

A decorative graphic consisting of a dark blue horizontal bar with a pointed right end, and a smaller, shorter dark blue bar below it.

Route to Zero Carbon

October 2020

A wide horizontal band featuring a photograph of white clouds against a blue sky, transitioning into a solid dark blue shape on the right, which then merges into a red shape on the far right.A wide horizontal band featuring a photograph of white clouds against a blue sky, transitioning into a solid dark blue shape on the right, which then merges into a red shape on the far right.A dark blue horizontal bar with a pointed right end.

In 2018, 24% of global CO₂
emissions came about from
transportation.

According to the World Resources Institute



Climate change affects us all

Route to Zero Carbon
By Prof. Dr. Omera Khan,
Executive Strategic Advisor
at Skill Dynamics
October 2020

This whitepaper is sponsored by:

Skill Dynamics (HQ)
11 St. James Square
London
SW1Y 4LB
United Kingdom
marketing@skilldynamics.com
sales@skilldynamics.com
www.skilldynamics.com

Credits

Editor: Prof. Dr. Omera Khan

Copywriter: Dr. Malcolm Wheatley

Layout: Loop Associates

Images: Istock

Copyright © Skill Dynamics

ISBN 978-1-8382452-0-7

Climate change affects us all. And in the battle against it—and the climbing temperatures and rising sea levels that accompany climate change—supply chain organizations are in the front line.

Why? Because choices about where—and how—products are sourced, manufactured, warehoused, and transported all turn out to have a significant effect on the global level of CO₂ emissions into the atmosphere. And it is those emissions that are in large part responsible for the climate change that the planet is experiencing.

The statistics are startling. In 2018, 24% of global CO₂ emissions came about from transportation. According to the World Resources Institute, in 2016, the transport sector for the first time surpassed the electric power industry as the single greatest source of greenhouse gases in the United States. In Europe, where most other sectors of the economy have reduced their CO₂ emissions since 1990, emissions from transport have risen—and continue to climb.

This paper discusses how supply chain organizations are addressing this. What motivates them, the barriers that they face, and—crucially—the skills that will be required in order to overcome those barriers.

Simply put, climate change is a battle that must be won. So if your organization is pursuing—or thinking about pursuing—a zero-carbon initiative as part of its sustainability agenda, then I believe the present report is essential reading.

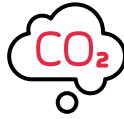


Prof. Dr. Omera Khan –
Executive Strategic Advisor at Skill Dynamics



Calculations from satellite imagery show that 28trn tonnes of ice have disappeared from the surface of the Earth since 1994, as the planet has warmed.

Estimates published in August 2020



In March 1958, geochemist David Keeling of America's Scripps Institution of Oceanography began collecting daily air samples at the Mauna Loa Observatory, Hawaii. Intended to monitor **the amount of carbon dioxide (CO₂) in the atmosphere**, Keeling's daily measurements now constitute the world's longest-running record of direct measurements of atmospheric CO₂.

Charted on a graph, they have become known as the Keeling Curve—so called, because it curves upwards at an increasingly exponential rate. Six years ago, levels of atmospheric CO₂ breached the symbolically important level of 400 parts per million (ppm); in May 2020, despite a dip in CO₂ emissions caused by coronavirus lockdowns and consequent economic slowdowns around the world, CO₂ concentrations reached fresh new record highs.

Which matters, because levels of atmospheric CO₂ contribute towards the greenhouse effect—the extent to which the Earth's atmosphere warms as solar radiation is absorbed as heat, rather than reflected into space. Simply put, rising levels of atmospheric CO₂ are gradually warming the planet, bringing about climate change and climbing sea levels: **estimates published in August 2020, calculated from satellite imagery, show that 28trn tonnes of ice have disappeared from the surface of the Earth since 1994, as the planet has warmed.**

According to the Intergovernmental Panel on Climate Change, **Earth's global surface temperature in 2019 was the second warmest since modern record keeping began**, and average temperatures today stand at just over 1°C above pre-industrial levels. Most of this

warming has occurred in the past 35 years, and the six warmest years on record have been since 2014. Climate scientists at NASA point out that not only was 2016 the warmest year on record, but that eight of the 12 months that make up that year were the warmest on record for the months in question.

Working retrospectively, using ice cores and other data, scientists have now plotted atmospheric CO₂ concentrations back to 1750, when CO₂ levels were just under 280 ppm. Reaching 320 ppm in the early 1960s, they have rocketed upwards since, with the Keeling Curve—as one would expect—highly correlated with CO₂ atmospheric emissions, which today stand at 38bn tonnes of CO₂ each year, up from 20bn tonnes per year in 1990.

Where do these emissions come from? Step forward, the world's businesses and industries, which collectively contribute a major proportion of those emissions. Factories, offices, data centres, warehouses, various transportation modes—collectively, they are significant consumers of energy. And since all too little of that energy is as yet produced sustainably, from hydro-electric power, wind power, or solar farms, the result is CO₂ emissions from the burning of oil, gas, or coal.



Earth's global surface temperature in 2019 was **the second warmest** since modern record keeping began.

A man in a blue uniform is pushing a hand truck in a warehouse. On the hand truck is a large, realistic-looking globe of the Earth. The warehouse has high ceilings and many tall shelving units filled with cardboard boxes. The scene is lit with warm, industrial lights. There are three decorative arrow-like shapes: a red one on the left, a blue one above the globe, and a red one below the globe.

It is decisions about where—and how—products are sourced, manufactured, warehoused, and transported that have the greater impact.



Businesses are owning up to their responsibilities in the fight against climate change.

Supply chains' central role

Those businesses and industries aren't blind to the charge. Even in the United States—where president Donald Trump abrogated the United States' position as a signatory to the Paris Treaty, an international climate change accord—businesses are owning up to their responsibilities in the fight against climate change. And around the world, through businesses' Corporate Social Responsibility (CSR) and Environmental, Social and Governance (ESG) programmes, sustainable energy initiatives are underway.

But the challenge is vast. Climbing atmospheric CO₂ concentrations show that natural processes—the world's forests and grasslands, for instance, which convert CO₂ back into oxygen, with carbon as a by-product—cannot keep pace with ever-growing emissions. It is not enough for businesses to simply reduce their emissions: that will merely slow the pace of climate change. For atmospheric CO₂ concentrations to stabilise, and then reduce, net new emissions of CO₂ need to be zero.

And in the battle to achieve that, businesses' supply chain organizations are in the front line. Yes, offices with their lighting and heating and computers are far from above reproach. Likewise data centres. But their contribution to an individual business's CO₂ emissions typically pales into relative insignificance compared to a given business's manufacturing and supply chain operations.

Simply put, it is decisions about where—and how—products are sourced, manufactured, warehoused, and transported that have the greater impact. And it is in those decisions that the greatest trade-offs and tensions lie.

Buying—say—a greener brand of photocopier paper, even at a modestly higher cost, creates few ripples. But sourcing machine components from—say—China rather than a local manufacturer in order to buy them at a lower price, has a more significant impact on a business's CO₂ emission footprint. For with that decision, a whole set of accompanying set of actions are set in train: containers of components transported thousands of miles, on trucks, trains, and ocean-going vessels. And should supply chain disruption occur, expedited shipment via air freight may be called for. At each stage of the journey, CO₂ emissions result.

Likewise with outbound supply chains. The journey from the assembly line to the final customer may involve a chain of custody stretching through multiple intermediaries—distributors and logistics partners alike—each with their own handling and storage operations. And at each stage, as goods move between these various intermediaries, transport is required: road, rail, air, or sea as appropriate.

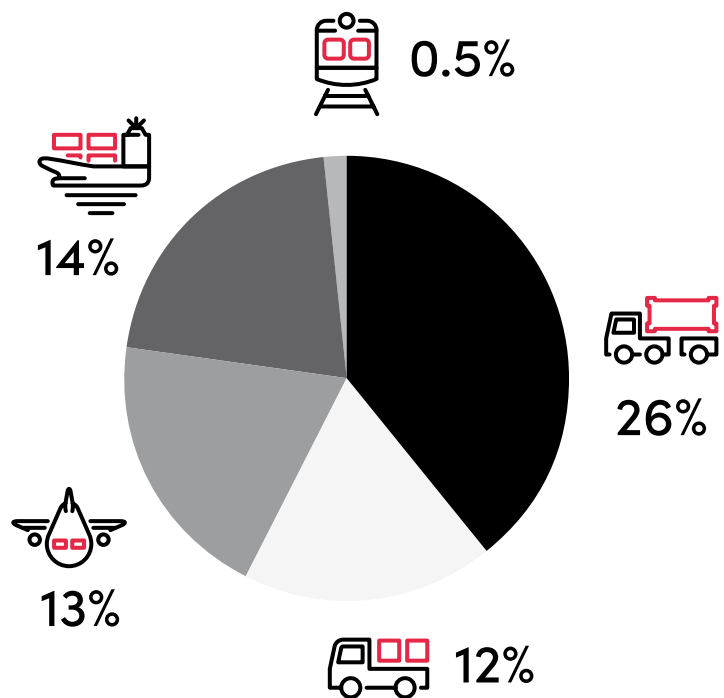
Ship by road—or rail? Ship by air—or sea? Each has its own carbon footprint. And while supply chain organisations will be aware in general terms of the relative difference between these carbon footprints, the actual choice of mode of transport is based on other criteria, typically cost or transit time.

In essence, for any business with a physical supply chain operation, the choices and strategies relating to the operation of that supply chain have a consequential impact on that business's CO₂ emissions. And as businesses in general begin to address their carbon footprints, as part of their general CSR and ESG agendas, those businesses' supply chains and supply chain organisations are coming under increasing scrutiny.



For any business with a physical supply chain operation, the choices and strategies relating to the operation of that supply chain have a consequential impact on that business's CO₂ emissions.

Heavy duty trucks contribute 26% of Europe's CO₂ emissions. Light duty trucks, 12%. Civil aviation, 13%. Water navigation, 14%. Rail transport, 0.5%.



Awkward truths


What that scrutiny reveals doesn't always make for comfortable reading. It isn't necessary to undertake a full carbon footprint analysis or audit in order to see that significant proportions of total CO₂ emissions come from supply chain activities.

European statistics published by the European Environment Agency paint a disturbing picture. Compared to 1990, significant reductions in emissions have been seen across Europe's economies. Emissions associated with manufacturing industry and construction, for instance, are at about 60% of 1990 levels. Emissions from agriculture, forestry and fisheries are at about 80% of 1990 levels. Energy production, likewise. Residential emissions have also slowed sharply.

Yet one sector has seen emissions actually increase: transport, where emissions are at around 120% of 1990 levels. Granted, this sector includes private cars and motorcycles. But heavy duty trucks contribute 26% of Europe's CO₂ emissions. Light duty trucks, 12%. Civil aviation, 13%. Water navigation, 14%. Rail transport, 0.5%. The scope for improvement by businesses is clear—particularly in the area of road transport, given that businesses own over half of all newly-registered vehicles on the road.

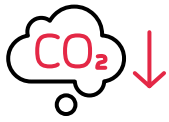
In 2008, the European Union adopted some ambitious anti-climate change targets, one of which was to achieve a 20% cut in greenhouse gas emissions compared to 1990 levels. In fact, progress was rapid: by 2018, the target had been met and exceeded, with emissions having decreased by 23.2%. But worryingly, the target for 2030—a 40% reduction from 1990 levels—looked set to be missed, and by a considerable margin. Based on member states' projections, the achieved emission reduction would only be about 30% by 2030. That picture hasn't changed.

Nor is Europe alone. A broadly comparable situation is seen in the United States, where CO₂ emissions per capita remained roughly constant from the mid-1980s (instead of continuing to climb), and began falling from 2005. Total CO₂ emissions were over 6.5bn tons in 2005, but by 2019 had fallen to below 6.0bn tons. Again, though, transportation remains the largest source of CO₂ emissions in the United States. And while after several years of flattening growth emissions were roughly stable in 2019, according to analysts at Rhodium Climate Service they now stand at approximately where they were before the Great Recession started in 2007: the emissions clock has been turned back, but not very far.

A man with a beard, wearing a light blue shirt, is lifting a young girl into the air. The girl is wearing a striped long-sleeved shirt and patterned shorts. They are in a field of tall grass. In the background, several large wind turbines are visible against a clear blue sky. There are three decorative arrow-shaped elements: a dark blue one at the top center, a red one on the left side, and another red one on the right side.

“For anyone who has children, there’s almost a moral imperative that we leave them a world that’s liveable in. And from a commercial perspective, for businesses, that’s an aspiration that resonates well with their customers.”

Nick Wilkins, senior vice-president
for global logistics at Avnet.



If supply chains play their full part in **emissions reduction**, there are reasonable grounds for believing that total global net CO₂ emissions will reduce.

Zero carbon in context

In short, the message is clear: **if supply chains play their full part in emissions reduction, there are reasonable grounds for believing that total global net CO₂ emissions will reduce**—the first important step towards achieving actual reductions in levels of atmospheric CO₂.

In response, supply chain organisations around the world are embracing a new and ambitious goal: zero carbon. In other words, they wish to reduce their supply chains' CO₂ emissions to zero, with the 'carbon' in 'zero carbon' being a shorthand (and sometimes confusing) abbreviation for the gas 'carbon dioxide', rather than the solid carbon produced within the so-called carbon cycle when carbon dioxide is broken down into carbon and oxygen.

As an objective, zero carbon is unquestionably ambitious and challenging. Clearly, given the extent of transportation's contribution to overall global CO₂ emissions—and the present pervasiveness of fossil fuels within transport networks, from which that CO₂ is generated—zero carbon is unlikely to be achieved any time soon.

But 'any time soon' doesn't mean 'never': there are considerable grounds for optimism. Consider the rapid advances being made in power generation, for example. In a period of a few short years, a number of countries have made a sizeable switch away from fossil-fuel generated electricity, and toward zero-emission renewable sources of energy. In the first three months of 2020, for instance, **renewable energy made up 47% of the UK's electricity generation**: the country now goes significant periods without coal-fired power stations being called into use, with coal meeting just 4% of the UK's electricity needs. And while bio-mass power production admittedly forms a small proportion of overall production, the bulk of renewable energy production comes from onshore and offshore wind, solar power,

hydroelectricity. In other countries—notably Germany, Sweden, Spain, and Italy—the story is similar. Yet such output levels would have been considered unthinkable a few short years ago.

Consider too the opinions of authorities on the subject. In 2018, the authoritative Energy Transitions Commission published *Mission Possible: Reaching net zero carbon emissions from harder to abate sectors by midcentury*, concluding that the decarbonisation of a lot of transport was indeed attainable.

"In heavy duty transport, electric trucks and buses (either battery or hydrogen fuel cells) are likely to become cost competitive by 2030, while, in shipping and aviation, liquid fuels are likely to remain the preferred option for long distances but can be made zero carbon by using bio or synthetic fuels. Improved energy efficiency, greater logistics efficiency and some level of modal shift for both freight and passenger transport could reduce the size of the transition challenge," it reported.

Consider too that while transportation may be a difficult nut to crack, transportation doesn't make up the entirety of supply chain operations: warehousing and other logistics operations are also involved. As we have seen, emissions from manufacturing industry are at about 60% of 1990 levels—driven not solely by CSR or ESG agendas, of course, but also by the fact that energy-saving (the prime source of emissions reduction) is also a saving in cost. In short, considerable scope still exists for zero carbon in non-transportation activities.

And finally, **consider that zero carbon, if not yet a destination that is firmly visible on the horizon, is certainly a journey worth undertaking**—and that every successful step forward reduces the amount of CO₂ being emitted into the atmosphere. As with other supply chain-related aspirations—lean manufacturing, for instance—benefits accrue from the journey, as well as from



Consider that zero carbon, if not yet a destination that is firmly **visible on the horizon**, is certainly a journey worth undertaking.



Renewable energy made
up 47% of the UK's
electricity generation.

EV100, committed to increasing the adoption of **electric vehicles** in their transportation networks, ultimately to 100%; or RE100, committed to using **100% renewable energy** in their operations.



Maersk, which aims to have **carbon-neutral vessels** in commercially-viable operation by 2030.

Mitie, committed to transitioning its entire 5,300-strong vehicle fleet to **zero-emission electric** by 2023.



reaching the journey's end.

Showing the way

Just ask those businesses already undertaking it—either on their own, or as part of a broader coalition, such as EV100, a group of businesses committed to increasing the adoption of electric vehicles in their transportation networks, ultimately to 100%; or RE100, a group of businesses committed to using 100% renewable energy in their operations.

As an example of the latter group of businesses, take multinational food and personal care giant Unilever: already, across five continents, it is using electricity from renewable energy sources in all of its manufacturing and distribution operations. And by 2030—just a decade away—the goal is for the company to be relying entirely 100% on renewable energy for these operations, a programme undertaken in parallel with considerable efforts to reduce energy usage.

Or take Maersk—the world's largest shipping container company—which aims to have carbon-neutral vessels in commercially-viable operation

by 2030, replacing older vessels with new and efficient ones. And bearing in mind shipping's reputation as an emitter of 'dirty' greenhouse gases thanks to its use of heavy bunker fuel to power ships' engines, it's worth considering in mind that Maersk's CO₂ emissions per container shipped have reduced by 46% since 2007.

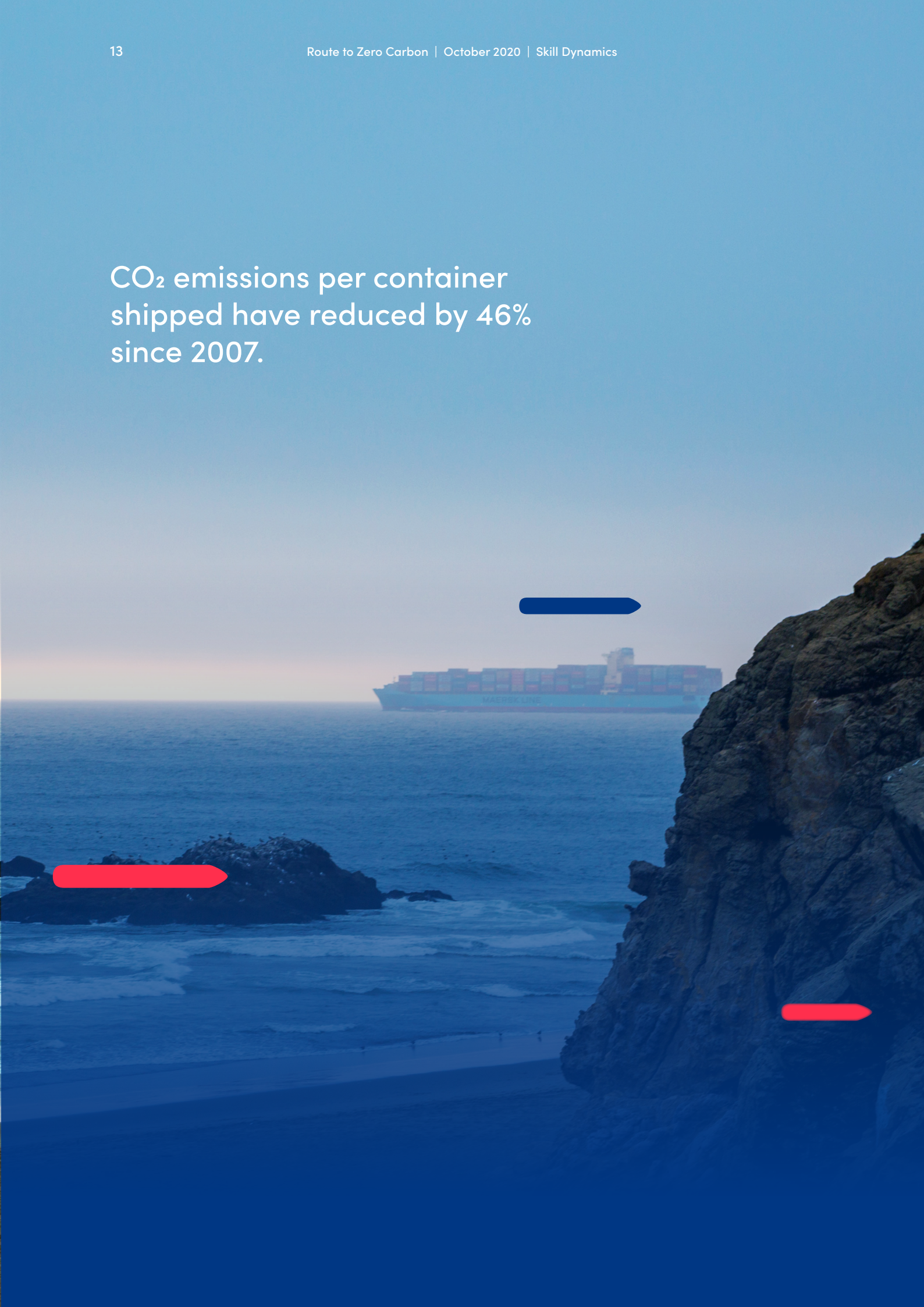
Or apparel firm Levi Strauss & Co, where a long-standing series of initiatives stretching back decades was replaced in 2019 with an aggressive new sets of goals: a 90% reduction in emissions from all owned and operated facilities; 100% renewable electricity in all owned and operated facilities; and a 40% reduction in greenhouse gas emissions right across Levi Strauss's entire supply chain, which stretches right back to the cotton farmer. All this from a 2016 baseline.

Or finally, consider UK facilities management outsourcing firm Mitie, which has committed to transitioning its entire 5,300-strong vehicle fleet to zero-emission electric by 2023—with 20% of them having already made the switch to all-electric by the end of 2020.

In short, such pathfinders show that concrete actions to limit CO₂ emissions are possible: what is required is for more businesses and supply

Such pathfinders show that concrete actions to **limit CO₂ emissions are possible**: what is required is for more businesses and supply chain organizations to join them on their journey.

CO₂ emissions per container shipped have reduced by 46% since 2007.



At sustainably-produced juice and smoothie manufacturer Innocent Drinks, for instance, **the company's green credentials are an important part of the brand**, and have been since the company's inception in 1999.

chain organizations to join them on their journey.

Broad acceptance

Why exactly are businesses and their supply chain organizations engaging with climate change, and adopting zero-carbon initiatives? Clearly, corporate-wide CSR and ESG agendas play a part, of course. But talk to businesses, and to the leadership of their supply chain organizations, and a richer picture emerges.

Ed Weenk, senior lecturer in supply chain management at Maastricht School of Management, sums it up well. At root, he says, the zero carbon agenda can be seen as the confluence of a whole set of corporate aspirations coming together: an opportunity to set out on a journey that turns out to tick a lot of boxes, all at once.

CSR and ESG: yes, of course. Image and marketing, too—especially for consumer-facing businesses, and especially if those businesses brands are fashionable with younger and more affluent consumers. Cynically, there may be an element of 'greenwashing', too, concedes Weenk. And there are overlapping objectives with other initiatives, too, with concepts such as the Triple Bottom Line neatly dovetailing with zero carbon. And of course, he observes wryly, it certainly doesn't hinder progress towards zero carbon if zero carbon turns out to be a useful source of cost savings, and therefore profit: burn less fuel, travel fewer miles, use less electricity in warehouses and logistics operations—the benefits flow straight through to the bottom line.

Talk to those leading supply chain organizations, and elements of all of these repeatedly crop up in discussion. **At sustainably-produced juice and smoothie manufacturer Innocent Drinks, for instance, the company's green credentials are an**

important part of the brand, and have been since the company's inception in 1999, explains group supply chain director Chris Fielden.

"With sustainability being part of our brand and corporate ethos, we're part of a group of businesses trying to balance our impact on people, planet, and profit. And when you look at the 'planet' part of that, the biggest threat facing the planet is global warming—and so, for us, becoming a carbon-neutral business is absolutely key to that."

And progress is being made, as supply chain professionals readily attest. Both at a 'macro' level, as lower-carbon technologies come into play, and at a 'micro' level, as individual companies take steps to measure and reduce their carbon footprints, "there's no question that progress has been made, and valuable lessons learned," says Alan Braithwaite, chair of the freight and logistics policy group at the Chartered Institute of Logistics and Transport, and a visiting fellow at Aston University Logistics and Systems Institute. Cleaner fuels, more efficient engines, lighter vehicles, electrification, better route planning, alternative fuels, improved infrastructure: advances are being made on a broad front, he points out, with even maritime shipping cleaning up its act.

Even in aviation, advances are being made, adds Richard Hunt, a logistics expert and former chief executive of Exel Logistics (now part of DHL) with extensive aviation experience. Modern aircraft have more fuel-efficient airframes than their predecessors, he points out, as well as having more fuel-efficient engines.

Throw in the move away from four-engined aircraft such as the Boeing 747 and Airbus A380 and towards more fuel-efficient twin-engined narrow-body and wide-body aircraft, and a growing proportion of belly-hold airfreight—which makes up the greater proportion of airfreight—the inescapable conclusion is that



The inescapable conclusion is that tomorrow's airfreight will be **lower carbon** than today's

“As an individual, I care. I have two young daughters, and I’m very aware of my impact on the planet that I’m eventually going to leave them. Zero carbon is an important part of reducing that impact, and leaving them a better planet.”

Simon Geale, senior vice-president for client solutions at procurement consultants Proxima.



In the absence of accurate **carbon footprint data**, it is difficult for buyers to make appropriate choices when selecting suppliers.



tomorrow's airfreight will be lower carbon than today's. Even so, he notes, electrically-powered aircraft are some way off, although even here, progress is being made.

Roadblocks ahead

That said, the route to zero carbon isn't all plain sailing. Barriers and roadblocks await the unwary, say experts, pointing out that while there are undoubtedly low-hanging fruit to be had, progressing beyond the basics involves addressing potentially awkward and challenging trade-offs and information voids.

Put another way, 'easy wins' through such things as technological improvements and better route planning are non-contentious, effectively handing businesses cost reductions on a plate. Organisational inertia and resistance may be encountered, though, when zero carbon involves cost increases, however modest: strong leadership will be called for, says Julia Moshkin, head of sustainability innovation at EcoVadis, an environmental benchmarking and sustainability ratings provider.

Lack of appropriate 'carbon accounting' information is another challenge, she adds,

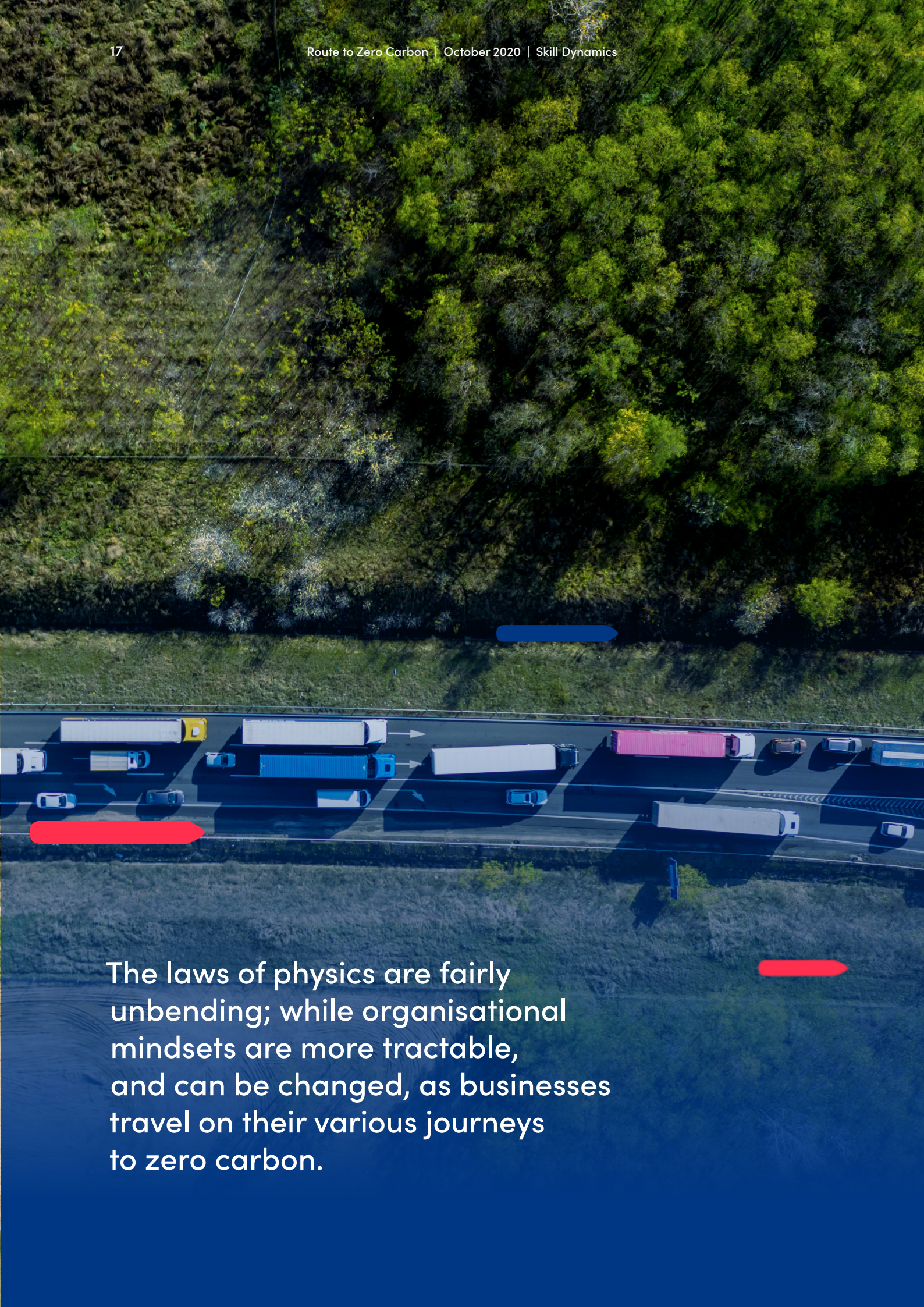
noting that in the absence of accurate carbon footprint data, it is difficult for buyers to make appropriate choices when selecting suppliers. Selecting on price or quality is relatively straightforward—but consciously trying to select the lowest-carbon supplier from a clutch of competing bids is difficult in the absence of accurate and standardised data on bidders' relative operational carbon footprints.

Regulatory disparity and uncertainty is another challenge, adds maritime shipping expert Sofia Fürstenberg Stott of consultants Fürstenberg Maritime Advisory. In the competitive world of sea freight, for instance, some shipping firms will be bound to delay investing in lower-carbon fuels or more efficient engines until forced by regulatory pressure. But will such regulation be truly global, and be applied multi-laterally, or will it be possible to escape it by flagging vessels under more pliant flags? No one yet knows—and in the presence of such uncertainty, the impetus for action is obviously weaker.

And so on, and so on. Again and again, **the real barriers being encountered on the journey towards zero carbon turn out to be man-made, not technological.** Which in a sense is good news: the laws of physics are fairly unbending; while organisational mindsets are more tractable, and can be changed, as businesses travel on their



The real barriers being encountered on the journey towards **zero carbon** turn out to be man-made, not technological.



The laws of physics are fairly unbending; while organisational mindsets are more tractable, and can be changed, as businesses travel on their various journeys to zero carbon.

“I’m 100% convinced that **new skills will be required** by supply chain professionals”



“As a profession, we’ve talked for a long time about supply chain professionals needing to **adopt a broader range of soft skills**”

various journeys to zero carbon.

Skilling for zero

But as they make those journeys, will supply chain organizations’ existing skill sets prove equal to the task? Talk to those close to zero carbon, and the answer is unequivocal: a firm ‘no’.

“I’m 100% convinced that **new skills will be required by supply chain professionals**,” says Simon Geale, senior vice-president for client solutions at procurement consultants Proxima. And yes, to some extent these will probably be ‘hard’, technical skills, equipping supply chain professionals with the knowledge and techniques to deal with new technologies, new carbon-specific measurement and management paradigms, and new energy-efficient production methods. But ‘soft’ skills will be important too, he stresses—perhaps more important—as businesses and their supply chain organizations negotiate the challenges, opportunities, barriers, and regulatory regimes that zero carbon entails.

“As a profession, we’ve talked for a long time


about supply chain professionals needing to **adopt a broader range of soft skills**—be they ‘consultancy’ skills, in terms of communicating with people, persuading and influencing people, and encouraging them to collaborate and communicate; and knowledge, insight and understanding as to how zero carbon is progressing and where the opportunities lie. And if one marries those two things together, it becomes possible for people to better challenge their organizations in interesting, relevant, and fact-based ways.”

Innocent Drinks’ Chris Fielden agrees. More than ever, he points out, supply chain organizations are working with third parties—contract manufacturers, logistics service providers, and suppliers— to fulfil their objectives, and so skill sets strong in persuasion and influencing come to the fore when an organizations’ zero carbon objectives must be achieved through these third parties.

“The world is changing, and it’s changing fast,” sums up Maastricht School of Management’s Ed Weenk. “**Cross-functional thinking, creative problem-solving, influencing skills, being able to ‘speak the language’ of other functions—it’s**



“Cross-functional thinking, creative problem-solving, influencing skills, being able to **‘speak the language’** of other functions—it’s soft skills like these that will determine progress, and deliver success.”



“As the saying goes, we didn’t inherit the planet from our parents, we’re borrowing it from our children.”

Ed Weenk, senior lecturer in supply chain management at Maastricht School of Management.



**Performance.
Accelerated.**



www.skilldynamics.com