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## Greenhouse gases — Quantification and reporting of greenhouse gas emissions arising from transport chain operations

*Gaz à effet de serre — Quantification et déclaration des émissions de gaz à effet de serre résultant des opérations des chaînes de transport*

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ISO 14083

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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 documents 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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 7, *Greenhouse gas and climate change management and related activities*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 320, *Transport — Logistics and services*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces IWA 16:2015, which has been technically revised throughout to expand the framework to a methodology.

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](http://www.iso.org/members.html).

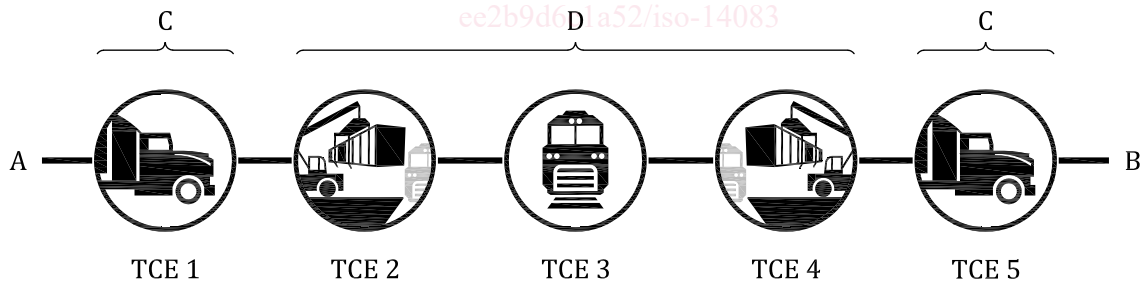
## Introduction

This document provides requirements and guidance for the quantification and reporting of greenhouse gas (GHG) emissions for transport chains for passengers and freight.

This document provides such a calculation with its related reporting. It specifies how to source data as input for the calculation, taking into account that transport operations vary hugely, from multinational organizations operating multiple transport modes to deliver transport services across the globe, through small local operators delivering a simple service to a single user; hence this document has adopted a structure to make it widely applicable. To ensure that values for GHG emissions that result from vehicle and hub operation and associated energy provision are considered, this document takes into account the GHG emissions associated with production and distribution of energy (including, for example, production and distribution of liquid energy carriers or grid transmission of electricity). As a result, calculation results can enable a consistent comparison of possible different energy carriers by transport service operators, users and any other interested parties. Calculation results are only directly comparable if all options chosen are internally consistent.

This document covers all modes of transport (land, water or in the air, irrespective of the means of transport, i.e. vessel, vehicle or pipeline) and includes the operational GHG emissions from hubs where they facilitate transfer of freight or passengers from one element of a transport chain to the next. It takes account of operation of empty trips required for subsequent transportation of freight or passengers. It is applicable at all stages along the entire transport chain (see also illustrative examples in [Figure 1](#) and [Figure 2](#)).

[Figure 1](#) provides an illustrative example of a freight transport chain from the point where freight leaves its last point of production or transformation (A, freight consignor) to the point where freight reaches its first non-transport related operation (B, freight consignee). This transport chain consists of five transport chain elements (TCEs), the GHG emissions of which are calculated separately. The first and last TCEs (TCE 1, TCE 5) represent road services (C) covering pre- and on-carriage; TCE 2 to TCE 4 represent a rail freight service (D) composed of road/rail terminal operations (TCE 2, TCE 4) and main carriage by rail transport (TCE 3).



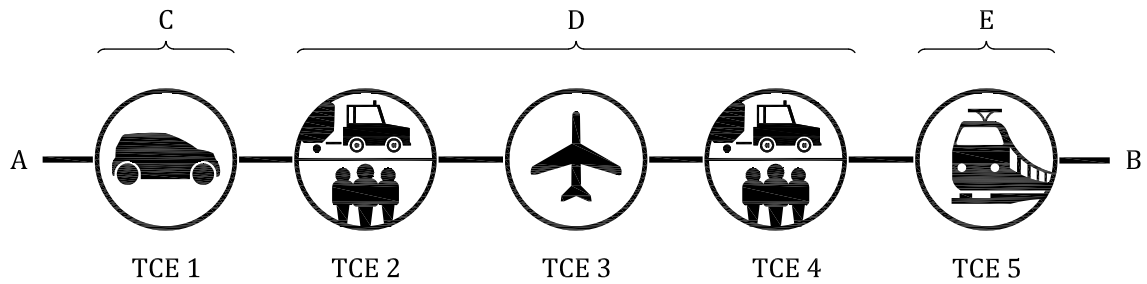
### Key

- A freight consignor
- B freight consignee
- C road services
- D rail freight service

**Figure 1 — Illustrative example of a multi-element freight transport chain**

[Figure 2](#) provides an illustrative example of a passenger transport chain from the point where passengers leave their departure location, A, to their destination, B. This transport chain consists of TCEs, the GHG emissions of which are calculated separately. The first TCE (TCE 1) represents transport of the passenger from home to the airport by private car (C); TCE 2 to TCE 4 represent an air travel service (D) composed of passenger terminal operations for the passenger and luggage (TCE 2, TCE 4) and main carriage by plane (TCE 3). The on-carriage represented by TCE 5 shows shuttle express via rail (E).



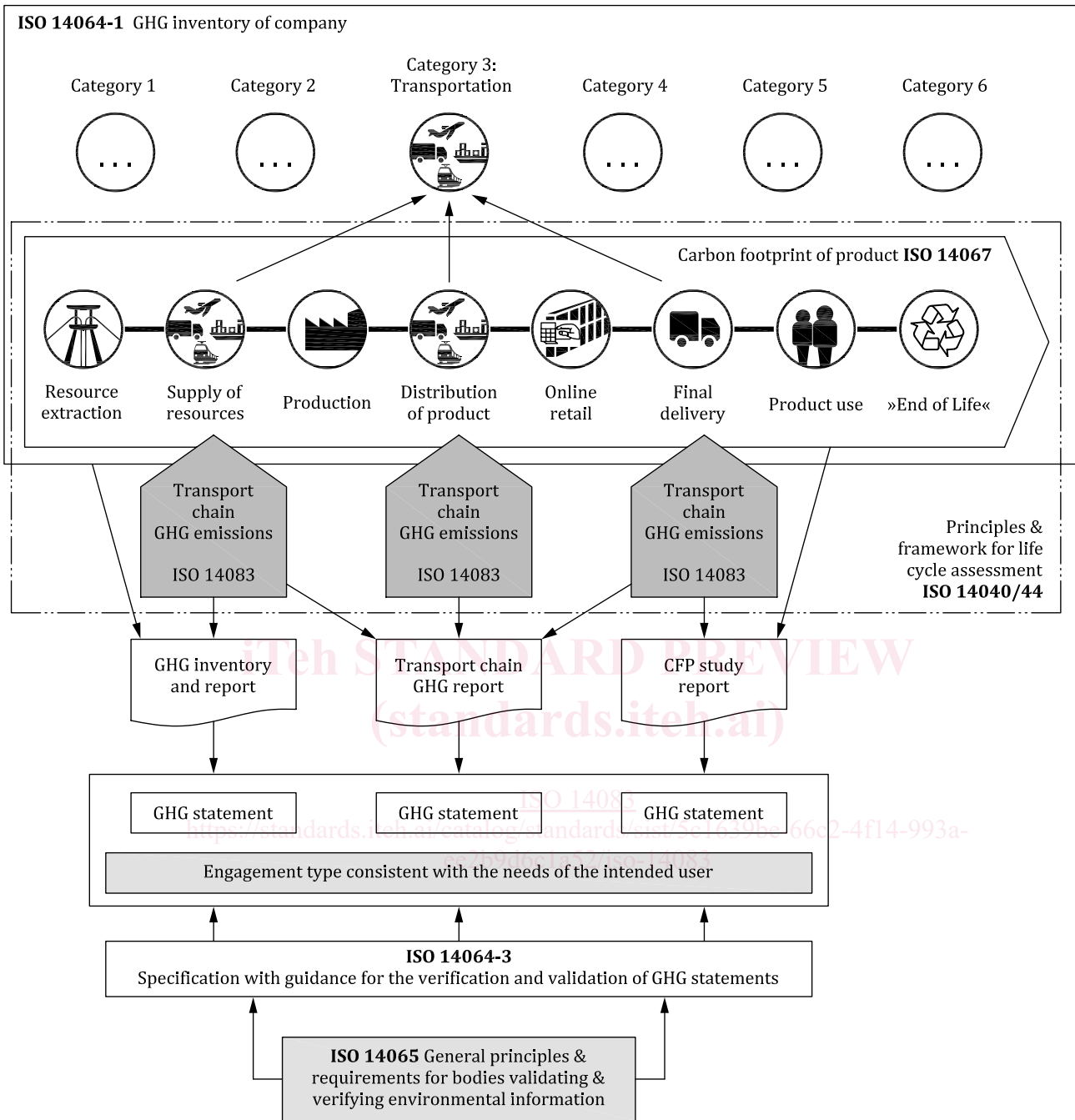
**Key**

- A departure location
- B destination
- C private car service
- D air travel service
- E shuttle express service via rail

**Figure 2 — Illustrative example of a multi-element passenger transport chain**

The reporting set out in this document reflects the need to report information between the parties in a transport chain because information known to the transport or hub operator, when reported to the user of their service, helps the latter to quantify, better manage and reduce the impacts of their transport or hub activities. This is a standard for GHG emission calculation only; therefore, offsetting is not part of this document.

This document is complementary to several existing standards. It is aligned with the ISO 14064 series and ISO 14067 (see [Figure 3](#)). It contributes to the carbon footprint of products (see ISO 14067) and the life cycle assessment in accordance with the ISO 14040 family of standards and ISO 14044. [Figure 3](#) shows the relationship of this document to other International Standards of the ISO 14040 family of standards and the ISO 14060 family of standards, using the example of a freight transport chain and including possible stages within the life cycle of a product bought online as well as example topics to be covered by a company's GHG inventory.



**Figure 3 — Relationship between the ISO 14040 family of standards and the ISO 14060 family of standards, using the example of a freight transport chain**

NOTE GHG emission intensity per tonne- or passenger-km calculated in accordance with this document can be used as primary or secondary data for GHG quantification projects in accordance with ISO 14067 and/or ISO 14064-1. These data require adaptation or modification if full life cycle based GHG-emissions are needed, e.g. vehicle manufacture or transport infrastructure provision.

The approach acknowledges, and is in line with, the valuable work conducted on GHG calculation and reporting that is documented in the aforementioned standards and by other protocols and organizations, including but not limited to, the United Nations Framework Convention on Climate Change (UNFCCC),<sup>[37]</sup> the GHG Protocol<sup>[16]</sup> and the Global Logistics Emissions Council (GLEC) Framework for Logistics Emissions Accounting and Reporting<sup>[15]</sup>.

# Greenhouse gases — Quantification and reporting of greenhouse gas emissions arising from transport chain operations

## 1 Scope

This document establishes a common methodology for the quantification and reporting of greenhouse gas (GHG) emissions arising from the operation of transport chains of passengers and freight.

## 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 Terms related to transport chain operations

#### 3.1.1

##### **cable car**

ropeway

transport system where *vehicles* (3.1.35) are moved by at least one cable motorized by a machinery

Note 1 to entry: Vehicles circulating on cable(s) whose movement is not transmitted by at least one cable are not considered cable cars. Vertical elevators are also not considered cable cars.

#### 3.1.2

##### **charter**

contract for the hire of a specific *vehicle* (3.1.35) from an owner for a specified period of time for the charterer's purposes subject to agreed restrictions

#### 3.1.3

##### **collection and delivery round**

trip with the purpose to collect and/or deliver *freight* (3.1.7) at successive locations along the trip

Note 1 to entry: Typically, but not necessarily, the trip starts and ends at the same location.

#### 3.1.4

##### **consignment**

separately identifiable amount of *freight* (3.1.7) transported from one consignor to one consignee via one or more modes of transport

Note 1 to entry: Although "consignment" and "*shipment*" (3.1.20) are common terms often considered as synonyms, in this document and other technical publications, a consignment is differentiated to a shipment. Indeed, a shipment refers to a grouping of freight corresponding to the shipper needs, whereas a consignment refers a grouping of freight according to a carrier or freight forwarder's transport solutions.

[SOURCE: ISO 26683-1:2013, 3.9, modified — “freight” replaced “goods items (available to be)”. “and specified in one single transport document” deleted. Note 1 to entry added.]

### 3.1.5

#### **empty trip**

section of the route of a *vehicle* (3.1.35) during which no *freight* (3.1.7) or *passenger* (3.1.16) is transported

EXAMPLE Vehicle (re)positioning trips, empty backhauls.

### 3.1.6

#### **fleet**

set of *vehicles* (3.1.35) operated by one *transport operator* (3.1.30)

### 3.1.7

#### **freight**

goods, materials, commodities, parcels, etc. being transported from one location to another

[SOURCE: EN 14943:2005, 3.437, modified — “materials, commodities, parcels, etc.” added.]

### 3.1.8

#### **hub**

DEPRECATED: node

DEPRECATED: site

DEPRECATED: station

DEPRECATED: facility

DEPRECATED: centre

DEPRECATED: depot

location where *passengers* (3.1.16) transfer and/or *freight* (3.1.7) is transferred from one *vehicle* (3.1.35) or mode of transportation to another before, after or between different elements of a *transport chain* (3.1.25)

Note 1 to entry: Hubs include, but are not limited to, rail/road terminals, cross-docking sites, airport terminals, terminals at seaports and distribution centres.

### 3.1.9

#### **hub activity**

parameter that quantifies the *throughput* (3.1.21) of a *hub* (3.1.8)

### 3.1.10

#### **hub equipment**

equipment and facilities used within a *hub* (3.1.8) to transfer *freight* (3.1.7) or *passengers* (3.1.16)

### 3.1.11

#### **hub operation**

operation in order to transfer *freight* (3.1.7) or *passengers* (3.1.16) through a *hub* (3.1.8)

### 3.1.12

#### **hub operation category**

##### **HOC**

group of *hub operations* (3.1.11) that share similar characteristics

Note 1 to entry: [Annex H](#) contains examples of HOCs.

### 3.1.13

#### **hub operator**

entity that carries out *hub operations* (3.1.11) involving carriage of *freight* (3.1.7) or *passengers* (3.1.16), or both

### 3.1.14

#### **hub service**

service provided within a *hub* (3.1.8) *transport chain element* (3.1.26)

**3.1.15****load factor**

ratio of the actual load to the maximum legally authorized load of a particular *vehicle* (3.1.35)

**3.1.16****passenger**

person carried by a *vehicle* (3.1.35)

Note 1 to entry: The term and its abbreviation “pax” are also used as a unit for quantity of passengers.

Note 2 to entry: Where the word “passengers” is used, it refers to one or more passengers unless specified in the context.

**3.1.17****pipeline**

long continuous line of pipes, including ancillary equipment, used for transporting *freight* (3.1.7)

[SOURCE: ISO 6707-1:2020, 3.1.2.30, modified — “freight” replaced “liquids or gases”.]

**3.1.18****pipeline transport**

movement of a medium (liquid, gas, liquefied gas, slurry) through a system of pipes from one location to another

**3.1.19****round trip**

group of sequential journeys that start and end in the same place, whatever the intermediate routing

**3.1.20****shipment**

identifiable collection of one or more *freight* (3.1.7) items (available to be) transported together from the original shipper to the ultimate consignee (14083)

Note 1 to entry: A shipment may be transported in one or a multiple number of *consignments* (3.1.4).

Note 2 to entry: A shipment can be aggregated or disaggregated to different consignments according to the requirements of the means of transportation on any one element of the *transport chain* (3.1.25), e.g. single bulk units and packages can be aggregated on a pallet and such pallet can be handed over as a unit for aggregation in a container, which in turn is treated as a consignment in a *vehicle* (3.1.35).

Note 3 to entry: Although “consignment” and “shipment” are common terms often considered as synonyms, in this document and other technical publications, a consignment is differentiated to a shipment. Indeed, a shipment refers to a grouping of freight corresponding to the shipper needs, whereas a consignment refers a grouping of freight according to a carrier or freight forwarder’s transport solutions.

[SOURCE: ISO 26683-1:2013, 3.34, modified — “freight” replaced “goods”. Notes 2 and 3 to entry added.]

**3.1.21****throughput**

quantity of *passengers* (3.1.16) or *freight* (3.1.7) handled, sorted, cross-docked or transferred within and between modes at a *hub* (3.1.8)

**3.1.22****transshipment**

action by which *freight* (3.1.7) is transferred from one means of transport to another during the course of one *transport chain* (3.1.25)

[SOURCE: EN 14943:2005, 3.1154, modified — “transport chain” replaced “transport operations”, and the second part of the definition deleted.]

### 3.1.23

#### **transport**

movement of *passengers* (3.1.16) and/or *freight* (3.1.7) from one location to another performed by modes of transport such as air, *cable car* (3.1.1), inland waterway, *pipeline* (3.1.17), rail, road and sea

[SOURCE: ISO 26683-1:2013, 3.37, modified — “passengers and/or freight” replaced “people and “goods”, “of transport” added and the following list changed, “and the field comprises the attributes of infrastructure, vehicles and operations” deleted.]

### 3.1.24

#### **transport activity**

parameter that quantifies *passenger* (3.1.16) or *freight* (3.1.7) *transport* (3.1.23)

### 3.1.25

#### **transport chain**

sequence of elements related to *freight* (3.1.7) or a (group of) *passenger(s)* (3.1.16) that, when taken together, constitutes its movement from an origin to a destination

Note 1 to entry: A passenger or a group of passengers can include their luggage and, if any, their *vehicles* (3.1.35).

Note 2 to entry: Where there are two or more elements, in the majority of cases, one of them implies that the freight or passengers use a *hub* (3.1.8).

### 3.1.26

#### **transport chain element**

##### **TCE**

section of a *transport chain* (3.1.25) within which the *freight* (3.1.7) or a (group of) *passenger(s)* (3.1.16) is carried by a single *vehicle* (3.1.35) or transits through a single *hub* (3.1.8)

EXAMPLE If a multimodal trip of a passenger includes taking a bus from stop “L4” to stop “L7” of bus line “L”, then one TCE is the trip of the passenger from “L4” to “L7”.

Note 1 to entry: See [Figures 4](#) and [5](#).

### 3.1.27

#### **transport distance**

distance between the origin and the destination of a *passenger* (3.1.16), a *consignment* (3.1.4) or a *vehicle* (3.1.35) along a specified route

Note 1 to entry: For the use of this document, the route followed by the passenger, the *freight* (3.1.7) or the vehicle may be different from that originally planned. This leads to two categories of transport distances: *actual distances* (3.1.27.1), and distances used for calculation of *greenhouse gas emissions* (3.2.8), i.e. *transport activity distances* (3.1.27.4).

#### 3.1.27.1

##### **actual distance**

*transport distance* (3.1.27) along the actual route taken by a *vehicle* (3.1.35)

EXAMPLE Distance measured by an on-board device (odometer).

#### 3.1.27.2

##### **great circle distance**

##### **GCD**

*transport distance* (3.1.27) determined as the shortest distance between any two points measured along the surface of a sphere

**3.1.27.3****shortest feasible distance****SFD**

DEPRECATED: planned distance

DEPRECATED: network distance

*transport distance* (3.1.27) determined as the distance achievable by the shortest practical route available according to the infrastructure options for a particular *vehicle* (3.1.35) type

Note 1 to entry: "Shortest practical route" implies that small detours from the shortest distance, e.g. to avoid congested city centres or rural roads unsuitable for certain vehicle sizes, can be included.

**3.1.27.4****transport activity distance**

*transport distance* (3.1.27) related to *passengers* (3.1.16) or *freight* (3.1.7) moved, used as a parameter for calculation of *transport activity* (3.1.24)

**3.1.28****transport operation**

operation of a *vehicle* (3.1.35) in order to transport *passengers* (3.1.16) and/or *freight* (3.1.7)

EXAMPLE If a multimodal trip of a passenger includes taking a bus from stop "L4" to stop "L7" of bus line "L", this requires a transport operation being the operation of this bus on line "L", from the first stop "L1" to the last stop of this bus line.

Note 1 to entry: It includes cases where the destination is the same as the origin passing through other locations on the way.

**3.1.29****transport operation category****TOC**

group of *transport operations* (3.1.28) that share similar characteristics

Note 1 to entry: Annexes A to G contain recommendations for the characteristics used to specify the TOCs for each transport mode.

**3.1.30****transport operator**

entity that carries out *transport operations* (3.1.28) involving carriage of *freight* (3.1.7) or *passengers* (3.1.16), or both

**3.1.31****transport service**

service provided to a *transport service user* (3.1.33) for the *transport* (3.1.23) of *freight* (3.1.7) or a *passenger* (3.1.16) from an origin to a destination

Note 1 to entry: A transport service can imply multiple *transport chain elements* (3.1.26), requiring both *transport operations* (3.1.28) and *hub operations* (3.1.11), as shown in Figure 1 and Figure 2.

**3.1.32****transport service organizer**

entity that provides *transport services* (3.1.31), within which the operation of some *transport chain elements* (3.1.26) are subcontracted to one or more other entities that operate them

Note 1 to entry: A transport service organizer acts as an intermediary between the *transport operator* (3.1.30) or *hub operator* (3.1.13) and the *transport service user* (3.1.33). A transport service organizer can act as the transport operator or hub operator for some of the transport chain elements that comprise the overall service.

Note 2 to entry: A transport service organizer can be, for example, a freight forwarder, an entity organizing trips/travel (e.g. travel agency, tour operator) or a local authority responsible for public passenger transport.