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PHÂN PHỐI PHI CÁC-BON TRONG CHUỖI CUNG ỨNG CỦA DHL VÀ NHỮNG BÀI HỌC RÚT RA CHO VIỆT NAM

Hoàng Ánh Hồng¹, Mai Tuấn Minh

Sinh viên K61 CLC Kinh doanh quốc tế - Viện Kinh tế và Kinh doanh Quốc tế
Trường Đại học Ngoại thương, Hà Nội, Việt Nam

Phạm Bình Minh, Nguyễn Thị Anh Tú

Sinh viên K62 CLC Kinh tế Đối ngoại - Viện Kinh tế và Kinh doanh Quốc tế
Trường Đại học Ngoại thương, Hà Nội, Việt Nam

Nguyễn Thị Yến

Giảng viên Bộ môn Quản lý Chuỗi cung ứng - Viện Kinh tế và Kinh doanh quốc tế
Trường Đại học Ngoại Thương, Hà Nội, Việt Nam

Tóm tắt:

Nghiên cứu này xem xét việc tích hợp phân phối phi các-bon trong chuỗi cung ứng toàn cầu của DHL và xác định những bài học có thể áp dụng được cho lĩnh vực logistics tại Việt Nam. Mục tiêu của nghiên cứu là làm rõ nền tảng lý thuyết của phân phối phi các-bon, phân tích những các ứng dụng thực tiễn trong các mạng lưới phân phối với quy mô lớn và đánh giá mức độ phù hợp tiềm năng đối với các thị trường mới nổi như Việt Nam. Bên cạnh đó, việc đánh giá bối cảnh logistics tại Việt Nam cho thấy những ràng buộc cấu trúc hiện tại cũng như khả năng hiện thực hoá mô hình này. Kết quả nghiên cứu chỉ ra rằng mặc dù Việt Nam chưa thể hoàn toàn tái lập mô hình của DHL trong điều kiện hiện tại, nhưng các biện pháp triển khai dần dần như số hoá, phát triển tầm nhìn

¹ Tác giả liên hệ, Email: k61.2212550028@ftu.edu.vn

chiến lược, đo lường hiệu quả và thử nghiệm các khu vực giao hàng xanh, có thể hỗ trợ quá trình chuyển đổi từng bước. Tổng thể, bài nghiên cứu này củng cố tầm quan trọng ngày càng tăng của phân phối phi các-bon như một tiêu chuẩn toàn cầu và nhấn mạnh tiềm năng của nó trong việc nâng cao cả hiệu quả và tính bền vững trong vận hành chuỗi cung ứng.

Từ khoá: phân phối phi các-bon, chuỗi cung ứng

DECARBONIZED DISTRIBUTION IN DHL'S SUPPLY CHAIN AND LESSONS LEARNED FOR VIETNAM

Abstract

The study examines the integration of Decarbonized Distribution within DHL's global supply chain and identifies lessons applicable to Vietnam's logistics sector. The objective is to clarify the theoretical foundations of Decarbonized Distribution, analyze its practical applications in large-scale distribution networks, and assess its potential relevance for emerging markets like Vietnam. Also, the evaluation of the Vietnamese logistics landscape reveals the current structural constraints as well as its attainability. The results suggest that although Vietnam cannot fully replicate DHL's model under current conditions, incremental measures namely digital optimization, strategic vision development, performance measurement and pilot green-delivery zones can support a gradual transition. Overall, this paper reinforces the growing importance of Decarbonized Distribution as a global standard and highlights its potential to enhance both efficiency and sustainability in supply chain operations.

Key words: decarbonized distribution, supply chain

INTRODUCTION

The global economy is shifting toward supply chain models that prioritize environmental sustainability. As the link between supply chains and consumers, distribution is both highly visible and strongly affected by rising regulations and evolving market expectations. Therefore, the rise of "Decarbonized Distribution" is no longer an optional corporate social responsibility (CSR) initiative but a strategic necessity driven by global Environmental, Social, and Governance (ESG).

In this context, DHL Group serves as the case study for examining the practical application of "*Decarbonized Distribution*". The selection of DHL for this research is based on its status as a global player that has successfully proven the theory that sustainability and profitability can coexist. Unlike many organizations that rely on carbon offsetting to claim "green" credentials, DHL has pursued a systemic restructuring of its operations through its "Mission 2050: Zero

Emissions" strategy. Thus, analyzing DHL's comprehensive strategy offers a concrete blueprint for how connected logistics networks can be re-engineered for the *net-zero* age.

As one of the fastest-growing logistics markets in Southeast Asia, Vietnam stands at a crucial crossroads. The nation is dealing with the dual challenge of sustaining economic growth while adjusting to climate commitments, including the Prime Minister's pledge at COP26 to achieve net-zero emissions by 2050. Vietnam's logistics sector, characterized by high urbanization and traffic congestion, mirrors the challenges that DHL's urban micro hubs and digital optimization tools were designed to solve. However, Vietnamese enterprises struggle with the initial capital investment and technological integration required for green logistics. By analyzing DHL's successes, specifically its strategies in digitalization, infrastructure integration, and long-term resilience. This report seeks to answer how global best practices can be adapted to the local context, transforming Vietnam's distribution networks into a driver of sustainable economic development.

1. Theoretical framework

1.1. Overview of Decarbonized distribution

Decarbonized Distribution (DD) signifies a shift in contemporary supply chain management, moving from traditional cost-and-speed paradigms to a system approach that embeds environmental sustainability into distribution activities. Theoretically, Decarbonized Distribution is the strategic reduction and elimination of greenhouse gas (GHG) emissions from the downstream movement of goods from distribution centers to the final customer ([McKinnon, 2018](#)). It is not merely adopting new technologies but a redesign of the logistics network that disconnects business growth from carbon intensity ([World Economic Forum, 2021](#)).

The theory of Decarbonized Distribution is based on four essential pillars. The first is low-emission transportation, depicting the replacement of internal combustion engine fleets with electric vehicles, hydrogen fuel cell trucks, and cargo bikes or pedestrian couriers for last-mile delivery. The second pillar is green facilities, requiring warehousing infrastructure that minimizes energy consumption through renewable energy, smart lighting systems, and low-carbon materials

The third area is digital optimization. In DD, digitalization serves as an enabler in sustainability. Machine-based algorithms and Artificial Intelligence allow dynamic route optimization to reduce mileage and fuel consumption ([McKinnon, 2018](#)), for example through greater load factors using the concept of the "Physical Internet" and shared logistics networks.

The ultimate goal with Decarbonized Distribution is the "Net-zero" status of a component of the supply chain while retaining service levels. Organizations manage progress with Key Performance Indicators (KPI). The most significant metric is CO₂ equivalent (CO₂e) per parcel or per kilogram transported ([Smart Freight Centre, 2019](#)). Other metrics include energy usage intensity and route efficiency ratios, moving beyond financial accounting to include "carbon accounting".

1.2. Overview of DHL

1.2.1. Company Background and Business Segments

DHL is one of the largest global supply chain operators, with a network that covers over 220 countries and territories. As part of the Deutsche Post DHL Group, it plays a central role in linking producers, distribution hubs and consumers worldwide. Having expanded beyond its origins as a courier service, DHL now functions as an integrated supply chain provider with significant influence over global trade, e-commerce and cross-border distribution. Its

organisational structure is divided into core business units, each responsible for distinct segments of supply chain activity, enabling the firm to deliver end-to-end logistics solutions ranging from express transport and freight services to contract logistics and last-mile delivery across multiple industries.

1.2.2. Global network and operational scale

DHL operates one of the world's largest transportation fleets, comprising extensive road, electric and aviation assets. Its global air network is anchored by major hubs in Leipzig, East Midlands and Northern Kentucky, which are strategically located near manufacturing centres, key markets and international trade corridors. These hubs function as consolidation and redistribution nodes, enabling short delivery times and consistent service performance across global operations.

Besides physical assets, [DHL Global Forwarding \(2024\)](#) reported that DHL has bolstered strong digital infrastructure, advanced data systems to monitor parcel flows, forecast volume fluctuations, synchronize warehouse and transport operations. This digital optimization is a core part of DHL's supply chain integration strategy, consolidating its sustainability approaches, particularly those related to emissions reduction in distribution activities.

1.2.3. DHL's role in the global supply chain & Distribution activities

Within the global supply chain network, DHL often holds a pivotal role as an integrator, cooperating with companies that combine transportation, warehousing, customs brokerage, information systems, and last-mile delivery into a seamless service portfolio. That function enables DHL to coordinate complex cross-border movements, ensuring a smooth goods transition from suppliers to warehouses, from hubs to local distribution centers, and to final customers. In regard to distribution specifically, DHL operates a large fleet of delivery vehicles and maintains extensive last-mile networks across urban, suburban, and rural areas. These distribution activities have become a benchmark for scale, technological capability, and sustainability adoption in global logistics.

1.2.4. Sustainability strategic orientation

Before Covid-19, DHL set a goal to become the pioneer in logistics-related decarbonization to zero in 2025. In recent years, DHL has positioned itself as a frontrunner in decarbonizing distribution at the last mile ([DHL, 2022](#)). The company has gradually deployed decarbonized technologies into core distribution processes globally. Alongside the rollout of electric delivery vehicles, cargo bikes, micro-hubs and renewable-energy infrastructure, DHL has piloted initiatives

involving alternative fuels, AI-enabled route optimization and carbon-tracking systems. These measures are intended not only to reduce emissions but also to strengthen network resilience, operational reliability and regulatory preparedness in response to tightening sustainability requirements. Together, they reflect a broader strategic shift toward greener distribution models to support long-term competitiveness.

1.3. Overview of Decarbonized Distribution in DHL

Deutsche Post DHL Group (DP DHL) has made Decarbonized Distribution a core part of its global supply-chain strategy. Through its "Mission 2050: Zero Emissions" program, DHL aims to cut all its logistic-related gas emissions to zero by 2050 ([Thompson, 2022](#)). This program targets the reduction of total gas emissions from 40 MtCO_{2e} levels in 2021 to below 29 MtCO_{2e} by 2030 ([Fleet, 2025](#)). To achieve this, DHL focuses on low-carbon technology and the electrification of its fleet. By 2030, first-mile and last-mile delivery vehicles should consist of battery-powered EVs, while sustainable fuels should contribute about 30% of fuel use ([DHL Group, 2021](#)). Through this program, Decarbonized Distribution is incorporated as part of DHL's transport requirements.

In operational terms, DHL is transforming its distribution fleet: by the end of 2025, DHL operated approximately 39,000 electric delivery vehicles worldwide, about 41% of its pickup/delivery fleet, compared to about 29,200 in 2022 ([DHL Group, 2022](#)). This electrification drive is more advanced in urban last-mile delivery due to the direct reduction of diesel use and tailpipe emissions. DHL also relies on data and technology to optimize distribution through route-planning algorithms, consolidated shipments, and management tools to minimize mileage and fuel burn ([DHL Group, 2025](#)). Complementary measures include energy efficiency in warehouses and alternative drives such as electric trucks and renewable energy at facilities.

There are also strong external pressures driving decarbonization. Policy requirements such as the EU's Green Deal, the Corporate Sustainability Reporting Directive, and the UK's Net-Zero Strategy require corporations to quantify and minimize emissions ([DHL Group, 2024](#)). New reporting rules, IFRS S2, force publicly listed companies such as DHL Group to publish climate risks, targets, and progress, while environmental, social, and governance factors have shifted toward a competitive edge ([IFRS, 2023](#)). Customer demand also contributes: DHL reports growing requests for low-carbon solutions, with demand for its low-emission "GoGreen Plus" services increasing by about 54% annually ([Fleet, 2025](#)). This pushes DHL to scale up EV fleets and sustainable fuels.

2. Application of Decarbonized Distribution in DHL

2.1. Application of Decarbonized Distribution in DHL's supply chain

DHL's Decarbonized Distribution model is illustrated through its large-scale operational deployments across major European cities where urban density, emission rules, and delivery patterns create strong incentives for low-carbon logistics innovation. In Berlin, DHL's "Green Urban Logistics" initiative combines electric delivery vans with an extensive network of cargo bikes for last-mile delivery. The model uses a two-tier structure: EVs transport consolidated parcels from distribution centers to drop-off points, while cargo bikes handle the final delivery leg in high-density districts. This approach reduces congestion impacts, avoids diesel-restricted zones, and cuts last-mile CO_{2e} emissions. Berlin's infrastructure and environmental regulations make it an ideal testbed ([DHL Group, 2021](#)), and DHL uses it to refine routing, charging schedules, and load allocation. The success of this case has positioned Berlin as a reference for DHL's future low-emission urban logistics models ([EIT Urban Mobility, 2025](#)).

A similar strategy is deployed in London, where DHL has developed a network of urban micro-hubs in the city center. These micro-hubs act as consolidation points that shorten delivery routes and reduce the number of large vans entering the Ultra-Low Emission Zone (ULEZ). From these locations, DHL dispatches electric vans and cargo bikes to serve high-traffic districts such as Westminster and the City of London ([Deutsche Post DHL Group, 2025](#)). The micro-hub model lowers vehicle-kilometers traveled (VKT) and improves delivery reliability by enabling multiple short delivery cycles. Because London imposes strict emission charges on conventional vehicles, DHL's micro-hubs provide both sustainability and cost-avoidance advantages.

2.2. Key actions

2.2.1. Electrification of the last-mile and heavy-duty fleet

The most important component of DHL's strategy is the electrification of its pickup and delivery (PuD) operations. By the end of 2023, DHL would be able to deploy approximately 35,200 electric vehicles (EVs) globally. More than 25,000 bikes and trikes will be used as part of this campaign ([DHL Group, 2024a](#)). This deployment involves a "duty-cycle matching" strategy in which each type of vehicle is paired with delivery routes based on daily range requirements, payload weight, and stop density.

Another important element of DHL's strategy was the decision to vertically integrate vehicle manufacturing when market options could not provide what DHL needed. Faced with an

insufficient supply of electric vans optimized for postal operations, DHL acquired and scaled StreetScooter, producing its own "Work" and "Work L" electric vans. Targeted at the "stop-and-go" nature of last-mile logistics, these vehicles feature an electric powertrain with ranges up to 205 km and a payload capacity of roughly 900 kg.

Beyond the last mile, DHL is also taking on the segment of heavy-duty transport. The company has partnered with Volvo Trucks and Mercedes-Benz for the piloting of heavy-duty electric trucks, such as the eActros 300, for regional distribution. These trucks haul 19 tons with a range of 220 km and are being deployed to decarbonize the "middle mile" between distribution centers ([DHL Group, 2024b](#)). This transition faces infrastructure hurdles, especially grid capacity limits at depots. To overcome this, DHL has initiated the development of "EV Centers of Excellence" to manage fleet charging schedules, grid loads, and battery health monitoring.

2.2.2. Digital integration and AI-driven optimization

Decarbonization within the logistics industry is linked directly to digitization, with efficiency being a theoretical concept without present data. DHL uses artificial intelligence and machine learning solutions to optimize routes and cargo consolidation, reducing unnecessary miles, idle engine times, and fuel consumption.

A strong example of this is the implementation of the Wise Systems route optimization solution. Contrary to fixed-route systems, this algorithm optimizes routes in real time according to traffic patterns, weather, and past data on parking difficulty ([Wise Systems, 2025](#)). This solution directly impacts fleet distance by decreasing idle and park-around-the-block times, contributing to reductions in CO_{2e} emissions per delivery.

Moreover, the group introduced Greenplan, an in-house algorithm created with the University of Bonn. Greenplan uses historical traffic data to create an 'optimal tour' rather than selecting the quickest route. Further, custom-made electronic tools such as "Follow My Parcel" also allow consignees to manage delivery options. With this solution, the 'failed delivery rate' is greatly reduced, bringing emission-reduction benefits against reroute travel miles ([DHL Group, 2024a](#)).

2.2.3. Renewable energy infrastructure and sector coupling

For the sustained functionality of its electric vehicles, investment in renewable energy is a key area for DHL, engaging in sector coupling - the integration of the energy and logistics sectors.

For carbon-neutral warehouse design projects, the investment in renewable energy includes rooftop PV systems, heat pumps, and sustainable materials.

One of the illustrative examples of an operational case would be the Bangna Sustainable Logistics Center in Thailand, launched in 2025. This facility features solar panels covering an area similar to three football fields, providing 38% of the total operational need of the logistics hub and charging electric vehicles. With renewable energy, DHL reduces dependence on electricity networks in developing nations, many of which rely on fossil fuels.

In Europe and other mature markets, DHL has committed to sourcing 100% green energy for its operations, ensuring the energy used for EVs is green, and aligned with the entire Well-to-Wheel process. The warehouses will continually transform into energy-producing facilities; with Building Management Systems, they will store generated energy in used EV batteries and provide it back during peak periods to guarantee a stable supply.

2.2.4. Urban Micro-hubs and the "City hub" concept

To respond to both the problem of traffic congestion and the need for strict emission standards in an urban setting, DHL developed specific hardware solutions. This setup makes use of a customized trailer, which serves as a movable depot. The "City Hub" concept utilizes a customized trailer that is pre-stocked in a major logistics hub outside the city and later transported into the city area by a van. Upon arriving and parking in an allocated micro-hub spot, the trailer serves as a replenishment hub for Cubicycles, a four-wheeled electric cargo bicycle network designed by [DHL Express in 2017](#).

The Cubicycle is a significant technological innovation. A Cubicycle features a reclined saddle, an electric pedal support system, and a detachable container with a payload of up to 125 kg (approx 1m³). As these vehicles qualify as bicycles, they can access bike paths and avoid congestion. Data from pilots in Frankfurt, Utrecht, and Amsterdam shows that a single City Hub can outperform up to two standard delivery vans and cut CO₂e emission rates by 16 tons a year. Delivery times of Cubicycles often outperform those of vans in heavily trafficked regions. This modal solution helps maximize delivery density with negligible effects on urban air pollution.

2.3. Key Results

2.3.1. Quantitative environmental impact

The key indicator of success is the absolute value of the reduction in greenhouse gas emitted. For the year 2023, DHL Group saved 1.3 million metric tons of CO₂e, thus decoupling its emission

growth from revenue growth ([DHL Group, 2024a](#)). It reached a total emission footprint of 33.3 million tons of CO_{2e}, outperforming its target ceiling of 39 million tons of CO_{2e}; furthermore, the effectiveness of its management of CO_{2e} is highlighted by its improved carbon efficiency index year after year, which translates to fewer CO_{2e} units emitted per piece of parcel delivered or tonnage carried.

2.3.2. Customer adoption and commercial success

A major effectiveness of the strategy adopted by DHL is the success of the commercialization of green logistics. The GoGreen Plus offering, which enables customers to mitigate their Scope 3 emission footprints by participating in an “insetting” process with Sustainable Aviation Fuel and other network-level solutions offered by DHL, has gained popularity. In the Asia Pacific region alone, over 12,000 customers have enrolled in the GoGreen Plus program within the first year ([DHL Express, 2024](#)). This indicates a change in market dynamics, with sustainable logistics becoming a distinguishing factor among logistics players, especially multinational companies with strict ESG reporting requirements.

2.3.3. Operational resilience and brand reputation

Operationally, the transition to electric and cycle-based logistics has ensured the delivery of quality services. DHL has ensured a 95% delivery within the required timeframe in major markets, demonstrating the viability of new drive technologies in time-sensitive express shipments. The deployment of cargo bicycles in major urban areas has often ensured faster delivery times than vans because cargo bicycles are unaffected by traffic congestion and parking limitations. This success has given the organization worldwide recognition. Today, the DHL Group is ranked among the leaders in the ‘Dow Jones Sustainability Indices’ World and Europe, along with a top “MSCI ESG rating” Though rankings such as “Corporate Knights Global 100” change each year, the organization’s consistent inclusion informs investment organizations that it has succeeded in overcoming transition risks related to climate change regulations.

3. Success of DHL in applying Decarbonized Distribution

One of the most significant achievements that DHL gained is its ability to turn “green distribution” from small experiments into a scalable operating model. The combination of EVs, cargo bikes, micro-hubs, and renewable-energy-powered facilities functions as a coordinated network, enabling DHL to decarbonize distribution across diverse markets and proving that environmental sustainability can coexist with strong performance.

As the regulatory landscape tightens in the European Union, United Kingdom, and other markets, logistics firms face pressure to comply with emissions standards and environmental taxation. DHL's early investments position the company ahead of compliance deadlines without disruption or major redesigns. This proactive posture turns sustainability into a competitive differentiator. Carbon-efficient distribution solutions strengthen DHL's role as a preferred partner for high-value customers.

In addition, DHL's sustainability strategy has reinforced brand loyalty and long-term customer relationships. Businesses and consumers increasingly select service providers whose environmental practices align with their values. This consolidates DHL's low-carbon initiatives, supported by its visibility in sustainability rankings, public reporting transparency, and GoGreen communication. These measures contribute to a stronger brand reputation and higher customer retention.

DHL has also demonstrated its operational learning capability, turning pilots into mainstream activities. The company assesses performance data from early phases such as cargo bikes in European cities or micro-hubs in London and refines operating models before expanding to new regions. This learning approach minimizes risks, accelerates innovation, and strengthens resilience by diversifying technologies and distribution models. DHL reduces dependence on any single fuel type, regulatory environment, or distribution method.

DHL's success also becomes clearer when contrasted with the wider logistics sector, where many firms struggle with fragmented networks, limited digitalization, and insufficient capital for low-emission technologies. DHL's scale and digital infrastructure enable it to expand Decarbonized Distribution while remaining cost-effective. Its ability to measure emissions per parcel, optimize routes using real-time data, and integrate digital dashboards underscores operational sophistication.

Finally, DHL's achievements in Decarbonized Distribution bring applicability for the future of supply chain management. Their success demonstrates that sustainable distribution can generate long-term value through reduced operational risk, improved efficiency, stronger stakeholder trust, and enhanced competitive positioning. DHL provides a replicable reference model for other logistics actors to apply toward low-carbon operations without compromising performance.

4. Recommendations

4.1. Vietnam's logistics context and readiness for Decarbonized Distribution

Over the past decade, Vietnam's logistics sector has grown at a remarkable pace, driven by strong export expansion, increasing domestic consumption, and foreign manufacturing investment. According to estimates consolidated from the [Ministry of Planning and Investment \(MPI\) and Industry Reports \(2024\)](#), logistics activities now contribute roughly 4–5% of national GDP, underscoring the sector's importance as an economic engine and enabler of trade and production. Despite this momentum, the industry remains fragmented, highly price competitive, and constrained by capacity limitations. These structural challenges influence how quickly practices like Decarbonized Distribution can be adopted.

Nearly 90% of service providers in Vietnam's logistics landscape are SMEs. These firms typically operate with narrow margins, limited capital reserves, and low levels of digitalization ([Bhatla, 2020](#)). Consequently, strategic investments in low-carbon initiatives remain out of reach. Customers tend to prioritize low delivery fees and speed, creating little incentive for firms to invest in sustainability unless cost savings or regulatory pressures are immediate.

Infrastructure conditions also pose barriers, increasing delivery costs and emissions. Although national policies such as the [Vietnam Green Growth Strategy \(2021-2030\)](#) emphasize energy efficiency and low-carbon adoption, concrete incentives for green logistics are still limited, including subsidies for electric vehicles, preferential financing, or standardized carbon-reporting frameworks. Decarbonization remains largely voluntary and is pursued mainly by multinational enterprises (MNEs) with global sustainability commitments.

Additionally, digital readiness represents another structural challenge. Although several large Vietnamese logistics companies have begun adopting tracking systems, transport management platforms, and warehouse automation, overall digital implementation remains limited. Many SMEs still rely on manual scheduling and paper-based documentation, restricting supply chain visibility and weakening the potential impact of low-carbon strategies.

However, the rapid expansion of Vietnamese e-commerce has pushed domestic firms (Giao Hàng Nhanh, Viettel Post) and foreign investors to improve last-mile networks and implement more advanced digital platforms. In the future, this enhanced infrastructure can support greener distribution models. While sustainability has not yet been the driving force behind current developments, the modernization of Vietnam's logistics ecosystem indirectly prepares conditions for a transition toward Decarbonized Distribution.

Taken together, Vietnam’s logistics industry is at a transition point: operational expansion is strong, digital momentum is emerging, but green transformation remains limited by financial, infrastructural, and institutional factors. This helps explain why the sophisticated Decarbonized Distribution model implemented by DHL cannot be replicated fully in Vietnam at present. However, the sector’s structural challenges also highlight where the most relevant lessons from DHL lie, particularly regarding long-term strategic vision, investment in data infrastructure, and the gradual integration of sustainability into core distribution activities. These insights form the basis for the subsequent section on lessons learned for Vietnam.

DHL solution	Required enabling conditions	Vietnam’s readiness level	Pilot-oriented application in Vietnam	Monitoring focus
Electric vans & cargo bikes for last-mile delivery	Dense urban demand; charging access; traffic regulation allowing low-emission vehicles	Medium in HCM & Hanoi; Low in secondary cities due to SME dominance and limited capital	Small-scale EV and cargo-bike pilots in central districts where demand density is highest	CO ₂ e emissions per parcel; delivery time reliability
Urban micro-hubs	Flexible zoning; available urban space; coordination with city authorities	Low-Medium due to land scarcity and fragmented urban planning	Public-private pilot micro-hubs near metro or major transit nodes	Vehicle-kilometers reduced; congestion exposure
AI-driven route optimization	Fleet digitalization; real-time traffic data; data management capabilities	Medium for large firms; Low for SMEs with manual scheduling	Platform-based routing tools adopted by large logistics providers as demonstration cases	Fuel consumption; route efficiency
Heavy-duty electric trucks for regional distribution	Grid capacity; depot charging infrastructure; high upfront investment	Low given financial constraints and limited charging infrastructure	Fixed-route pilot projects between major distribution centers	Energy use per ton-kilometer
Emissions measurement and reporting systems	MRV standards; data transparency; regulatory support	Medium , with upcoming GHG inventory requirements	Mandatory reporting pilots for large logistics firms prior to sector-wide rollout	Emissions intensity trends (Scope 1 & 2)

Table 1. Mapping DHL’s Decarbonized Distribution solutions to Vietnam’s logistics context
Source: Author’s compilation based on DHL case materials.

The mapping underscores the need for phased, city-level pilot implementation rather than full-scale replication of DHL's model in the short term.

4.2. Lesson learned

4.2.1. Strategic Vision

DHL Group has integrated decarbonization into its corporate strategy and has declared a science-based net zero goal by 2050, receiving official approval in 2024 by the Science-Based Target initiative (SBTi). By 2030, DHL Group plans to convert two-thirds of the first and last-mile delivery vehicles to electric and use 30% renewable aviation fuel. This long-term approach enables the company to align its environment-related targets with its business operations. A similar net-zero target by 2050 has been set by Vietnam through its National Logistics Strategy (2025-2035), focusing on green development. Nevertheless, this strategy should be facilitated by feasible action roads and accountability. A teamwork approach like the "Journey to Net Zero" program led by the Ministry of Planning and Investment promotes cooperation among government entities, logistics companies, and technology partners ([MAE, 2023](#)). To this end, it's suggested that the country should take the path set by DHL by integrating decarbonization at the national and business levels.

4.2.2. Data investment

DHL invests significantly in technology that promotes efficiency and helps cut emissions. Through their investment, the Greenplan application enables the calculation of the shortest delivery routes based on AI algorithms that take into account road traffic conditions, resulting in minimized distances of up to 20% ([Lee, 2020](#)). Clients of DHL can monitor emissions and consumption levels throughout the supply chain with the myDHLi portal's GoGreen Dashboard. In the Vietnamese logistics industry, the lack of information infrastructure and technical know-how may affect Vietnamese logistics companies, including small and medium-sized businesses that account for almost 89% of the sector. As of a 2023 survey, only 47% of these companies have a clear digital strategy ([Le Viet and Dang Quoc, 2023](#)). As such, the complete implementation of the DHL approach might not be feasible yet. Small-scale pilot projects concentrating on particular cities like Ho Chi Minh or Hanoi may be more suitable. Under new norms on GHG emission inventory reporting taking effect in 2025, the foundations for developing the infrastructure are laid.

4.2.3. Sustainability integration

DHL has implemented sustainability throughout its supply chain. All new DHL-owned facilities must be climate-neutral and run on renewable fuels. The company utilizes electric

vehicles (EVs), micro-hubs, and cargo bikes that emit fewer emissions. The Vietnamese government has started adopting similar measures. Investment in EV trucks has begun by companies like VinGroup, while various Logistics Zones are being upgraded into green zones that run on solar power. Incentives such as the exemption of 100% registration fees for EVs until 2027 will help increase the shift. However, green investments remain expensive, and EV infrastructure and funding are limited. Public and private partnerships and development aid (such as ADB or JETP) contribute to scaling up the program. Solar-powered warehouses, city-based micro-hubs, and hybrid vehicles could help incrementally integrate green logistics operations.

4.2.4. Performance measurement

DHL's success is reinforced by the fact that the company measures its results effectively. DHL identifies its emissions with the 'Realized Decarbonization Effects' method, which ties this performance metric with its executives' performance. Customers are provided with their respective carbon footprint information on the company's online platforms. Similar trends are being implemented in Vietnam, with government strategies emphasizing the significance of GHGs as a resource. New technologies like EcoHub and pilot carbon trading projects support the standardization and verification of emissions reporting. Logistics companies should start with the measurement of at least Scopes 1 and 2 emissions and make the results available in testbed environments. This movement can gain further boost through government strategies that offer taxation advantages or awards for emission reductions.

To introduce a decarbonized distribution system like that of DHL serves as a learning experience but must be implemented gradually in Vietnam. A complete implementation may not be easy due to financial constraints, lack of infrastructure, and the demand for affordable services. By initiating pilot programs focused on optimizing routes, delivery zones, and emission disclosure, the problem of an inefficient distribution system could be overcome and the sector prepared for the future of sustainability.

CONCLUSION

The analysis of Decarbonized Distribution within DHL's supply chain confirms that the transition to sustainable logistics is no longer a peripheral Corporate Social Responsibility (CSR) option, but the definitive new standard for global supply chain management. Driven by intensifying regulatory frameworks, such as the EU Green Deal, and shifting investor and consumer expectations, the decarbonization of downstream logistics has evolved into a strategic imperative. The theoretical "transition risks" of fossil-fuel dependence are now immediate operational realities, establishing Decarbonized Distribution as the essential baseline for future commercial viability.

DHL's case study provides clear evidence that environmental sustainability and operational efficiency are not mutually exclusive trade-offs but are, in fact, synergistic. By successfully decoupling emissions growth from revenue growth, saving 1.3 million metric tons of CO₂e in 2023 while maintaining on-time delivery rates above 95%, DHL has demonstrated that green logistics can equal or exceed the performance of traditional models. The success of the "City Hub" concept, where electric cargo bikes often navigate urban gridlock faster than combustion vans, validates the thesis that low-carbon solutions can resolve operational bottlenecks such as congestion.

For the wider business community, DHL's transformation offers three critical strategic lessons. First, effective decarbonization requires systemic integration rather than simple asset substitution. Merely purchasing electric vehicles is insufficient; success relies on "sector coupling", integrating logistics with energy infrastructure, such as transforming warehouses into solar-powered hubs that stabilize local grids. Second, digitalization must be viewed as a primary enabler of sustainability, as evidenced by DHL's use of AI-driven tools like Wise Systems and Greenplan; minimizing "empty miles" and optimizing load factors through data is as critical as physical assets. Finally, organizations must adopt long-term sustainability strategies that prioritize resilience over short-term cost, as demonstrated by DHL's willingness to vertically integrate, proving that firms best positioned for the future are those actively designing carbon out of their operations today.

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