

Practices Collection

Innovative Application on Carbon Label and Carbon Reduction Integrated Supply Chain Management



This document was compiled within the collaboration between International Green Purchasing Network (IGPN) and the One Planet Network Sustainable Public Procurement(SPP) Programme. It was produced by IGPN Secretariat-China Environmental United Certification Center.

The views presented in this publication are those of the authors who provided the cases and do not necessarily reflect the views of the International Green Purchasing Network and the One Planet Network Sustainable Public Procurement Programme in any way or for any purpose.



One Planet Network Sustainable Public Procurement Program

Established in 2014, the One Planet [Sustainable Public Procurement Programme](#) envisions a world in which environmental, economic and social aspects of sustainability are embedded in public procurement policies, strategies, processes and practices as a means for promoting efficiency, value for public spending, good governance and integrity. The Sustainable Public Procurement Programme operates as a global, multi-stakeholder platform that brings together and scales up existing initiatives and partnerships and facilitates new projects and activities to accelerate the transition to sustainable consumption and production. Together with the other programmes of the One Planet Network, it serves as an open, inclusive and collaborative platform, and an incubator for ideas, expertise and resources. The One Planet Network Sustainable Public Procurement Programme amplifies and extends the impact of the Sustainable Public Procurement Initiative (SPPI), which was launched in June 2012 at the Rio+20 Conference, as a continuation of the Marrakech Task Force on Sustainable Public Procurement led by the Government of Switzerland from 2005 until 2011.

International Green Purchasing Network

[International Green Purchasing Network \(IGPN\)](#) promotes green purchasing around the globe by coordinating those who take the initiative in implementing green purchasing towards sustainable consumption and production. IGPN was launched in 2005 with its mission: promote globally the development of environmentally friendly products and services and green purchasing activities; share information and know-how on green purchasing and environmentally friendly products and services internationally; harmonize the efforts of green purchasing and the development of environmentally friendly products and services from a global viewpoint. IGPN works with its members, Green Purchasing Networks from Japan, Korea, Thailand, Malaysia, Singapore, the Philippines, India, Vietnam, China etc., and regions such as China Hong Kong SAR and Chinese Taipei, partners with the Global Lead City Network led by ICLEI on sustainable procurement and the Green Ecolabelling Network, collaborates with the UNEP One Planet Network Sustainable Public Procurement Programme support the implementation of SDG12. The International Green Purchasing Network (IGPN) Secretariat is hosted by China Environmental United Certification Center (CEC) since 2018.

Acknowledgement

The elements employed and the material in this document were from the contribution of the members from the IGPN and One Planet Network SPP program including: Kanchanattee Vasuvat (GIZ Office Thailand), Pongsan Wongsermhira (Thai Wacoal Public Company Limited), Chuttree Phurat (Thailand Environment Institute), Scot case (National Retail Federation), Maud Vastbinder (Foundation for Climate Friendly Procurement and Business), Circular & Fair ICT Pact Secretariat, YAN Dong (Midea Group), WANG Jing (Farizon (Zhe Jiang) New Energy Commercial Vehicle Group Co., Ltd).

The compiled cases were reviewed by: Farzana Fayeza (UNEP 10YFP Secretariat), Laetitia Montero (UNEP 10YFP Secretariat), Sophia Groll (UNEP Consumption and Product Unit), Bruna De Moraes Tiussu (UNEP Consumption and Product Unit), Francini van Staden (Western Cape Government), Mervyn Jones (Rijkswaterstaat), CHEN Yanping (IGPN), ZHU Shu (ICLEI), Scot Case (National Retail Federation), Yasushi Umeda (Green Purchasing Network Japan), Augustine Koh (Green Purchasing Network Malaysia), Prasad Modak (Green Purchasing Network India), Farid Yaker (Expert), Chaiyod Bunyagidj (Thailand SCP Network), Nick LIU (TCO Development), ZHANG Xiaodan (Expert), Kanchanattee Vasuvat (GIZ Office Thailand), Isabella Huang-Loh (Green Purchasing Network Singapore).

This document was compiled by the Secretariat of the International Green Purchasing Network - China Environmental Certification Center. The member of working group include: LIU Zunwen, CHEN Yiqun, WANG Jing, ZHANG Xiaohui, CHEN Xiaoshuo, YANG Lu.

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General Introduction

This series of cases reflect the practices on carbon label and carbon reduction in the theme of public institute or corporation supplier management, low carbon logistics, carbon inclusion, supply chain finance, remanufacturing and cleaner production, and digitization. The practice cases included here attempt to demonstrate the benefits of using carbon labels and other carbon-reduction measures across business-to-business (B2B) purchasing and public procurement and in the quantification of carbon emissions. Through the use of carbon labels or other verified carbon-reduction measures, carbon emissions (both embedded and operational) become quantifiable and transparent across the value/supply chain. When these measures become common practice in the value chain, including in business-to-business (B2B) purchasing, an important segment of supply chain management, it promotes collaborative emission reductions across upstream and downstream partners, including public purchasers. When suppliers participating in a public procurement are able to demonstrate low-carbon products and services through carbon labels or otherwise they help achieve government mandated carbon targets in response to climate change. Overall, use of carbon labels can help optimize purchase decisions, enhance trust between enterprises across the value/supply chain and promote their participation in carbon reduction cooperations, and improve the competitiveness of the whole supply chain—all of which are regarded as ‘innovative’.

The case studies focus mostly on the use of carbon labels and practices in carbon reduction and supply chain management. Definitions for each of these terms are provided below to facilitate shared understanding of these terms within this report.

- **Carbon Label¹**: an environmental statement of a product or service based on Life Cycle Assessment that quantifies and communicates to an intended audience the total greenhouse gas emissions expressed as carbon dioxide equivalent (CO₂e), to provide information related to climate change impact.
- **Carbon Reduction²**: a quantified decrease in emission specifically related to or arising from an activity between two points in time or relative to a baseline.
- **Supply Chain Management³**: As defined in the Supply Chain Dictionary published by the Association for Supply Chain Management, it is the design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand, and measuring performance globally.

This report was developed as an outcome of the collaboration between the International

¹ Adapted from [ISO 14020:2022](#), 3.2.1, 3.2.8; [ISO 14067:2018](#)

² Adapted from [IWA 42:2022](#), 3.3.2

³ <https://learn.ascm.org/s/ascm-dictionary/view-dictionary?fld=069R300000QYPjOIAx>

Green Purchasing Network (IGPN) and the One Planet Network Sustainable Public Procurement Programme. These innovative practices in the report aim to identify the policies, measures, means and results of supply chain management using carbon labels, and promote knowledge sharing among members of the IGPN and beyond. By summarizing experiences and showcasing , benefits improved supplier capabilities, it aims to support an increase in the application of carbon label, and in demand for sustainable products and services from both supply and market side.

Practice #1

Upgrading Thailand’s Green Procurement Database for Carbon-Label Integration

Theme

Public institute/corporation supplier management and carbon label
Digitization and carbon label

What is about?

This document focus on applying a digital public procurement data system, which is automatically connected to the eco-label and carbon label databases maintained by relevant certification agencies. This enables the tracking of the carbon emission reduction benefits brought about by public procurement, thereby facilitating public institutions to make informed and climate-friendly procurement decisions and to monitor the progress in real time.

It is essential to be highlighted that the practice has strengthened the management of procurement data related to the environment and carbon performance, establishing a connection between eco-labels, carbon labels and the procurement database, thereby improving procurement efficiency.



Why carbon label/carbon reduction matters?

Carbon labels/carbon reduction format in this case mostly refer the use of a digital procurement system to facilitate the coordination of eco-label and carbon label data, its functions mainly include:

- Centralize on obtaining verified information on green products, form quantitative emission reduction data, and enhance the traceability of carbon dioxide emission reduction related to procurement;
- The consistency of carbon reduction in certified products integrating ecological labels and carbon labels.



How does stimulate supply chain innovation management practices?

Supply chain innovation management practices in this case reflect as follows:

- Technically, establish an API integration between the procurement center, the eco-labeling and the carbon label certification agency databases;
- Pilot testing in public procurement agency, procurement performance reports has been established, automating carbon impact tracking and enabling data-driven decisions on a scale

Examples

The “Upgrade for Thailand’s Green Procurement Database” project digitized the country’s procurement data to integrate certified eco-label and carbon-label products. The upgraded system automatically links product certification databases and tracks carbon emission reductions resulting from government purchasing. Through this, public agencies can make informed, climate-friendly procurement decisions and monitor progress in real time. The initiative demonstrates how digital transformation enhances transparency, efficiency, and accountability in sustainable procurement.

Context

Thailand’s Green Public Procurement (GPP) policy encourages ministries and local governments to purchase products with reduced environmental impacts. However, limited access to verified data on certified products previously hindered implementation. GIZ’s SCP Outreach project responded by developing an integrated digital database linking the Pollution Control Department (PCD)’s procurement system with eco-label and carbon-label databases maintained by Thailand Environment Institute (TEI) and Thailand’s Greenhouse Gas Management Organization (TGO). The new system provides standardized product and supplier information, automated data exchange, and online dashboards estimating CO₂ reductions achieved through procurement.

This modernization improves procurement efficiency and allows agencies to quantify the climate benefits of their purchasing decisions. The approach aligns with Thailand’s digital government strategy and can be replicated across ASEAN countries seeking to digitalize sustainability performance tracking.

Objective

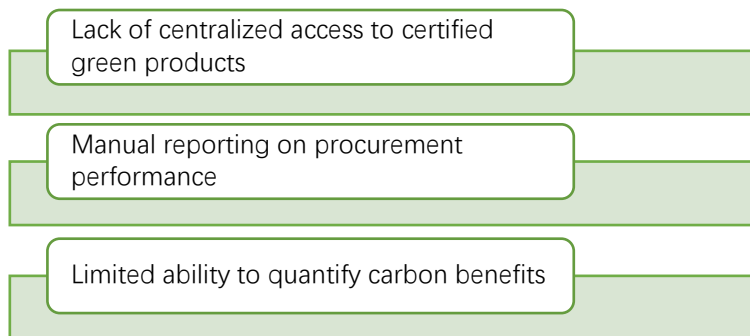
- Enhance Thailand’s procurement data management for environmental and carbon metrics.
- Strengthen interlinkages between eco-label, carbon label, and procurement databases.
- Enable automatic monitoring of GPP-related CO₂ reduction.

Approach

The initiative was implemented through a collaborative process involving the Pollution Control Department (PCD), the Thailand Environment Institute (TEI), the Thailand Greenhouse Gas Management Organization (TGO), and GIZ under the SCP Outreach project. The approach focused on integrating existing certification databases with the national Green Public Procurement (GPP) database through Application Programming Interface connections.

A series of joint design workshops and technical consultations were conducted to define system requirements, harmonize data formats, and establish data exchange protocols between the agencies. The upgraded system was then pilot tested with selected government procurement units, followed by user training and technical support to ensure effective adoption. In addition, an online monitoring dashboard was developed to visualize procurement data and estimate carbon emission reductions associated with certified products purchased by public institutions.

Solved problems



Timeline

2022–2024 (concept, pilot, and launch under SCP Outreach project).

Output and Results

The project successfully upgraded Thailand’s GPP database into a digital platform capable of integrating eco-label and carbon-label product information. The system now connects certification data from TEI and TGO with procurement records maintained by PCD, enabling automatic data exchange and improved transparency of environmentally friendly procurement practices.

More than 800 eco-labelled and carbon-labelled products are currently integrated into the platform, allowing public agencies to easily identify certified products during procurement processes. The system also generates dashboards that estimate the carbon reductions achieved through green procurement activities across government agencies.

As a result, the upgraded database has strengthened evidence-based policy implementation for sustainable procurement, improved procurement efficiency, and enhanced the ability of public institutions to track to report climate-related impacts of their purchasing decisions.

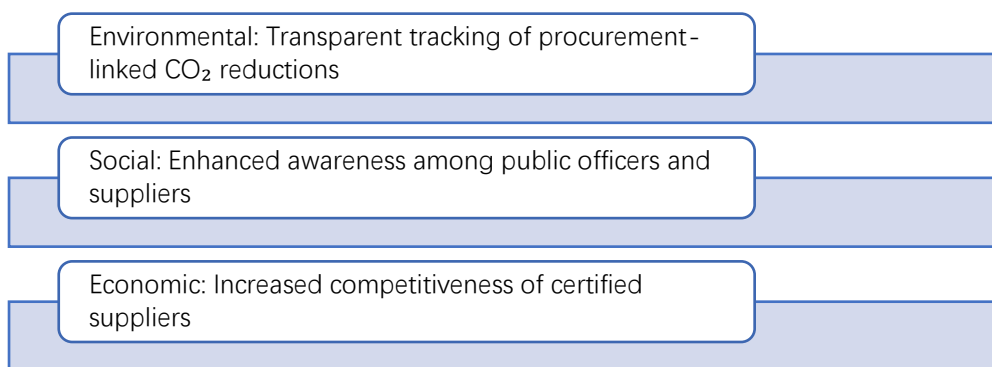
Innovative aspect

The innovation of this initiative lies in digital linking procurement data with environmental certification systems to enable automated tracking of climate-related

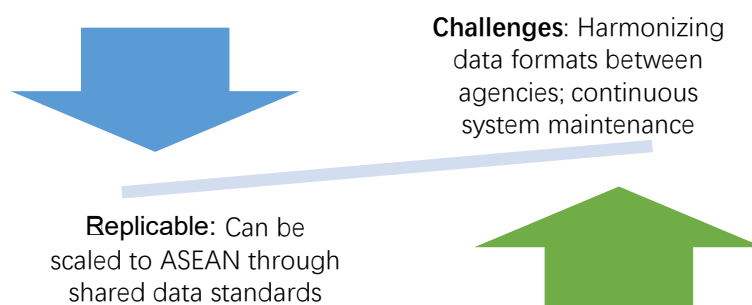
impacts from public purchasing. By integrating eco-label and carbon-label databases directly into the national procurement platform, the system transforms procurement data into a tool for monitoring greenhouse gas reduction outcomes.

This integrated approach represents one of the first examples in the Association of Southeast Asian Nations (ASEAN), where sustainable procurement, eco-labeling, and carbon-labeling systems are digitally connected. The platform demonstrates how digital transformation can enhance transparency, accountability, and data-driven decision-making in public procurement while supporting national climate commitments.

Social, environmental and economic benefit



Replicable experiences and challenge faced



Future Prospect

The platform will evolve into a regional knowledge hub on green and carbon procurement, supporting data-based policy planning and Nationally Determined Contributions (NDC) tracking.

Organization

GIZ, on behalf of the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), supports Thailand in strengthening sustainable public procurement (SPP) and eco-labelling systems. Under the SCP Outreach project, GIZ provided technical assistance to the Pollution Control Department (PCD) to modernize Thailand's national Green Public Procurement (GPP) database. This online platform now integrates environmental and carbon label data from certified products and suppliers, supporting the government's ambition to use procurement as a tool for greenhouse gas (GHG) reduction.

The initiative builds upon more than a decade of GIZ-PCD cooperation in climate-friendly public procurement and complements Thailand's Nationally Determined Contribution (NDC) by providing data-driven insights into low-carbon purchasing decisions.



Kanchanatetee Vasuvat, Community Manager, GIZ Office Bangkok, IGPN Advisory Board member, at kanchanatetee.vasuvat@giz.de,

Practice #2

Thai Wacoal Low Carbon Solution to Sustainability

Theme

Corporation supplier management and carbon label

What is about?

This document focus on enterprises supplier chain management and carbon label throughout its “Eco Product System” in textile industry. Through the “Eco Product System”, relevant activities including design, procurement, produce, disposal and communicate with consumers were compliance with the requirement towards carbon neutrality and circularity.

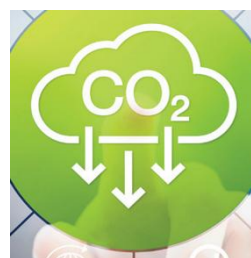
Carbon Footprint of product assessment, Circular Economy Management System (CEMS) certification, together with Green Label certification were adopted and incorporated to guarantee the quantified Co₂ emission. In additional, the relevant project such as zero waste has been carried out continuously to reduce community waste, the use of natural resources or fossil energy, the impact of climate change or global warming.

It is essential to be highlighted that the enterprise motivated themselves to pursue their sustainability demand from market, meanwhile, besides the low carbon and carbon neutrality, circular economy approach is another aspect to be adopted.

Why carbon label matters?

Carbon labels in this case mostly refer the Carbon Footprint of product assessment, Circular Economy Management System (CEMS) certification on the basis of green label, its functions mainly include:

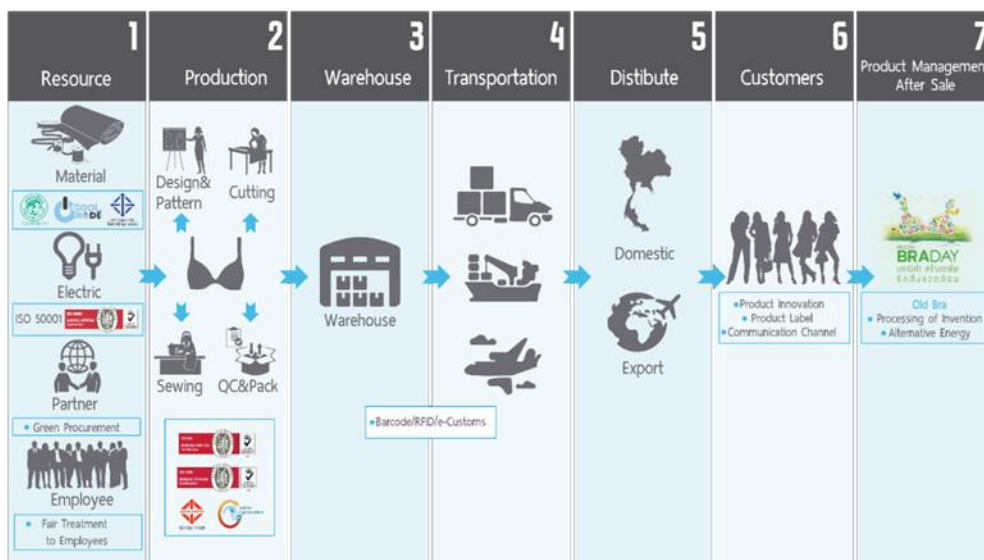
- Aligning with international standards for sustainable production and labeling, to enhance its competitiveness in the global market;
- Push to adopt sustainable practices which improve technological advancements and circular economy principles, strengthens the country's competitiveness in the global market;
- Educated consumer about low carbon products to drive and stimulate market demand.



How does stimulate supply chain innovation management practices?

Supply chain innovation management practices in this case reflect as follows:

- Wacoal Eco Product System-systematical approach from design to disposal-ensure safe and environmentally friendly operations;
- Benefit from the government initiatives and industry collaboration, such as the Thai government's Green Industry Project;
- Researches and develops its products and materials by considering the customers' needs and the health effects, low carbon and circularity are as part of aspects;
- Company culture with an established Sustainability Framework, which is aligned with international practices and supports the United Nations Sustainable Development Goals (SDGs).



Examples

Context

Thai textile production is increasingly focused on sustainability and reducing its carbon footprint, reflecting a broader global shift towards eco-conscious practices. Thailand's unique textile heritage, combined with modern technological advancements, positions it to become a leader in sustainable fashion, which show as follows:

Traditional Wisdom and Sustainable Practices: Thai textile production has historically relied on natural fibers like cotton and silk, and natural dyes derived from plants and minerals. Natural Fibers and Recycling or Upcycling material, which minimizes reliance on synthetic materials and harmful chemicals, change to recycling or Upcycling material and reducing the overall environmental impact.

Government Initiatives and Industry Collaboration: Promote sustainability textile by Green Industry and Sustainable Fashion Promotion project, aligning with international standards for sustainable production and labeling, like carbon footprint reduction, to enhance its competitiveness in the global market.

Technological Advancements: Precision Manufacturing including laser cutting,

robotic sewing, and 3D printing enabled more efficient and waste-reducing production processes, research is underway to develop and utilize innovative materials like recycled textiles, bio-based fabrics, and other sustainable alternatives of Eco-Friendly materials.

Circular Economy and Waste

Reduction: A growing emphasis on recycling and upcycling textile waste, Promoting durable, high-quality textiles, extend product lifecycles, reduce the overall demand for new materials and decrease textile waste.

Market Trends and Consumer

Awareness: Consumers are increasingly aware of the environmental impact of the fashion industry and are actively seeking sustainable and ethically produced clothing. Meanwhile, Thai fashion brands are responding to this demand by adopting sustainable practices, sourcing eco-friendly materials, and promoting transparency in their supply chains.

By integrating traditional wisdom, embracing technological advancements, and promoting circular economy principles, Thailand is well-positioned to become a leader in low-carbon textile production and sustainable fashion.

Objective

- The company operates its business with environmental responsibility and has an integrated environmental management approach to provide effective environmental management covering all aspects : climate change, energy management, water management, and industrial waste management, including a commitment to strictly complying with the law and various requirements of environment at the national and international level to reduce impacts throughout the company's value chain to reduce environmental impacts and decrease greenhouse gas emissions throughout the company's value chain, aiming towards Carbon Neutrality and Net Zero Emissions.

Approach

Under the “WACOAL ECO PRODUCT SYSTEM”(Figure 1) , Thai Wacoal ensure safe and environmentally friendly operations. All business activities are conducted in compliance with this system, such as the green procurement, materials design, purchasing only highquality materials, eco-friendly product design, effective production and inventory management, and the communication of accurate information to customers, as well as environmentally friendly waste disposal.

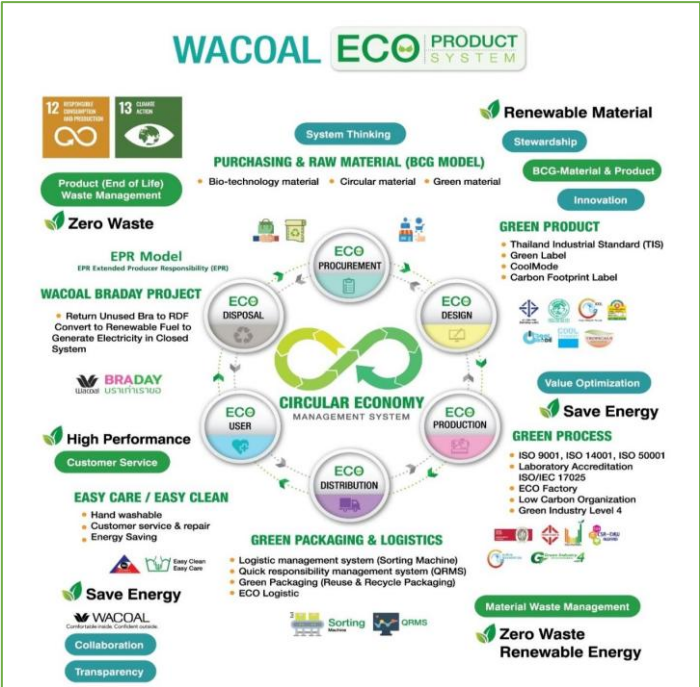


Figure 1. Wacoal eco product system

Output and result

- The company has been the first company in Thailand to receive the Green Label certification for all ladies' lingerie products for 15 consecutive years, from 2009 to the present.
- Ladies' lingerie products under the Wacoal trademark have passed the Carbon Footprint of product assessment since 2011, furthermore, in 2024, the company assessed the carbon footprint of three new product models.
- Ladies' lingerie products under the Wacoal trademark have been the first lingerie brand in Thailand to receive the Circular Economy Management System (CEMS) certification, attributed to the application of standard requirements in every process, from design and procurement to production, inventory management, transportation, distribution, and after-sales product management.
- Develop new products made from recycled materials and adopting environmentally friendly processes, including materials from regenerated polyamide fiber and recycled PET, incorporating 10% of palm oil in replacement of crude oil from petroleum (B10), using the biodegradable and environmental-friendly natural rubber etc.
- Wacoal BRADAY Project, has been carried out continuously since 2012 until now for the 13th year, reduced community waste, the use of natural resources or fossil energy, the impact of climate change or global warming under the concept "Zero Waste".

The innovative or highlighted aspect

The company is committed to three core values offered to customers: Beauty, Comfort, and Health, continuously researches and develops its products and materials by considering the customers' needs and the health effects. This ensures customer satisfaction, offering high quality, safety, and environmental friendliness, by placing great importance on research and development to continuously build a database; developing raw materials, sewing techniques and environmentally friendly products; designs and packaging that facilitate material circulation and environmentally friendly manufacturing processes.

The social, environmental and economic benefit

The principles of Corporate Governance (CG), incorporated with sustainability framework, which is aligned with international practices and supports the United Nations Sustainable Development Goals (SDGs), involves analyzing impacts and creating value in a balanced way across three areas economy, society, and environment (Figure 2).



For example, the “Wacoal BRADAY” project, from 2012 to 2024, has helped to eliminate totaling 120,826 kilograms, or reduce community waste by over 121 tons, and reduce greenhouse gas emission or carbon dioxide from landfill and from the use of renewable energy instead of coal by more than 785 TonCO₂e. In 2024, the company developed raw materials, sewing techniques and environmentally friendly products with high quality, generating revenue from innovatively developed products, which accounts for 10.23% of total domestic sales of finished products.

Replicable experiences

- **Circular Economy Principles:** such as designing for deconstruction and recyclability, enables products to be reused, refurbished, or recycled, minimizing waste and resource depletion.
- **Life Cycle Assessment (LCA):** Conducting thorough LCA studies helps identify hotspots in a product's life cycle, allowing for targeted efforts to reduce carbon emissions during production, distribution, use, and end-of-life.
- **Green Procurement:** Implementing green procurement strategies, where companies prioritize suppliers with strong environmental performance, helps reduce carbon emissions across the supply chain.
- **Low-Carbon Technologies:** Utilizing low-carbon technologies, such as renewable energy sources, energy efficient manufacturing processes, and sustainable transportation, can significantly reduce a product's carbon footprint.
- **Consumer Engagement:** Educating consumers about the benefits of low-carbon products and encouraging them to adopt sustainable consumption patterns can drive demand and market growth for such products.

Challenges faced

- **High Costs:** Transitioning to low-carbon technologies and sustainable materials can often involve higher initial costs compared to conventional methods.
- **Limited Availability:** Finding and sourcing sustainable materials and components,

especially in certain regions, can be a challenge.

- **Complexities in Scope 3 Emissions:** Addressing Scope 3 emissions (indirect emissions from the supply chain) requires collaboration and influence across the entire value chain, which can be difficult to manage.
- **Consumer Behavior:** Shifting consumer behavior towards adopting low-carbon products and lifestyles can be slow and require sustained efforts in education and awareness.
- **Data Collection and Transparency:** Accurately measuring and reporting carbon emissions across the product lifecycle can be complex and require robust data collection systems.
- **Scalability and Affordability:** Ensuring that low-carbon solutions are both scalable and affordable for mass adoption remains a key challenge

Outlook

The future for low-carbon footprint products is driven by increasing consumer awareness, government regulations, and technological advancements:

- **Increased Consumer Demand:** Consumers are becoming more conscious of their environmental impact and are actively seeking out low-carbon products; This shift in consumer preferences is pushing businesses to prioritize sustainability in their product development and manufacturing processes; Access to Product Carbon Footprints (PCFs) will empower consumers to make informed purchasing decisions based on environmental impact, further driving demand for low-carbon options.
- **Technological Advancements:** Innovations in materials science are enabling the development of products made from renewable and sustainable resources; Improved energy efficiency technologies are reducing the carbon footprint of manufacturing processes; Carbon capture, utilization, and storage (CCUS) technologies are emerging as crucial tools for mitigating emissions, particularly in hard-to-abate sectors.
- **Government Regulations and Policies:** Governments are implementing policies and regulations to incentivize the adoption of low-carbon technologies and practices; These policies create a supportive environment for businesses to invest in sustainable solutions and drive the transition to a low-carbon economy.
- **Shift Towards a Circular Economy:** The concept of a circular economy, where products are designed for durability, reuse, and recycling, is gaining traction; This approach minimizes waste and reduces the need for virgin materials, further lowering the overall carbon footprint.
- **Challenges remain in terms of scaling up production, reducing costs, and ensuring widespread adoption.**

Organization

Thai Wacoal Public Company Limited was established through joint-venture investments between Saha Pathanapibul Company Limited and Wacoal Corporation of Japan on October 1, 1970 as the first ladies' lingerie products manufacturer on an industrial basis in Thailand. In 1983, the company became a listed company on The Stock Exchange of Thailand, and later on in 1994 was transformed into a public company.

Today, the company is engaged in the manufacturing and selling of ladies' apparel products, covering the range of ladies' lingerie, ladies' outerwear, and children wear, with ladies' lingerie category serving as the core product group for the company. With regard to the distribution of its products to the domestic market, I.C.C. International Public Company Limited is the company's major customer. Whereas for its export business operations, the company exports its products to affiliated companies under Wacoal Corporation, to major country destinations such as Japan, the U.S., and ASEAN countries.



Pongsan Wongsermhira, Research Development & Innovation Division, Thai Wacoal Public Company Limited, at: pongsan.won@wacoal.co.th

Chuttree Phurat, Director, Green Label and Environmental Label Division, Thailand Environment Institute, GPN Thailand, at: chuttree@tei.or.th

Practice #3

Analysis on greenhouse gas emissions hotspots and reduction levers for retailer products

Theme

Other carbon reduction relevant supply chain innovative management

What is about?

This document focus on the greenhouse gas emission “hotspots” associated with the retail industry. It outlines the climate impacts of the raw materials used to make products, the manufacturing process, retail operations, getting the products to consumers’ homes and consumer impacts from using and disposing of products, emphasized on the main hotspots and the consumer and retailers’ connection to these and how they can contribute to GHG emission reduction through their measures and decisions.

It is essential to be highlighted that key levers are product selection, how the product is transported “the last mile” and the way the consumer uses the products. These entailed for consumers awareness on key levers and retailers focus on measures providing environment and climate friendly products or creating resell market, which tend to influence consumers making choice and using based on reducing its own climate impacts.

Why carbon label/carbon reduction matters?

Carbon labels/carbon reduction format in this case mostly refer the key lever and measures, effects are as follows:

- Bring awareness of consumers’ key lever on product selection, last mile transportation, product use and disposal;
- Encourage retailers taking actions focus on reducing their own adverse climate impacts; meanwhile working on measures providing environment and climate friendly products or creating resell market, which tend to influence consumers making choice and using.

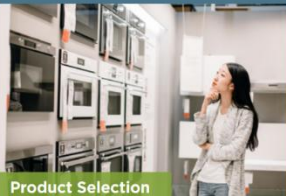




From [NRF website](#)

How does stimulate supply chain innovation management practices?

Supply chain innovation management practices for retailers in this case reflect as follows:

- Reduce packaging use with reusable and refillable containers;
- Create resale markets for consumers to buy and sell “gently used”, pre-owned products;
- Offer more sustainable products for sale.
- Reducing their own adverse climate impacts by lowering energy use, transitioning to cleaner and renewable energy sources, increasing recycling rates, reducing waste and addressing other opportunities that directly control

 <p>Product Selection</p> <p>When selecting which products to purchase in-store or online, consider:</p> <ul style="list-style-type: none"> • Seeking out reused and recycled products, or packaging with recycled material • Selecting products in more concentrated or compact formats • Choosing formats with less packaging material per unit of product • For food and beverages, selecting more plant-based options • Choosing more energy and water efficient products (e.g., appliances) 	 <p>Last Mile Transportation</p> <p>When deciding how to transport the product home, i.e., “the last mile,” consider:</p> <p>If shopping in-store...</p> <ul style="list-style-type: none"> • Walk, bike or use public transportation • When using a personal motorized vehicle, electric is better • Combine shopping occasions with other stops and away from home trips (i.e., trip chaining) <p>If shopping online ...</p> <ul style="list-style-type: none"> • Avoid rush delivery • Consolidate shipments <p>Regardless of where you shop...</p> <ul style="list-style-type: none"> • Minimize the total miles needed to get all the purchased items from the retailer to home (e.g., fewer total trips for the products purchased) 	 <p>Use and Disposal</p> <p>When preparing, using and disposing of products, consider:</p> <ul style="list-style-type: none"> • Minimizing the number of products returned • Minimizing product waste (e.g., food waste) • Conserving energy and water when using products • Reusing and recycling product packaging • Donating, reselling or recycling products that are no longer needed
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From Report of [The Carbon Footprint of Retail Products: A Review of Greenhouse Gas Emissions Hotspots and Reduction Levers for Consumer Decision](#)

Examples

Context

The retail industry is both impacted by and contributing to climate change. Retailers face increasing supply chain disruptions and risks associated with a changing climate, and many are taking action to curb emissions from their operations and supply chains. Further, consumers are more aware that shopping decisions have an impact on greenhouse gas (GHG) emissions and are increasingly willing to take personal action to combat sustainability challenges, yet be challenging for a shopper to understand the key drivers of emissions, and which specific purchasing decisions or behaviors have lower impacts. Meanwhile, consumers are shifting where they purchase items, using a combination of retail models. Consumers are hearing conflicting information around whether ecommerce or bricks-and-mortar shopping at stores is better for the environment. This can lead to inconsistent assumptions or confusion about how best to incorporate sustainability considerations in purchasing decisions.

[The Carbon Footprint of Retail Products: A Review of Greenhouse Gas Emissions Hotspots and Reduction Levers for Consumer Decision](#) released by NRF, written by sustainability consulting firm Pure Strategies, explains the greenhouse gas emission “hotspots” associated with the retail industry. It highlights the climate impacts of the raw materials used to make products, the manufacturing process, retail operations, getting the products to consumers’ homes and consumer impacts from using and disposing of products, focuses on the main hotspots and the consumer and retailers’ connection to these and how they can contribute to GHG emission reduction through their measures and decisions.



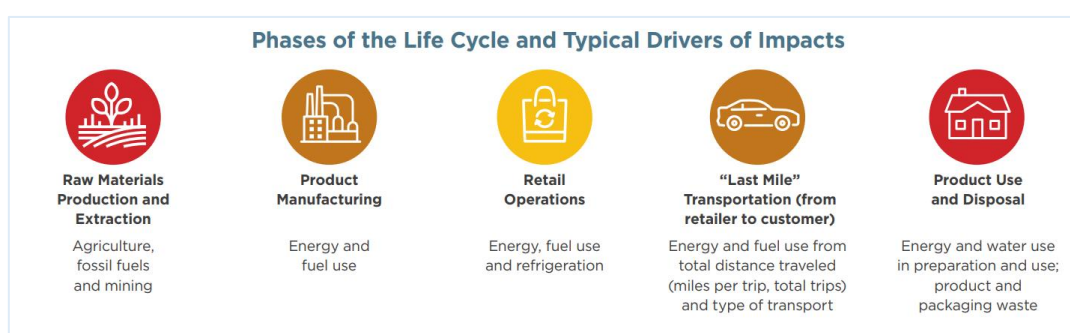
Objective

- Assess literature and studies on the life cycles of a broad range of retail products, outline the major GHG emissions hotspots associated with retail products, identify key levers for emissions reductions.
- Help consumers and retailers understand and identify opportunities, including actions or measures can be taken to reduce the carbon emissions associated with their

purchases or sale.

Approach

- Review Life cycle assessment (LCA) peer-reviewed studies and public reports focused on retail products to help identify general GHG emissions hotspots and reduction opportunities.
- Included LCA studies on retail food and beverage, apparel, footwear, household and personal goods, and consumer electronics products, retail company sustainability reports which included results from LCAs' or GHGs' inventories of the companies' value chains were also included.



From Report of [The Carbon Footprint of Retail Products: A Review of Greenhouse Gas Emissions Hotspots and Reduction Levers for Consumer Decision](#)

Key findings

- **Raw material production and extraction** is a leading source of GHG emissions especially for products that use agricultural-based materials, fossil fuel-based materials or mined materials.
- **Product manufacturing** is a hotspot for some electronics, household goods and apparel, but in many cases is not the biggest GHG emissions contributor.
- **Retail operations** GHG emissions are typically smaller than other value chain phases such as raw material production and product use. They are also impacted by variables that the consumer influences (e.g., products selected, total miles needed for those products and use/waste considerations).
- **"Last mile" transportation (from retailer to home)** can be highly variable depending on consumer choices, but typically is not the leading source of GHG emissions.
- **Product use and disposal phase** is another leading source of GHG emissions especially for electronics, household appliances and items that need or use hot water (e.g., shower products, cooking foods or washing clothes). Consumer waste also drives GHG emissions, depending on the quantity and the method used to dispose of products when they are no longer needed (e.g., donating, reselling, recycling, composting or landfilling).

Highlighted aspect

The highlighted surprising aspects are as follows:

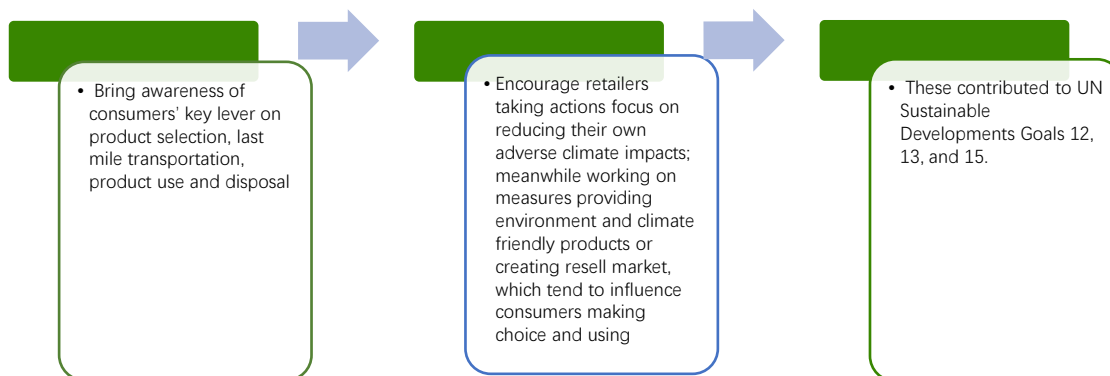
- The most significant climate impacts of many food and beverage products generally occur where ingredients are grown and when crops are processed into ingredients, which typically account for 70% of the total impact.
- How consumers buy products does not generally have a significant impact on the carbon footprint of their purchases.
- With large appliances like refrigerators, washing machines and dryers, the enormous energy it takes to create the steel and other metals and to manufacture the products is less than 25% of the products' total climate impacts.
- Other products like laundry detergents, soaps and shampoos and fashion items also have their biggest

climate impacts from raw materials and consumer use rather than during their manufacture.

In general, what consumers buy and how they use those products generally have bigger sustainability and climate impacts than whether consumers are shopping online, in-store or some combination of the two. Retailers are helping consumers meet their own sustainability goals by reducing packaging use with reusable and refillable containers, creating resale markets for consumers to buy and sell “gently used”, pre-owned products and offering more sustainable products for sale. Retailers remain focused on reducing their own adverse climate impacts by lowering their energy use, transitioning to cleaner and renewable energy sources, increasing recycling rates, reducing waste and addressing other opportunities that they directly control.



Social, environmental and economic benefit



Replicable experiences and challenge faced

- Experience is that one should not oversimplify these levers. For example, assuming that one type of retail model will always be better than another overlooks other important considerations. Rather, the key to reducing emissions is optimizing the multiple factors the consumer controls while also improving the rest of the life cycle, which includes retailers and manufacturers also achieving GHG reductions.
- Challenge is that impacts on water, air, land use, waste, worker health and rights, livelihoods and others are also important factors to consider, but comparative literature on these impacts is more limited so insights were not included in this analysis

Organization

The [National Retail Federation](#) (NRF) has represented retail for over a century. Every day, we passionately stand up for the people, policies and ideas that help retail succeed. As the nation's largest private-sector employer, retail contributes \$5.3 trillion to the annual GDP. No other industry comes close. Wherever the industry goes, the nation follows, committed to helping retail go further. The [Sustainability Council](#) is a collaborative networking group open to senior executives and their designees within NRF member companies.



Contact: Scot Case, NRF's vice president of CSR and sustainability policy, IGPN Council member. at scotcase@gmail.com

Note:

This case is excerpted from The [Carbon Footprint of Retail Products](#) released by NRF and [Answers to consumer questions about the climate impacts of shopping implementation](#), which has been edited in structure according to the format of "Carbon Label/Carbon Reduction-Based Supply Chain Management Innovative Practice Cases Collection".

Disclaimer:

This case has been described to provide inspiration. If, after careful reflection, this example offers added value to your practices, adapt it to fit your organization and make sure it is compliant with the applicable rules and regulations.

Practice #4

CO₂ Performance Ladder: A proven and effective GPP best practice

Theme

Public institute/corporation supplier management and carbon label

Low carbon logistics and carbon label

Carbon inclusion and carbon label

What is it about?

This document focuses on the “CO₂ Performance Ladder” (Ladder) which integrates carbon management, green procurement incentives and third-party verification, in order to achieve global climate targets through helping organizations to eliminate carbon emissions by 2050 or before. These include, on one hand, defining three Steps of ambition for organizations to realize energy savings and reduce CO₂ emissions in their own organization, projects and in the supply chain; and on other hand, providing advice to contracting authorities on how they can incorporate the "Ladder" into their tenders, procurement policies, rules and requirements. The third-party verification, shifts the burden of proof for procurers, making it easier to be applied.

It is essential to highlight that the Ladder, contributes to the monitoring of GPP, and encourages participants to develop new tools, products and methods to reduce emissions.

Why carbon label or carbon reduction matters?

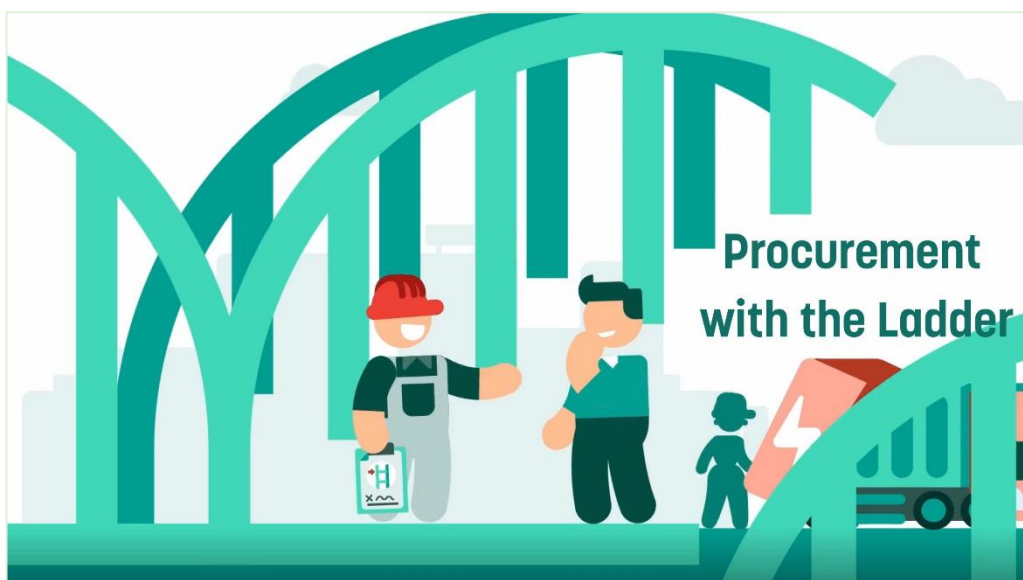
Carbon labels/carbon reduction format in this case refers to using the Ladder in public procurement. The Ladder works as follows:

- Certified organizations, or those that commit to achieving certification after winning the contract, receive an award advantage at the evaluation stage of tenders. With a certificate on the Ladder, organizations gain a concrete competitive advantage during the tendering process.
- The contracting authority decides the award advantage an organization can receive on each level of the Ladder. The higher the level an organization has on the Ladder, the higher the award advantage.

How does the Ladder stimulate supply chain innovation management practices?

Supply chain innovation management practices in this case are as follows:

- In terms of procurement practice, the approach includes: incorporating the Ladder 4.0 award criterion into the procurement documents; incorporating the advantage available per 'CO₂ Ambition level' in the tender document; awarding contract based on the price-quality ratio and the CO₂ ambition level offered by the contractors. target which recorded in the contract. After signing the contract, the winning contractor(s) shall execute the contract and demonstrate its compliance with the offered CO₂ ambition level
- In terms of carbon management practices, organizations can choose themselves at which of the three steps established by the Ladder 4.0 they wish to be certified. Then, they can take different measures by following the specific requirements of the ladder, grouped into four 'angles' - "insight, reduction, communication and collaboration" and by implementing a continuous improvement (PDCA) cycle, in order to structurally manage and reduce energy use and carbon emissions.



Example

Context

The Ladder uses the mechanism of the ‘power of procurement’ to stimulate decarbonisation. The Ladder is not only an energy and carbon management system, but it also acts as a green procurement tool: certified organisations have a bigger chance of winning a green tender. Investing in low carbon turns into a green business case for suppliers. Third party verification, shifts the burden of proof for procurers, making the Ladder easy to apply in green tenders.

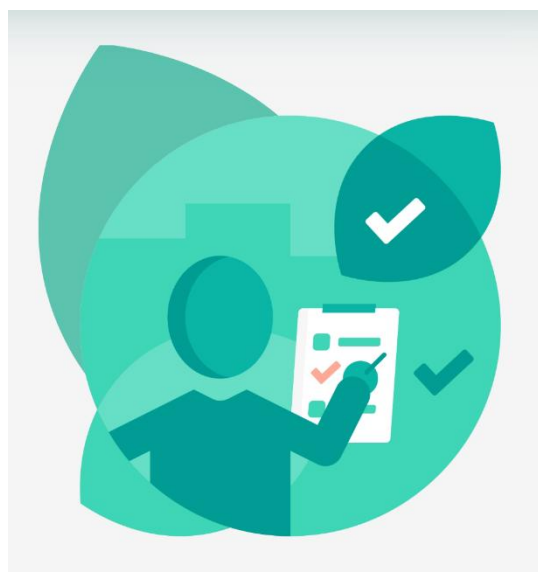


The Ladder was developed in the Netherlands, by ProRail, the manager of Dutch railway infrastructure, in order to address their scope 3 emissions, incentivizing their suppliers to reduce their emissions through granting an award advantage in the tender process. See this [video](#) for more. The Ladder is a proven tool for achieving carbon reduction through procurement, active for over 15 years in the Netherlands and now used across Europe. The Ladder began in the Dutch infrastructure sector, but is now recognized as a global best practice, including by the [WEF](#), [OECD](#), the [European Commission](#) and [IPCC](#), and is implemented across [Europe](#), specifically in [Belgium](#), [France](#), Germany, the United Kingdom, [Ireland](#) and Portugal. Further,

it is sector neutral and is used in procurement processes from infrastructure to facilities management to the healthcare sector.

Objective

The Ladder aims to achieve global climate targets, helping organisations to eliminate carbon emissions by 2050 or before. The Ladder uses green procurement as a strategic lever to drive structural carbon reduction through whole markets. In so doing it helps procurers to reduce their own scope 3 emissions, and to stimulate their suppliers to invest in structural carbon management and carbon reduction.



Approach

The Ladder works based on the power of procurement – given public procurement accounts for 15% of emissions globally,

public authorities have the power to steer market transitions, advancing sustainable development and climate action. By investing public money in low-carbon innovations, materials and organisations public authorities can lead by example.

The Ladder is both a carbon management system and a procurement tool. As a carbon management system, The Ladder defines three Steps of ambition for organisations to realise energy savings and reduce CO₂ emissions in their own organisation, projects and in the supply chain. Contracting authorities can use the Ladder to encourage their suppliers to reduce CO₂ and make sustainable procurement goals a reality. Step 1 focusses on reducing emissions within the own organisation, Step 2 expands to the value chain, and Step 3 aims for zero emissions by 2050. As a procurement tool, the contracting authority uses the Ladder to achieve sustainable public goal by encouraging the suppliers to take measures on carbon reduction.

Meanwhile, certification is based on external audits carried out by accredited certification bodies.

Therefore, certified organisations, or those that commit to achieving certification after winning the contract, receive an award advantage at the evaluation stage of tenders. With a

certificate on the Ladder, organisations gain a concrete competitive advantage during the tendering process. The higher the level an organisation has on the Ladder, the higher the award advantage. The contracting authority decides the award advantage an organisation can receive on each level of the Ladder.

Implementation Steps

In summary, the contracting authority can use the Ladder 4.0 Award Criterion in a procurement process by following four steps. These steps are explained in more detail in the [procurement guide](#).

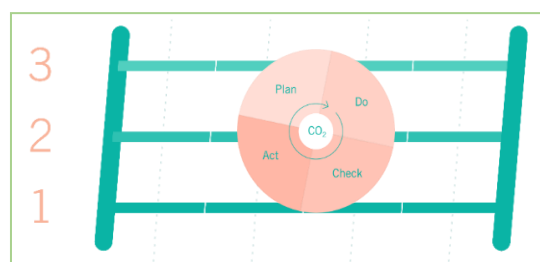
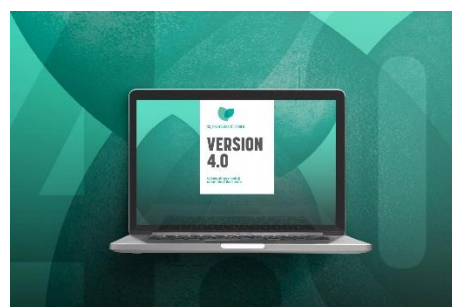
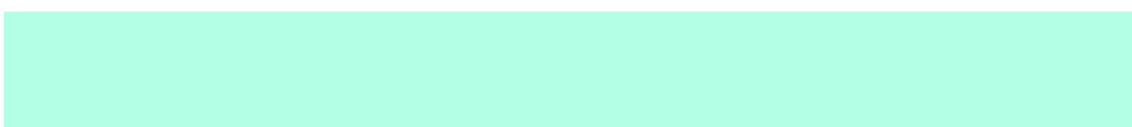


Figure 1. Ladder certification system chart



STEP 1. INCLUDE LADDER 4.0 AWARD CRITERION IN THE TENDER

For each procurement, consider whether the use of the Ladder 4.0 Award Criterion fits within the contracting authority's policy framework and makes sense for the specific project. If the contracting authority chooses to apply the Ladder 4.0 Award Criterion, before the contracting authority publishes the tender, it must include the following items in the procurement instructions and contract:

- a. Include the Ladder 4.0 Award Criterion in the procurement instructions. Describe the award method, award advantage and tiered quality value for each CO₂ Ambition Level. Also describe the method and deadline for demonstrating that the contractor meets the requirements of the Ladder 4.0 Award Criterion and include a penalty provision.
- b. Add two appendices to the procurement instructions:
 - i. The Ladder 4.0 Award Criterion Requirements (see Appendix A of the [procurement guide](#)).
 - ii. The form for bidders to indicate their CO₂ Ambition Level for project implementation (see Appendix C of the [procurement guide](#)), which includes the form of proof (a Project Statement or Ladder Certificate) and which Certification Body will perform the review).
- c. Include the following in the (draft) contract (if applicable, see [procurement guide](#) Appendix D):
 - i. A reference to the CO₂ Ambition Level of the bid submitted by the bidder, agreements on how and when the contractor must demonstrate compliance with the requirements and – if desired – engaging in dialogue and sharing project information.

STEP 2. BIDDERS SUBMIT THEIR BID, INCLUDING THEIR INTENDED CO₂ AMBITION LEVEL FOR PROJECT IMPLEMENTATION

The contracting authority receives the procurement documents and bid from the bidder, including the CO₂ Ambition Level at which it will implement the project. When bidding, the bidder must indicate whether it will demonstrate the chosen CO₂ Ambition Level with a Ladder Certificate or a project statement. Then, during project implementation, the bidder must demonstrate - with a Ladder Certificate or project statement – that it meets the requirements of the Ladder 4.0 Award Criterion at the selected CO₂ Ambition Level. (The contracting authority must add the requirements of the various CO₂ Ambition Levels as an appendix to the procurement instructions, see step 1.)

STEP 3. CONTRACTING AUTHORITY AWARDS THE CONTRACT ON THE BASIS OF BPQR AND RECORDS THE CO₂ AMBITION LEVEL CONTRACTUALLY

The contracting authority determines the award advantage for the various bids based on the tiered quality value for each CO₂ Ambition Level (as defined in the procurement instructions). The project will be awarded to the bid with the best price-quality ratio (BPQR). The bidder is not required to submit a project statement or CO₂ Performance Ladder Certificate at the time of bidding; the substantive assessment takes place at step 4. The CO₂ Ambition Level selected by the bidder (from now on: contractor) is included in the contract, in addition to agreements on the method and term of accountability, a penalty provision and possibly agreements on sharing project documentation and engaging in dialogue. See step 1 and the sample text in the [procurement guide](#) Appendix D.

STEP 4. THE CONTRACTOR EXECUTES THE CONTRACT AND DEMONSTRATES COMPLIANCE WITH THE CO₂ AMBITION LEVEL

The procurement instructions state that within one year of award, the contractor must demonstrate that it has met the CO₂ Ambition Level requirements. The contracting authority may choose a different deadline. The contractor must then repeat this annually for the duration of the project. For projects with a duration of less than one year, the contractor must demonstrate the agreed implementation level upon completion (unless otherwise agreed). The contracting authority receives the project statement or a Ladder Certificate issued by a certification body accredited for the Ladder. In doing so, the contractor demonstrates compliance with the selected CO₂ Ambition Level. If the contractor fails to provide proof in a timely manner, the contracting authority will impose the penalty specified in the procurement documents or contract.

Regarding the certification system, organisations can get certified at one of three steps, each outlined in a separate handbook. This includes some general requirements on establishing a management system, based on a cycle of continuous improvement (Plan Do Check Act cycle). These are the same for all Steps. Further there are specific requirements related to 4 thematic angles: insight, reduction, communication and collaboration, which differ per Step. (see figure 1).

Output and result

Research by CE Delft, IISD and the University of Utrecht shows the effectiveness of the Ladder. Certified organisations decarbonize twice as fast as organisations without a certificate.

Tendering with the CO₂PL leads to accelerated decarbonisation and innovation and the Ladder helps to institutionalise carbon reduction and awareness and behavioural changes. A project using the Ladder in Ireland achieved a 21% carbon reduction in first Irish tender.

Over 300 public procuring authorities use the Ladder regularly, in 3000+ projects.

Highlighted aspect

The [International Institute for Sustainable Development \(IISD\)](#) concluded that the Ladder is unique as a tool that was specifically developed for low-carbon procurement.

The Ladder drives innovation, encouraging certified organisations to develop new tools, products and methodologies to reduce emissions.

See for example these blogs:

- [Using hydrogen](#)
- [Working circularly with hubs and a marketplace for materials](#)
- Scheldebouw contribute to sector initiatives [PerpetuAI](#) and [Circulaire façade economy: How Scheldebouw builds a greener](#)

[facade construction industry with the CO₂ Performance Ladder](#)

Social, environmental and economic benefit

- For certified organisations the Ladder represents a green business case and reinforces their market position as a sustainable supplier, supporting them to improve the sustainability of their products and services, working towards eliminating carbon emissions in 2050 or before. Further their certificate is multi-use and can be used in all procurement processes where the Ladder is requested.
- For procuring authorities, it is advantageous that the burden of proof to verify decarbonization claims is shifted to the supplier, and their footprints and reduction plans are reviewed by independent third-party expert auditors. This ensures the Ladder is a user-friendly tool and makes it easy for organisations to start with certification. Lastly, the Ladder is a proven method applicable to all procurement contexts.
- The Ladder can contribute to the [monitoring of GPP](#), and is proven to drive real, consistent carbon reduction.

Replicable experiences and challenge faced

The growing potential of the Ladder high due to its sector-neutrality and scalable implementation potential.

Organization

The CO₂ Performance Ladder is an initiative managed by the Foundation for Climate Friendly Procurement and Business (SKAO). This non-profit foundation oversees its use, development, certification, and industry expansion. SKAO supports companies and governments in reducing CO₂ emissions by fostering connections, sharing knowledge, and strengthening networks to promote a climate-neutral business environment. SKAO's mission is to reduce global warming and climate change by promoting CO₂ reduction through the CO₂ Performance Ladder.

Any stakeholders interested in learning more about the Ladder can get in touch with the Ladder international team via info@co2performanceladder.com.

For any more information please see our website www.co2performanceladder.com



Maud Vastbinder, Manager Ladder, Foundation for Climate Friendly Procurement and Business (SKAO), at: maud.vastbinder@skao.nl

Practice #5

Requiring life cycle CO₂ emissions calculation, reduction, and compensation for carbon efficient and climate neutral IT products

Theme

Public institute/corporation supplier management and carbon label

What is about?

This document focus on requiring life cycle CO₂ emissions calculation, reduction, and compensation for carbon efficient and climate neutral IT products of procurement strategy “Procurement with impact” launched by the Government of the Netherlands. Through the procurement rules, requirements and reporting mechanisms for calculating, reducing and compensating CO₂ emissions, contractors are committed to take actions to reduce CO₂ emissions in the supply chain, hence to fulfill the government's climate target.

It is essential to be highlighted that the practice has combining economic measures such as carbon emission reduction and carbon footprint compensation, and also introducing incentives for purchasing carbon credits in accordance with stricter standards, has enhanced the willingness of participants to reduce emissions.

Why carbon label/carbon reduction matters?

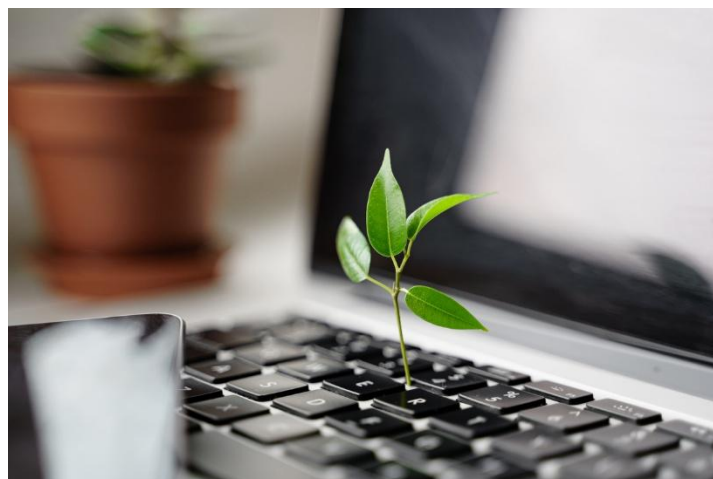
Carbon labels/carbon reduction format in this case mostly refer the strategy of public procurement, its functions mainly include:

- Increase awareness by all participating purchasing organizations of the carbon impact of their IT purchases, provide support and define actions to contribute to the overall IT carbon footprint in line with the government’s climate commitments;
- Incorporating the cost of carbon footprint offset into the procurement cost has enabled the complete compensation for the CO₂ emissions generated by the products purchased (excluding accessories);
- Closely connected the climate change impact of procurement with the government's climate goals, thus better facilitating procurement decisions and supplier management based on climate goals.

How does stimulate supply chain innovation management practices?

Supply chain innovation management practices in this case reflect as follows:

- The government's sustainability commitments (with references to the Paris agreement, the Dutch climate agreement, its procurement strategy, etc.) and the main sustainability objectives are described in the document of the general context, framework, and conditions of the contracts, sustainability are included in procurement procedures;
- In the technical specifications, contractors were required to provide the carbon footprint of the products purchased under the contract, to provide support and define actions to contribute to the overall IT carbon footprint, to compensate the estimated carbon footprint emissions of the products purchased through the appropriate compensation programmes, meanwhile, if suppliers committed to buy credits from projects complying with stricter sustainability standards, points were awarded.;
- Regular monthly and yearly reports to monitor contract deployment and the contribution to the organization's corporate responsibility goals were compulsory required to the contractors. In the monthly sales reports, contractors had to provide, for each purchased product, their carbon footprint and compensation, among other information. In the yearly reports on corporate responsibility, information of CO2 emission and compensation were required.

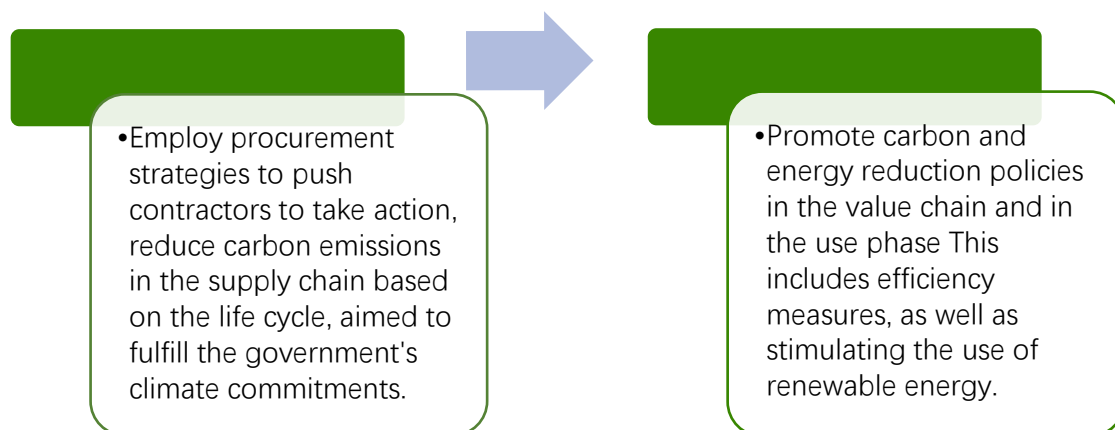


Example

Context

ICT hardware is one of the ten priority circular operational management categories of procurement strategy '[Procurement with impact](#)' launched by the Government of the Netherlands, aimed to be climate-neutral by 2030. Accordingly, The government had already set up the procurement category 'ICT Work Environment of the National Government' (ICT Werkomgeving Rijk, hereafter referred to as IWR), In 2021, IWR defined a very ambitious [ICT category plan](#), launched five tenders for government-wide framework agreements for the acquisition of displays, laptops and fixed workstations, Android devices, Apple devices and IT workspace-related services. A total of 130 government ministries, agencies and government-owned companies were covered by the framework agreements, with an overall estimated value of approximately 475 million euros for 4 years (a 2-year contract with the possibility of a 2-year extension).

Objective



Methodology

- First, the government's sustainability commitments (with references to the Paris agreement, the Dutch climate agreement, its procurement strategy, etc.) and the main sustainability objectives are described in the document of the general context, framework, and conditions of the contracts, sustainability are included in procurement procedures. For example, as a contract provision, the CO₂ footprints (based on life cycle analysis (LCA) calculations) for the products to be acquired, encourage suppliers to work together with the government to reduce the CO₂ footprint; CO₂ compensation (based on the carbon footprints) for all hardware and/or

services supplied.

- Second, in the technical specifications, on the one hand, contractors were required to provide the carbon footprint of the products purchased under the contract to increase awareness by all participating purchasing organizations of the carbon impact of their IT purchases, meanwhile, required to provide support and define actions to contribute to the overall IT carbon footprint in line with the government's climate commitments; on the other hand, to achieve carbon neutrality, contractors were required to compensate the estimated carbon footprint emissions of the products purchased through the appropriate compensation programmes, and the offset costs had to be integrated in the economic offer, as part of the acquisition cost. Meanwhile, if suppliers committed to buy credits from projects complying with stricter sustainability standards, points were awarded, for example, the Fairtrade Climate Standard or equivalent.
- Third, regular reports to monitor contract deployment and the contribution to the organization's

corporate responsibility goals were compulsory required to the contractors. For example, in the monthly sales reports, contractors had to provide, for each purchased product, their carbon footprint and compensation, among other information. In the yearly reports on corporate responsibility, information of CO₂ emission and compensation were required. At the CO₂ emission perspective, include total CO₂ emissions of all products delivered (including rented ones); the total realized CO₂ reduction of the previous calendar year compared to the period calendar year minus 1 year; the percentage CO₂ reduction (cumulative) of the previous calendar year compared to the Dutch Climate Agreement. At the CO₂ compensation perspective, include the contract with the provider of the CO₂ compensation or a reference to the contract with the CO₂ compensation provide; mention of the certifications used (e.g. Gold Standard) and the associated projects; contribution to the realization of at least three relevant Sustainable Development Goals (SDGs); independent annual verification of the total amount of CO₂ compensated over the previous calendar year.

The solved problem

By requiring the disclosure of information such as carbon footprints, carbon compensation, and carbon reduction actions through procurement, the climate change impact of procurement is closely linked to the government's climate goals, thus better facilitating procurement decisions and supplier management based on climate goals. This information includes:

- The average carbon footprint of the different devices purchased by the government, so organizations can be aware of the impact of each device when analyzing their needs and setting purchasing orders (figure 1).

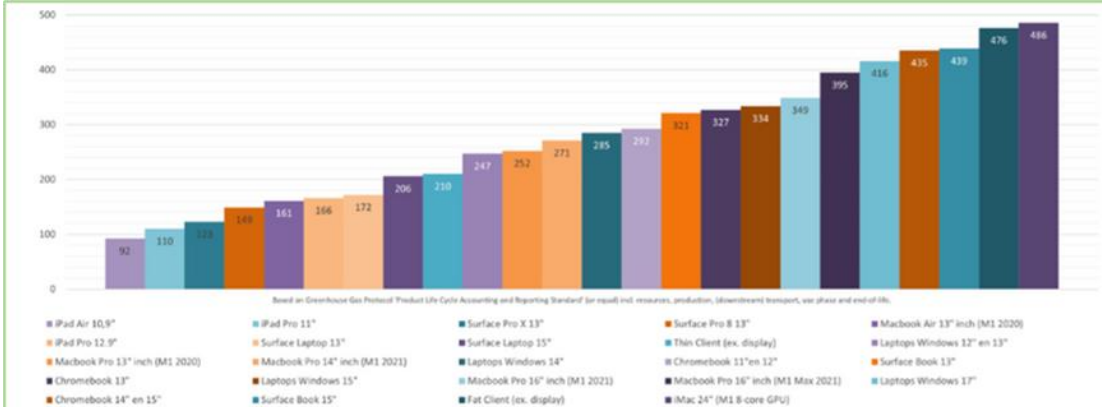


Figure 1. Average product carbon footprint in Kg CO₂-eq. based on 4-year lifecycle and on the Greenhouse Gas Protocol Standard

- Product portfolio recommendations, including information on impacts reduction when extending the lifespan of the devices (figure 2) and on overall CO₂ footprint of different equipment configurations (figure 3) to help organisations better plan their IT infrastructure.



Figure 2. CO₂ reductions when maximising the useful lifespan of the different IT devices

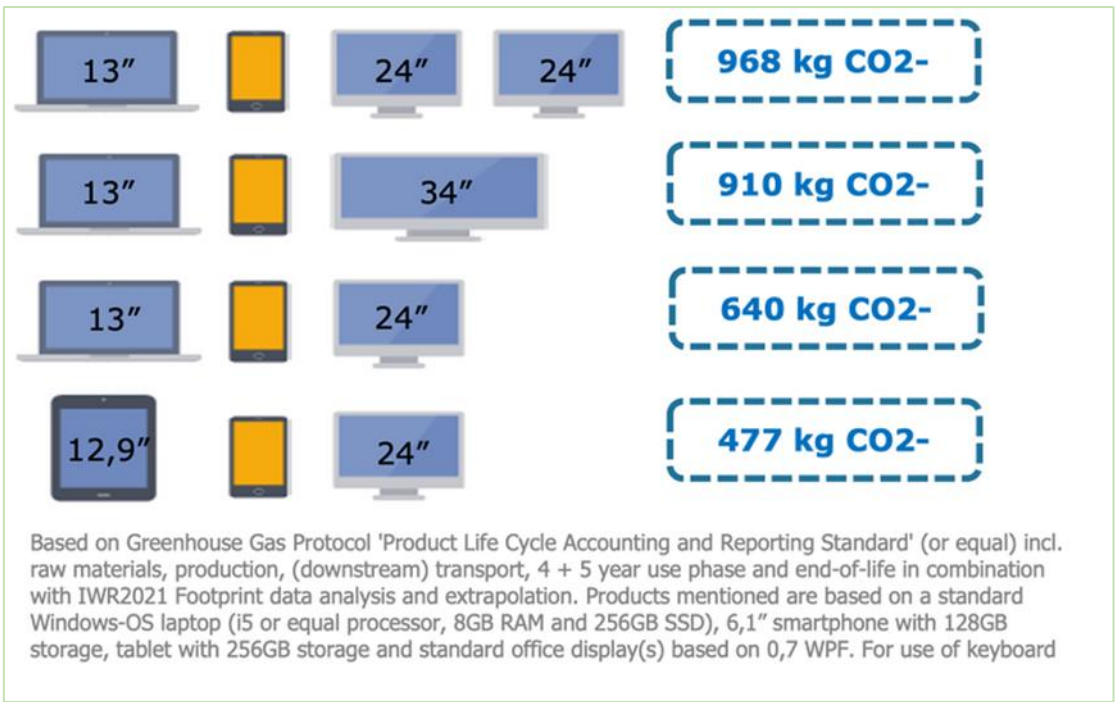


Figure 3. Examples of CO₂ effects based on the product portfolio of the organization

- The total carbon footprint linked to purchased devices each year and the evolution in relation to the carbon reduction commitments of the government, to assess progress and define strategies to reduce them (figure 4).

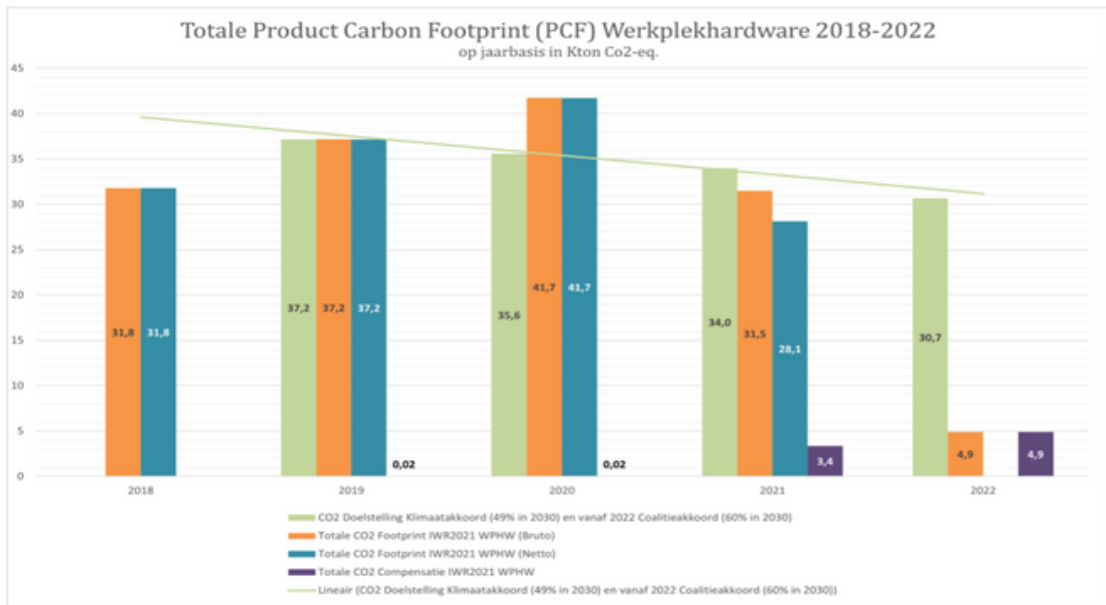


Figure 4. Total products carbon footprint per year in Kg CO₂-eq.

Timeline

From 2021, 4 years (a 2-year contract with the possibility of a 2-year extension).

Highlighted aspect

In order to achieve carbon neutrality, contractors were required to compensate the estimated carbon footprint emissions of the products purchased through the appropriate compensation programmes, and the offset costs had to be integrated in the economic offer, as part of the acquisition cost. In this way, the CO₂ emissions generated by the purchased products (excluding accessories) will all be compensated.

CO₂ compensation here means compensating released greenhouse gases (translated to CO₂ equivalents) by sequestering CO₂ in trees or preventing CO₂ emissions by investing in renewable energy and/or energy savings. Offsetting is done on the basis of LCA results (expressed in CO₂ equivalents). The calculation method of the amount of CO₂ to be compensated is fixed during the Framework Agreement.

Social, environmental and economic benefit

- Suppliers responded positively to the calls, and no negative effect on participation was perceived in the number of tenderers as compared to previous calls. In general, five bidders applied per tender (mostly resellers).

- Regarding the carbon footprint offset, all bidders committed to buy credits from projects certified with the most stringent standard, given the important weight of this award criterion
- The overall sustainability criteria contributed to eleven UN Sustainable Developments Goals: 3, 4, 6, 7, 8, 10, 12, 13, 14, 15 and 16.

Replicable experiences and challenge faced

- Investing in building internal expertise and knowledge is important and pays off on the medium and long term. It helps defending certain procurement and management decisions. A strong political commitment and a vision for innovative and sustainable ways to improve operations also facilitate deployment and building internal expertise.
- Dialogue with the market at an early stage is also key. There is a fragile line between being innovative and being realistic. Market consultation helps identify consensus areas and where to push the market further.
- Having life cycle data and presenting and communicating it to high level decision makers in a user friendly, graphic, and useful way is helping to achieve the government's sustainability goals (reducing renovation rates, changing purchasing practices and product portfolios).

Organization

[The Circular & Fair ICT \(CFIT\) Pact](#) is an international procurement-led partnership to accelerate circularity, fairness and sustainability in the ICT sector. CFIT will stimulate the use of common, easy-to-use procurement criteria, provide guidance and facilitate knowledge sharing. Together we will leverage our collective procurement power, in close dialogue with the ICT supply side, to affect the change and innovation we need. CFIT is an action under the UN One Planet Network SPP programme.



CFIT Secretariat: cfit@rws.nl

Note:

This case is excerpted from the implementation [case study](#) of [The Circular & Fair ICT \(CFIT\) Pact](#), which has been edited in structure according to the format of “Carbon Label/Carbon Reduction-Based Supply Chain Management Innovative Practice Cases Collection”. This case mainly illustrates elements of the Buy Better principle of CFIT Commitments principle: Buy Less, Buy Better, Use Better, and Use Longer, which include: 1) promote carbon and energy reduction policies in the value chain and in the use phase; 2) buy energy efficient devices.

Disclaimer:

This case has been described to provide inspiration. If, after careful reflection, this example offers added value to your procurement practices, adapt it to fit your organization and make sure it is compliant with the applicable rules and regulations for procurement.

Practice #6

Integrate corporation carbon governance for sustainable development: Establishment, innovation and practice of Midea RAC carbon footprint management system

Theme

Digitization and carbon label/carbon reduction

Other carbon reduction relevant

What is about?

This case focuses on the carbon footprint management system establishment of ‘Midea RAC’ through measures including standard development, digital platform, information disclosure, and green design. These efforts promote the design of green air-conditioning products and the application of carbon labelling, which accelerates the green and low-carbon transformation of the Heating, Ventilation and Air Conditioning (HVAC) industry.

It is essential to highlight that the practice drives collaborative carbon reduction along the supply chain through a carbon footprint management system.

Meanwhile, the corporate carbon footprint management platform enhances international mutual recognition and provides replicable experience for carbon management in the industry.

Why carbon reduction matters?

The carbon reduction pathway in this

case mainly refers to the establishment approach of corporate carbon footprint management system. The functions mainly include:

- Steer and participate in the international and national standards development to close the gap (i.e., the absence of the product carbon footprint (PCF) standards) in the industry, enhancing the accuracy of the results and international recognition;
- Build industry-specific databases through supply chain collaboration to reduce the use of commercial databases with insufficient accuracy.
- Achieve real-time data collection and efficient calculation of PCF through the self-developed digital platform, which significantly reduce the calculation period and cost.

- Guide consumers to choose greener products by information disclosure and expanding carbon labeling application, promote the popularization of green consumption concept.
- Accelerate the upgrading and evolving of green and low-carbon products by focusing on the research and development (R&D) of energy-efficiency technology and low global warming potential (GWP) refrigerants, to significantly reduce the carbon footprint of air-conditioning products.

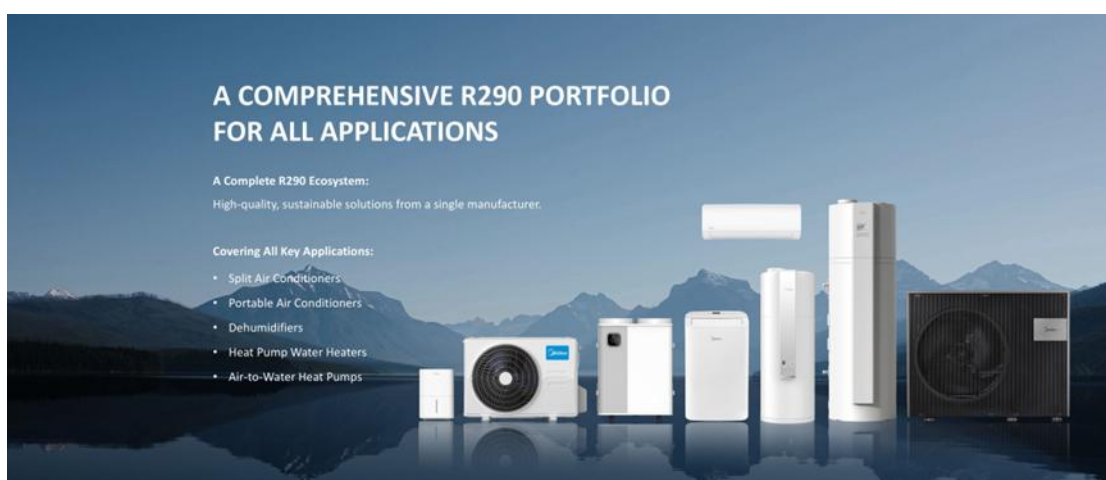
How does stimulate supply chain innovation management practices?

Supply chain innovation management practices in this case mainly includes:

- Dual-wheel drive mode: Systematically elevate carbon management, based on the

combination of fundamental capability of standard development and digital platform with the demonstration application of information disclosure and green design;

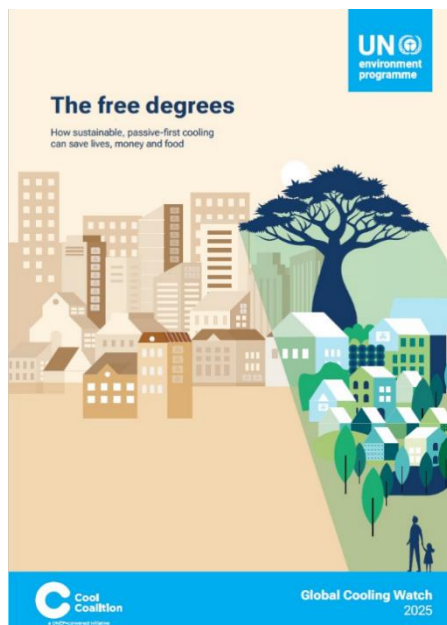
- End-to-end system platform: Build the product carbon platform into a credible platform, achieve the closed-loop management which include platform development, system construction, evaluation and recognition, calculation and application, and carbon footprint certification;
- Green supply chain management: Empower and collaborate with small and medium-sized suppliers, build an industry-specific database for raw materials and components, promote green supply chain management measures, and drive carbon reduction throughout the entire value chain.



Example

Context

The HVAC industry is confronted with double challenges of energy consumption and environmental impact, as well as potential for improvement. <[Global Cooling Watch 2025](#)> released by the UNEP indicates that cooling-related greenhouse gas (GHG) emissions will be pushed to an estimated 7.2 billion tons of carbon dioxide equivalence (CO₂e) by 2050 under a business-as-usual pathway, accounting for 10% of the global total emissions. Meanwhile, adopting a ‘Sustainable Cooling Pathway’ which includes measures of improving energy efficiency and reducing the application of high-GWP refrigerants, the related emissions are expected to be cut over 60% in 2050.

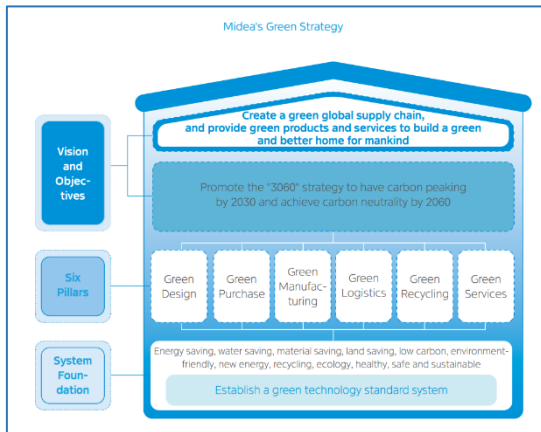


From [UNEP website](#)

The carbon footprint management system is conducive to green and low-carbon transition of industries. In 2024, the Ministry of Ecology and Environment and related ministries jointly issued the "[Implementation Plan for Establishing a Carbon Footprint Management System](#)", which prioritize key products including electronic and electrical appliances, to develop and issue PCF quantification rules and standards, and facilitate the application of carbon labelling. However, the PCF and evaluation system for the air conditioning industry is not well-established, which has become a bottleneck restricting green and high-quality development and the promotion of carbon labelling. It is urgent to establish a domestic harmonized and internationally recognized standard system, in order to elevate low-carbon transition. Accordingly, 'Midea RAC' actively works on the establishment of a carbon footprint management system, which support the industrial low-carbon development and high-quality transition.

The carbon footprint management system was established by the 'Midea RAC' to enhance the R&D of green air-conditioning products and the application of carbon labelling, boost collaborative carbon reduction in the supply chain, and provide technology support which contribute to industrial green and low-

carbon transition.



Midea's green strategy

The practice adopts a dual-wheel drive mode which combined the fundamental capability with the demonstration application, developed carbon footprint

quantification standards for air-conditioning products, built a digital management platform, and significantly enhanced the calculation efficiency and international recognition. Moreover, through the analysis of the full life cycle carbon footprint, the practice focuses on the research and development of high energy-efficiency technologies and environmentally friendly refrigerants, expanding the wide application of high-efficiency air-conditioning and low-GWP refrigerant products, which significantly reduced the GHG emissions of air-conditioning products and enhanced their green competitiveness. The replicable practical experiences were provided to the industry, which contribute to the high-quality development of energy conservation and carbon reduction efforts.

Objective
<ul style="list-style-type: none"> ○ Establish a well-developed PCF management system to address major issues such as inconsistent PCF quantification standards and data deficiency. ○ Significantly enhance the efficiency and reliability of PCF results, expand the application of carbon labelling, and accelerate the research and innovation of green air-conditioning products. ○ Provide a replicable low-carbon technology solutions for the industry and contribute to global sustainable development.

Approach

The case systematically facilitate the establishment of the carbon footprint management system and its application, through a dual-wheel drive mode which combined the fundamental capability and demonstration application. Specific measures include:

- Standard: Steer the development of the national standards for carbon footprint quantification methods of air-conditioning products and major components, providing theoretical and standard support for the industry to carry out scientific evaluations. Meanwhile, proactively participate in the development of international standards to enhance international recognition.
- Digital platform: Independently develop the "Midea PCF Product Carbon Footprint Management Platform", which establishes a carbon footprint database for raw materials and major components of household electric appliances. The platform improves the management efficiency by real-time carbon footprint data capture, efficient PCF quantification and automatic reporting.
- Information disclosure: Proactively disclose the carbon footprint information, expand the application of carbon labelling, enhance the public's awareness of

green consumption, promote low-carbon consumption concept.

- Eco-design: guide the development of green air-conditioning products by quantifying carbon footprints, centering on dual core aspects of energy conservation and environmentally friendly refrigerants, accelerate the R&D and marketing of high-efficiency and energy-saving technologies and low-GWP refrigerant products, and thereby contribute to industrial green transition and upgrading.

Problem solved

- Lack of PCF quantification standards: Steer the development of national and international standards to bridge the gap in the industry and enhance the accuracy and international recognition of PCF results
- Inaccurate data: Collaborate across the supply chain to build an industry-specific database to reduce reliance on commercial databases with inadequate accuracy.
- Low efficiency and high cost of PCF quantification: Through the self-developed digital platform, achieve real-time data collection and efficient calculation of PCF, which significantly reduce the PCF quantification period and cost

- Insufficient green awareness: Through information disclosure and the promotion of carbon labelling, guide consumers to choose greener products and drive the adoption of green consumption concepts.
- Inadequate research and development of green technology: By focusing on the R&D of energy-efficient and low-GWP refrigerant technologies, drive the upgrading and iteration of green and low-carbon products, which significantly reduced the GHG emissions of air-conditioning products.

Output and results

- Standard system establishment: Steer the development of national standards for carbon footprint quantification of air-conditioning products and key components, which bridge the industry gap, and improve the scientific validity and international recognition of the results
- Digital platform development: The self-developed "PCF Product Carbon Footprint Management Platform" enables real-time data collection, efficient calculation and automatic reporting of PCF. The PCF quantification period is shortened by approximately 85%, and the overall cost is reduced by about 80%
- Green technology research and application: Accelerate the research and application of high-efficiency and energy-saving air conditioners and low-GWP refrigerants. By adopting these green technology, the carbon footprint of typical products are reduced by 30% throughout its entire life cycle, and the proportion of energy-efficient and low-carbon products are increased to over 80%.
- International recognition enhancement: Published the world's first Environmental Product Declaration (EPD) of air-conditioning product. More than 60 products obtained PCF certificates. The independently completed Life Cycle Assessment (LCA) report has obtained the PEP Ecopassport® international certification, demonstrating the growing international recognition of the results generated by the self-developed "PCF Product Carbon Footprint Management Platform".

Innovative aspect

- Dual-wheel drive mode: Systematically elevate carbon management by integrating fundamental capabilities (standard development and digital platform) with demonstration applications (information disclosure and green design).
- End-to-end system platform: Build the PCF platform into a credible platform, through the closed-loop management which includes platform development, system construction, evaluation and recognition, calculation and application, and carbon footprint certification.
- Green supply chain management: Empower and collaborate with small and medium-sized suppliers, build an industry-specific database for raw materials and components, promote green supply chain management measures, and drive carbon reduction throughout the entire value chain.

Highlighted aspect

- Enhancing international mutual trust: The "PCF Product Carbon Footprint Management Platform" has been evaluated by a third-party institution (TÜV SÜD) and confirmed compliance with the requirements of ISO 14067:2018, EN 50693:2019, and T/CAS 1134-2025. Notably, Midea Group led the development of T/CAS 1134-2025. Moreover, the self-conducted LCA report has obtained PEP Ecopassport® certificate, which demonstrates its global credibility.
- Focus precisely: Optimize the air conditioner design to reduce the carbon footprint by 30% through identifying major sources of GHG emissions (more than 80% of which comes from the energy consumption during the use of product and the refrigerant emissions).
- Social responsibility: Expand the adoption and application of product carbon labelling and foster green consumption, by voluntarily disclosing carbon footprint information of products.

Social, environmental and economic benefit

- **Environmental benefits:** The energy-efficient air conditioners developed based on Midea's green air-conditioning technology have greatly reduced electricity consumption. Based on an annual production of about 2.85 million units, it is estimated to save about 416 million kWh of electricity, reducing the CO₂ emissions by about 414,700 tons, and the SO₂ emissions by around 12,400 tons ([2021 Midea Group ESG Report](#)). By the end of 2024, the cumulative sales of R290 environmentally friendly refrigerants air-conditioning products have exceed 10 million units. The associated refrigerant substitution has achieved a GHG emission reduction of approximately 5.21 million tCO₂e, which is equivalent to the annual CO₂ absorption of 6.18 million hectares of the Amazon rainforest ([2024 Midea Group ESG Report](#)).
- **Social benefits:** Enhance the fairness and accessibility of cooling services, protect low-income and vulnerable groups from the hazards of extreme heat, reduce heat-related illness and medical expenditures, which in turn increase the productivity. At the same time, improve the grid stability and reduce the risk of power outages, and improve the quality of life accordingly.
- **Economic benefits:** High-efficient air conditioners save electricity consumption, alleviate peak load, and reduce the need for additional power infrastructure investment. Green products enhance market competitiveness and drive sales growth. The improved PCF quantification efficiency reduces the cost by 80%, which helps optimize the operating costs of enterprises.



Replicable experiences and challenge faced

Experiences

- Dual-wheel drive mode: Develop a sound carbon footprint management system based on the combination of ‘fundamental capability (standard development and digital platform) and the demonstration applications (information disclosure and green design)’, to provide digital management experience for other industries, helping consumers choose greener products, and expanding the adoption and implementation of green consumption concept.
- Supply chain collaborative carbon reduction: By leveraging platform capabilities to empower small and medium-sized suppliers, a high-quality carbon footprint database is established to ensure the accuracy and reliability of whole-chain data, driving carbon reduction throughout the entire value chain.
- International standard participation: Steering the development of national standards and integrating into the international framework, enhancing the mutual recognition of standards, setting an example and practical experience for global carbon management.

Challenge

- Difficulty in data acquisition: The

lack of GHG emission data of the raw material production process affects the completeness of the calculation. It is urgent to strengthen the construction of transparent supply chain data.

- Insufficient standard harmonization: Differences exist between domestic and international carbon footprint standards, and the mutual recognition process is slow. Sustained efforts to facilitate international cooperation and coordination are needed.
- Low participation of SMEs: Some small and medium-sized suppliers have limited technical capabilities and insufficient willingness to participate. More training and resource support should be provided to enhance their participation.
- High cost of technological research and development: The research and development of green technologies require significant investment. It is necessary to continuously increase the financial and resource support.
- Weak consumer awareness: The green consumption concept has not been fully popularized. Further strengthening of publicity and promotion efforts is needed to guide consumers to actively participate in green consumption

Outlook

"Midea RAC" will continue to intensify efforts on the carbon footprint management system and drive the green and high-quality development of the air-conditioning industry. On one hand, it will accelerate the process of mutual recognition of international standards to enhance global recognition; on the other hand, it will optimize the functions of the digital platform to improve the calculation efficiency and data quality. Meanwhile, it will focus on the research and development of energy-saving products and environmentally friendly refrigerants, promote the upgrading and iteration of green and low-carbon products, and further reduce the carbon emissions of air-conditioning products. Moreover, it will intensify public awareness campaign for green consumption concepts and expand the wide application of carbon labelling in the home appliance industry. "Midea RAC" will take innovation-driven as the core, facilitate the achievement of its carbon neutrality goal, and contribute to global sustainable development.



Organization

GD Midea Air-Conditioning Equipment Co., Ltd (referred to as "Midea RAC") , a subsidiary of "Midea Group", is a manufacturer of HVAC industry that integrates R&D, production and sales. Its product portfolio includes household air conditioners, multi-split system, ducted units, dehumidifiers, water heaters etc., serving nearly 400 million consumers across more than 200 countries and regions worldwide.

Over the past few years, the company has been committed to continuous innovation and green development, making positive contributions to global GHG reduction and ozone layer protection. The company has been awarded recognition of its technological prowess including 80 internationally certified leading-edge technologies, 3 national awards for science and technology progress, over 100 other science and technology awards, and holds 7,741 invention patents. Recognized for its outstanding green development practices. The company has been honoured with a series of prestigious title, including 'Green Factory', 'Green Design Demonstration Enterprise' and "Green Supply Chain Management Enterprise" by the Ministry of Industry and Information Technology, and international recognition including "Low-Carbon and Environmental Protection Leading Award" by the UNEP, the "Outstanding Contribution Award for Energy Conservation and Environmental Protection" and the "Outstanding Contribution Unit Award for the 30th Anniversary of the Montreal Protocol" by the UNIDO, Achieving these milestones showcases how Chinese manufacturing is contributing to global sustainable development and step up to the challenge of climate change.



YAN Dong, Ph.D/Senior Engineer, RAC Division, Midea Group

Email: yandong8@midea.com

Practice #7

Green manufacturing and supply chain transformation: A practice of Farizon (Zhejiang) new energy commercial vehicles

Theme

Remanufacturing and cleaner production and carbon label

What is about?

This document focuses monetization on full supply chain carbon reduction, an integrated supply chain management system with four key components of "green supply chain, low-carbon logistics, zero-carbon manufacturing and resource recycling" built by Farizon New Energy Commercial Vehicle Group (Farizon), through measures including supply chain carbon management, low carbon logistic system, zero-carbon manufacturing, resource recycling system, and digital platform.

It is essential to be highlighted that the practice Integrated scenario-based service platform with circular ecosystem, enable carbon reduction investment cost of individual corporate, and enhances the overall sustainable competitiveness of the industrial chain through collaboration. Meanwhile, the digital platform it builds to monitor carbon emission reduction and convert emission reduction into liquid carbon assets on the basis of decarbonization, providing a replicable and measurable reference for supply chain carbon reduction.

Why carbon reduction matters?

Carbon reduction format in this case mostly refers the establishment approach of integrated supply chain management system, its functions mainly include:

- Solutions for difficulty in carbon emission accounting for components and insufficient carbon reduction collaboration among suppliers, to achieve full-chain carbon visualization from procurement to production;
- Solutions for key challenges including scattered transportation routes, high empty-load rates, and excessive packaging waste, to achieve a win-win of decarbonization and cost savings.
- Solutions for high energy consumption and high emissions in traditional manufacturing, and reduce carbon emissions at the manufacturing stage through the substitution of clean energy and process upgrading.
- Solutions for resource waste and environmental risks, to make up

the shortcomings of the recycling system for end-of-life vehicles and batteries and build a closed loop of circular economy.

- Solution for the "Dilemma of high input with no return", to realize the monetization of carbon assets through Verified Carbon Standard (VCS) projects and forms a sustainable carbon reduction mechanism.

How does stimulate supply chain innovation management practices?

Supply chain innovation management practices in this case reflect as follows:

- A full-chain carbon reduction framework was established covering the stage of "upstream,

manufacturing, logistics and transportation, product operation, recycling".

- Integrate digitalization with standard building to ensure all emission reduction measures are traceable, assessable and replicable.
- Integrated scenario-based service platform with circular ecosystem, enable carbon reduction cost of the industrial chain through collaboration.
- Establish a virtuous cycle that links "qualified targets, technology commercialization, revenue reinvestment" to transforming carbon reduction from "cost center" into "value driver".



Example

Context

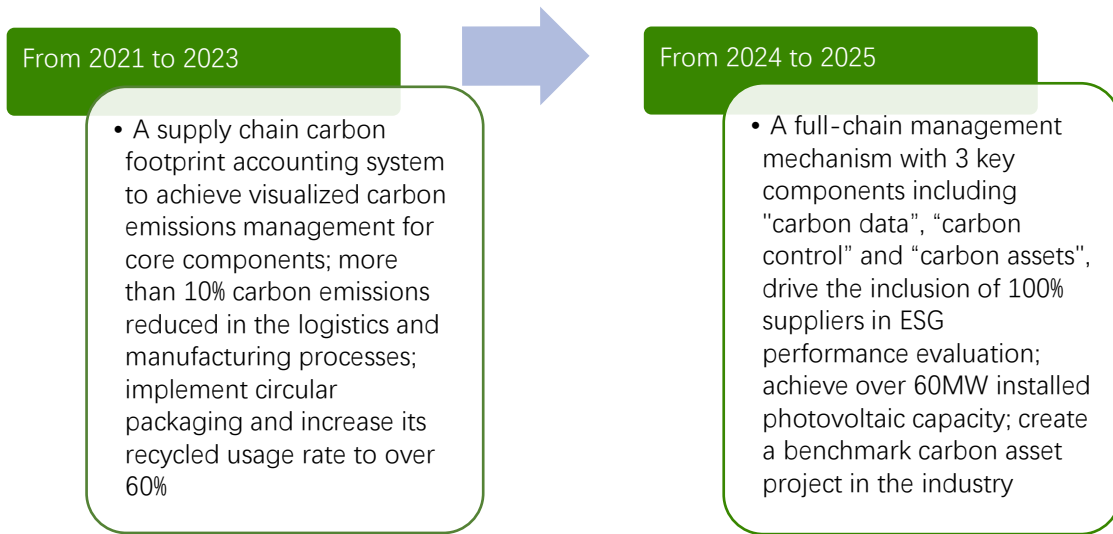
As the world's largest commercial vehicle market, China views this sector contributes to over 56% of the total carbon emissions in the transportation sector. Characterized by an extended supply chain, vast array of components, and complex logistics, these factors collectively make managing supply chain carbon footprint a core challenge for decarbonization of the industry. Under the strategic guidance of China dual carbon goals, a full life-cycle carbon footprint management system has been explicitly required in key industries with the aim to drive supply chain green transition. Currently, the commercial vehicle industry generally faces obstacles including difficulty in calculating the carbon emissions of components, lack collaboration among suppliers in reducing carbon emissions, high energy consumption in logistics and manufacturing processes, and an inadequate recycling system, traditional supply chain management models can no longer meet the essential need for decarbonization. In this context, the Farizon has taken the lead to explore supply chain management innovative solutions based on carbon reduction, by adopting technological empowerment, collaborative synergy, and model innovation, providing practical references for green supply chain transition in China's commercial vehicle industry.

The practice focuses on full supply chain

carbon reduction of commercial vehicles, innovatively build an integrated supply chain management system with four key components :green supply chain, low-carbon logistics, zero-carbon manufacturing and resource recycling. Through key measures such as Environmental, Social and Governance (ESG) Operational Transportation Work Bench (OTWB) assessment of suppliers, digital carbon data management, application of recyclable packaging, and photovoltaic energy substitution, it has established a full-chain carbon reduction path from component procurement to the recycling of used assets. The practice has achieved a reduction in carbon emissions per vehicle for a third consecutive year, the largest VCS carbon asset project for commercial vehicles in Asia, and 63% recyclable packaging ratio, providing a replicable and measurable innovative sample for supply chain carbon reduction.



Objective



Approach

- **Supply chain carbon management:** measures taken to drive carbon reduction throughout the entire supply chain including establishment of a supplier ranking mechanism; green requirements such as recycled materials and lightweight design; carbon footprint inclusion into ESG performance evaluation; over 700 export vehicle model components carbon emissions calculation; large-scale application of green electricity and the supplier control of power batteries.
- **Low carbon logistic system:** measures taken to reduce energy consumption including Implementing the consolidated logistics model to connect the transportation routes of suppliers which covering four major bases; introducing the OTWB (Operational Technology Workbench) system to achieve full-scenario tracking to optimize routes and reduce empty loading rate by 17%; formulating the "Inbound Packaging Specifications " to standardize the size and weight of packaging materials, the packaging reuse rate of new models exceeds 62% to promote circular packaging.
- **Zero-carbon manufacture:** The implementation of integrated zero-carbon manufacturing plan with 6 key components which are zero carbon construction, zero carbon energy, zero carbon smart manufacturing, low waste emissions, carbon management system, and carbon financial mechanism, 100% manufacturing bases which meet the requirement equipped with photovoltaic facilities, upgraded with energy conservation and

environmental friendly processes, carried out dedicated energy conservation and emission reduction projects, and met the Level I Cleaner Production requirement.

- **Resource recycling system:**

Construct a green transformation framework including a “1” smart green low-carbon circular industrial ecosystem and ”2” recycling system which are green remanufacturing based smart low-carbon reverse logistics system and a forward logistics system based EPR; establish three major reverse recycling systems for used vehicles, waste batteries, and components; build 119 vehicle recycling networks and 263 battery recycling depots; operate a component

remanufacturing center and build an integrated low-carbon vehicle repair system with including “1” vehicle assembly plant, “N” full vehicle refurbishment facility and "X" vehicle repair capability established based its core distribution service system, of which now several remanufacturing center has been completed and are now operating.

- **Digitalization and platform:**

Collect and analyze supplier carbon data; achieve carbon emission reduction monitoring at the operational level by green smart platforms including " Green Intelligent Link and “One World ”; develop VCS carbon asset projects to realize the conversion of emission reduction value

Problem solved

- **Supply chain carbon blind spots:** Solutions for difficulty in carbon emission accounting for components and insufficient carbon reduction collaboration among suppliers, to achieve full-chain carbon visualization from procurement to production.
- **High emissions and low efficiency in logistics:** Solutions for key challenges including scattered transportation routes, high empty-load rates, and excessive packaging waste, to achieve a win-win of decarbonization and cost savings.
- **High energy consumption at the manufacturing stage:** Solutions for high energy consumption and high emissions in traditional manufacturing, and reduce carbon emissions at the manufacturing stage through the substitution of clean energy and process upgrading.
- **Insufficient resources recycling:** Solutions for resource waste and environmental risks, to make up the shortcomings of the recycling system for used vehicles and batteries and build a closed loop of circular economy.
- **Difficulty in monetizing carbon reduction:** Solution for the "Dilemma of high input with no return", to realize the monetization of carbon assets through VCS projects and forms a sustainable carbon reduction mechanism.

Timeline

The practice was formally launched in 2021 and progressing through three major stages:

- **From 2021 to 2023**, the supply chain carbon accounting system was established, low-carbon logistics was implemented, and the initial construction of zero-carbon manufacturing was carried out, resulting in a reduction in carbon emission per vehicle for a third consecutive year;
- **In 2024**, the resource recycling system and carbon asset development were deepened, and supplier ESG performance evaluation was fully covered;
- **Since 2025**, continuous optimization and upgrading have been carried out, driving towards the normalization and platform of full life-cycle carbon reduction.

Output, results and benefits

The practice built an integrated full-chain carbon management system covering supply chain, manufacturing, logistics and recycling, formulated numbers of specifications such as “Inbound Packaging Specifications”, has implemented the largest VCS carbon asset project for commercial vehicles in Asia, providing a replicable and measurable innovative sample for supply chain carbon reduction. <[Geely Holding Group 2024 Sustainability Report](#)> shown as follows:

- **Carbon emission**: The practice has achieved with a reduction in carbon emissions per vehicle for a third consecutive year (2021-2023); in 2023, t reduce manufacturing carbon emissions 14,000 tons in total (which accounts for 14% of Scope 1+2 emissions); Compared to the baseline year of 2021, reduce lifecycle carbon footprints per ton-kilometer by 9.20% in 2024, reduce manufacturing carbon emissions per vehicle by 33.30% in 2024; In 2024, Green Intelligent Link obtained the Verified Carbon Standard (VCS) certification from Verra, an internationally authoritative carbon credit registry, becoming the first company in the transportation sector in China to complete validation and verification and to get issued carbon credits. This is the first international carbon reduction certification obtained by Geely Holding and also its first officially issued carbon credits. By following the VCS methodologies and combining data from its NEVs in operation, Green Intelligent Link achieved a carbon emission reduction of 25,000 tons for its NEVs compared to traditional fuel vehicles during operations.
- **Green logistics**: The cost of logistics is reduced by more than 20%, recycled material usage ratio reaches 63%, and the empty load rate drops by 17%.
- **Zero-carbon manufacturing**: Three national-level green factories have been built, and 100% of the bases have passed ISO14001 certification. The recycling network

covers the whole country, with 100% traceability of batteries and a recyclable rate of 95% for scrapped vehicles.

- **Resource recycling efficiency**: Over 94.06% of end-of-life vehicle materials are recycled for the Farizon; 322 pieces used batteries are recycled, with a total recycled battery weight of 9.54 tons.
- **Green electricity usage**: By the end of 2024, 3,333.07 MWh of photovoltaic power has been generated.

Innovative Aspect, Highlighted Aspect, Replicable Experiences

- ※ **A FULL-CHAIN CARBON REDUCTION FRAMEWORK** was established covering the stage of "upstream, manufacturing, logistics and transportation, product operation, recycling", to form a carbon reduction model featured with four components including "enterprise-led, upstream and downstream synergized, full-process coverage", which ensure the carbon reduction effect runs through the entire life cycle. Characteristic in each stage are as follows:
 - Upstream: drive supply chain partners to reduce carbon emissions simultaneously through standards such as carbon footprint calculation of components; green rating of suppliers, and requirements for recycled materials usage;
 - Midstream: focus on energy structure transformation and process optimization in manufacturing;
 - Downstream: improve logistics efficiency and replace clean energy in the operation to reduce emissions;
 - End: a closed loop of recycling and reuse.
- ※ **INTEGRATE DIGITALIZATION WITH STANDARD BUILDING** to ensure all emission reduction measures are traceable, assessable and replicable. Characteristic in each stage are as follows:
 - digital platforms including supplier carbon emission data collection and analysis systems, logistics full-scenario tracking systems (OTWB), and battery traceability blockchain technology, were built to enable real-time data acquisition, dynamic analysis, and precise control;
 - standard system including green design standards for components (lightweight and easy disassembly), standards for recyclable packaging specifications, carbon footprint calculation methods, and ESG performance assessment indicators for suppliers embedded with carbon emission weights, etc.

❖ **INTEGRATED SCENARIO-BASED SERVICE PLATFORM** with circular ecosystem, enable carbon reduction investment cost of individual corporate, and enhances the overall sustainable competitiveness of the industrial chain through collaboration, providing with a reference model with two key components of "scenario-based empowerment and ecological circulation".

- scenario-based service platform: a service platform which integrate supporting services vehicle operation, charging and battery swapping, financial support, and digital monitoring according usage scenarios of commercial vehicles (such as urban distribution logistics, road logistics, energy supply, etc.).
- circular ecosystem: an industrial ecosystem centered on circular economy, with three major reverse recycling networks for the End-of-Vehicles, used batteries, and components, drive towards a closed loop of "recycling - disassembly - remanufacturing - recycling" which including remanufacturing centers and low-carbon vehicle repair system.

❖ **ESTABLISH A VIRTUOUS CYCLE** that links "qualified targets, technology commercialization, revenue reinvestment" to transforming carbon reduction from "cost center" into "value driver".

- Phased quantified targets, such as a reduction in carbon emissions per vehicle for a third consecutive year, an increase in the proportion of circular packaging to 63% (the target for 2026 is 75%), and a photovoltaic installed capacity exceeding 60MW, etc. specific indicators used to continuous improvement;
- Tradable carbon asset projects (such as the Green Intelligence Link VCS project), convert emission reduction into liquid carbon assets, obtain continuous economic benefits, and revenue reinvestment to subsequent carbon reduction technology research and development and system construction, providing a dynamic closed loop which from "carbon



Outlook

The Farizon will continue to deepen the innovation of carbon management in its supply chain, further improve the carbon label system for suppliers and promote the intercommunication and sharing of carbon data throughout the entire industrial chain, strengthen the construction of core three-electricity remanufacturing and low-carbon vehicle repair capabilities, and expand the categories of carbon asset development. At the same time, by opening up supply chain carbon management experience and digital platforms, empower industry partners collaborate to decarbonization, supporting China's commercial vehicle industry in its accelerated transition to carbon neutrality, building world-leading green supply chain benchmark, and contributing China's solutions to carbon reduction in transportation sector.

Organization

[Farizon \(Zhe Jiang\) New Energy Commercial Vehicle Group Co., Ltd](#) (Farizon) founded in 2014, a part of [Geely Holding Group](#), the first commercial new energy vehicle group in China. The core values of “technology leading, consumers based, zero carbon development” adhered to the Farizon encompass not only enhancing user experiences through technological innovation but also fostering environmentally friendly and sustainable development by integrating the zero-carbon concept into all aspects of corporate growth. The Farizon adopts diverse low-carbon development strategies, with the leading green transportation platforms for new energy commercial vehicles, including *Green Intelligence Link* for green transportation and intelligent IoV platform provider, *Oneworld technology* for co-creating a smart and green logistics ecosystem for highways, integrated with its whole life cycle operation services and green energy replenishment infrastructure, commit to achieve zero carbon operation by 2030 and full chain carbon neutrality by 2045. By strengthening zero-carbon manufacturing, sustainable supply chains and resource recycling, The Farizon has not only achieved its own green development, but also promoted the green transformation of the entire industrial chain.



WANG Jing, Manager of government and public affairs, President Office, Farizon (Zhe Jiang) New Energy Commercial Vehicle Group Co., Ltd

Email: Jing.Wang84@zeekrlife.com



China Environmental United Certification Center

China Environmental United Certification Center (CEC), approved by the Ministry of Ecology and Environment of the People's Republic of China (MEE) and accredited by Certification and Accreditation Administration Committee of PRC, is a comprehensive certification and service institution leading in environmental protection, energy saving and low carbon areas.

CEC is committed to serve building national ecological civilization and low carbon high quality development; has carried out research on environmental protection, energy saving, low carbon development strategies and solutions; has been continuously improving and innovating green industry evaluation system on industrial green development and transition.

CEC is engaged in China Environmental Labelling Program, strive to advocate China green public procurement development. On doing this, CEC holds the secretariat of International Green Purchasing Network (IGPN) since 2018, works as UNEP one planet network sustainable public procurement program co-leads implementation entity since 2019, proactively contribute the implementation of sustainable public procurement globally.

For more information, please find at: <http://www.meecec.com/>.

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