



Technical Report

ISO/TR 25326

Use cases for green logistics activities

Cas d'usage pour les activités logistiques vertes

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 344, *Innovative logistics*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

As an important carrier of service production and life, logistics integrates a number of rapidly developing fields such as transportation freight, construction warehousing and information services, and has become an important pillar of the global economy. However, logistics activities are also accompanied by significant energy consumption, greenhouse gas emissions, exhaust pollution, and the use and disposal of packaging plastics, which have a significant impact on the environment. In the context of global sustainable development and combating climate change, governments and market players have put forward carbon peak and carbon neutral targets to promote the green development of enterprises and their upstream and downstream supply chains.

This document focuses on the green transformation of generalized logistics and provides application cases in green logistics, including transport, storage and other scenarios. These cases show guided by principles of resource intensive utilization, low-carbon emissions, resource recycling, environmental protection and occupational health.

The goal of this document is to help organizations better understand green logistics activities, thereby driving the overall logistics industry towards sustainable development and contributing to the broader environmental protection and social responsibility goals.

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Use cases for green logistics activities

1 Scope

This document presents case studies and insights into the practical application of green logistics. The cases are delineated across various operational scenarios, including transport, storing, loading and unloading, handling, package, distribution processing, distribution and information processing.

The objective of this document is to facilitate organizations in comprehending green logistics activities.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

green logistics

advanced technologies and management methods employed by organizations to effectively plan and implement processes, such as transportation, storage, loading and unloading, handling, packaging, distribution processing, distribution, and information management, guided by principles of resource intensive utilization, low-carbon emissions, resource recycling, environmental protection and occupational health, which aims to achieve a balance between economic development, social benefits, and environmental protection

Note 1 to entry: The principle of resource intensive utilization advocates that in logistics activities, resources should be utilized efficiently and rationally through measures such as integration and reduction.

Note 2 to entry: The principle of low-carbon emissions advocates reducing the intensity of greenhouse gas emissions through cost-effective measures such as carbon reduction at the source, during the process, and carbon sequestration at the terminal. These efforts are based on comprehensive monitoring of energy consumption and greenhouse gas emissions under various circumstances to ensure that economically feasible methods are adopted to reduce emissions.

Note 3 to entry: The principle of resource recycling advocates the return and reuse of raw materials, semi-finished products, finished products, waste and other resources from the usage stage through the design and use of recyclable logistics container equipment, as well as the optimization of logistics operation processes, so as to restore their value or dispose of them reasonably.

Note 4 to entry: The principle of environmental protection advocates efforts to reduce solid, liquid, gas and noise pollution, thereby minimizing the environmental impact of logistics activities.

Note 5 to entry: The occupational health principle advocates safeguarding the physical and mental health of workers participating in green logistics activities. It involves minimizing harmful factors, preventing occupational diseases and workplace accidents, and improving the working environment and practices through intelligent and green technologies, with the goal of achieving sustainable occupational health management.

3.2

transport

act of carrying resources to move goods over a long distance by vehicles, facilities, equipment, and manpower

3.3

storing, verb

to store, protect and manage goods

3.4

loading and unloading

act of putting in or taking out goods by manual or mechanical manner, between transport means or between transport means and storage sites (warehouses)

3.5

handling

process of moving goods by manual or mechanical means at the same location

3.6

package

containers, materials and auxiliary materials adopted according to certain technical approaches in order to protect products, facilitate storage and transport and promote sales during circulation

Note 1 to entry: It also refers to the operation activities such as applying certain technical approaches in the process of using containers, materials and auxiliary materials in order to achieve the above purposes.

3.7

distribution processing

act of carrying on products in the process of circulation according to the needs of customers

Note 1 to entry: Simple processing activities include packaging, cutting, metering, sorting, and picking, marking, labelling, grouping allocation and assembly, etc.

3.8

distribution

act of sorting, picking, consolidating, packing, assembling and delivering goods to their designated locations on time in line with customer requirements

3.9

information processing

collecting, analysing, storing, and disseminating data and information related to logistics activities

4 Methodology and overview of selected cases

4.1 Methodology

4.1.1 Overall methodology

This document presents a curated collection of green logistics case studies contributed by 28 enterprises across 15 nations.

The selection of these cases is based on various logistics business scenarios and the principles followed by green logistics.

- Covering some or all aspects of logistics business scenarios. Logistics business scenarios include transport, storing, loading and unloading, handling, package, distribution processing, distribution, and information processing.
- Guided by principles of resource intensive utilization, low-carbon emissions, resource recycling, environmental protection and occupational health.

4.1.2 Relationship between green logistics elements and cases

As a result of this document, the links between the elements of green logistics activities and the use cases in this document are identified in [Table 1](#).

The rightmost column of [Table 1](#) shows the correspondence between the content of the application cases and the relevant elements of the SDGs. For more information on the SDGs, refer to ISO/UNDP PAS 53002.

The SDGs in [Table 1](#) are also applicable to other tables in this document.

Table 1 — The relationship between green logistics related elements and cases

Business scenario of logistics	Characteristics of green logistics	Application cases in this document	Application cases in SDGs
Transport	Resource intensive utilization	Case 1, Case2, Case3, case4	7, 9, 12
	Low-carbon emission	Case 5, Case6, Case7, Case 8	7,9,13
	Resource recycling	Case 9, Case10	7,12,15
	Environmental protection	Case 11, Case12	6,8,9,11
	Occupational health	Case 13, Case14	3,8,6,11
Storing	Resource intensive utilization	Case 15, Case16, Case17, Case 18	9,12
	Low-carbon emission	Case 19, Case 20	7,9,13
	Resource recycling	Case 21, Case22	9,11,12
	Environmental protection	Case 23, Case24	3,8,9,11
	Occupational health	Case25	3,9
loading and unloading	Resource intensive utilization	Case 26, Case27	9,12
	Low-carbon emission	Case28, Case29, Case30	7,9,12
	Resource recycling	Case 31	9,12
	Environmental protection	Case32, Case33	6,11,12
	Occupational health	Case34, Case35	3,8,11
Handling	Resource intensive utilization	Case36, Case37	9,12
	Low-carbon emission	Case 38	7,12
	Resource recycling	Case 39	8,12
	Environmental protection	Case 40	3,9,12
	Occupational health	Case 41	3
Package	Resource intensive utilization	Case42, Case43, Case44	8,12
	Low-carbon emission	Case45, Case46, Case47	7,8,12
	Resource recycling	Case48	8,12
	Environmental protection	Case49, Case50, Case51	8,12
	Occupational health	Case52, Case53	3
Distribution processing	Resource intensive utilization	Case54, Case55	12
	Low-carbon emission	Case56, Case57	7,12
	Resource recycling	Case58, Case59	7,8,12
	Environmental protection	Case60, Case61	6,12
	Occupational health	Case62, Case63	3,8
delivery	Resource intensive utilization	Case64, Case65	12
	Low-carbon emission	Case66, Case67	7,12
	Resource recycling	Case68, Case69	12
	Environmental protection	Case70, Case71	7,12,15
	Occupational health	Case72	3,8

Table 1 (continued)

Business scenario of logistics	Characteristics of green logistics	Application cases in this document	Application cases in SDGs
information processing	Resource intensive utilization	Case73, Case74, Case75	12
	Low-carbon emission	Case76, Case77	7,8
	Resource recycling	Case78	11,12
	Environmental protection	Case79, Case80, Case81, Case82	9
	Occupational health	Case83	3

4.2 Overview of selected cases

An overview of selected cases is shown in [Table 2](#).

Table 2 — Overview of cases

No.	Countries	Overview
Case 1	China	This paper introduces the effective cargo stowage strategy of Enterprise 1, which can improve the transportation efficiency by logical arrangement according to the volume and weight of goods
Case 2	Denmark	This paper introduces how Enterprise 2 can reduce transportation cost, improve safety and timeliness through sea LCL service
Case 3	China	Enterprise 3 has introduced 'One Container Service' intermodal transport, which facilitates the transition of transportation methods without the need for any manipulation of the goods themselves, offering a comprehensive door-to-door service across the entire supply chain. The technology for transporting rolled steel plates cargo with platform-based containers has the effect of environmental protection, energy-saving and low-carbon
case 4	Denmark	This paper introduces the platform scheduling system based on big data analysis in Enterprise 2 to optimize route and resource allocation and realize efficient transportation management
Case 5	United States, Saudi Arabia	Enterprise 4 and Enterprise 5 are introduced to use electric trucks to reduce carbon emissions, while incentivizing logistics providers to follow suit to expand the impact of green logistics
Case 6	France	Based on microgrid and energy management technology, Enterprise 6 is introduced to optimize the operation management and charging infrastructure of electric trucks, reduce energy consumption and improve operational efficiency
Case 7	Denmark	Introduced Enterprise 2's attempt to reduce emissions by using hydrogenated vegetable oil (HVO) and MGO mixed fuel by diversifying energy sources
Case 8	Japan	Enterprise 7 developed a GHG emission visualization tool based on ISO 14083 to help customers accurately calculate emissions and improve emissions transparency
Case 9	Denmark	Introduced the cooperation between Enterprise 2 and green dismantling field to ensure environmentally friendly and safe dismantling of transport machinery and reduce environmental impact
Case 10	Germany	Enterprise 8 has deployed repurposed battery energy storage solutions, paired with sophisticated energy management, to significantly cut carbon emissions
Case 11	America	Introduced the real-time monitoring of vehicle driving status of Enterprise 9 through vehicle management platform, optimizing driving routes, reducing fuel consumption and exhaust emissions

Table 2 (continued)

No.	Countries	Overview
Case 12	Denmark	Introduced the predictive analysis technology introduced by Enterprise 2 to collect and analyze real-time data of Marine engine and realize preventive maintenance
Case 13	Finland	Enterprise 10 adopts ISO 14001 environmental management standard to systematically promote environmental management and ensure safe and sustainable transportation environment
Case 14	China	Introduced Enterprise 9 with the introduction of transport vehicles equipped with automatic or assisted driving technology to reduce the frequency of traffic accidents and protect the safety of drivers
Case 15	Japan	Introduced how Enterprise 11 can improve operation efficiency by introducing automated warehouse system, combining robot technology and automated guided vehicle (AGV)
Case 16	Korea	Introduced how Enterprises 12 optimize warehouse layout according to cargo attributes and operation plans, ensure efficient use of space, and use algorithms to optimize logistics routes to improve efficiency
Case 17	China	Introduced how Enterprise 9 interconnects warehouses across the country into a shared network, updates inventory information in real time, and optimizes inventory distribution and distribution distance
Case 18	Switzerland	Introduced the implementation of a digital warehouse management system by Enterprise 13, enhancing order tracking and management capabilities, optimizing resource allocation, and enabling more flexible and precise inventory control
Case 19	Denmark, Switzerland	Introduced the construction of energy-efficient warehousing facilities by Enterprise 2 and Enterprise 14, aiming to reduce operational costs
Case 20	China	Introduced Enterprise 1 to implement low-carbon transformation such as rooftop photovoltaic power generation and LED solar street lights to reduce energy consumption
Case 21	South Korea	Enterprise 15 has established recycling centres dedicated to the refurbishment and processing of returned products
Case 22	China	Enterprise 9 established a perfect product reverse warehousing network to realize the return of goods to the nearest outlets
Case 23	Norway	Introduced Enterprise 16's development of intelligent tracking devices for parcels, ensuring real-time updates of location information and status data
Case 24	South Korea	Introduced Enterprise 12 to install AI sensors on forklifts to reduce accidents
Case 25	France	Enterprise 17 has implemented intelligent warehousing equipment to alleviate the work burden on employees
Case 26	Denmark	Enterprise 2 is introduced to optimize the loading and unloading scheme, reduce transit and repeat operation, and improve loading and unloading efficiency
Case 27	China	Enterprise 1 adopts digital loading and unloading scheduling system to improve the overall operation fluency
Case 28	Germany	Enterprise 8 adopts electric forklift, equipped with high-capacity batteries, achieving zero emissions and low noise
Case 29	Germany	The introduction of Enterprise 8 deployment of intelligent scheduling system, optimize the operation efficiency of forklift trucks and automation equipment, reduce energy consumption
Case 30	Singapore	Introduced Enterprise 18 Harnessing solar power to reduce dependence on traditional energy sources
Case 31	China	Introduced the wide application of recyclable environmental protection materials such as circular packing boxes in the loading and unloading links to extend the service life of Enterprise 9

Table 2 (continued)

No.	Countries	Overview
Case 32	China	The introduction of Enterprise 9 in the logistics loading and unloading links to fully introduce electric forklifts and automatic stackers, reduce noise
Case 33	South Korea	This paper introduces how Enterprise 12 improve the inspection mechanism of loading and unloading equipment to ensure the normal operation of equipment
Case 34	China	The article introduces the requirement of Enterprise 19 to install tailboard on trucks to realize automatic lifting and lifting and improve loading and unloading efficiency and safety
Case 35	France	Enterprise 20 introduced to promote safety awareness and environmental awareness among employees through regular meetings and training
Case 36	China	Introduced the Enterprise 9 use automated handling equipment to improve handling efficiency and accuracy
Case 37	China	Enterprise 19 optimization handling scheme is introduced to improve the logistics processing efficiency and operation efficiency
Case 38	Switzerland	Introduced Enterprise 13 to adopt low-carbon emission handling equipment to reduce carbon emissions
Case 39	China	Introduced Enterprise 9 use reusable handling containers to reduce resource consumption
Case 40	China	Enterprise 9 adopts light handling equipment to reduce environmental burden and maintenance frequency
Case 41	France, Switzerland	The establishment of work health and safety management system in Enterprise 20 and Enterprise 13 to protect the health of employees is introduced
Case 42	Germany	Introduced Enterprise 8 reduce the use of packaging materials by optimizing packaging design
Case 43	South Korea, India	Introduced Enterprise 15 and Enterprise 21 reduce unnecessary space and material use and reduce plastic consumption through improved packaging
Case 44	Italy	Introduced Enterprise 22 choose to use strong but light-weight materials for packaging, improve safety and reduce overall weight
Case 45	Germany	Introduced Enterprise 8 introduce energy-saving sealing machine and baler to reduce energy consumption
Case 46	China	Introduced Enterprise 3 to work with partners to promote green packaging, optimize the choice of packaging materials, use recyclable and environmentally friendly materials, and reduce environmental impact
Case 47	China, Finland	Introduced Enterprise 9 and Enterprise 10 reduce package materials consumption by application of foldable insulated turnover boxes and reusable packaging boxes
Case 48	Germany, Switzerland	Introduced Enterprise 14 and Enterprise 23 using recyclable packaging materials such as cardboard and aluminium to reduce environmental impact
Case 49	Denmark, Switzerland	Introduced the research and development of biodegradable packaging materials in Enterprise 2 and Enterprise 14 to gradually reduce the use of disposable non-degradable plastics
Case 50	China	Introduced Enterprise 9 encourage the use of original packaging and constantly upgrade environmentally friendly packaging materials to ensure safety and harmless
Case 51	China	Introduced Enterprise 19 on fragile products, liquids, powders and other goods to take additional reinforcement and leak-proof treatment measures to improve stability and safety
Case 52	Switzerland	Introduced Enterprise 13 to provide packaging workers with professional personal protective equipment to ensure safety

Table 2 (continued)

No.	Countries	Overview
Case 53	Finland	Introduced Enterprise 10 packaging workstation ergonomic optimization, reduce the burden of employees
Case 54	China	Introduced Enterprise 3 use the online platform to centrally purchase raw materials, optimize production and inventory management, reduce costs and improve efficiency
Case 55	United States	Introduced Enterprise 24 to adopt the cross-warehouse distribution mode to improve the efficiency of goods circulation
Case 56	China	Introduced Enterprise 9 based on packaging algorithm to improve packaging efficiency and reduce carbon emissions
Case 57	Japan	Enterprise 11 has successfully transformed biogas into electricity, hydrogen energy, and potable water through a highly efficient and pollution-free process, thereby achieving the objective of zero air pollutants across the entire operation
Case 58	Japan	Introduces Enterprise 11 to build a closed-loop battery ecology, expand the recycling network, and promote the collection and storage of batteries to be more efficient
Case 59	China	Introduced Enterprise 3 use automatic identification technology to trace the whole process of returned products, establish resource recycling system to record energy consumption, emissions and treatment methods, optimize resource utilization
Case 60	Japan	Enterprise 11 improved the efficiency of water resource utilization by filtering processed wastewater through membrane bioreactor technology and reverse osmosis system
Case 61	China	Introduced Enterprise 3 use digital platform to carry out environmental monitoring, improve resource management and environmental protection efficiency
Case 62	Switzerland	Introduced Enterprise 14 conducts regular occupational health assessments to help employees identify and manage potential risks at work
Case 63	United States	Introduced Enterprise 25 offers a diverse range of health benefits to its staff, promoting a harmonious balance between work and personal life
Case 64	Saudi Arabia	The introduction of Enterprise 5 provides customized distribution schemes to meet different logistics needs and enhance market competitiveness
Case 65	France	Introduced how Enterprise 20 has integrated an advanced digital platform to optimize delivery routes and reduce transportation costs
Case 66	France	Introduced Enterprise 26 to develop sustainable high-tech barges and 'river warehouses' to deliver packages efficiently in a low-carbon emission manner
Case 67	France	Introduced the cooperation between Enterprise 20 and new energy vehicle enterprises, using tools such as carbon emission reduction simulator and autonomous driving simulator to optimize low-carbon emission distribution scheme and promote sustainable development of logistics industry
Case 68	China	Enterprise 9 is introduced to build a resource recycling distribution centre, conduct quality inspection and sorting of returned goods, and reduce transportation distance and carbon emissions
Case 69	Sweden	Enterprise 27 works with partners to build a systematic resource recycling process for easy return and resale of goods
Case 70	China	Enterprise 9 is introduced to optimize the delivery path through an intelligent scheduling system while monitoring the status of parcels and creating a safe delivery environment
Case 71	Finland	Enterprise 10 uses fossil free and renewable energy sources to power electric vehicles and lower emissions

Table 2 (continued)

No.	Countries	Overview
Case 72	Japan	Introduced the safety strengthening activities carried out by the Enterprise 28 every year to reduce the risk of industrial accidents and protect the health and safety of employees
Case 73	Germany	Enterprise 8 adopts the Internet of Things technology to achieve real-time data acquisition, reducing the workload and error rate of manual data entry
Case 74	United States	Enterprise 24 use blockchain technology to improve transparency and security in the product supply chain
Case 75	Singapore	Introduced the central unified management and control platform developed by Enterprise 18 for multi-data centres to achieve intelligent management
Case 76	China	The introduction of Enterprise 1 through the electronic voucher system and the enterprise's warehouse management system seamless connection, to achieve the rapid transfer of information and automatic update, improve the efficiency of parcel handling
Case 77	Singapore	The introduction of Enterprise 18 by establishing real-time monitoring system, optimize equipment adjustment strategy, improve equipment efficiency
Case 78	Germany	Enterprise 8 set up recycling stations in global logistics centres to ensure efficient and systematic recycling of waste equipment
Case 79	Germany	Introduced how Enterprise 8 optimized the placement of user privacy pop-ups through big data analysis during data compliance processes, ensuring privacy security and trustworthiness
Case 80	China	Introduced the efficient cooling system of logistics data centre of Enterprise 9, which effectively reduces energy consumption
Case 81	China	Introduced how to manage dust, moisture, and cleaning in Enterprise 9 data centres to ensure the stable operation of data centre devices.
Case 82	Singapore	Introduced how Enterprise 18 integrated AI technology into its data centre to ensure equipment security.
Case 83	Germany	Enterprise 8 introduced AR smart wearable devices to reduce information processing errors and improve work experience.

5 Green logistics practice in different business scenarios

5.1 Transportation

5.1.1 Resource intensive utilization

5.1.1.1 Cases

Case 1: Cargo stowage optimization

Enterprise 1 employs an effective cargo stowage strategy. This approach takes into account the volume and weight of goods being transported. The principle is to arrange goods in a logical order within the carriage where heavy and compact items are placed at the bottom while lighter and larger items are positioned on top. By implementing this efficient cargo stowage method, Enterprise 1 can optimize each truck's load, reduce empty space, and ultimately enhance transportation efficiency.

Case 2: Consolidated transportation services

Enterprise 2 offers less-than-container load (LCL) shipping solutions, consolidating small shipments from multiple clients into a single container to optimize transportation costs. This LCL service not only reduces maritime shipping expenses but also enhances safety, reliability and delivery efficiency.

Case 3: 'One container service' intermodal transport

Enterprise 3 has launched the 'One Container Service' intermodal transport, a streamlined logistics model where goods are packed into a container and transported using two or more integrated transportation modes. Throughout the journey, the container remains sealed, and the goods are not handled or reloaded during transitions between transportation modes, ensuring a seamless door-to-door delivery experience. This intermodal approach significantly reduces transit time, minimizes energy consumption, and enhances overall logistics efficiency and customer satisfaction. In addition, the technology for transporting rolled steel plates cargo with platform-based containers does not need grass products as support, which solves the environmental problems caused by the original straw as the support body of coil steel. The technology for transporting rolled steel plates cargo with platform-based containers can be adopted as 'One Container Service' intermodal transport, which can realize energy saving and low-carbon.

Case 4: Optimization of transportation dispatch

Enterprise 2 has deployed an advanced transportation management system utilizing a big data analytics-driven platform for dispatch operations. This system employs intelligent algorithms to optimize routing, allocate resources efficiently, and enhance overall transportation performance. Key functionalities include real-time tracking of cargo location, monitoring of traffic conditions, and assessment of vessel/aircraft status, as well as the dynamic adjustment of transportation schedules and routes in response to operational demands. By leveraging this platform, Enterprise 2 ensures compliance with industry standards, delivering expedited, reliable, and environmentally compliant logistics services.

5.1.1.2 The experience given by the cases**5.1.1.2.1 Objectives**

The objectives of the cases are shown in [Table 3](#).

Table 3 — Objectives of the cases

Case No.	Objectives	Corresponding SDGs	Dimensions involved
1	Maximizing load capacity and space within a limited vehicle space	12	Economy
2	Taking into account the timeliness and cost of cargo transportation	7, 12	Economy
3	'One container service' intermodal transport	7, 12	Economy, environment
4	Improved transportation scheduling efficiency	9, 12	Economy

5.1.1.2.2 Key elements

The key elements include cargo stowing, unloading transport, integrated transport, warehouse delivery, intermodal transport, real-time monitoring based on transport system, route optimization, scheduling and early warning.

5.1.1.2.3 Standardization suggestions

- 1) Carry out vehicle (ship, machine) cargo matching, and implement cargo loading and route optimization based on the status of the goods.
- 2) The implementation of swinging transport, consolidation, warehouse distribution, line and back convection optimization, intermodal transport 'one Bill service', 'One container service', 'scattered change set', cloud warehouse and other models.
- 3) The use of intelligent logistics platform to achieve the planning and management of two-way transport load rate, heavy load rate, turnover rate, to achieve the optimization of transport routes, vehicle scheduling, cargo distribution, etc.