



FROM TARGETS TO ACTIONS  
**REALIZING YOUR  
DECARBONIZATION  
AMBITIONS THROUGH  
SUSTAINABLE  
LOGISTICS**



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## THE TIME TO ACT IS NOW

Environmental sustainability is a global imperative for businesses, governments and consumers. The global climate emergency continues to prove its devastating effects on the planet, including biodiversity loss, population displacement and severe economic disruption. Over the last 50 years, 11,072 disasters have been attributed to weather, climate and water hazards, resulting in 2.06 million deaths and US\$ 3.64 trillion in losses.<sup>1</sup> The effects of extreme weather have accelerated supply chain disruptions, making environmental sustainability a top organizational priority in risk management and resilience initiatives.

Corporate climate action has exponentially mobilized over the past decade. Still, bolder efforts will be crucial to avoid the catastrophic effects of the warming of the planet above the 2.0°C threshold. Despite significant decarbonization measures, global energy-related CO<sub>2</sub> emissions rose by over two billion metric tons in 2021 to their highest level in history.<sup>2</sup> Moreover, preliminary data shows that levels of the three main greenhouse gases continued to increase in 2022.<sup>3</sup> For businesses, bringing near and long-term sustainability ambitions into overdrive - and, more importantly, transforming these ambitions into concrete results will be essential.

**Environmental sustainability is a complex journey for any business to tackle alone. In this guide, you will explore the contributions sustainable logistics solutions can deliver to realize your sustainability targets.**



<sup>1</sup>[https://library.wmo.int/doc\\_num.php?explnum\\_id=10989](https://library.wmo.int/doc_num.php?explnum_id=10989)

<sup>2</sup><https://www.iea.org/news/global-co2-emissions-rebounded-to-their-highest-level-in-history-in-2021>

<sup>3</sup><https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate>



**60%** estimated carbon emissions are generated by supply chains globally<sup>4</sup>

Because of this staggering number, businesses and their supply chains are at the center of climate action and environmental stewardship. About 90% of a product's emissions derive from its supply chains,<sup>4</sup> meaning that for businesses like yours, it's no longer enough to address the direct environmental impact of your operations but that of your broader ecosystem of partners along the value chain. Tackling climate change can be incredibly complex, and adding those supply chain partners may seem like one way to increase complexity. However, working with that ecosystem of partners could be the key to reducing that complexity and turning your sustainability targets into tangible results.

**It will take just a little bit of science to achieve.**

<sup>4</sup><https://www.dhl.com/global-en/home/insights-and-innovation/thought-leadership/trend-reports/supply-chain-decarbonization.html>



# SCIENCE-BASED WHAT?



**Science-based targets show organizations how much and how quickly they need to reduce their greenhouse gas (GHG) emissions to prevent the worst effects of climate change.**

Approaches, best practices and expertise on science-based targets are provided by the Science Based Targets initiative (SBTi), a partnership between CDP, World Resources Institute (WRI), the World Wide Fund for Nature (WWF), and the United Nations Global Compact (UN Global Compact).

They provide businesses with the confidence that their climate targets are supporting the global economy to halve emissions by 2030 and achieve net-zero before 2050.<sup>5</sup>

**There are great benefits to having science-based targets for your business:**



**1.5°C-aligned companies are cutting emissions**

**2x faster**

**than required<sup>6</sup>**

Over **US\$29 billion savings** reported by suppliers through almost **1.8 billion metric tons of GHG emission reductions** in 2021<sup>7</sup>

<sup>5</sup><https://sciencebasedtargets.org/>

<sup>6</sup><https://sciencebasedtargets.org/reports/sbti-progress-report-2021>

<sup>7</sup><https://www.weforum.org/agenda/2022/05/guide-to-decarbonizing-your-supply-chain/>

## How can your business set science-based targets?

SBTi provides extensive guidance for organizations to set targets within the scope of three types of GHG emissions:

### Scope 3 Upstream Activities

Indirect emissions from procured products, transport of supplies, business travel

### Scope 1

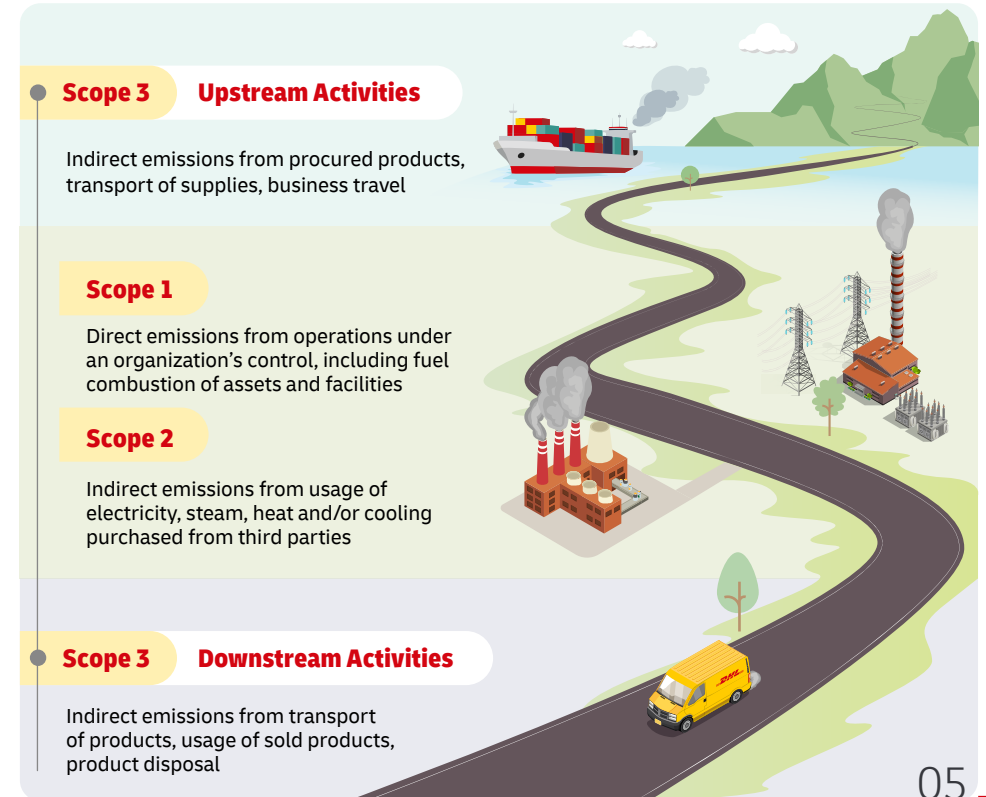
Direct emissions from operations under an organization's control, including fuel combustion of assets and facilities

### Scope 2

Indirect emissions from usage of electricity, steam, heat and/or cooling purchased from third parties

### Scope 3 Downstream Activities

Indirect emissions from transport of products, usage of sold products, product disposal





**Scope 3 emissions are pivotal for your business to effectively address your sustainability targets because there are, on average,**

**11.4x**

**more emissions in a company's supply chain compared to its own direct operations<sup>8</sup>**

A better grasp of the emissions generated by partners along the supply chain - and how these are helping or hindering your sustainability targets - will ultimately influence your sustainability progress more than tackling it alone. Open and collaborative relationships with partners can reduce complexity and improve the visibility of your sustainability initiatives and goals. Environmental sustainability can be a journey with many unknowns but also many opportunities to create a significant impact.

**One of those areas within your reach is  
the sustainability of your logistics operations.**

<sup>8</sup>[https://cdn.cdp.net/cdp-production/cms/reports/documents/000/006/106/original/CDP\\_SC\\_Report\\_2021.pdf?1644513297](https://cdn.cdp.net/cdp-production/cms/reports/documents/000/006/106/original/CDP_SC_Report_2021.pdf?1644513297)



# SUSTAINABLE LOGISTICS CONTRIBUTES TO DECARBONIZATION EFFORTS

Whether your sustainability targets are science-based or not, what's most important is having the right initiatives to achieve them successfully. New technologies, processes and materials contribute to emission reductions to various degrees of efficiency across logistics operations. A World Economic Forum report estimates that eight supply chains - food, fashion, construction, electronics, fast-moving consumer goods, automotive, freight and professional services - account for more than 50% of global emissions and through readily available and highly affordable levers approximately 40% of emissions can be reduced across them,<sup>9</sup> many of which directly apply to logistics operations. Achieving full decarbonization will take more time and higher investments, but progress is rapidly accelerating through regulatory changes and technology scale-ups.

This section will highlight concrete sustainability levers to benefit your logistics operations and the efficiencies they can deliver within the warehousing, transport and packaging domains.



<sup>9</sup><https://www.weforum.org/reports/net-zero-challenge-the-supply-chain-opportunity>



## Sustainable Warehousing

Carbon-neutral warehousing solutions can deliver significant carbon footprint reductions through various green warehousing technologies aimed at decarbonizing energy supply, improving overall operational efficiency and even more advanced measures to address embodied carbon. While variations due to size, geographical location, operational and statutory requirements can influence efficiency, sustainable warehousing measures can generate anywhere between 75 to 100% CO<sub>2</sub>e savings.<sup>10</sup>

The **building industry** is responsible for

**35%**

**of energy  
consumption**

**38%**

**of energy related  
carbon emissions**

**50%**

**of resource  
consumption<sup>11</sup>**

**75 – 100%** **potential CO<sub>2</sub>e reductions by implementing  
sustainable warehousing solutions<sup>10</sup>**

NOTE: when evaluating sustainable warehousing technologies, it's important to maximize efficiencies achieved through direct interventions rather than offsetting, which are not permitted under SBTi criteria.

<sup>10</sup>DHL Supply Chain data on sustainable warehousing solutions

<sup>11</sup><https://worldgbc.org/thecommitment/>





## LIGHT EMITTING DIODE (LED) LIGHTING TECHNOLOGY WITH SMART CONTROLS



Entry

LED lighting is based on semi-conductor technology rather than traditional light sources such as fluorescent or metal halide lighting with a significantly higher lifetime than other lighting technologies at around 10 years (or up to 100,000 hours). LED lighting is the most efficient form of lighting available for application in warehouse/operational spaces.

Since 2010, the average efficacy of LEDs has improved by around

**6-8 lm/W  
each year.**<sup>12</sup>



### Key advantages

Lower operational costs due to electricity and maintenance savings while reducing overall CO<sub>2</sub> emissions.

Suitable for retrofit and represents one of the biggest levers for warehouse energy reduction, saving between 20 to 60% of a site's electricity consumption.

Sensors incorporated into the lighting system can capture operational processes such as indoor navigation, collision prevention, asset tracking and heat map generation.

### Important considerations

Investment payback is relatively short (between 1.5 to 6 years) and will be impacted by multiple factors, including the cost of electricity, warehouse activity levels, running hours, and the replacement timing of a currently installed inefficient system.

Implementing smart controls - to manage daylight, time and movement control - maximizes the lighting system's efficiency.

<sup>12</sup><https://www.iea.org/reports/lighting>



## SOLAR PHOTOVOLTAIC (PV) SYSTEMS

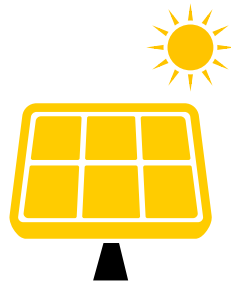
Solar photovoltaic (PV) systems are the simplest form of on-site renewable technology and deliver a reliable, low-maintenance source of zero carbon electricity. These systems are typically roof-mounted, but they can also be installed in any other area free from shade and facing the sun's path.



Intermediate

A typical solar panel can save over

**900kg of CO<sub>2</sub>  
per year.**<sup>13</sup>



### Key advantages

PV installations produce green electricity that reduces CO<sub>2</sub> emissions, saves costs and minimizes reliance on grid electricity.

With a power generation record of 179 TWh in 2021, representing a 22% growth on 2020, solar PV is becoming the lowest-cost option for new electricity generation in most of the world.<sup>14</sup>

### Important considerations

Investment payback period is on average 3 - 8 years (depending on various location factors).

Sufficient space is required to allocate all system components and to achieve optimum payback.

<sup>13</sup><https://www.renewableenergyhub.co.uk/main/solar-panels/solar-panels-carbon-analysis/>

<sup>14</sup><https://www.iea.org/reports/solar-pv>



## BATTERY STORAGE

**Advanced**

Stationary battery storage systems are key technologies to maximize the usage of intermittent renewable energy sources. Batteries are the most scalable type of storage to cover a complete site's energy demand, but the technology still requires some progress to make their usage commercially viable. Recent years' growth in battery and electricity storage patents shows promise in accelerating this progress.

# 14%



**Average annual growth rate of battery and electricity storage patents between 2005 and 2018.<sup>15</sup>**

### Key advantages

Reduces costs by avoiding peak demand charges and maximizes the use of self-generated electricity, day and night.

Provides reliable backup power during outages, protects critical operations and equipment.

Reduces carbon footprint, enables renewable energy integration, reduces reliance on fossil fuel-based power plants when used to store solar-generated electricity.

### Important considerations

Commercial viability will depend on site-specific factors such as electricity costs and energy consumption patterns, but the technology is rapidly advancing, as well as future returns on investment.

It is strongly recommended to apply “battery storage ready” criteria for all new buildings, as the technology will be catching up quickly to make battery storage the norm.

<sup>15</sup><https://www.iea.org/reports/innovation-in-batteries-and-electricity-storage>



## Sustainable Transport

From advanced efficiency measures to alternative fuels and vehicle fleets, sustainable transport solutions can substantially reduce GHG emissions and deliver value to your transport operations. Transport is one of the more challenging areas to tackle within logistics operations - whether due to technology viability or high cost due to limited supply – but also where some of the most significant impacts can be generated. Sustainable transport measures, depending on the nature of the solution, can generate anywhere between 20 to 100% CO<sub>2</sub>e savings.<sup>16</sup>

# 20 – 100%

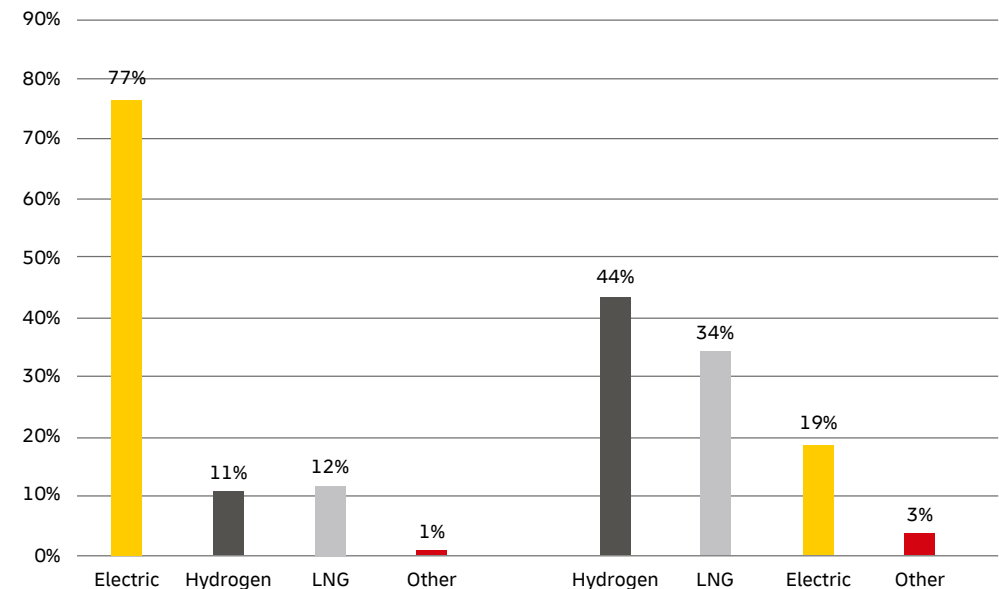
**potential CO<sub>2</sub>e reductions by implementing sustainable transport solutions.<sup>16</sup>**

<sup>16</sup>DHL Supply Chain data on sustainable transport solutions

<sup>17</sup><https://www.ti-insight.com/whitepapers/sustainability-survey-2021-2/?whitepaperTitle=Sustainability%20Survey%202021>

**Executives' responses on which alternative propulsion system is most likely to gain widest adoption for vans and heavy duty trucks.<sup>17</sup>**

### VANS



### HEAVY DUTY TRUCKS



## TELEMATICS AND DRIVER TRAINING

Telematics is a measurement system that provides vehicle condition and driver action data, including driving behavior, fuel consumption and real-time journey management, part of an integrated transport management approach and continuous improvement of transport operations. Combined with driver training programs aligned with driver performance data the system yields, telematics systems can deliver great fuel and carbon efficiencies and foster a health and safety culture.



Entry

# 38%

**year-on-year emission reduction after country-wide implementation of telematics and management control program.<sup>18</sup>**



### Key advantages

Fuel savings of 4 to 7% enabling carbon and cost reductions.

Identifies driver performance, training and incentives requirements.

### Important considerations

While it's possible to retrofit telematics systems on certain vehicles, for some cases doing so may invalidate the vehicle's warranty.

Other restrictions to implementation of telematics include technology availability, cost restriction or system application not meaningful due to climatic conditions.

<sup>18</sup>DHL Supply Chain country implementation case study





## BIOMETHANE

Biomethane is a chemically identical fuel to fossil methane made from sustainable feedstocks. Biomethane comes in two different states, Bio CNG, which stands for Compressed Natural Gas, and Bio LGN, or Liquified Natural Gas, which is essentially the same as CNG but stored in a liquid state. Both Bio CNG / LGN can reduce CO<sub>2</sub>e up to 100%, depending on the feedstock.



Intermediate

**>700 million tonnes  
of oil equivalent  
(Mtoe) of biomethane**

**could be produced sustainably today,  
equivalent to more than 20% of global  
natural gas demand. By 2040, this  
figure would be over 1000 Mtoe.<sup>19</sup>**



### Key advantages

This technology is established, reliable and can serve as a transitional solution until other zero-carbon technologies become fully available in the market.

The low noise levels of these vehicles make them suitable for night deliveries.

Note: Tonne of oil equivalent (toe) is defined as the amount of energy released by burning one tonne of crude oil.

### Important considerations

CNG vehicles have a limited range of approximately 500 km. Another important consideration when implementing this technology is the availability of compatible fueling infrastructure.

Compared to diesel trucks, CNG trucks typically require an additional investment of 25 to 30k EUR, while LNG trucks require an investment of 30 to 40k EUR.<sup>20</sup> Overall, costs of Bio CNG/LNG are lower than fossil-based CNG/LNG.

<sup>19</sup><https://www.iea.org/reports/outlook-for-biogas-and-biomethane-prospects-for-organic-growth>

<sup>20</sup>DHL Supply Chain data on Bio-CNG/LNG implementation





## ELECTRIC VEHICLES

**Advanced**

Battery-powered electric vehicles (BEV) represent a key technology to decarbonize road transport, a sector that accounts for 16% of global emissions.<sup>21</sup> Current models of light, medium and heavy-duty electric vehicles are generating significant carbon efficiencies, particularly catering to deliveries within short and medium-distance hauls. With improvements in battery technology and charging station infrastructure, McKinsey estimates electric truck adoption will exceed 30% by 2030.<sup>22</sup>

**Over****70%****sales growth of electric light commercial vehicles (LCV) worldwide.<sup>23</sup>**

### Key advantages

These vehicles can be considered zero carbon technology if renewable electricity is used.

Best suited for low mileage/ inner city operations, especially in areas with legislative restrictions such as low emission zones.

### Important considerations

Electric vehicles require infrastructure to charge / refuel, an essential consideration in operational planning. Currently, very limited public truck charging infrastructure is available, so setting this up on own facilities is advised.

Current battery technology is also limiting the driving range of heavy-duty vehicles, but the technology to increase the charging power is rapidly advancing, thus accelerating the market entry of these vehicles.

<sup>21</sup><https://www.iea.org/reports/electric-vehicles>

<sup>22</sup><https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/why-most-etrucks-will-choose-overnight-charging>

<sup>23</sup><https://www.iea.org/reports/global-ev-outlook-2022>





## Sustainable Packaging

Increased consumer demand for more sustainable products requires sustainability to be a part of the long list of packaging needs necessary to achieve customer satisfaction. After all, the packaging is the first touchpoint end customers have with the product across many industries. Sustainable primary, secondary and tertiary packaging solutions focus primarily on how to avoid, reduce, repurpose and recycle packaging to reduce the overall carbon footprint of your products. Efficiencies delivered from sustainable packaging solutions vary and can range from material savings to reduction of outbound shipment costs.

# 50%

**emissions reduced by one manufacturer who switched to a returnable, collapsible container.<sup>24</sup>**

### Top sustainable packaging strategies in the consumer packaged goods (CPG) sector<sup>25</sup>



<sup>24</sup><https://www.mckinsey.com/industries/advanced-electronics/our-insights/sustainability-in-packaging-five-key-levers-for-significant-impact>

<sup>25</sup><https://www.pmml.org/report/2022-shaping-future-packaging-operations>





## SUSTAINABLE VOID FILL

Void fill is an important element in packaging to ensure the product's integrity along the value chain – and the materials used can significantly contribute to the sustainability of packaging solutions. Alternatives to traditional plastic void fill material – including kraft paper and repurposed leftover cardboard – can reduce the environmental footprint of packaging solutions cost-effectively.



Entry

# 52%

of consumers would pay more for a product if it came in recyclable packaging<sup>26</sup>



### Key advantages

Kraft paper and repurposed cardboard provide excellent shipment protection at a lower cost.

These sustainable materials can reduce reliance on single-use materials such as plastic packing peanuts, bubble wrap and packaging airbags.

Both kraft paper and repurposed cardboard generate savings due to less material required and reduced purchasing costs.

### Important considerations

Kraft paper used in combination with machine dispensers can improve material savings. Sourcing is also essential – consider material that's 100% paper from recycled content or at least a 50-50 combination of sustainable forestry and recycled paper.

The repurposed cardboard solution suits operations with high inbound volumes and requires cardboard converter / shredder equipment.

<sup>26</sup><https://www.packaginginsights.com/news/top-packaging-trends-2023-plastics-circularization-leads-sustainability-charge-amid-greenwashing-backlash.html>



## RIGHT-SIZED PACKAGING TECHNOLOGY

Right-sized packaging technology combines various tools to create fit-to-size packaging. Carton optimization software can provide detailed analysis of optimal number and sizes of shipping cartons and box on demand machines cover the entire packaging process from carton creation to carton closing and labeling. These technologies deliver multiple benefits, from material waste reduction and improved carton utilization to outbound shipping cost savings and improved carbon footprint.



Intermediate

# 24%

of the volume in typical e-commerce packages is empty space<sup>27</sup>



### Key advantages

Carton optimization can deliver significant data-driven efficiencies related to SKU proliferation, carton empty space and load utilization and can generate outbound shipping cost savings between 5 and 20%.

Box on demand machines create up to 400% productivity improvement in packaging operations and 100% elimination of void fill.<sup>28</sup>

### Important considerations

Right-size packaging technology use cases apply in multiple industries, but can be of more interest to consumer and retail sectors, particularly with significant e-commerce business.

Investment payback period is relatively fast for both technologies depending on volumes and some labor management considerations. For carton optimization it can be within a few months, for box on demand machines within three years, provided volumes are greater than one million parcels / year.

<sup>27</sup>[https://dhlinsights.dhlsupplychain.dhl.com/ao\\_packaging/sci\\_article\\_boxing-clever-in-e-commerce](https://dhlinsights.dhlsupplychain.dhl.com/ao_packaging/sci_article_boxing-clever-in-e-commerce)

<sup>28</sup>DHL Supply Chain data of box on demand machines





## RETURNABLE / REUSABLE PACKAGING

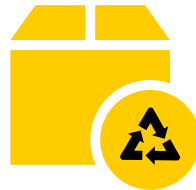
**Advanced**

Reusable packaging is particularly attractive thanks to its impact on improving the environmental footprint and overall circularity of products. Once a limited packaging solution, it has seen rapid adoption over the past few years across industries, including the logistics industry, with the rise of reusable containers for transport and warehouse storage, reusable pallet wrap and strap solutions and even reusable capsules for e-commerce. New solutions can also incorporate additional elements to maintain product integrity, including IoT sensors, insulation, and phase change material for temperature control.

**29%** less total GHG emission generation,

**39%** less total energy requirement,

**95%** less total solid waste production on average,  
from reusable packaging containers.<sup>29</sup>



### Key advantages

Returnable / reusable packaging solutions have a high applicability in multiple industries, from e-commerce channels in retail and consumer sectors, to temperature-controlled shipments of the life sciences and healthcare sector.

These durable systems are particularly interesting for high value goods.

### Important considerations

Depending on the solution the initial cost may be high, but investment payback can be achieved fast, often within a year. Working with large suppliers with more robust procurement and purchasing power can minimize costs.

For intercontinental shipping, carbon emissions can be high due to additional return leg, so network design should play an important role in minimizing them.

<sup>29</sup>[https://reusables.org/wp-content/uploads/2016/06/Reusables-101.pdf?\\_ga=2.106691395.11797451.1668545145-2078614510.1668545145](https://reusables.org/wp-content/uploads/2016/06/Reusables-101.pdf?_ga=2.106691395.11797451.1668545145-2078614510.1668545145)





## CHANGE BEGINS TODAY

Targets can trace a path toward decarbonization and overall ESG objectives, but concrete actions will ultimately help you realize your sustainability ambitions. One IBM survey of C-suite execs found that while 86% said their organization now has a sustainability strategy in place, only 35% had acted on that strategy.<sup>30</sup>

### THIS NEEDS TO CHANGE.

The sustainable logistics levers highlighted in this guide show that no matter what stage of your sustainability journey, there are always strategies within your reach and, with the right partners, ways to execute them successfully.



“Whatever the stage in your journey, tackling sustainability challenges requires partnerships along the supply chain that work together to mutually achieve ESG targets. We are inspired and committed to supporting your sustainability strategies and fulfilling our purpose to create **long-term value as a partner.**”



**Florence Noblot**  
Head of ESG  
Customer Solutions  
DHL Supply Chain

<sup>30</sup><https://www.ibm.com/thought-leadership/institute-business-value/report/sustainability-transformation>

DHL Group is committed to reduce GHG emissions from 39 million tonnes CO<sub>2</sub>e to under 29 million by 2030. Starting from a base year of 2021, our goals are to reduce Scope 1 and 2 emissions by 42% and Scope 3 emissions by 25%. The Science Based Target Initiative (SBTi) has officially confirmed that DHL Group's climate targets are in line with the SBTi criteria and thus reflect the current state of climate science.

## FOR FURTHER INFORMATION

Contact our supply chain experts **here** >

or visit our **website** >

