there potential for conflict between the restrictions imposed by the landmark protection requirements and the requirements for climate-neutral energy refurbishment?

It goes without saying that the landmarked Speicherstadt district, which has been designated a World Heritage Site, poses a real challenge. Particular sensitivity is required with regard to the façades and roof landscape. Tourists come to see and photograph them thousands of times over and these images go out into the world. We have to find solutions as to how our energy refurbishment measures can meet the requirements that apply to landmarked buildings and design in equal measure.

Will the climate-neutral refurbishment of the Speicherstadt historical warehouse district World Heritage Site send out a signal for other older office buildings?

That is most certainly one of the interesting aspects of the project. Sustainable refurbishment is becoming increasingly important. It would truly mark a milestone if, at the end of the research project, there was a “package of measures” available for the energy-efficient modernisation of landmarked buildings, in keeping with landmark protection requirements, and other older buildings that are prominent features of a city's image.

The Speicherstadt could serve as a model for office buildings in other German regions.

up to 70 degrees generated on the roof in summer in the medium term in order to supply the offices in the warehouse unit with what is known as “sensitive” heat for weeks during the transitional period. But once the heat stored in the concrete block has been used up during a prolonged period of cold weather, it can no longer be regenerated there during a sunshine-poor winter. This is when the ice storage unit takes over and makes use of what is known as “latent heat”. The phenomenon of “phase change” is utilised in a total of twelve cells of the specially developed and novel ice storage type: A heat exchanger extracts the energy from the water in the ice storage unit until it freezes. This changes the phase from liquid to solid, which triggers a latent heat energy boost. This energy boost can be utilised via the heat pump to supply the underfloor heating system. It is precisely in the coldest depths of winter that the use of heat pumps is most profitable. In the meantime, the roof cells start to slowly reheat the medium flowing through the pipes between the roof and the ice storage unit. It is channelled into the cellar, used to thaw the ice block – and the cycle can begin anew. This method can be used once or twice a week to “harvest” the thermal energy from the ice storage unit, producing around 93 kilowatt hours per cubic metre of water in the storage unit. In terms of heat output, this is the equivalent of no less than 9.3 litres of heating oil. Investigating how efficiently this works means venturing into uncharted scientific territory. The model experiment should now supply reliable data.

DISTRIBUTION AND CONTROL: THE PACE IS SET BY THE HEAT PUMP

THE DISTRIBUTION POINT on the ground floor of the warehouse block is a complex network of pipes, control units, sensors and valves. Connected to the distribution point, and not far from it, is a box the size of a refrigerator: the central heat pump. This is where the pipes running from and to all components of the energy system come together. These include the two energy sources: so-



A SIMILAR APPROACH: Photovoltaic system in keeping with landmarked building standards on the roof of the convent of the Congregation of the Sisters of the Redeemer in Würzburg. With the help of specialists for energy-conscious construction from the Bavarian State Office for Monument Protection (BLfD), the entire convent site is being refurbished.

lar power and solar thermal energy on the roof. Additionally, the heat flows from the two storage units in the basement that operate based on different approaches: the ice and hybrid concrete storage units. Third, the supply and return pipes in the underfloor heating system belonging to the test open-plan office. The power lines, which are also supplied by the “hybrid solar roof-mounted system”, cannot be seen. They mainly supply the heat pump compressor via an intermediate storage battery. When the heat pump requests environmental heat from the roof, the liquid medium in the copper pipes is pumped into the roof modules by a circulating pump, where the winter sun and environmental heat warm it up to a few degrees Celsius. On the way back, it reaches the heat pump, which heats the medium to around 30 degrees with a high degree of efficiency and feeds it into the underfloor heating system.

USE AND SCALABILITY: SELF-SUFFICIENT HEAT SUPPLY FOR OTHER EXISTING PROPERTIES, TOO

PART OF THE RESEARCH WORKSHOP is being used to simulate and measure how future tenants in climate-neutral, energy-refurbished Speicherstadt offices will experience their heat



“If these prototypical developments work, they could be applied to any normal existing building right away.”

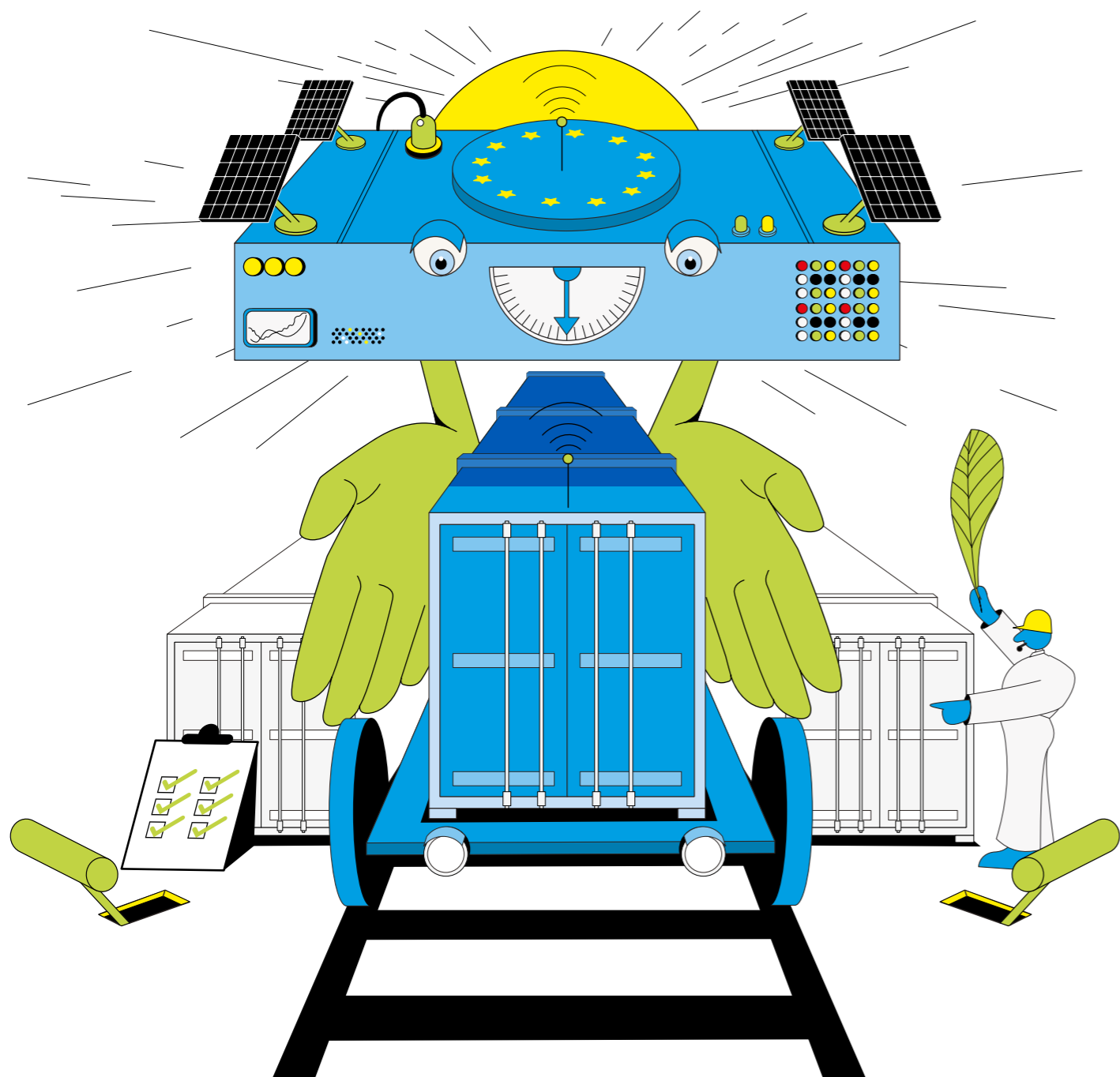
Prof. Dr.-Ing. Harald Garrecht, University of Stuttgart

supply. This includes an underfloor heating system, although the latest generation of electric infrared heating elements is also being used to cover peak loads during cold winters. “Various discreet interior insulating plaster methods are being tested for thermal insulation that is consistent with the requirements that apply to landmarked buildings,” explains Peter Rosenzweig, project manager at HHLA Real Estate.

All in all, the researchers, HHLA Real Estate and the City of Hamburg are optimistic: all of them hope to be able to develop a “package of measures” that is easy to scale (see interview) for the large-scale climate-neutral thermal refurbishment of the entire Speicherstadt historical warehouse district. “While the test phase is still ongoing,” says Rosenzweig, “a roof like this one and the sort of storage technology we have in the basement could be enough to supply one warehouse block.” And the concept would be even easier to implement as a blueprint for older office properties in other locations that are not affected by the sort of planning restrictions that apply due to landmarked status. “These are prototypical developments and nobody knows what the outcome will be as yet,” says materials researcher Garrecht from the University of Stuttgart. “If they work, however, they could be applied to any normal existing building right away.” And save a lot of the “grey energy”!

TAXONO-WHAT?

The **EU Taxonomy** is one of the many regulatory components that aim to help companies improve their contribution towards protecting the climate. The EU states want to use it to achieve climate-neutral status by 2050 and to reduce greenhouse gas emissions by 55 per cent by 2030. Anyone already pursuing a sustainable business model – such as HHLA – can use standardised calculations to prove how they are fulfilling the specifications.



Economy and ecology have more in common than sharing the same first letter. When it comes to climate change, sustainable business practices are now the basis for all business. But what does sustainability in business mean? This is now something that is regulated by the EU via its Taxonomy Regulation, which has outlined binding standards for large businesses since 2022. At its core are six environmental targets that companies are to support: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems. A company can be said to engage in taxonomy-aligned business practices if it makes a significant contribution towards one of these environmental targets without having a negative impact on any of the others. It must also comply with international standards in terms of human rights and social issues, for example.

The idea behind the EU Taxonomy is that transparency with regard to companies' commitment to environmentally friendly practices makes it easier for investors to identify sustainable capital investments. This should then result in more investments being diverted to sustainable companies and green technologies, while supporting the EU Green Deal. Consistent standards also help to prevent the risk of greenwashing by companies.

Way above the industry average: 79 per cent of HHLA revenue in 2023 is taxonomy-aligned

Using the clear evaluation criteria in the EU Taxonomy, HHLA is able to prove that it takes climate protection seriously. For example, 79 per cent of its 2023 revenue is taxonomy-aligned, while for capital expenditure (CapEx), this figure rises to 87 per cent. "These figures far outstrip the industry average in the transport sector. They show that the HHLA business model is very sustainable and that we don't just apply these principles to individual pilot projects," says Jan Hendrik Pietsch, Head of Sustainability at HHLA. "The high percentage of taxonomy-aligned capital expenditure shows that we will be investing in protecting the climate in future, too."

The above-average values are also the result of transporting freight by rail, which is something that HHLA subsidiary Metrans does almost entirely with electric multi-system locomotives. Because shipping results in relatively low carbon emissions, "infrastructure for low-carbon

shipping" is also classified by the EU as being advantageous for climate change mitigation. Here, the HHLA business model really shows off its advantages by dovetailing maritime shipping and rail transport, thus making a major contribution towards protecting the climate. "In applying the EU Taxonomy, we conducted a climate risk analysis and looked at how extreme weather events and climate models will affect our operational processes in 2050 at various locations," says Pietsch. "The results showed that our existing infrastructure and suprastructure is very resilient."

Further regulations in the pipeline

This means that HHLA is well-positioned to face the future. "Sustainability is firmly anchored in our corporate governance and management processes," says Pietsch. It's a good starting point because a whole host of new laws and regulations drawing on the Taxonomy will be passed in the coming year which will also drive the development towards more sustainable business practices. For example, the CSRD (Corporate Sustainability Reporting Directive) will establish the requirements for standardised sustainability reporting. As here too, data about environmental concerns, social issues and governance is to be made accessible to all stakeholders and practical for them to use, across all sectors.

How are the criteria for sustainability activities assessed through the EU Taxonomy



Environmental targets:

- Climate change mitigation
- Climate change adaptation
- Sustainable use and protection of water and marine resources
- Transition to a circular economy
- Pollution prevention and control
- Protection and restoration of biodiversity and ecosystems

STOP TALKING ...

HHLA's rail subsidiary Metrans is a pioneer in the world of sustainable logistics. Over 95 per cent of its rail transport is already certified carbon-neutral* and the company is implementing a whole host of other ideas at its terminals. We asked **Robert Groiss** from Metrans which measures are particularly effective and what the EU can do to increase the volume of goods transported by rail.

_Welcome to HHLA Talk, Robert! You are responsible for sustainability at Metrans, but not just that. What other tasks fall under your remit?

I've been at Metrans for five and a half years now and I'm responsible for the major topic of sustainability and also for business development. I'm also responsible for funding-related topics and maintaining contact with various associations and the European Commission. There are a whole range of legislative developments and innovations in intermodal transport that need to be monitored. On top of that is the expansion of the terminals, particularly in Austria, because I live in Vienna.

_That's a lot of interesting topics there – let's start with your climate protection initiative. Right from the start, I was fascinated by the fact that Metrans not only talks the talk but actually walks the walk when it comes to protecting the climate. It was a joint initiative with HHLA that got things off the ground: the "Balanced Logistics" strategy. The strategy had a clear aim: to become climate-neutral* by 2040. We worked together and the result was the product HHLA Pure. The willingness of the Metrans Executive Board to take action in terms of making transportation more sustainable was something I found impressive. My whole working life has been spent in the logistics and transport sector. Of course, we know that transportation results in high emissions. But at Metrans, a project was launched and implemented immediately. Now we really are more sustainable and this makes us stand out from the competition.

"According to various experts, our HHLA Pure product generates 60 to 70 percent less emissions than road transport."

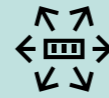
_Overall, the logistics industry has a huge carbon footprint. Can you describe a bit more specifically where most emissions are produced and what is being done to reduce them?

We primarily work in the intermodal sector, where the longest distances are covered with electric locomotives. This means we generally emit less CO₂. In countries such as Germany and Austria, we now only use green electricity to power them. The last mile is still driven with diesel-powered heavy goods vehicles – although e-trucks are being tested – and conventional reach stackers are still in use at the terminals. But compared to road transport, various experts estimate that this cuts emissions by 60 to 70 per cent. This was the inspiration behind expanding our HHLA Pure product.

_Do the Metrans terminals look similar to the HHLA terminals in this respect? With everything electrified and with most of the equipment running on electricity from renewables? Yes, we are trying to install electric cranes everywhere. Although we are not currently able to replace the diesel-powered reach stackers, we are of course trying to figure out how they could be powered by renewable energy in future. There are already some prototypes of electric or hydrogen-powered reach stackers, but the market will determine which innovation will win out here.

_You also have another concept that involves containers no longer having to be driven about the terminal at all. A yard right below the rail gantry crane ... →

METRANS IN FIGURES



20

With 20 of its own terminals and a steadily growing number of routes, the company is not only optimising rail transport but also container handling.



650

With around 650 connections every week in the European Metrans network, customers can choose the right one for them.



130

130 of our own locomotives and 3,700 special rail cars ensure high frequency and reliability for our transports.

LOOKING AHEAD
Robert Groiss at Metrans is responsible for the major topic of sustainability and also for business development.

... START ACTING!



LEADING THE WAY for more rail transport. A container train leaves the Metrans terminal in Dunajska Streda, Slovakia.

→ That's right. We stack up to three containers right below the jibs of the rail gantry cranes. The container comes directly off the train, is stored next to the rails and the crane lifts it and loads it straight onto the outgoing heavy goods vehicle. Then we don't need the reach stackers and everything is powered by electricity – including a total of 28 cranes. Last year, we specifically expanded major terminals such as Dunajska Streda, Ceska Trebova and Budapest from three to four cranes. Our biggest terminal in Prague now has six of these cranes in operation. It's a major development but not the only one. For example, the terminal lighting systems, which used to be equipped with conventional spotlights, were retrofitted for LEDs. Office buildings are now constructed using more environmentally friendly methods and electricity is generated using photovoltaic systems.

You mentioned that you're already testing the first e-trucks for the last mile.

We believe that electric-powered vehicles have their advantages on the roads. We are already testing them and have appointed a panel of experts to deal with the topic of electric trucks and evaluate the tests. Our aim is to switch over our fleets to electric-powered vehicles in the future, starting at the major terminals. After all, the last mile also needs to become carbon-neutral.

Where is there still scope for making rail transport even greener?

We purchase the most environmentally friendly electric locomotives around, with the lowest energy consumption. In the past, shunting at the terminal was always done by diesel-powered locomotive. Today, we have several hybrid locomotives in service, powered by both diesel and

“We believe that electric-powered vehicles are advantageous on the roads, even if there are a few promising hydrogen projects. We are testing this in a trial project in Budapest.”

electricity, i.e. battery-powered. This enables us to cut our carbon emissions by over 50 per cent. A long while back now, we developed rail cars that are lighter than the conventional ones used for transporting containers. Overall, they weigh four tonnes less and are more flexible in terms of loading. This means that we can operate longer trains with the same energy consumption. Unfortunately, there are still stretches of track that have not yet been electrified, particularly in Central Europe. In those areas, we will try to use hybrid locomotives in future.

Can you say which projects are particularly close to your heart?

It's got to be HHLA Pure. When we undertook the initial tests in 2018 and 2019, we worked in the same way as most other rail operators. We only offset emissions if the customer specifically requested it. Customers tended to be a little reticent to do so, but the carriers started demanding more sustainable options. For this reason, we took the plunge in 2021 and transported all containers with zero carbon emissions* from Hamburg, Bremerhaven and Koper into the hinterland to all destinations and vice versa. Of the 1.4 million TEU transported by Metrans, this corresponded to nearly 1 million TEU. We invited customers to get on board, right from the start.

So, there were some initial problems?

It wasn't easy, but there is a lot of pressure from carriers. Sustainability is a huge buzzword. So we decided to expand our list of destinations for HHLA Pure in September 2023. We have now added Wilhelmshaven, Rotterdam, Gdansk, Rijeka and Trieste, along with Duisburg as a major inland terminal and our new Indija terminal in Serbia. This means that over 95 percent of all

transports are now carbon-neutral*. The feedback from our clients, particularly those who already use HHLA Pure, has been very positive. I think we can make a major contribution towards climate protection here, and we are doing it voluntarily.

You spoke about the pressure coming from carriers. What does that look like?

It's primarily our clients, so shipping companies and freight forwarders, who feel the pressure from carriers. With HHLA Pure, you also receive a certificate for the transport. This is very popular with customers.

Because not all routes are fully electrified, what will happen with the rest?

Firstly, we have very low specific emissions as a result of our lightweight flat rail cars, energy-efficient electric locomotives and high capacity utilisation. The remaining carbon emissions amount to about 10 per cent to 20 per cent of those resulting from heavy goods vehicle alone. The remaining emissions are offset via gold standard climate protection projects. In the HHLA Pure project, we worked with the TÜV certifying body to calculate the carbon emissions per TEU for the 200 or so routes that we serve. We will adapt these every year during the TÜV audit. In this way, there are clear values relating to how much CO2 can be saved and offset per route.

In other areas, what's necessary doesn't seem to have been achieved yet. I'm thinking of the lack of a consistent regulatory framework and financial support from the EU.

We have a lot to do at the moment, based on the EU's Greening Freight Package. We don't like everything about it because some aspects could have a negative impact on the development of the intermodal sector. We need to be very active with our associations here so that a bigger share can be transferred to rail. The rail operators need more scope for development, particularly the private rail companies. There's a lot to do at the moment to ensure that legal regulations which facilitate the growth of rail transport are developed in the next few years.

In terms of the EU, additional laws intend to make transport logistics more climate-friendly. Do you think these are all pointing in the right direction?

The ideas are fundamentally sound, but they are not perfect. Of course, every carrier has its own lobby organisations. Some of them are trying to transport higher tonnage on the roads, which has only been possible for intermodal transport

“With HHLA Pure, over 95 percent of all transports are now carbon-neutral.* The feedback from our clients has been very positive.”

until now. Does that make sense? Rail transport has a lot of issues when it comes to European harmonisation. There are Europe-wide projects in the pipeline, but they are very ambitious. Intermodal transport could play a much bigger role in protecting the environment but we need more here than just bright ideas.

If you could be granted one wish, what should happen to make European transportation more sustainable?

My main wish would be for better rail infrastructure, more investment in this essential mode of transport. We can see that there are not enough tracks available. We need those in order to facilitate the further growth of our rail system.

* The carbon footprint (on various routes) includes all necessary steps required to provide the service. The carbon footprint calculation takes into account emissions from stationary and mobile combustion, like natural gas or diesel, as well as from imported electricity. The carbon footprint verified by TÜV NORD CERT GmbH was offset with gold standard offsetting projects in accordance with the TN-CC 020 standard. The carbon footprint of HHLA Container Terminal Altenwerder takes into account emissions from stationary and mobile combustion, like natural gas or diesel, from imported electricity, emissions from commuter traffic, and upstream chains of the energy sources used. The carbon footprint verified by TÜV NORD CERT GmbH in compliance with DIN ISO 14064-3:2020 was offset with gold standard offsetting projects in accordance with the TN-CC 020 standard.



HOW CAN WE IMPROVE THE RAIL SECTOR?

Around 20 per cent of carbon emissions in Germany are produced by the freight transport sector. This can be improved, for example, with the smart use of intermodal transport. What innovations could increase the share of freight transported by rail? And why aren't forwarding and rail companies leading the way in terms of digitalisation? HHLA Talk addresses these questions and other unexpected issues besides. A member of the logistics think tank – Berit Börke, a well-known expert and advisor in the industry – provides the answers.



HHLA TALK

Read the complete interview

HEAVY LOADS

like this ship propeller are all part of daily business. They are transported on the floating crane to vessels and then hoisted on deck.



HHLA floating cranes

RETROFITTING ON A GRAND SCALE

A project of the future steeped in history: through retrofitting, HHLA is ensuring its historical floating cranes remain in service for years to come. Together, the cranes are nearly 150 years old and counting. Thanks to the right maintenance regime, they continue to operate and lift heavy loads in the Port of Hamburg.

Throughout its 67 years of faithful service to date, the HHLA IV has been working hard to move weighty loads. Perhaps a well-deserved retirement is on the horizon? No, the floating crane, built by Demag in 1956 and put into operation in 1957, is far from hoisting its last load. Its services are in high demand in the Port of Hamburg – as are those of its sister crane, the HHLA III, which is 16 years its senior. That's why the grey giant with its 55-metre jib, which is able to lift over 200 tonnes nearly 32 metres into the air, is now being upgraded to meet the challenges of the future. While the work is ongoing, the HHLA III will take care of business on its own. "This is the first major retrofit of the HHLA IV in seven decades of service," says Stephan Fröhlich, Head of Floating Cranes at HHLA.

Complex new construction avoided through retrofitting

The project is based on the original construction and schematics from the 1950s. The retrofit should ensure the crane can continue to function for at least a further 15 years. By then, it will have already celebrated its 80th birthday, serving as a great example of HHLA's lived approach to sustainability. After all, construction of a new crane of this magnitude would have required an enormous amount of energy and materials.

September 2023, the sun is shining over the Port of Hamburg. Even from a distance, it is possible to make out that extensive work is being undertaken on this specialist crane: the superstructure is surrounded by scaffolding and wrapped in construction sheeting. The jib was removed in summer 2023 by the HHLA III,



15

further years of service are in store for the HHLA IV – an example of the company's lived approach to sustainability.

working alongside mobile cranes. The mobile structure has been deposited on the quayside in five segments.

The lifting link is covered with a tent with a corrugated roof. The historical steel structure is undergoing thorough renovation in the mobile hall: it's time to remove the signs of wear and the old paint, carry out the necessary repairs and apply the new anti-corrosive coatings. The gigantic bearings are also being replaced at the same time. Covered by sheeting, the relevant work is being completed on the tower of the self-propelled pontoon. Entering the tent, the jib appears even more gargantuan in the fading light than it does up on the superstructure: the historical rivets from the 1950s are currently being inspected. They are replaced with bolts rather than new rivets if damaged. →



STEPHAN FRÖHLICH, Head of Floating Cranes at HHLA, in front of the scaffolded oldie.

CONSTRUCTION OF A NEW CRANE WOULD HAVE REQUIRED AN ENORMOUS AMOUNT OF ENERGY AND MATERIALS.

→ These bolts are as thick as a finger and can bear weights of many tonnes. Head of Floating Cranes, Stephan Fröhlich, says this is all about safety and efficiency. However, the number of damaged connectors and sheets is very small – which shows that the good maintenance work conducted on both floating cranes by the HHLA team pays off. Machinist Heinrich Proes is up to his elbows in a piece of mechanical engineering history at this time. The inland shipping specialist has been part of the Floating Cranes team for the past 19 years. Currently, he is removing the nearly 70-year-old roller bearings, which enable the gigantic jib to move on the crane superstructure.

Of course, the ravages of time are clear to see. But Proes is happy with how well the historical equipment has held up despite regular use over such a long period of time. After all, one or other of the two cranes is in use at least once a day. Replacing the bearings on the historical hoist won't be a problem either, Proes says. This is because standardised components were already being used in 1957 and are still around today. There are also suitable replacements for the enormous bearings from FAG Kugelfischer.

Still perfectly suited to specific tasks

But why is HHLA going to all this trouble to retrofit the cranes? This is primarily because the mid-20th century construction continues to be perfectly suited to specific tasks in the port. Since the 1960s, most goods have of course been handled by container gantry cranes. But there are still occasionally heavy loads and oversize dimensions that need handling. These include things like ship propellers and components for offshore wind farms. That's where HHLA's two floating cranes come in. They can lift very heavy loads extremely flexibly, transport them autonomously and load them onto enormous ships. For the largest assignments, the cranes can even work in tandem.

This is made possible by their traditional construction: a cone-shaped steel-frame tower is securely attached to the pontoon. The continuously rotating superstructure is slid over this like a hood. Towards the top of it are the bearings of the jib construction with the lower arms (hitch lifting arms) and upper arms (upper links). The tip of the jib completes the geome-



200

tonnes up to a height of 32 metres – the hoisting capacity of the HHLA IV with its 55-metre jib.

try at the front, with the counterbalance at the back. Together, the lower rotating assembly and tip of the load-bearing construction bear the vertical and horizontal forces. A whole battery of slip rings at the heart of the superstructure transfers the electrical energy and control signals between the superstructure and the vessel.

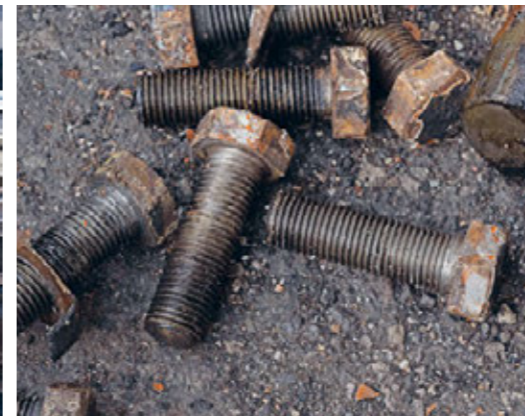
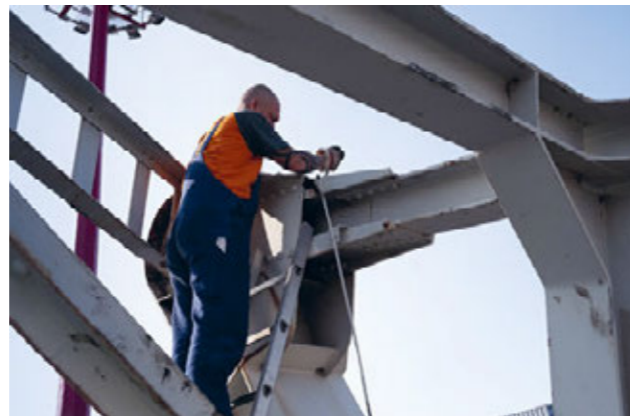
Regular trips to the dry dock ensure continued fitness

The team of nine, working under Stephan Fröhlich, ensures the HHLA IV is properly maintained and all deadlines are met. New steel cables are installed every ten years. The crane goes into the dry dock every five years so that the hull of the pontoon can be cleaned and repainted. The crane components are lubricated every six months. Machinist Proes climbs up to the very top with the lubrication gun for this. And this point is even higher on the HHLA III than it is on the floating crane that is now being retrofitted: that specialist vessel built in 1941 can lift loads of a maximum of 100 tonnes up to 48 metres high with its 76-metre jib. In addition to the maintenance schedule, the equipment is also reclassified regularly. The HHLA IV received its reclassification in December 2022. The crew sees that as a good omen for the successful completion of the work currently under way.



Contact

To find the right contact person, please visit: <https://hhl.de/en/company/subsidiaries/floating-cranes>



VERY FEW PARTS

have to be replaced, and these can usually still be sourced. All in all, the structure is in incredibly good condition – thanks to the devoted attention of the Floating Cranes crew.

What can I hope for?

This is a question familiar to any philosopher. The father of the Enlightenment, Immanuel Kant, asked it in his "Critique of Pure Reason". Kant answered this question simply himself despite the fact that his reasons were highly complex: "Have the courage to use your own reason." But one who hopes shouldn't just dream, Kant adds.



He also stated that we have a duty to do something to make this hope a reality. And this still applies today, despite the fact that his work was published in 1781. It is encouraging to anyone who fears for the future of nature, the climate or humanity in these times. Hope can be found everywhere, even when reading this short article.

World's biggest solar power plant being built in India

A gigantic project, the **Renewable Energy Park in Khavda**, is currently being constructed in a salt desert in India. Adani Green Energy is installing solar panels and a wind farm across an area five times the size of Paris. The park is due for completion in just five years, when it will provide **16 million Indian homes** with green electricity. Currently, India generates around 70 per cent of its electricity from coal. But that can change quickly, as the UK shows. There, only two per cent of electricity is generated from coal – while 30 years ago, this figure was around 60 per cent.



SOLAR AND WIND FARM
An infertile desert in the west of India is being transformed. Soon, this area will generate green electricity for 16 million Indian homes.



Hope based on facts

Factful thinking

How can we be hopeful in the face of centuries of environmental destruction? We could be the first generation to leave the world in a better state than how we found it! We can all do something – this is Hannah Ritchie's optimistic message. And what's even more encouraging is that the facts look better now than they did a decade ago.

Is this climate change denial? Are we glossing over the dramatic loss of biodiversity here? Absolutely not. We wouldn't stand for either. But we are in a position to be able to stop them. And that's what we've managed to do to an extent with forest die-back. The hole in the ozone layer has also partially regenerated. The British author points out that her life is much more comfortable than that of the average female citizen in 1850. Despite all of the energy-guzzling technology, she emits on average the same amount of carbon as her British counterpart would have 175 years ago. And back then she would hardly have been able to breathe the polluted air in London on some days.

Ritchie disproves widely accepted assumptions with facts and scientific prognoses. For example, the oft-cited exponential growth of the global population. While the highest population figure is still 50 years off, the more important "peak child" statistic has already been passed – 2017 was the year when there were the most children on earth. Ritchie's "factfulness" principle doesn't sugarcoat reality. However, it does show that many trends can be reversed or stopped.



HANNAH RITCHIE doesn't want to just give us hope. She also gives professional pessimists a way to counter the doom and gloom using facts.

The forest's art of survival

Tough giants

At the precise spot where forest fires raged in a Californian national park six years ago, redwood saplings are springing up all over the place. In future, this may result in a very thickly forested area of redwoods, which could protect the trees from fires in the future. This is because conditions are cooler and more moist where tree coverage is dense. These trees appear to have been masters of survival since the dawn of time. This is borne out by a 700 to 800-year-old California redwood which, at nearly 116 metres, is the tallest tree in the world.





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Publisher
Executive Board of Hamburger
Hafen und Logistik AG

Responsible representative
Carolin Flemming,
Head of HHLA Corporate
Communications

Editor-in-chief
Christian Lorenz

Art direction, design
Redaktion 4 GmbH, Hamburg

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Photos

adobe stock (2,19,20,21,51), Aral AG (27), BLfD / Matthias Hofner (39), Oliver Bock (30/31), BSW / Bina Engel (38), Angela Catlin / Piper Verlag (51), Daimler Truck AG (27), Oliver Driesen (20), Martin Elsen (2/3,10/11), Marco Grundt (32), Dietmar Hasenpusch (17), Wolfgang Heumer (6,15), HHLA Archiv (7,31,36), HHLA / Metrans / Studio Kanovits (2), Nele Martensen (3,8,22/24,25,29u.), mediaserver.hamburg.de/Andreas Vallbracht (3,34/35), Mihkel Notta (31), picture alliance / Reuters / Amit Dave (50), screen: oceanscore.com (19), Thies Rätzke (3,12,15,26,28,29,43,44), The SeaClear Project (21), Peter Thomas (46/49), Bernd Westphal (20), Wirtschaftsvereinigung Stahl (14)

Illustration

Matthias Seifarth (Cover, 2, 4, 6/7, 40)

Infographics

Florian Müller (16/17, 28),
Redaktion 4 GmbH (Source p. 37: DEMIRAG ARCHITEKTEN)

Print

Lehmann Offset Druck und Verlag GmbH

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Druckprodukt mit finanziellem
Klimabeitrag
ClimatePartner.com/12682-2403-1028





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