

BearingPoint®

BRC
CLIMATE
ACTION ROADMAP



THE FUTURE OF NET-ZERO SHIPPING AND THE USE OF RAIL

This Guide was produced in partnership with BearingPoint, the BRC Climate Action Roadmap logistics Pathway partner



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INTRODUCTION

REPORT BACKGROUND AND OBJECTIVES

BACKGROUND:

The BRC'S Climate Action Roadmap is an industry-led initiative designed to get the whole of the UK Retail Industry and its supply chains to net zero by 2040. This report, commissioned by the BRC, identifies the current and future fuels and technologies being developed to reach net zero emissions, the challenges retailers face and recommendations going forward.

OBJECTIVES:

This research focuses on providing clear guidance to retailers on the best solutions and strategies to reach net zero for maritime shipping and rail by 2040, including the opportunities of using rail as an alternative to road. Within this overall objective, specific aims include:



Provide insight into the retail landscape on the current and emerging use of maritime shipping and rail



Educate retailers on the current and potential sustainable fuels and technologies in the maritime shipping and rail industry, to support them to make more informed decisions when using 3PLs (Third Party Logistics partners)



Educate retailers on other more operational and tactical actions that they and their Shipping / Rail suppliers can take to reduce carbon emissions



Provide insights into how the BRC and its members can work collaboratively to influence UK government, shipping companies and ports to take specific recommended actions that will reduce carbon emissions

EXECUTIVE SUMMARY

UK Retailers are committed to the British Retail Consortium's (BRC) Climate Action Roadmap, an industry-led initiative designed to get the whole of the industry and its supply chains to net zero by 2040 – a date 10 years earlier than International Maritime Organisation's target for net zero.

This report focuses on addressing decarbonisation in maritime shipping and rail, part of BRC's scope 3 pathway. The way BRC members (and retailers in other countries) choose to engage with maritime and rail freight providers, to optimise supply chain design and freight provision, can have a significant impact on climate action targets. Equally, BRC members ability to influence UK Government policy can also have a significant impact on carbon reduction.

SHIPPING:

Choice of shipping line, tendering and management: Different shipping lines have very different levels of ambition and technical approaches towards climate action, with core reduction targets from now until 2030 varying from 12% to 50%. All of the major shipping lines offer carbon monitoring tools which allow BRC member targets to be included in shipping tender & management processes, using the lines' own fact-base to enrol them as active partners in retail carbon reduction. Using their own KPIs (key performance indicators) and tools is a far more practical approach. Better to utilise their outputs for your cargo-related emissions than deep-diving into shipping technology to encourage specific technical solutions.

Different approaches, investment vs. continuous improvement: Some lines are focusing more on expensive new investments to make the fastest progress, others are putting more emphasis on 'continuous improvement' style initiatives. Some are focusing more on ocean carbon reduction, some more on terminal and landside reductions.

Carbon clubs: Aside from individual action, there are examples of businesses and cities clubbing together to pressure or mandate the shipping industry to accelerate climate friendly solutions on specific high volume freight corridors – such as on the Shanghai to Los Angeles corridor where Amazon, IKEA, Inditex, Target and various product suppliers have worked together.

Routing and origin / destination transport: Significant carbon reductions can be achieved through tactical and operational changes to optimise alternative shipping routes between the same origin-destination pair and the standards which are mandated for origin and destination movements of containers.

RAIL:

Rail may be able to contribute to BRC members' climate impact for major imported or long-distance domestic movements, generally from ports to DCs where its carbon intensity is typically only 20-40% of that of road freight. A small number of interlinked actions can maximise this opportunity:

Network and Modal Choices Today: Within the current rail network's limited locations and capacity, making greater use of intermodal rail, as Tesco and Peacocks have done, can significantly reduce carbon.

HS2 Freight Allocation: The current use of rail for imported containers and other movements is capacity constrained. With HS2 about to deliver a generational increase in rail capacity which will be allocated between passenger and freight paths, government needs to be influenced so that greater priority is given to creating increased rail freight capacity.

Further High Leverage Investment: HS2 is already under construction and a major commitment and, given the current state of government finances, other sums will be difficult to approve. Nevertheless, even within government's constrained spending plans, small investments to seed new ideas or fix specific bottlenecks (such as electrification of the lines near Felixstowe) can deliver major carbon reductions.

Fuel Choice: Finally, where members are already using rail, they can influence the rail operators to move from pilot to full use of alternative fuels and also to invest in hybrid locomotives.

RESEARCH METHODOLOGY

The study included 20 retailers (one-to-one interviews with 8 members of the BRC Scope 3 working group; and a survey of 12 UK retailers) with different profiles:



Sectors: General merchandise, electricals, fashion, health and beauty, home and garden, outdoor leisure and grocery



End-to-End Supply Chain: A range of modes of transport including road, rail, sea and air



Annual UK Turnover: A range from under £50 million to over £1 billion



Suppliers: A range of suppliers based in APAC, Europe, UK and North and South America

In addition, we spoke to subject matter experts in both the Chartered Institute of Logistics and Transport (CILT) and at Maersk to gain insight into issues, opportunities and challenges in maritime shipping and rail freight from a net-zero carbon perspective.



RETAIL LANDSCAPE

THE RETAIL SECTOR IS IN A STATE OF FLUX AND HAS FACED SEVERAL CHALLENGES WHICH HAVE CAUSED DISRUPTION TO SUPPLY CHAINS, INCLUDING:

COVID-19

The Covid-19 pandemic had a significant impact on the UK's international trade flows, as well as causing disruption to global supply chains. Customer behaviour shifted, and supply chains were disrupted due to labour and product shortages. Freight containers prioritised personal protective equipment (PPE) instead of consumer goods, which was a particular problem in regard to seasonality in the fashion industry.

In addition, most ports in the Far East were affected by labour reductions and lockdown restrictions, causing the ports to be shut for periods of time, adding to the disruption.

It is unlikely that international supply chains will return to the stability and efficiency that was the norm before Covid-19, and retailers need to think innovatively and proactively to manage risk and ensure resilience within their international supply chain operations.

USA WEST COAST STRIKES

The ongoing labour strikes and lockouts (a closure of working areas by management, preventing workers from working) in the West Coast of America have directly affected the UK's supply chain as often, the vessels come direct from the US to the UK. This is causing further disruption to UK supply chains due to late arrival of vessels in the UK.

NEARSHORING SUPPLY CHAIN

Companies are turning their attention to nearshoring to secure their supply chains, with particular focus on Turkey. Nearshoring refers to an organisation's transfer of certain business operations, in particular its manufacturing capability or a key supplier to a nearby country closer to the demand location.

Nearshoring allows retailers to order closer to launch dates and to employ dual-sourcing strategies, often allowing them to switch to land-freight if needed.

Historically, retailers and brands have moved their manufacturing and production overseas to countries that have lower labour costs and high production capabilities. Recently, the increasing manufacturing costs in some countries, including China, has underpinned the appeal of nearshoring as the need for quick lead-times is essential in a customer-driven world.

There are significant benefits to the retailer, including reduced carbon footprint, shorter delivery lead times and reduced transport costs, better production planning and responsiveness to fashion trends.

THERE ARE A FEW CONSIDERATIONS FOR RETAILERS:



Labour costs: Typically, China has the lowest labour costs, nearshoring would be expected to result in a higher cost for labour, although wage inflation especially in the coastal parts of China is making other Asian countries potentially more attractive options



Stability in tariff regime and trade relations: This has been of increasing importance given the rise of trade disputes between the major trading blocs and with the UK's exit from the EU



Labour availability: The availability of an adequate supply of labour with the required skills is crucial

MARITIME SHIPPING

MARITIME SHIPPING RETAIL LANDSCAPE

Maritime shipping is one of the most efficient modes of long-distance transportation and is responsible for transporting 90% of trade goods around the world. However, maritime shipping contributes nearly 3% of all global carbon emissions and its reliance on fossil fuels has made the path to decarbonisation difficult.

Currently, 90% of all container vessels are powered by heavy fuel oil. A typical long-haul journey emits more than 5,000 tonnes of carbon dioxide along with other harmful pollutants including nitrogen oxides, sulphur oxides and particulates. Widespread development of heavy fuel oil alternatives and innovative vessel designs, technologies and legislation have the potential to significantly reduce emissions to reach 2050 targets.

The International Maritime Organisation (IMO) has pledged to reduce emissions by 50% from 2008 levels. The UK Chamber of Shipping had urged that the IMO and other shipping bodies must commit to a net-zero carbon emissions target by 2050. Cooperation and collaboration through international organisations and the UK will be vital to decarbonise the shipping industry.

Retailers are increasingly looking to understand the alternative fuel and technologies being developed and in-play in order to make more informed choices when initiating contracts with their shipping provider and suppliers.

The journey to net-zero in maritime shipping will be a difficult voyage, but it requires collaboration with international bodies (IMO, ICS), governments, shipping companies and retailers.

“ A typical long-haul journey emits more than 5,000 tonnes of carbon dioxide along with other harmful pollutants including nitrogen oxides, sulphur oxides and particulates.

CHOICE OF SHIPPING LINE, TENDERING AND MANAGEMENT

Shipping lines are playing a key role in decarbonisation with key strategic objectives and targets in place to drive their commitments to net-zero in maritime shipping.

Much progress has already been made – this graph published by Evergreen shows a 58% reduction in carbon per TEU-Km between 2008 and 2021, with other lines reporting similar falls, although it should be noted that the rate of reduction has slowed significantly and marginally reversed in the last three years.



(Source: Evergreen Maritime CSR reporting.)

Different lines have different levels of investment and speed of carbon reduction. The table below draws on shipping lines' own published information to provide an indication of these differences:

SHIPPING LINE (BY DESCENDING SIZE)	CURRENT MAJOR INVESTMENTS / INVESTMENT FOCUS AREAS	TARGET REDUCTION IN CARBON / GREEN HOUSE GASES (GHG) BY YEAR *		
		2030	2040	2050
Maersk	12 x 16000 TEU methanol fuelled vessels	50% for Ocean 70% for Terminal	100%	
MSC	1st LNG Capable ship 2022 1st net zero carbon emissions capable ship in service by 2030			100%
CMA-CGM	1st 20000 LNG ship 2020 10% Alternative Fuels 2023	40%		100%
COSCO Shipping		12% for Ocean 15-20% for Terminal		Reach 100% by 2060
Hapag Lloyd	12 x LNG newbuild ships	30% for Ocean	100% by 2045	
ONE	1st Alternative Fuel Ship 2030	70% (Direct only)		100%
Evergreen		50% (vs. 2008 target)		70%

(*Base years vary by shipping line, making comparisons before 100% achieved indicative only. Targets are typically for 'intensity' (g per TEU-Km) rather than aggregate figures.)

Direct comparisons on % reductions ahead of the achievement of full net zero are made difficult by different shipping lines having different target methodologies and base years, but actual levels of investment and the date for full 100% net-zero are more readily comparable.

Maersk and Hapag Lloyd are the most ambitious both in terms of number of new vessels and target date for full net-zero.

The other notable fact is that many lines are expecting to have made major reductions in both ocean and terminal emission levels by 2030. These reductions should be available to BRC members if their tendering and management processes focus on the most ambitious lines and use the lines' carbon monitoring tools to:

- Factor different carbon efficiencies in choose of shipping line, and
- Once selected, to use the services and choose from alternatives in a way that maximises reductions.



DIFFERENT APPROACHES -

INVESTMENT IN ALTERNATIVES FUELS

There has been significant work already undertaken with alternative fuels showing different levels of carbon reduction, technical challenge and economic impact.

METHANOL

An option that is already available is methanol which is in the spotlight for maritime decarbonisation due to the immediate roll-out available.

Methanol is produced by combining hydrogen and captured carbon dioxide. When methanol burns it releases some Green House Gases (GHG), but it emits less carbon dioxide and airborne pollutants such as sulphur oxides, nitrous oxides and particulate matter than conventional fuels. Methanol is said to cut these emissions by over 60%. Methanol produced from natural gas offers an initial 25% carbon dioxide saving, rising to between 60 - 90% when using renewable methanol.

Currently, most methanol is produced from coal or natural gas, and although in the vessel emissions may reduce by up to 25%, the full cycle carbon is estimated to be 10% higher, when carbon emissions generated in manufacturing and distribution are taken into account.

Renewable methanol ('eMethanol' or 'green Methanol') does not suffer from this problem and has amongst the lowest carbon content for currently available fuels – hence the carbon savings of 60 – 90%. Renewable methanol can be generated from materials such as agricultural waste, biomass or municipal solid waste.

“ There has been significant work already undertaken with alternative fuels showing different levels of reduction, technical challenge and economic impact.

OTHER BENEFITS:



It is available today and is a proven technology which means it can be selected for new build or retrofitted to existing fleets



It is dense enough to be usable without significantly displacing load capacity



It is useable without too many hazards



It can be bunkered vessel to vessel or shore to vessel



It is the lowest cost option at the point of delivery

Maersk are currently committing heavily to this new fuel, including launching 12 x 16000 TEU Methanol fuelled vessels. Currently, the global production of methanol is around 30,000 tonnes per annum. The total requirement to fuel the new dual fuel vessels is closer to 500,000 tonnes per annum (if fueled solely on methanol). Maersk have engaged in 7 larger partnerships to produce around 800,000-900,000 tonnes of green methanol.

LIQUIFIED NATURAL GAS (LNG)

Hapag Lloyd are investing in 12 LNG Vessels, with MSC and CMA CGM also investing in LNG powered vessels. LNG has a well-established supply infrastructure, high energy density and is currently used in vessels globally. Although it has a lower sulphur content than the normal Heavy Fuel Oils that vessels currently burn, it still has significantly higher emissions than other low-carbon alternative fuels. For context CMA CGM quote a reduction of 20% in Green House Gases (GHG) from their new LNG fuelled ship.

1ST AND 2ND GENERATION BIOFUELS

Biofuels have an established infrastructure due to their use in multiple sectors. They use can easily be integrated into current engines, and they can be used as a 'drop-in fuel' used in combination with conventional fuels due to their chemical and functional similarity. However, high demand from multiple sectors makes scaling difficult.

Also, care needs to be taken in distinguishing between 1st generation and 2nd generation biofuels. The production of 1st generation biofuels may detrimentally affect land use, which could impact global food security. 1st generation biofuels are typically blended with existing conventional fuels. For example, biofuels based on palm or soy have similar full lifecycle GHG emissions as conventional Marine Gas Oil (MGO).

2nd generation biofuels are generally seen as much more beneficial, yielding a 70-100% reduction in lifecycle GHGs compared to conventional MGO. The International Council on Clean Transportation (2020) has identified five of the most viable liquid biofuels in terms of life cycle GHGs. They are:

- Fatty acid methyl ester (FAME)
- Fischer-Tropsch (FT) diesel
- Biodiesel, hydrotreated vegetable oils (HVOs) (which CMA CGM state as providing an 84% GHG reduction)
- Dimethyl ether (DME)
- Bio-methanol (discussed in the section on methanol)

AMMONIA

There is increasing consensus that ammonia will have a key role to play in the future of net-zero fuels in maritime shipping and it is expected that with current developments, it will be in use widely towards the end of the decade.

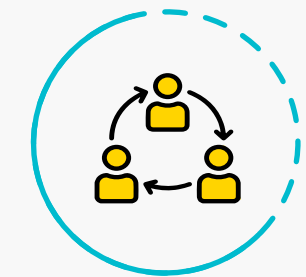
Ammonia is a colourless fuel that does not emit any carbon dioxide when burned. Ammonia can be made using hydrogen from water electrolysis and nitrogen separated from the air and fed into an artificial nitrogen fixation process (also known as the Haber process) with sustainable electricity. For this reason, ammonia is gaining favour in the maritime shipping industry, however, there are some challenges that need to be overcome to scale ammonia as a marine fuel:



Cost – green ammonia remains more costly than incumbent fuels, although the prices are expected to drop with increasing scale of production



Safety – ammonia is highly toxic, flammable and corrosive, and poses many risks to humans and aquatic life if there is an accident



Regulatory collaboration – there needs to be collaboration between organisations setting international standards and local regulators to scale the production, bunkering, and use of ammonia

To scale ammonia, there needs to be significant investment and collaboration between relevant industries and suppliers to enable a successful roll-out. This is one for retailers to watch.

HYDROGEN FUEL CELLS

Fuel cells operating on hydrogen fuel are an efficient, environmentally friendly and genuine zero emission fuel technology which is being developed.

Fuel cell technology has already been successfully applied to heavy duty bus, truck, and train applications, and is now under development for marine applications.

A key advantage of hydrogen over other fuel alternatives is the relative ease of retrofitting existing ships with hydrogen fuel cells. Hydrogen's energy is converted into electricity and heat energy, which powers the ship's propulsion mechanism. The process can provide a continuous supply of energy as long as the cell is fed with fuel.

One of the big disadvantages with hydrogen is that it is extremely flammable. There needs to be more development of hydrogen fuel cell technology before it can be safely embedded in the maritime shipping industry.



WIND-ASSISTED SHIP PROPULSION (WASP)

Wind-assisted ship propulsion (WASP) technologies are developing rapidly and could be a promising solution toward the decarbonisation of the maritime industries. WASP technology uses wind to reduce the propulsive power needed from traditional fuels, typically enabling a ship to maintain the same speed for a reduced engine power or increase speed for the same energy consumption. Overall the benefit is a significant reduction in the levels of carbon dioxide produced.

A range of WASP products have been developed and trialled, including; rotor sails, rigid sails, soft sails, kites, suction wings, wind turbines and hull sails. Many of the initial operational issues have been recently solved and it is expected that WASP technologies will be widely implemented over the next two years.

There are a series of considerations and concerns around WASP technology, including:

- Space constraints: there is not enough space for kites and sails on board currently
- Lack of government funding: there are many UK companies that are developing WASP technology with no government funding which tends to slow development. This is an area the government could support to accelerate the testing of hybrid systems and WASP technologies

BATTERY

Batteries have been tested in a small capacity in the race to reach net-zero in shipping and companies are looking to see how batteries can play a bigger role. Currently, batteries take up too much space on board, however, in the short term they could be utilised in short sea shipping.

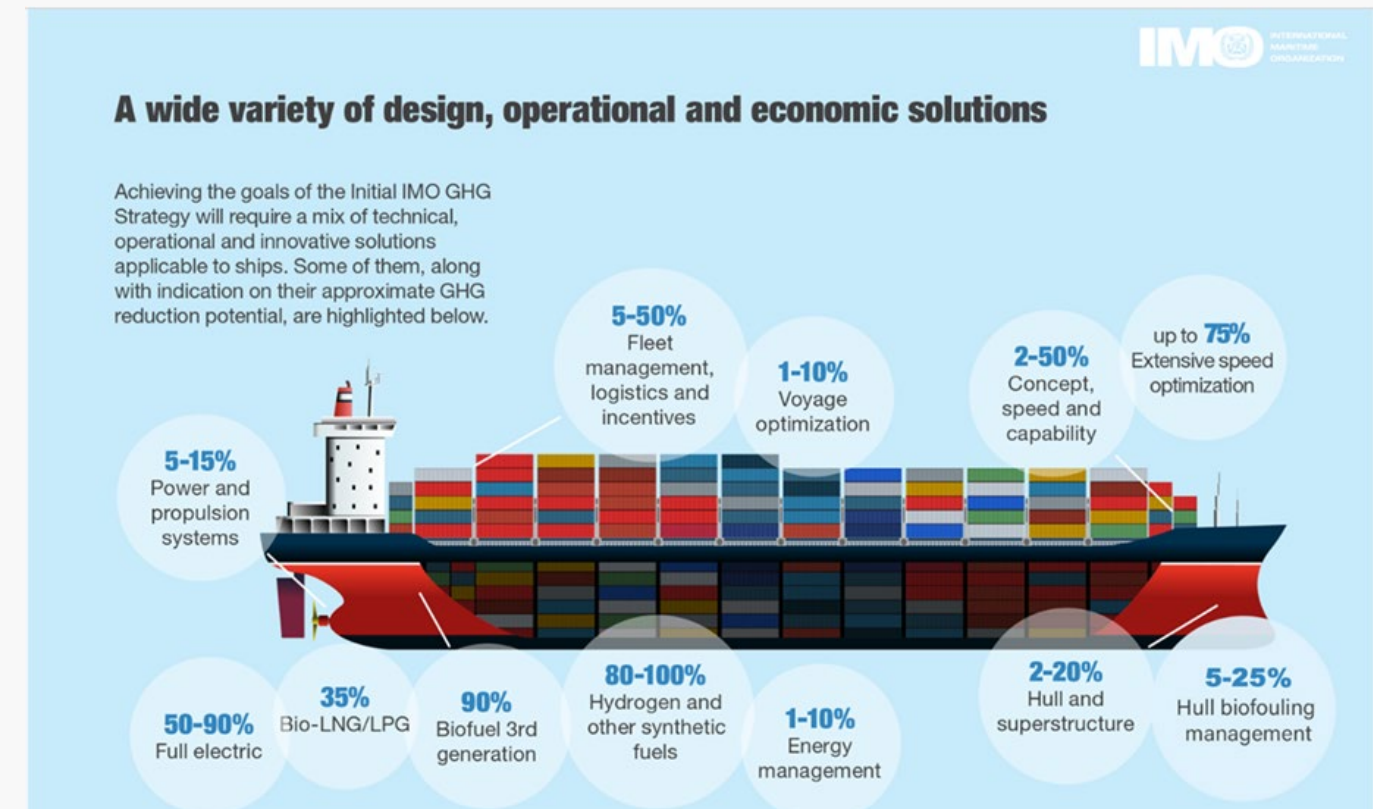
DIFFERENT APPROACHES

- CONTINUOUS IMPROVEMENT

The graphic to the right, provided by the International Maritime Organisation (IMO), shows that major improvements are possible even outside of the introduction of new types of vessels. When tendering and managing their shipping, BRC members should investigate the degree to which their suppliers' use these sources of reduction:

- Slowing down the speed of ships
- Continuously monitoring fuel consumption and engine operations to ensure the main engine is working efficiently
- Using the weather navigation system to provide the fleet with real-time information on routing that optimises fuel efficiency
- Improving cargo handling efficiency to shorten port stays
- Planning of ship cargo loads to maximize economic returns and minimize carbon per TEU
- Application of special anti-fouling paint to ship hulls to reduce build up of slime, weed, barnacles and other sea creatures on which increases drag and fuel consumption
- Installation of low energy light bulbs
- Installation of solar/wind auxiliary power for accommodation services
- Replacement of old vessels
- Just-in-time (JIT) refers to the method whereby a ship optimises and maintains a particular speed to arrive at a port or piloting station in a timeframe that guarantees a berth, throughway or servicing without the need to moor
- Autopilot software. To mitigate energy consumption, autopilot software can be used to make calculated decisions about rudder movement to optimise its utilisation
- Time, draft and ballast optimisation. The draft, ballast and trim of a vessel is critical in determining fuel and energy consumption. The trim of the ship dictates the ability of the ship to maintain a maximum speed while keeping the shaft power a constant, thus reducing energy and fuel usage

KPIs and management processes for all of these should be requested from 3PL partners and interrogated.



(Source: International Maritime Organization, 2021)

CARBON CLUBS

Carbon Clubs are still at an early stage, but some major retailers and brand manufacturers are clubbing together to put pressure on shipping lines and government to provide shipping services with zero or much reduced carbon emissions.

A strong example of this is Cargo Owners for Zero Emission Vessels (coZEV). CoZEV is a platform for high ambition cargo owners to collaborate. Recognising that no single cargo owner (even of the scale of Amazon) has sufficient market influence to prompt decarbonisation of the maritime industry if they act alone, they are pooling their influence to change shipping line and government behaviour. There are several major retail members supporting this including Amazon, IKEA, Inditex and Target.

Their most advanced initiative is the Los Angeles - Shanghai Green Shipping Corridor. Convened by circa 40 Cities and the ports of Shanghai and Los Angeles, the partnership has agreed to work on an initiative to establish a green shipping corridor to decarbonize maritime shipping between the U.S. and China.

The partnership intends to work together to achieve these goals by developing a "Green Shipping Corridor Implementation Plan" by the end of calendar year 2022 that will include deliverables, milestones, and roles for the partnership. Key decarbonisation goals for the Green Shipping Corridor partnership include:

- The phasing in of low, ultra-low, and zero-carbon fuelled ships through the 2020s, with the world's first zero-carbon trans-Pacific container ships introduced by 2030 by qualified and willing shipping lines
- The development of best management practices to help reduce emissions and improve efficiency for all ships using this international trade corridor
- Reducing supply chain emissions from port operations, improving air quality in the ports of Shanghai and Los Angeles and adjacent communities

Working together, BRC members could use their combined influence to accelerate changes both on vessels and in terminals at the UK's three major container ports of Felixstowe, Southampton and London Gateway.

Recognizing that most vessels call at multiple ports in Northwest Europe, working with partner retail organisations in these locations could be even more effective.

ROUTING AND ORIGIN / DESTINATION TRANSPORT

BRC members will normally have set Ports of Origin (determined by supplier and product) and strong views on UK Port of Arrival (determined by UK DC location) and also the need not to be reliant on a single port. Within these constraints there are four ways in which carbon can be reduced:



Origin road container movement from supplier to port: The distance travelled and age / standard of the vehicle are key factors in the level of carbon generated. Road container movement typically generates 62g per Tonne-Km, compared to Shipping Deep Sea 16g and Shipping Short Sea at 8g per Tonne-Km. Therefore, choosing suppliers close to a port and making sure suppliers use the closest port are key factors in minimizing carbon emissions. An old and poorly maintained truck can generate carbon emissions three times higher than for a modern and well-maintained truck



Vessel route choice: COSCO Shipping has two of their services from Yantian in China to Felixstowe. The AEU7 service generates 24% more carbon per 1 TEU moved than their AEU1 service



Destination port: Different ports have invested to different levels in methods and equipment to minimise carbon



Destination transport mode: Using rail rather than road to move imported containers will yield significant carbon reductions – explored in more detail in the rail section of the report

UK PORTS

UK ports will play a vital role in decarbonising the maritime shipping sector. Retailers should be made aware of the opportunities of developments such as shore power, Internet of Things (IoT) and Free Port incentives, in order to make more informed choices and decisions on the options available.

SHORE POWER

Shore power is the process of providing electrical power from the shore to a ship while it is docked, allowing the ship's auxiliary engines to be turned off and the burning of diesel fuel to cease, eliminating emissions from mooring ships and improving the local air quality.

Shore power has been installed in many ports, mostly in North America and Europe, as a viable option to reduce port emissions. In the UK, there are only two ports; Orkney and Southampton, that have the facilities. This provides an opportunity for ports in the UK to develop these facilities further.



RECOMMENDATIONS TO RETAILERS - SHIPPING

There are significant opportunities for retailers to reduce emissions by considering how they work with their shipping providers and by seeking to influence government:

- 1 Contracting and management:** BRC members' corporate targets now have to factor in both climate and financial metrics, so the shipping tendering process should take this into account. Given the current strong position of shipping lines, this is undoubtedly a challenge. Nevertheless, tendering should include lane by lane information on emissions as well as the standard charge and service information. The shipping lines should also present on their carbon management and targeting measures so members can better understand the reality behind claimed numbers. These numbers should be holistic, covering all activities, not just the ocean leg and show performance against a set of agreed targets.
- 2 Network design and operation:** When members are at points where they are assessing their distribution network design for capacity and other changes, the design should include the opportunity to use or build facilities that are close to ports. Where this is not possible or economic, then use of rail for the port to DC movement should be included and given serious consideration. Where a DC has a rail siding or is close to a rail terminal, moving the container by rail is often more cost-effective than moving it by road.

Even outside of these periods when networks can be changed, opportunities to use rail freight should be sought. The rationale and feasibility of this is considered in the Rail section of the report.
- 3 Carbon clubs and government influencing:** Serious consideration should be given for how BRC members can emulate the progress being made in the USA by groups such as COZEV. It is starting to be effective in the USA, why shouldn't the UK and Northwest Europe follow?

RECOMMENDATIONS TO GOVERNMENT

AND PORT PROVIDERS - SHIPPING

Given the current condition of UK public finances and attitude to regulation, the timing with which these recommendations are pursued should be carefully considered. Apart from safety legislation and planning permissions, The UK government has a limited role in shipping which is a truly international and global industry where one country's government cannot dictate change.

Allowing for all of these limitations, the recommendations with the best balance of cost vs benefit vs difficulty include:



- Demand Side Incentives: Tax Credits for retailers who incur expense for using low carbon shipping



- Supply Side Incentives:
 - Regulation to mandate some of the port best practices already in play to be adopted by all ports
 - Technology Development Grants – again focusing on ports to fund best practice
 - Shore Power Funding: Provide funding to develop shore power facilities in other ports in the UK
 - Wind Power Funding: Companies in the UK that are developing WASP technologies do not benefit from access to government funding, unlike in some other countries like France with their 'Blue Decarbonisation' legislation

RAIL

RAIL RETAIL LANDSCAPE

The rail freight industry delivers an estimated £2.4bn of economic benefit to the UK annually, as well as contributing to the UK's sustainability targets.

Rail is an environmentally friendly way to transport people and goods across the UK when compared to road freight. Rail moves 9% of all UK freight tonne-kilometres, but only generates 1.4% of the total UK transport emissions and around 0.5% of the UK's total emissions.

Retailers are now increasingly looking to rail to offer environmentally sound logistics solutions as part of their supply chain offer in terms of climate impact and alleviating road congestion. Retail rail freight (heavily focused around the movement of imported containers and a small number of other long-distance movements) comprises approximately 40% of the total goods carried on rail and is increasing in scale. The Chartered Institute of Logistics and Transport (CILT) have recently concluded that 33% of traffic currently carried by road HGVs could transfer onto the rail network.

While the rail sector's role in achieving the UK's decarbonisation targets is critical, current capacity and inflexibility remains a significant constraint. However, with the right infrastructure and policies in place, rail can play a leading role in the decarbonisation of the UK transport sector.

Rail freight can deliver significant and immediate carbon reductions, including:

- Decongesting the UK roads by reducing the number of HGVs required. Each rail freight journey can carry the equivalent of 76 HGVs
- Reducing Emissions, which are 76% lower for rail than they are on road

As the ultimate retail store destination will rarely, if ever, be connected to rail, using rail will always involve some element of road freight road for the final mile. Therefore, an intermodal rail-road solution will always have a higher total distance than a point-to-point road-only movement that goes straight from origin to the end retail destination. However, even allowing for this extra distance, total carbon emissions are normally lower for any long-distance journeys where the long haul can be by rail due to its much lower carbon intensity.

NETWORK AND MODAL CHOICE TODAY

Whether electric or diesel traction is used for rail, its climate impact per Tonne-Km is much lower than for road. The leading authority, Prof. Alan MacKinnon, has estimated typical road emissions for a large truck at 62 g per Tonne-Km, compared to an average for a blended average for rail freight of 22 g per Tonne-Km.

This confirms the climate case for using rail. But as retail rail movements, even where the product originates in a rail-connected port or factory or DC, will nearly always involve a final movement by road, the economic and service case is focused around long-distance movements.

The transshipment from rail to road introduces extra handling cost at the terminal, additional mileage for the extra leg and the potential for delay and service issues or disconnects. If the origin-destination journey is short, these penalties tend to be prohibitive.

This is why retail use of rail so heavily focuses on container movements of imported products, or occasionally long-distance movements of domestically originated products.

“ Companies such as Tesco and Peacocks have used rail extensively to reduce carbon.

The network currently available to make such movements has plenty of geographic coverage, with all three major deep sea import ports being rail-connected with multiple daily-services, and the channel tunnel providing a similar service for imports from or exports to Europe.

The map on page 29 illustrates this, showing the rail service map from the UK's three largest container ports: Felixstowe, Southampton and London Gateway.

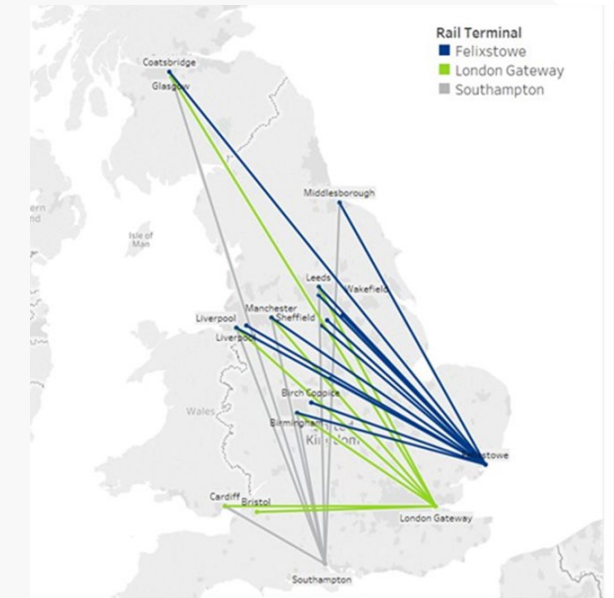
Companies such as Tesco and Peacocks have used rail extensively to reduce carbon. Tesco use rail services from Spain into the UK for chilled fresh fruit and from Tilbury into Coatbridge in Scotland (amongst other long-distance routes), again for chilled fresh fruit. More than 7.3 million road miles per year has been transferred to rail, saving 9000 tonnes of carbon annually.

Although much smaller in scale, Peacocks have successfully used rail from Southampton into Cardiff to transfer 2000 containers per year from road to rail.

However, there are various capacity and service issues which constrain the use of rail for retail:

CAPACITY SHORTAGES AND PRIORITISATION:

- Currently freight trains often receive lower priority than passenger services which can impact service timings and reliability. This is due to the current passenger services operating in anticipation of demand, whereas current freight services operating in response to demand.
- If more paths and capacity could be made available for port to inland terminal container trains, then the volume on these routes would increase. Volumes are currently capacity constrained.
- There is often maintenance work taking place throughout the network which impacts network availability, especially over the weekend. As a result, when retailers are considering the options, they tend to favour the reliable road transport option.
- The system for booking time slots on the railway network is not agile enough to support retailer supply chain decision making cycles.



(Sources: DP World; Port of Felixstowe)

SHORTAGE OF RESOURCES:

- There is a current lack of containers in general, with availability being especially challenging for temperature-controlled rail containers for transporting refrigerated goods. This causes a barrier to entry for grocery retailers due to the high customer demand for fresh groceries, so must be a focus area for future development if the rail industry is to become a viable alternative to road for these retailers.

HS2 FREIGHT

ALLOCATION

'High Speed 2', is a new rail line to add significant extra capacity to infrastructure that was laid down more than 150 years ago. This major investment costs £72 bn to £107 bn.

The process to allocate capacity and paths between freight and passenger services is ongoing. Various local freight groups, such as Midlands Connect, have estimated that HS2 could provide capacity for an additional 144 trains per day, and with each train replacing 76 trucks this equates to carbon reduction for 3.8 million truck moves annum. As these are, by and large, long-distance movements of between 100 and 400 miles, the carbon benefit is further amplified.

The role of retailers in seeking to influence Government so that rail freight is allocated a reasonable share of capacity is extremely important. Given recent increases in remote working and the resultant drop in rail passenger numbers, there is even less justification for rail freight not getting a large allocation of the newly created capacity.

FURTHER HIGH LEVERAGE

INVESTMENT

Given the amount already being invested in HS2 and the well-publicized short- and medium-term pressures on UK government spending, any requests for further funding or investment will have to be well targeted, and likely small, and generating a high climate and social / economic benefit according to Treasury Blue Book business case rules.

Two investment linked to greater use of electric locomotives that would deliver strong climate benefit include:

Ipswich to Felixstowe electrification: The last 10-miles of the line into Felixstowe has not been electrified, leading to ongoing use of diesel locomotion, with its higher climate impact. There is hope that this investment may come to fruition, as part of the line has recently received investment to be converted from single line to a double line passing loop, increasing daily capacity from 66 to 90 trains.

Seed investment for new flexible terminal electrification: One of the factors limiting the use of electric locomotives is that loading and unloading of the freight wagons often involves access from above. In this scenario an electric locomotive can be used for the main haul, but a diesel locomotive will be needed in and out of the siding for loading and unloading because electric cables above will not be feasible. The use of two sets of locomotives introduces extra costs, time and complexity. One rail operator (GB Railfreight) has been working with Tarmac and local specialist engineers to implement an innovative solution whereby they use a movable electric overhead conduction system to unload containers.

Electrification provides an environmentally friendly alternative to diesel and has several advantages:

- Air quality is improved; noise pollution is reduced
- Electric locomotives cost less to operate
- Electric locomotives have better reliability than diesel-fuelled services
- Electric trains produce less than half the carbon emissions of diesel trails



(Source: GB Railfreight)

Another innovative investment, where seed funding exists to support the pilot and pre-scaling phase, is the Orion freight service whereby unused electric passenger multiple-unit trains have had their interiors fundamentally redesigned so that they are 100% geared for roll-cages and palletized cargo. This allows the trialling of high-speed unitized freight directly into city centre train stations. The long part of the journey can be undertaken by rail at speeds in excess of 100 mph and with low carbon impact. The loads are then quickly handled onto the platform for local last mile delivery by eCargoBike or other climate friendly local methods. Suitability and focus is currently mainly around retail and general parcel use.

FUELS CHOICE

The challenge for rail freight is that current alternatives to electrification, such as hydrogen and battery, do not have sufficient power to pull heavy freight trains due to the requirement for additional wagons for fuel and battery storage.

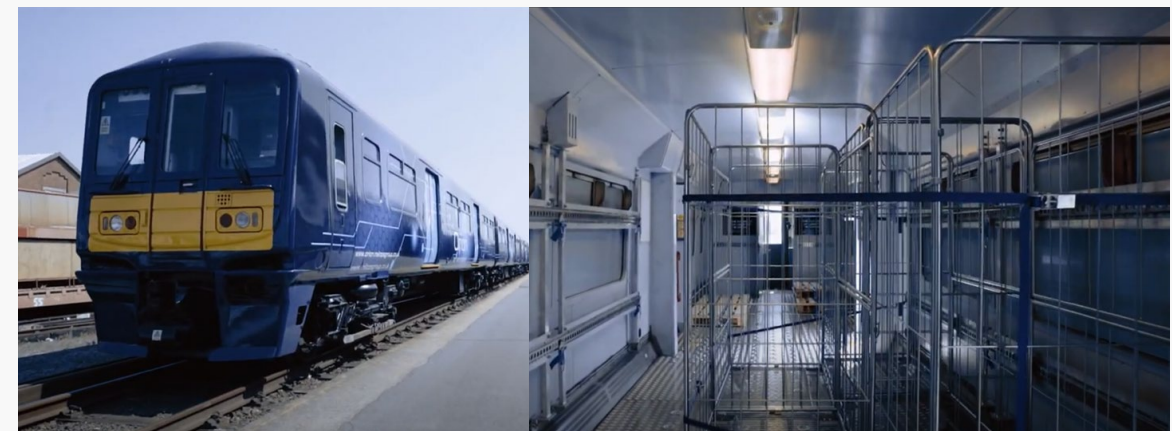
Given these constraints, most of the changes in fuels choice are focusing in two areas:



Hybrid locomotives: Britain's rail network is a mix of electrified and diesel, reducing the case for retailers' use of rail, as extra cost is introduced and carbon benefits are lower than they would be with an all-electric network. However, as this situation is likely to persist, Hybrid locomotives are becoming an important option as they can operate on both electric and diesel power. Not ideal, but certainly better than using diesel-only traction with its higher carbon impact. The Class 88 locomotive has been deployed to provide this Hybrid service, with the operators DRS estimating a 25% reduction in carbon emissions when compared to conventional diesel locomotives.



Biofuels: Several of the UK's rail freight operators are piloting biofuels and are estimating carbon reductions of around 90%. The main fuel option is Hydrotreated Vegetable Oil (HVO), which is being trialled by DRS for Tesco cargoes and by DB Cargo UK.



(Source: Rail Operations Group)

RECOMMENDATIONS TO RETAILERS - RAIL

There are significant opportunities for retailers to use rail freight for carbon and cost improvements, both directly and indirectly through influencing government:

INDIVIDUAL ACTIONS WITHIN CURRENT DISTRIBUTION NETWORKS

Most attention should be focused on flows of imported containers and any other long-distance UK domestically sourced flows (which tend to be of smaller scale). Working with the suppliers who manage / provide these flows for you, assess the cost and time-service-carbon impact of switching these movements from road to rail. Make this a point of emphasis in tendering and management processes as for many importers rail inbound container movement is the default option, with only a lack of capacity limiting greater use.

Where retailers have outbound e-Com or other parcel traffic, it is recommended that you hold exploratory discussions to see if some of these volumes could use a service such as the Orion service. These discussions should also cover conventional retail deliveries of roll cages and pallets, especially to stores or near to passenger stations. As this service is at an embryonic stage so these discussions may only help reduce carbon in the medium-term.

If you are currently using rail freight services, then pressure should be placed on rail freight providers to use biofuels such as HVO wherever possible and / or hybrid locomotives where full electric traction is not possible. This should link to working closely with them so that carbon reporting of actual (not planned) carbon emissions becomes part of their regular KPI reporting.

INDIVIDUAL ACTIONS WHEN DISTRIBUTION NETWORKS ARE REVIEWED

It is highly likely that the current location and lack of direct rail connections of current DCs may limit retailer ability to use rail freight today, however give industry changes from e-Com, Covid, nearshoring and the climate agenda, many businesses are actively reviewing their UK distribution networks.

As and when such reviews occur, they should give due consideration to using DCs which are rail-connected, with rail sidings that allow inbound containers to be received by rail without the added expense of a road movement from a local rail terminal. This assessment should include exploratory discussions on the availability of government grants to support any incremental costs.

The review should also look at the feasibility of using services such as the Orion service for outbound rail deliveries.



COLLECTIVE ACTIONS WITH RAIL INDUSTRY AND GOVERNMENT

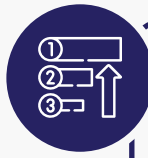
The key areas where retailers can work together to strengthen rail's ability to reduce climate impact are:



Government decisions on HS2 freight capacity: Influencing government to ensure that freight receives a high allocation of the new capacity that is being created



Lobbying government for high leverage, spot investments: Influencing government to invest in a small number of high benefit schemes such as the Ipswich-Felixstowe electrification, increasing capacity at the Ely bottleneck and providing seed investment for schemes such as Orion and Movable Terminal Electrification



Influencing rail operators for shared high priority changes: Acting together is likely to increase the chance of rail operators delivering on important changes such as:

- Terminals having wider opening hours, which interviewees raised as a key constraint (often limited by planning restrictions)
- Better service reliability information systems, mirroring the high-quality systems which are available to provide information on road movements
- Obligate 3PLs (third party logistics providers) to provide regular data that enables the retailer to accurately measure and report on its scope 1, 2 and 3 emissions
- Ask 3PL's to provide detailed plans on how they will move to net zero including their overall and interim targets with details on how those targets will be met
- Increased use of hybrid locomotives and biofuel, as mentioned above

RECOMMENDATIONS TO GOVERNMENTS AND RAIL OPERATORS

In addition to the changes already highlighted further changes that would increase retail use of rail freight include:



Demand Side Incentives: Over and above current funding, increased grants and tax incentives to ensure a wider uptake of rail freight, reducing emissions and accelerating the decarbonisation of the freight sector



Supply Side Incentives: Continued R&D funding to support the development and piloting of diesel-alternative fuels, mirroring the wide choice of alternative fuels available in the shipping industry



Rail network management improvement: Scheduling and track maintenance work (often at times of low passenger use but normal or high freight use) needs to better consider the impacts on planned freight movements to avoid disruption to retailers

“ It is highly likely that the current location and lack of direct rail connections of current DCs may limit your ability to use rail freight today.

EMISSIONS DATA COLLECTION AND ANALYSIS

RETAILERS - CURRENT LANDSCAPE

& CHANGE PRIORITIES

Most global organisations are committed to reporting their corporate emissions, with many having set their aspirational net zero targets, and calculated their baseline figures (in particular the figures related to scopes 1 and 2). For the majority there is a significant amount of work to do to understand how to achieve net zero targets, and to develop the competence to accurately and efficiently measure and report on activities covering Scope 1, 2 and 3, albeit organisations are showing more progression in scopes 1 and 2 (in comparison to scope 3).

Retailers need to pivot from simply reporting emissions to generating active actions to reduce emissions. However, to enable this shift requires:

- a consistent reporting methodology, to a global standard, allowing for global transparency and comparison
- tools or systems which allow the modelling and assessment of the carbon impact of alternative transport mode / route / load choices

The value of emission reporting is well understood but the net-zero targets in place for each retailer differs substantially, based on their carbon journey.

In the survey published to BRC retailers, only 18% of retailers have specific net-zero targets for the different modes of transport they use.

Some retailers are collecting data and using it to report on their progress to achieving identified scope 1 and scope 2 net zero targets. Retailers are able to report on this due to the availability of internal data and the roadmaps and technology clearly defined and in place.

Retailers are ensuring they are aligned to the BRC's pledged targets:

- 2030 – for retailers' electricity use ('Scope 2' emissions)
- 2035 – for fuel, gas and refrigerant use ('Scope 1' emissions)

Some retailers do not currently have the necessary data to report against adopted targets, but have a clear roadmap in place that identifies how targets will be met.

There are other retailers that do not currently have any net-zero transport targets or any scope 1, 2 or 3 targets in place, but they report they are working towards setting these targets across their business.

One grocery retailer is making significant progress with emissions reporting. They are working with advisory partners and the Carbon Trust to provide regular emission calculations. This report includes all carbon emissions in their end-to-end supply chain which is fed into a dashboard. This has been a base for their emissions targets and a useful way to stay on track.

54% of our survey respondents have outlined that a key constraint in measuring and reporting emissions is the lack of available data. In particular, we are observing the challenge with the availability of scope 3 data as it requires data from suppliers, logistics partners and internal stakeholders.

However, we are beginning to see the increase in availability of emissions data as net-zero is becoming a focus for more companies and industries. For example, shipping lines beginning to publish their CO₂ efficiency records and suppliers are becoming more aware of data requirements that retailers are looking for.

A concern many retailers have is the variation in carbon measuring methods that different retailers are employing. For example, some are measuring the end-to-end supply chain emissions whereas, others are only measuring when they receive the goods from the supplier. A consistent, industry wide, approach needs to be adopted to ensure comparability between retailers.



EMISSIONS INITIATIVES AND PRODUCTS

There are various initiatives and products aimed at promoting data collection and reporting:

SCIENCE BASED TARGETS INITIATIVE (SBTi).

More than 3,000 business worldwide have signed up to the Science Based Targets initiative (SBTi). The SBTi defines and promotes best practice in science-based target setting and we are seeing more retailers sign up to this initiative.

SHIPPING LINES TOOLS / 3PL TOOLS

Most major shipping lines have basic carbon calculator tools and the more ambitious are beginning to develop fuller digital platforms to provide customers with the carbon impact visibility of their end-to-end supply chains and logistics operations. The tools offer innovative features to reduce carbon emissions, predict arrival times using data. Some shipping lines, for example DHL allows customers to track emissions across the supply chain down to a single shipment.

BEARINGPOINT EMISSIONS CALCULATOR

BearingPoint Emission Calculator (BEC) is a software product used by businesses to collect / collate primary and secondary emissions data covering scopes 1, 2 and 3, and then, using embedded methodologies, to calculate and report on emissions which are aligned (and continuously updated) to globally agreed standards. The solution enables businesses to move from manual data collection and reporting to automated reporting and provides proxy calculations in areas for which data is not currently available. It is linked directly into ERP systems and driven by transactional data to enable side by side comparison of both cost and emissions with built in scenario modelling to understand the cost and emission impacts of any planned business changes.

CONCLUSION

RETAILERS ARE COMMITTED TO WORKING TOWARDS NET-ZERO LOGISTICS. THIS RESEARCH, COMMISSIONED BY BRC, CLEARLY SHOWS THAT CHANGES IN SHIPPING AND IN THE UK RAIL FREIGHT INDUSTRY (ESPECIALLY WITH HS2) WILL PROVIDE SERVICES THAT HAVE LOWER CARBON INTENSITY.

What is now needed are changes, both individually and collectively, to make sure that this potential is effectively used to actively reduce retail carbon emissions:



Tendering and management of freight contracts with a focus on working with the more ambitious shipping lines, rather than the laggards, making sure that KPIs track the actual carbon reductions that their strategies promise



Redesigning shipping routes and UK distribution networks to minimize road movements where possible, replacing them with either containers moving by rail or short-sea feeder services



Influencing the UK government so that rail capacity is increased, and reliability and service management systems enhanced



Influencing both shipping lines and rail operators to make the earliest possible use of biofuels, especially 2nd generation biofuels which give much greater full-cycle climate benefits

It is only with actions such as these that the significant reductions needed in the next few years will be achieved. Delivering major carbon reductions by 2030 should be the target, as a waypoint on the route to achieving net zero by 2040.

BRC CLIMATE ACTION ROADMAP

BRC's Better Retail Better World campaign commits the retail industry to build a fairer, more sustainable economy in line with the UN Sustainable Development Goals.

One of the critical goals determined by us and our stakeholders is Climate Action.

The BRC Climate Action Roadmap is the framework to guide the industry to Net Zero.

Supporters of the BRC Climate Action Roadmap commit to working with other retailers, their suppliers, Government and other stakeholders, and to support customers to collectively deliver the industry's Net Zero ambition.



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ABOUT BEARINGPOINT

BearingPoint is an independent management and technology consultancy with European roots and a global reach. The company operates in three business units: Consulting, Products, and Capital. Consulting covers the advisory business with a clear focus on selected business areas. Products provides IP-driven digital assets and managed services for business-critical processes. Capital delivers M&A and transaction services.

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