

Glossary of Vehicle Logistics Terminology











Version 2 September 2017



Established in 1997, ECG is the Association of European Vehicle Logistics and represents around 100 leading vehicle logistics companies from 28 countries across Europe, including Georgia, the Russian Federation, Ukraine and Turkey. ECG Members provide transport, distribution, storage, preparation and post-production services to manufacturers, importers, car rental companies and vehicle leasing operators. ECG's Brussels based secretariat works daily to fulfil the core mission of the Association, i.e. Information & Awareness; Education; Networking & Integration; Lobbying & Representation; and Standardisation.

The project to produce and publish the ECG 'Glossary of Vehicle Logistics Terminology' was initiated by the ECG Quality Working Group (WG). It includes the most common terms, with their definitions, used in the Finished Vehicle Logistics sector. The final draft of the Glossary was approved by members of the WG on 20th January 2015 and published on line in April. The Glossary has been reviewed several times since its first publication: version 1.1 in 2015, versions 1.2 and 1.3 in 2016. The current version 2 of the Glossary was revised and complemented with approximately 50 new logistics terms and prepared for publication in August 2017.

The Glossary contains approximately 250 entries which cover terms from rail, road, and maritime transport. Since many terms that are used in the FVL sector are abbreviated, the Glossary contains an abbreviation list which helps the user to quickly identify a term and then to find its definition in the document. Whilst this publication does not claim to be an exhaustive source of information, it does provide sufficient detail on the terms, sometimes with a link to the source it was taken from or where more information can be found.

The Glossary is constantly updated and improved, but for this we depend on you. Should you wish to have a term added, or feel some definitions are not precise enough, please feel free to provide us with your suggestions or corrections either by completing the 'Amendment proposal' which you can find at the back of the book and returning it to ECG, or informing us by sending an e-mail to: info@ecgassociation.eu.

For more information, please visit the ECG website: www.ecgassociation.eu

List of Abbreviations

ADR European Agreement concerning the International Carriage of Dangerous Goods by

Road – Accord européen relatif au transport international des marchandises

Dangereuses par Route (FR)

AFV Alternative Fuel Vehicle

AIDC Automatic Identification and Data Capture (See: Radio-frequency identification)

ATA Actual Time of Arrival
ATD Actual Time of Departure
BAF Bunker Adjustment Factor

B/L Bill of Lading

CAF Currency Adjustment Factor

CBU Completely Built Up
CDV Car-Derived Vans

CEN European Committee for Standardisation

CFR Cost and Freight (See: *Incoterms*)

CIF Cost, Insurance & Freight (See: *Incoterms*)

CIM Uniform Rules concerning the Contract of International Carriage of Goods by Rail

CIP Carriage and Insurance Paid to (See: *Incoterms*)

CKD Complete Knock Down

CMR Convention on the Contract for the International Carriage of Goods by Road¹

CNG Compressed Natural Gas
Con-Ro Container Roll-on-roll-off

COTIF Convention concerning International Carriage by Rail

CPT Carriage Paid to (See: *Incoterms*)

cSt Centistoke

CUV Crossover Utility Vehicle
CV Commercial Vehicle

DAP Delivered at Place (See: *Incoterms*)

DAT Delivered at Terminal (See: *Incoterms*)

DDP Delivered Duty Paid (See: *Incoterms*)

EDI Electronic Data Interchange²

EFAF Emergency Fuel Adjustment Factor

EIT Efficient & Integrated Transport Processes

ETA Estimated Time of Arrival
ETD Estimated Time of Departure

EV Electric Vehicle

EXW Ex Works (See: *Incoterms*)

FAS Free Alongside Ship (See: *Incoterms*)

FCA Free Carrier (See: *Incoterms*)
FCR Forwarders' Certificate

FCT Forwarders' Certificate of Transport

FEU Forty-foot Equivalent Unit

FFO Furnace Fuel Oil (See: Bunker fuel)

FIO Free In and Out FOB Free On Board FOR Free On Rail

¹ http://www.jus.uio.no/lm/un.cmr.road.carriage.contract.convention.1956/doc.html

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² http://www.cen.eu/Pages/default.aspx

FOT Free On Truck
FPR First Point of Rest

GIS Geographic Information System
GPS Global Positioning by Satellite

GSM Global System for Mobile Communications

GSM-R Global System for Mobile Communications for Railways

GTL Global Transport Label GHG Greenhouse Gases GVW Gross Vehicle Weight

HEV Hybrid Electric Vehicle (See: *Hybrid vehicle*)

HFO Heavy Fuel Oil (See: Bunker fuel)

HGV Heavy Goods Vehicle H&H High and Heavy Cargo

ICC International Chamber of Commerce (See: *Incoterms*)

IFO Intermediate Fuel Oil (See: Bunker fuel)

IM Infrastructure Manager

IMDG International Maritime Dangerous Goods Code

IMO International Maritime Organisation³

IOC Information of Collection IOD Information of Delivery

ISM International Safety Management

ISO International Organization for Standardization⁴
ISPS International Ship and Port Facility Security Code

ITS Intelligent Transport Systems

ITU/UTI Intermodal Transport Unit (Unité de Transport Intermodal)

LPG Liquefied Petroleum Gas

LPR Last Point of Rest

LCV Light Commercial Vehicle
LLP Lead Logistics Provider
LNG Liquefied Natural Gas

Lo-Lo Lift-on-lift-off

LPG Liquefied Petroleum Gas

LS Low-Sulphur (fuel oil) (See: *Bunker fuel*)
LSMGO Low-Sulphur Marine Gas Oil (See: *Bunker fuel*)

LSP Logistics Service Provider

MDO Marine Diesel Oil (See: Bunker fuel)
MFO Marine Fuel Oil (See: Bunker fuel)
MGO Marine Gas Oil (See: Bunker fuel)

MPV Multi-Purpose Vehicle

NSFO Navy Special Fuel Oil (See: *Bunker fuel*)
OEM Original Equipment Manufacturer

OSJD/OSShD Organization for Co-operation of Railways⁵

OTIF Intergovernmental Organisation for International Carriage by Rail⁶

PC Passenger Car

PMR Personal Mobile Radio

PO Purchase Order

4 www.iso.org/iso/home.html

2

³ http://www.imo.org

⁵ https://en.wikipedia.org/wiki/Organization_for_Cooperation_of_Railways

⁶ http://otif.org/en/

POE Port of Entry

PPO **Post Production Option** PDI **Pre-Delivery Inspection Privately Owned Vehicle** POV POC **Proof of Collection** POD Proof of Delivery

RFID Radio-frequency Identification

RID Regulation concerning the International Carriage of Dangerous Goods by Rail

Roll-on-lift-off Ro-Lo

Roll-on-roll-off Passenger Ro-Pax

Roll-on-roll-off Ro-Ro RU Rail Undertaking

SAD Single Administrative Document

Agreement on Direct International Goods Transport by Rail and Procedure **SMGS**

Instruction

SUV Sport Utility Vehicle Single Wagon Load **SWL**

TEU Twenty-foot Equivalent Unit UCR Unique Consignment Reference International Union of Railways⁷ UIC

Ultra Low Sulphur Marine Gas Oil (See: Bunker fuel) **ULSMGO**

VPC Vehicle Processing Centre VIN Vehicle Identification Number WCO World Customs Organisation⁸

1D One dimension 2D Two dimensions

1PL First Party Logistics Services Provider 2PL Second Party Logistics Services Provider 3PL Third Party Logistics Services Provider Fourth Party Logistics Services Provider 4PL

⁷ http://uic.org/

⁸ http://www.wcoomd.org/en.aspx

GLOSSARY

Finished Vehicle Logistics Terminology

Actual time of arrival (ATA) – the time when a means of transport actually arrives at its place of destination.

Actual time of departure (ATD) – the time when goods actually departed.

Agreement on International Goods Transport by Rail (SMGS) – governs railway activities between countries. The countries that have entered into the agreement belong to the Organization for Co-operation of Railways (OSJD).⁹

Alternative fuels – known as non-conventional or advanced fuels, are any materials or substances that can be used as fuels, other than conventional fuels. Conventional fuels include: fossil fuels (petroleum (oil), coal, and natural gas), as well as nuclear materials such as uranium and thorium, and also artificial radioisotope fuels that are made in nuclear reactors. Some well-known alternative fuels include biodiesel, bioalcohol (methanol, ethanol, butanol), chemically stored electricity (batteries and fuel cells), hydrogen, nonfossil methane, non-fossil natural gas, vegetable oil, propane, and other biomass sources.¹⁰

Alternative fuel vehicle (AFV) – a vehicle that runs on a fuel other than traditional petroleum fuels (petrol or Diesel); and also refers to any technology of powering an engine that does not involve solely petroleum (e.g. electric car, hybrid electric vehicles, solar powered).¹¹

Arrival notice – a notification sent by a carrier to a nominated party advising the arrival of a means of transport for a certain consignment.

Articulated vehicle – road tractor unit coupled to a semi-trailer.

Backhaul – is to haul a shipment back over part of a route that the transport has already travelled; return movement of cargo, usually opposite from the direction of the primary cargo. 12

Barcode – is an optical machine-readable representation of data relating to the object to which it is attached. Originally barcodes systematically represented data by varying the widths and spacings of parallel lines, and may be referred to as linear or one-dimensional (1D). Later they evolved into rectangles, dots, hexagons and other geometric patterns in two dimensions (2D). Although 2D systems use a variety of symbols, they are generally referred to as barcodes as well. Barcodes are scanned by special optical scanners called barcode readers.

⁹ The Organization for Co-operation of Railways (OSJD or OSShD) was established at a conference in Sofia, Bulgaria on 28 June 1956, the governmental ministers managing railway transport of Eastern bloc countries Albania, Bulgaria, Hungary, Vietnam, East Germany, China, North Korea, Mongolia, Poland, Romania, the USSR, and Czechoslovakia decided to establish a special inter-governmental organization, the executive body of which started operations in Warsaw, Poland on 1 September 1957. It is the equivalent of the International Union of Railways (UIC) to create and improve the co-ordination of international rail transport. Concerning especially the transports between Europe and Asia, it has helped develop co-operation between railway companies and with other international organisations. The members of this organisation created an international transport law.

¹⁰ http://en.wikipedia.org/wiki/Alternative fuel

¹¹ https://en.wikipedia.org/wiki/Alternative fuel vehicle

¹² http://www.seinemaritime.net/suports/uploads/files/Glossary%20of%20Port%20and%20Shipping%20Terms.pdf

- **Bill of Lading (B/L)** is a document issued by the carrier¹³ to the shipper, signed by the captain, agent or owner of a vessel, providing written evidence regarding receipt of the goods (cargo), the conditions on which transportation is made (contract of carriage), the conditions of the goods and the engagement to deliver the goods at the prescribed port of destination to the lawful holder of the bill of lading. It is, therefore, both a receipt for merchandise and a contract to deliver it as freight.¹⁴ An inland bill of lading (a waybill on rail or the "pro forma" bill of lading in trucking) is used to document the transportation of the goods between the port and the point of origin or destination. A waybill can also be used for ocean transportation.
- **Biofuel** a fuel that is derived from biological materials, such as plants and animals. Also biofuel can still be seen as fuel derived indirectly from agricultural, commercial, domestic, and/or industrial wastes. There are first- and second-generations of bio fuels. First-generation or conventional biofuels are made from sugar, starch, or vegetable oil Second-generation biofuels are manufactured from various types of biomass, i.e. lignocellulosic biomass or woody crops, agricultural residues or waste. 15

Types of biofuels	Biofuels						
First-generation	ethanol, biodiesel, bioalcohols, green diesel, biofuel gasoline,						
(conventional	vegetable oil, bioether, biogas, syngas, etc.						
biofuels)							
Second generation	biomethanol, bioDME, biohydrogen, mixed alcohols,						
(advanced)	biomethane (or bio-SNG), butanol, isobutanol, etc.						

- **Block train or full train** railway train in which all the wagons contain the goods of one customer, and are shipped from the same origin to the same destination, without being split up or stored on route.
- **Break Bulk Cargo** is conventional, uncontainerised cargo that is shipped in units of one (such as uncontainerised machinery or trucks) or shipped in units or packages (such as palletised or boxed cargo).
- **Broker** person whose business it is to prepare shipping and customs documents for international shipments. Brokers often have offices at major freight gateways, including border crossings, seaports, and airports.¹⁶
- **Bunker Adjustment Factor (BAF)** is a freight charge adjustment that takes into account the fluctuation of the bunker (fuel) prices during the contract period.
- Bunker fuel or bunker crude any type of fuel oil used aboard vessels. There are six different fuel grades (from 1 to 6). The boiling point and carbon chain length of the fuel increases with fuel oil number. Viscosity also increases with number, and the heaviest oil has to be heated to get it to flow. Price usually decreases as the fuel number increases. No. 6 is the most common and as often known as "bunker fuel." No. 5 fuel oil is also called Navy Special Fuel Oil (NSFO) or just 'navy special'; Nos. 5 and 6 are also commonly called heavy fuel oil (HFO) or furnace fuel oil (FFO). There two main types of bunker oil: distillate and residual fuels.

 $^{^{13}\} http://www.globalnegotiator.com/blog_en/transport-documents-cmr-bill-of-lading-air-waybill/$

¹⁴ http://www.tschudilogistics.com/page/122/Glossary_of_Maritime_Terms

¹⁵ http://en.wikipedia.org/wiki/Biofuel

¹⁶http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf

¹⁷ http://www.viscopedia.com/viscosity-tables/substances/bunker-oil-marine-fuel-oil/

Marine fuels are classified using the 'Bunker ABC':

Туре	Description			
Bunker A	corresponds to the distillate fuel oil No. 2			
Bunker B	is a No. 4 or No. 5 fuel oil			
Bunker C	corresponds to the residual fuel oil No. 6			

There is another type of classification for fuel oils:

Туре	Description
MGO	roughly equivalent to No. 2, Bunker A; fuel oil, made from distillate only
MDO	a blend of heavy gasoil (MGO and HFO) that may contain very small
	amounts of black refinery feed stocks, but has a low viscosity up to 12 cSt
	so it need not be heated for use in internal combustion engines
IFO	a blend of gasoil and heavy fuel oil (MGO and HFO), with less gasoil than
	marine diesel oil
MFO	a blend of MGO and HFO, with less gasoil than IFO
HFO	pure or nearly pure residual oil, roughly equivalent to No. 6, Bunker B fuel
	oil

Marine fuels are quoted on the international bunker markets with their maximum viscosity (which is set by the ISO 8217 standard): 18

Туре	Description
IFO 380	Intermediate fuel oil with a maximum viscosity of 380 cSt (<3.5% sulphur)
IFO 180	Intermediate fuel oil with a maximum viscosity of 180 cSt (<3.5% sulphur)
LS 380	Low-sulphur (<1.0%) intermediate fuel oil with a maximum viscosity of
	380 cSt
LS 180	Low-sulphur (<1.0%) intermediate fuel oil with a maximum viscosity of
	180 cSt
MDO	Marine diesel oil
MGO	Marine gasoil
LSMGO	Low-sulphur (<0.1%) Marine Gas Oil - the fuel is to be used in EU
	community Ports and Anchorages and SECA. EU Sulphur directive
	2005/33/EC
ULSMGO	Ultra Low Sulphur Marine Gas Oil - referred to as Ultra Low Sulfur Diesel
	(sulphur 0.0015% max) in the US and Auto Gas Oil (sulphur 0.001% max)
	in the EU. Maximum sulphur allowable in US territories and territorial
	waters (inland, marine and automotive) and in the EU for inland use.

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¹⁸ http://en.wikipedia.org/wiki/Fuel_oil

- Cabotage traditionally refers to shipping along coastal routes, port to port. Now the word is often used to refer to the transport of goods or passengers between two points in the same country by a vessel or an aircraft registered in another country. Originally a shipping term, cabotage now also covers aviation, railways, and road transport. Cabotage is used in the context of "cabotage rights," the right of a company from one country to trade in another country. In aviation terms, it is the right to operate within the domestic borders of another country. Most countries do not permit aviation cabotage, for reasons of economic protectionism, national security or public safety. One notable exception is the European Union, whose members all grant cabotage rights to each other.¹⁹
- **Car-derived van** a goods vehicle which is constructed or adapted as a derivative of a passenger vehicle and which has a maximum laden weight not exceeding 2 tonnes.
- **Carbon footprint** a popular term for the summation of all carbon dioxide emissions (or other greenhouse gas emissions) caused during the product life cycle, from raw material extraction to waste management for a product, such as a vehicle, vehicle fuel, a transport service or a road.
- Cargo rail station, freight depot/yard cargo traffic location where goods are handled and prepared for upcoming transportation. See also: Yard.
- **Carrier** is any person or company who, in a contract of carriage, undertakes to perform or to procure the performance of transport by rail, road, air, sea, inland waterways or by combinations of such modes.
- **Charterer** the legal person who has signed a charter party with the owner of the vessel or aircraft and thus hires or leases a vessel or an aircraft or a part of the capacity thereof.
- **Collection of goods** the process of collecting goods ready for transport.
- **Combined transport or intermodal transport** this method involves the transportation of cargo in a container or swap body or trailer, using various means of transportation (rail, ocean vessel and truck), without any handling of the freight itself when changing modes.
- Commercial Vehicle (CV) is any type of motor vehicle used for transporting goods or paid passengers. The European Union defines "commercial motor vehicle" as any motorised road vehicle, that by its type of construction and equipment is designed for, and capable of transporting, whether for payment or not: (1) more than nine persons, including the driver; (2) goods and "standard fuel tanks."²⁰
- **Completely Built Up (CBU)** is the terminology for when a vehicle is imported/exported to/from some other country as a complete car fully assembled. It does not require assembly before it can be sold to a buyer.²¹
- Complete Knock Down (CKD) means a vehicle which is imported/exported as a kind of parts and not as one assembled unit. Such units are first sent to an assembly plant where all these parts are assembled and one complete vehicle is made using the imported components. These kinds of units generate employment in the target country as more machinery and manpower investment is needed to assemble the components to make the vehicle and as a result often attract lower rates of import duty.²²

Compound – an area for storing vehicles.

¹⁹ http://en.wikipedia.org/wiki/Cabotage

²⁰ https://en.wikipedia.org/wiki/Commercial vehicle

²¹ http://www.carblogindia.com/what-is-cbu-what-is-ckd/

²² http://www.carblogindia.com/what-is-cbu-what-is-ckd/

- Compressed natural gas (CNG) methane stored at high pressure. It can be used in place of gasoline (petrol), diesel fuel and propane/LPG. CNG combustion produces fewer undesirable gases than other fuels. It is also safer than other fuels in the event of a spill, because natural gas is lighter than air and disperses quickly when released. CNG is made by compressing natural gas to less than 1 percent of the volume it occupies at standard atmospheric pressure. It is stored and distributed in hard containers at a pressure of 20–25 MPa (2,900–3,600 psi), usually in cylindrical or spherical shapes.²³
- Container roll-on-roll-off (Con-Ro) the Con-Ro vessel is a hybrid of a Ro-Ro and a container ship. This type of vessel has a below-deck area used for vehicle storage while stacking containerised freight on the top decks. Con-Ro ships can carry a combination of twenty-foot equivalent units (TEU) of containers, heavy equipment, project and oversized cargo on three decks, and cars on five decks. Separate internal ramp systems within the vessel segregate automobiles from other vehicles, Mafi trailers, and break-bulk cargo.²⁴
- **Consignee** is the company or person named in a freight contract to whom the goods have been shipped, as stated on the Bill of Lading.
- Consignment note a document prepared by a consignor and countersigned by the carrier as a proof of receipt of consignment for delivery at the destination. Used as an alternative to bill of lading (specially in inland transport), it is generally neither a contract of carriage nor a negotiable instrument. CMR consignment notes are used in road transport and CIM, or SMGS, or common CIM/SMGS consignment notes are used in rail transport.
- **Consignor** a company or a person that ships cargo to the consignee. See Shipper.
- Contract of Carriage is a binding agreement (evidenced usually by a bill of lading) which contains conditions of carriage that spell out the obligations and rights of a carrier and a shipper. The carrier undertakes to deliver goods from a named place of departure to a named destination, in consideration for a freight charge. This contract addresses issues associated specifically with what is being carried, and how the liability and compensation for damage or loss of the goods is assessed, apportioned, and paid.
- Convention on the Contract for the International Carriage of Goods by Road (CMR) is a United Nations convention that was signed in Geneva on 19 May 1956. It relates to various legal issues concerning transportation of cargo by road. It has been ratified by the majority of European states.²⁵
- Cross-docking the concept of packing products on the incoming shipments so they can be easily sorted at intermediate warehouses or for outgoing shipments based on final destination. The items are carried from the incoming vehicle docking point to the outgoing vehicle docking point without being stored in inventory at the warehouse. Cross-docking reduces inventory investment and storage space requirements.
- Crossover/crossover utility vehicle (CUV) a vehicle built on a car platform and combining, in highly variable degrees, features of a SUV with features from a passenger vehicle, especially those of a station wagon or hatchback.²⁶
- Currency Adjustment Factor (CAF) is a freight charge adjustment used by an international Carrier to offset foreign currency fluctuations.

²³ http://en.wikipedia.org/wiki/Liquefied natural gas

²⁴ http://en.wikipedia.org/wiki/Roll-on/roll-off

²⁵ http://www.jus.uio.no/lm/un.cmr.road.carriage.contract.convention.1956/doc.html and http://www.globalnegotiator.com/blog_en/transport-documents-cmr-bill-of-lading-air-waybill/

²⁶ https://en.wikipedia.org/wiki/Crossover_(automobile)

Custom Value Declaration – is a document which needs to be presented to the customs authorities where the value of the goods exceeds €10,000. The Customs Value Declaration must be drawn up conforming to form DV 1²⁷ of which a specimen is provided in Annex 8²⁸ to Regulation (EU) 2016/341²⁹ the UCC Transitional Delegated Act.³⁰ This form must be presented with the Single Administrative Document (SAD).

Damage Codes – a set of codes which are used to report damages on a vehicle. AIAG prepared a list of 'Standard Global Damage Codes' which ECG supports and promotes.³¹

Dangerous goods – the classes of dangerous goods carried by rail are those defined by the fifteenth revised edition of the UN Recommendations on the Transport of Dangerous Goods, United Nations, Geneva 2007.³²

Class 1: Explosives

Class 2: Gases

Class 3: Flammable liquids

Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases

Class 5: Oxidizing substances and organic peroxides

Class 6: Toxic and infectious substances

Class 7: Radioactive material

Class 8: Corrosive substances

Class 9: Miscellaneous dangerous substances and articles.

Dead Freight – slots paid for but not used.

Deep-sea shipping – refers to maritime traffic of cargo and passengers that crosses oceans.

Delivery – the physical process of handing over goods to the consignee or to the party acting on his behalf. Synonym: drop off.³³

Delivery date – is the date on which the shipper should deliver the goods to the Carrier in the port of loading.

Direct transport – the conveyance of goods directly from the consignor to the consignee without intermediate storage or unnecessary delay in the distribution activities.

Drop off – See Delivery.

Dwell time – is the amount of time that freight sits at a point in the supply chain between transport legs.

²⁷ http://exporthelp.europa.eu/update/requirements/ehir_eu16_04v001/eu/auxi/eu_gen_valuedec_dv1.pdf

²⁸ http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32016R0341

²⁹ http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0341

³⁰ https://ec.europa.eu/taxation_customs/business/union-customs-code/ucc-legislation_en

³¹ See the AIAG and ECG joint publication of M22 that includes the Global Damage Codes:

http://www.ecgassociation.eu/publicationsreports/fvltransportdamagereporting.aspx

³² http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/glossen4.pdf

³³ http://en.wikipedia.org/wiki/Short sea shipping

- eCall is a European initiative intended to bring rapid assistance to motorists involved in a collision anywhere in the European Union. It is a system that provides an automated message to the emergency services³⁴ following a road crash which includes the precise crash location. The in-vehicle eCall is an emergency call generated either manually by the vehicle occupants by pushing a button or automatically via activation of in-vehicle sensors after a crash. When activated, the in-vehicle eCall device will establish an emergency call carrying both voice and data directly to the nearest emergency services. At the same time, a minimum set of data will be sent to the eCall operator receiving the voice call. The minimum set of data contains information about the incident including time, precise location, vehicle identification, eCall status (as a minimum, indication if eCall has been manually or automatically triggered) and information about a possible service provider. eCall will be mandatory in all new cars sold within the EU after April 2018.³⁵
- **Electric vehicle (EV)** also referred to as an *electric drive vehicle*, uses one or more electric motors or traction motors for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery to provide electricity or generator to convert fuel to electricity. EVs include road and rail vehicles, surface and underwater vessels, electric aircraft and electrically powered space vehicles.³⁶
- **Electronic Data Interchange (EDI)** an electronic communication method that provides standards for exchanging data via any electronic means. By adhering to the same standard, two different companies, even in two different countries, can electronically exchange documents (such as purchase orders, invoices, shipping notices, and many others).³⁷
- Emergency fuel adjustment factor (EFAF) is a freight charge adjustment that takes into account the fluctuation of the fuel prices where no BAF is present in the contract of carriage, or where the BAF does not adequately cover the additional bunker costs.
- **Estimated time of arrival (ETA)** the time when a carrier estimates that a means of transport will arrive at its place of destination.³⁸
- **Estimated time of departure (ETD)** the time when a carrier estimates that a means of transport will depart from its place of departure.
- **Euro Class** European emission standards define the acceptable limits for exhaust emissions of new vehicles sold in EU and EEA member states. The emission standards are defined in a series of European Union directives (Euro 4, Euro 5, ...) staging the progressive introduction of increasingly stringent standards.³⁹

³⁴

https://ec.europa.eu/transport/road_safety/specialist/knowledge/esave/esafety_measures_unknown_safety_effects/e call en

³⁵ https://en.wikipedia.org/wiki/ECall

³⁶ http://en.wikipedia.org/wiki/Electric_vehicle

³⁷ http://en.wikipedia.org/wiki/Electronic_data_interchange

³⁸ https://en.wikipedia.org/wiki/Estimated_time_of_arrival

³⁹ https://www.dieselnet.com/standards/eu/ld.php

- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) is a United Nations treaty that governs transnational transport of hazardous materials. It was signed at Geneva on 30 September 1957 under the auspices of the United Nations Economic Commission for Europe, and it entered into force on 29 January 1968. The Agreement itself was amended by the Protocol amending article 14 (3) done at New York on 21 August 1975, which entered into force on 19 April 1985. A new amended ADR 2011 entered into force on 1 January 2011. Annexes A and B have been regularly amended and updated since the entry into force of ADR. Consequently, for the amendments for entry into force on 1 January 2015, a revised consolidated version has been published as document ECE/TRANS/242, Vol. I and II.
- **Fairway dues** are taxes collected by the State to cover costs it incurs from the construction, maintenance and care of public fairways used for navigation, and safety devices required by waterborne traffic, and from assistance provided by icebreakers.
- **Final consignee** the receiving party for a scheduled vehicle movement.
- First Party Logistics Services Provider (1PL) beneficial cargo owners which can be the shipper (such as a manufacturing firm delivering to customers) or the consignee (such as a retailer picking up cargo from a supplier). They dictate the origin (supply) and the destination (demand) of the cargo with distribution being an entirely internal process assumed by the firm.⁴¹
- First point of rest (FPR) a nominated area where vehicles are parked when unloaded after a transport leg. Often they are inspected for damage at FPR as part of the process of handover from one LSP to another.
- **Fleet Management System** a system for collecting data on vehicle operations (route, fuel consumption, shipments, goods, *etc.*) and links this to office systems (ERP, accounting, *etc.*)
- **Forty-foot equivalent unit (FEU)** a unit of measurement equivalent to one forty-foot container. Two twenty-foot containers (TEUs) equal one FEU.⁴²
- **Forwarders' Certificate of Receipt (FCR)** is a document that is used for transportation of goods intermodally. It provides proof that a forwarder has collected goods with irrevocable instructions to deliver them to the consignee indicated on the FCR.⁴³
- Forwarders' Certificate of Transport (FCT) is a document that is used for transportation of goods intermodally. Unlike FCR, it is negotiable. This means that the forwarder accepts responsibility to deliver to a destination you specify not to an unchangeable destination as with the FCR.
- Fourth Party Logistics Services Provider (4PL) a supplier of outsourced supply chain co-ordination and management services that generally does not own or operate the underlying logistical assets and resources. 44 Synonym: Lead logistics provider and Control Tower.

⁴⁰ https://www.unece.org/trans/danger/publi/adr/adr e.html

⁴¹ http://cerasis.com/2013/08/08/3pl-vs-4pl/

⁴² http://www.seinemaritime.net/suports/uploads/files/Glossary%20of%20Port%20and%20Shipping%20Terms.pdf

⁴³ http://www.secondhand4business.com/transport/moving-goods-by-rail/key-rail-transport-documents/

⁴⁴ http://www.logisuite.com/logistics-terms-glossary/

- **Free alongside (FAS)** a maritime trade term requiring the seller to deliver goods to a named port alongside a vessel designated by the buyer. "Alongside" means that the goods are within reach of a ship's lifting tackle. When used in trade terms, the word "free" means the seller has an obligation to deliver goods to a named place for transfer to a carrier. 45
- Free in and out (FIO) transport condition denoting that the freight rate excludes the costs of loading and discharging and, if appropriate, stowage and lashing.
- **Free on Board (FOB)** a maritime trade term requiring the seller to deliver goods on board a vessel designated by the buyer. The seller fulfils its obligations to deliver when the goods have passed over the ship's rail. When used in trade terms, the word "free" means the seller has an obligation to deliver goods to a named place for transfer to a carrier. 46
- **Freight** is the term for all merchandise, goods, products or commodities shipped by rail, air, road or water, other than baggage, express mail or regular mail.
- Freight Charge is the charge assessed for transporting freight.
- **Freight forwarder** person or company involved in the collection, consolidation, shipping and distribution of goods, who acts as an agent on behalf of a shipper. A freight forwarder frequently consolidates shipments from several shippers and co-ordinates booking reservations, clears freight through customs, prepares documents and arranges shipping, warehousing and delivery⁴⁷.
- **Freight invoice** a document issued by a transport service provider, specifying freight costs and charges incurred for a transport operation and stating conditions of payment. Synonym: Freight bill.
- **Freight payer** party responsible for the payment of freight charges.
- **Freight wagon** vehicles used for the transportation of goods (from all-round to special-purpose types) for rail transportation.
- **Freightways** European cross-border tracks for freight transportation used by all European train operators.
- **Fuels** any materials that store potential energy in forms that can be released and used for work or as heat energy such as in the form of chemical energy that could be released through combustion. Fuels are divided into three main groups, according to their physical properties, as a solid, liquid or gas. They are also divided into two groups according to their occurrence: primary (natural fuel) and secondary (artificial fuel).⁴⁸

	Primary (natural)	Secondary (artificial)				
Solid fuels	wood, coal, peat,	coke, charcoal				
	dung, etc.					
Liquid fuels	petroleum	naphtha, ethanol				
Gaseous	natural gas/CNG	hydrogen, propane, coal gas, water gas, bla				
fuels		furnace gas, coke oven gas				

Full train - see 'block train.'

⁴⁵ http://www.investopedia.com/terms/f/fas.asp

⁴⁶ http://www.investopedia.com/terms/f/fas.asp

⁴⁷ http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf

⁴⁸ http://en.wikipedia.org/wiki/Fuel

- **General Cargo** Cargo, consisting of goods, unpacked or packed, for example in cartons, crates, bags or bales, often palletised. General cargo can be shipped either in breakbulk or containerised.⁴⁹
- **Geographic Information System (GIS)** high quality database for assets using exact geographic information for object location, in most cases referenced to a national grid system. It may include full mapping information. Generally of a relational type and based on a standard software such as ORACLE or ARCINFO.
- **Global Positioning by Satellite (GPS)** navigation based on measuring time delays of signals received from four or five satellites.
- Global System for Mobile Communications (GSM) internationally agreed standard and protocols for mobile radio (telephone type) communications using cellular arrangements to maximise use of the frequency spectrum.
- Global System for Mobile Communications for Railways (GSM-R) specialised GSM cellular Personal Mobile Radio (PMR) implementation for railways using the 900MHz band and with a higher level of reliability and safety and more features than GSM.
- Global Transport Label (GTL) a label used between supplier and customer containing information related to the goods, parties and the electronic dispatch advice. Globally unique ID. Under implementation but already widely used in Europe and in the US. Published by JAIF, Joint Automotive Industry Forum, in Europe represented by Odette International.
- Greenhouse Gases (GHG) a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Greenhouse gases greatly affect the temperature of the Earth; without them, the Earth's surface would average about 33 °C colder, which is about 59 °F below the present average of 14 °C (57 °F). 50
- Gross Vehicle Weight (GVW) combined total weight of a vehicle and its freight.⁵¹
- **Harbourmaster** an officer who is in charge of vessel movements, safety, security, and environmental issues within a port.⁵²
- **Haulage** the inland transport service which is offered by the carrier under the terms and conditions of the tariff and of the relative transport document.⁵³
- **Headway** the time interval between the passing of the front ends of successive multiple units or trains moving along the same lane or track in the same direction.
- **Heavy Goods Vehicle (HGV)** the kind of road transport used for transporting car parts, materials or finished vehicles. Normally refers to vehicle / trailer combinations of more than 3.5 tonnes.
- High and Heavy cargo (H&H) the term for self-propelled cargo (excluding passenger cars and LCV) and agricultural/industrial trailers. Self-propelled cargo includes: commercial and passenger vehicles with a Gross Vehicle Weight of above 3.5 tonnes and agricultural/industrial/construction vehicles.

⁴⁹ http://www.tschudilogistics.com/page/122/Glossary_of_Maritime_Terms

⁵⁰ http://en.wikipedia.org/wiki/Greenhouse_gas

⁵¹ http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf

⁵² http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf.

⁵³ http://cscmp.org/sites/default/files/user_uploads/resources/downloads/glossary-2013.pdf

High Cube or Hi-Cube container – See Intermodal Container

Hub – common connection point for devices in a network. Often used as a reference in a transportation network such as in "hub and spoke" commonly used in the airline and trucking industry.⁵⁴

Hybrid vehicle – a vehicle that uses two or more distinct power sources to move the vehicle. The term most commonly refers to hybrid electric vehicles (HEVs), which combine an internal combustion engine and one or more electric motors. However, other mechanisms to capture and use energy are included.⁵⁵

Inbound logistics – movement of raw materials and components from suppliers/vendors to production processes and storage facilities.

Incoterms rules (International Commercial Terms) – are a series of pre-defined commercial terms published by the International Chamber of Commerce (ICC). They are widely used in International commercial transactions or procurement processes. A series of three-letter trade terms related to common contractual sales practices, the Incoterms rules are intended primarily to clearly communicate the tasks, costs, and risks associated with the transportation and delivery of goods.⁵⁶

Allocations of costs to buyer/seller according to Incoterms 2010:

Incoterm 2010	Export customs declaration	Carriage to port of export	Unloading of truck in port of export	Loading on vessel/ airplane in port of export	Carriage (Sea/Air) to port of import	Insurance	Unloading in port of import	Loading on truck in port of import	Carriage to place of destination		Import taxes
EXW	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
FCA	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
FAS	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
FOB	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
CPT	Seller	Seller	Seller	Seller	Seller	Buyer	Seller	Buyer/Seller	Seller	Buyer	Buyer
CFR (CNF)	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer/Seller	Buyer	Buyer	Buyer	Buyer
CIF	Seller	Seller	Seller	Seller	Seller	Seller	Buyer/Seller	Buyer	Buyer	Buyer	Buyer
CIP	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer/Seller	Seller	Buyer	Buyer
DAT	Seller	Seller	Seller	Seller	Seller	Seller/Buyer	Seller	Buyer	Buyer	Buyer	Buyer
DAP	Seller	Seller	Seller	Seller	Seller	Seller/Buyer	Seller	Seller	Seller	Buyer	Buyer
DDP	Seller	Seller	Seller	Seller	Seller	Seller/Buyer	Seller	Seller	Seller	Seller	Seller

EXW – **Ex Works** – the seller makes the goods available at their premises. This term places the maximum obligation on the buyer and minimum obligations on the seller. The Ex Works term is often used when making an initial quotation for the sale of goods without any costs included. EXW means that a buyer incurs the risks for bringing the goods to their final destination.

FCA – **Free Carrier** – the seller delivers the goods, cleared for export, at a named place. This can be to a carrier nominated by the buyer, or to another party nominated by the buyer.

CPT – Carriage Paid To – it replaces the venerable C&F (cost and freight) and CFR terms for all shipping modes outside of non-containerised seafreight. The seller pays for the carriage of the goods up to the named place of destination.

⁵⁴ http://www.seinemaritime.net/suports/uploads/files/Glossary%20of%20Port%20and%20Shipping%20Terms.pdf

⁵⁵ http://en.wikipedia.org/wiki/Hybrid_vehicle

⁵⁶ https://en.wikipedia.org/wiki/Incoterms

CIP – Carriage and Insurance Paid to – is broadly similar to CPT term, with the exception that the seller is required to obtain insurance for the goods while in transit. CIP requires the seller to insure the goods for 110% of their value under at least the minimum cover of the Institute Cargo Clauses of the Institute of London Underwriters (which would be Institute Cargo Clauses (C)), or any similar set of clauses.

DAT – Delivered at Terminal – it means that the seller covers all the costs of transport (export fees, carriage, unloading from main carrier at destination port and destination port charges) and assumes all risk until destination port or terminal. The terminal can be a Port, Airport, or inland freight interchange. Import duty/taxes/customs costs are to be borne by Buyer.

DAP – Delivered at Place – the seller delivers when the goods are placed at the disposal of the buyer on the arriving means of transport ready for unloading at the named place of destination. Under DAP terms, the risk passes from seller to buyer at the point of destination mentioned in the contract of delivery.

DDP – Delivered Duty Paid – seller is responsible for delivering the goods to the named place in the country of the buyer, and pays all costs in bringing the goods to the destination including import duties and taxes. The seller is not responsible for unloading.

FAS – Free Alongside Ship – the seller delivers when the goods are placed alongside the buyer's vessel at the named port of shipment. This means that the buyer has to bear all costs and risks of loss of or damage to the goods from that moment. The FAS term requires the seller to clear the goods for export, which is a reversal from previous Incoterms versions that required the buyer to arrange for export clearance.

FOB – **Free on Board** – the seller bears all costs and risks up to the point the goods are loaded on board the vessel. The seller must also arrange for export clearance. The buyer pays cost of marine freight transportation, bill of lading fees, insurance, unloading and transportation cost from the arrival port to destination.

CFR – Cost and Freight – the seller pays for the carriage of the goods up to the named port of destination. Risk transfers to buyer when the goods have been loaded on board the ship in the country of Export. The Shipper is responsible for origin costs including export clearance and freight costs for carriage to named port. The shipper is not responsible for delivery to the final destination from the port (generally the buyer's facilities), or for buying insurance. If the buyer does require the seller to obtain insurance, the Incoterm CIF should be considered. CFR should only be used for non-containerized seafreight and inland waterways transport; for all other modes of transport it should be replaced with CPT.

CIF – **Cost, Insurance & Freight** – it is broadly similar to the above CFR term, with the exception that the seller is required to obtain insurance for the goods while in transit to the named port of destination. CIF requires the seller to insure the goods for 110% of their value under at least the minimum cover of the Institute Cargo Clauses of the Institute of London Underwriters (which would be Institute Cargo Clauses (C)), or any similar set of clauses.

- **Information of collection (IOC)** the process of receiving a consignment usually against the issue of a status report. As from this moment the party accepting the consignment becomes responsible for the consignment.
- **Information of delivery (IOD)** the process of receiving a consignment usually against the issue of a status report. As from this moment the party accepting the consignment becomes responsible for the consignment.
- Infrastructure Manager (IM) any enterprise or transport operator responsible in particular for establishing and maintaining railway infrastructure, as well as for operating the control and safety systems. An infrastructure manager can delegate to another railway enterprise the following tasks: maintaining railway infrastructure and operating the control and safety system.⁵⁷
- Inland bill of lading is the Bill of Lading for transport over land and/or inland waterways, on the way to the point where the goods will be put aboard a ship and a normal (carrier's) Bill of Lading will be issued.
- **Inland shipping / navigation** refers to transportation of goods and passengers by ships via inland waterways (canals, rivers, lakes *etc.*) between inland ports or quays and wharfs.⁵⁸
- Intelligent Transport Systems (ITS) the term ITS refers to information and communication technology (applied to transport infrastructure and vehicles) that improve transport outcomes such as transport safety, transport productivity, travel reliability, informed travel choices, social equity, environmental performance and network operation resilience.
- Intermodal Container is a large standardized shipping container, ⁵⁹ designed and built for intermodal freight transport, i.e. it can be used across different modes of transport from ship to rail to truck without unloading and reloading their cargo. Intermodal containers are primarily used to store and transport materials and products efficiently and securely in the global containerized intermodal freight transport system, but smaller numbers are in regional use as well. These containers are known under a number of names, such as simply container, cargo or freight container, ISO container, shipping, sea or ocean container, container van or (Conex) box. Intermodal containers exist in many types and a number of standardized sizes, but 90% of the global container fleet are so-called "dry freight" or "general purpose" containers, durable closed steel boxes, mostly of either twenty (TEU) or forty foot (FEU) (6 or 12m) standard length. The common heights are 8 feet 6 inches (2.6 m) and 9 feet 6 inches (2.9 m) the latter are known as High Cube or Hi-Cube containers. ISO 6346 standard classifies a broad spectrum of container types in great detail. Basic dimensions and permissible gross weights of intermodal containers are largely determined by two ISO standards:
 - ISO 668:2013 Series 1 freight containers—Classification, dimensions and ratings.
 - ISO 1496-1:2013 Series 1 freight containers—Specification and testing—Part 1: General cargo containers for general purposes.

⁵⁷ http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/glossen4.pdf

⁵⁸ http://en.wikipedia.org/wiki/Inland_navigation

⁵⁹ https://en.wikipedia.org/wiki/Intermodal_container

Weights and dimensions of the most common standardized types of containers:

Type of container		20' container (TEU)		40' container (FEU)		40' high-cube container		45' high-cube container	
		imperial	metric	imperial	metric	imperial	metric	imperial	metric
external	length	19′ 10.5″	6.058 m	40′ 0″	12.192 m	40′ 0″	12.192 m	45′ 0″	13.716 m
dimensions	width	8′ 0″	2.438 m	8′ 0″	2.438 m	8′ 0″	2.438 m	8′ 0″	2.438 m
	height	8′ 6″	2.591 m	8′ 6″	2.591 m	9′ 6″	2.896 m	9′ 6″	2.896 m
interior dimensions	length	19′ 3″	5.867 m	39′ 5 45/64″	12.032 m	39′ 4″	12.000 m	44′ 4″	13.556 m
	width	7′ 8 19/32″	2.352 m	7′ 8 19/32″	2.352 m	7′ 7″	2.311 m	7′ 8 19/32″	2.352 m
	eight	7′ 9 57/64″	2.385 m	7′ 9 57/64"	2.385 m	8′ 9″	2.650 m	8′ 9 15/16″	2.698 m
door aperture	width	7′ 8 1⁄8″	2.343 m	7′ 8 1⁄8″	2.343 m	7′ 6"	2.280 m	7′ 8 1⁄8″	2.343 m
	height	7′ 5 ¾″	2.280 m	7′ 5 ¾″	2.280 m	8′ 5″	2.560 m	8′ 5 49/64″	2.585 m
internal volume		1,169 ft³	33.1 m³	2,385 ft³	67.5 m³	2,660 ft ³	75.3 m³	3,040 ft ³	86.1 m³
maximum gross weight		66,139 lb	30,400 kg	66,139 lb	30,400 kg	68,008 lb	30,848 kg	66,139 lb	30,400 kg
empty weight		4,850 lb	2,200 kg	8,380 lb	3,800 kg	8,598 lb	3,900 kg	10,580 lb	4,800 kg
net load		61,289 lb	28,200 kg	57,759 lb	26,600 kg	58,598 lb	26,580 kg	55,559 lb	25,600 kg

- **Intermodal traffic** Freight transportation involving several different types of transport mode (*e.g.* rail, truck, aircraft *etc.*)
- Intermodal transport movement of goods in which the same loading unit is used in a transport chain in an integrated manner using successively more than one mode of transport without the handling of goods.
- International Maritime Dangerous Goods Code (IMDG) provisions concerning the international maritime transport of dangerous goods. These are the rules of the International Maritime Organization (IMO),⁶⁰ obligatory in all countries belonging to the organization.
- International Ship and Port Facility Security (ISPS) Code is an amendment to the Safety of Life at Sea (SOLAS) Convention (1974/1988)⁶¹ on minimum security arrangements for ships, ports and government agencies. Having come into force in 2004, it prescribes responsibilities to governments, shipping companies, shipboard personnel, and port/facility personnel to "detect security threats and take preventative measures against security incidents affecting ships or port facilities used in international trade."
- **Intermodal Transport Unit (ITU/UTI)** is a container, swap body or semi-trailer suitable for intermodal transport.
- **Jockey / yard jockey** is a person responsible for the movement and positioning of cars within compound.
- **Kaizen (Jap.)** a system of continuous improvement in which *muda* (waste) is eliminated by all employees.⁶²

⁶⁰ http://www.imo.org

⁶¹ http://www.imo.org/en/about/conventions/listofconventions/pages/international-convention-for-the-safety-of-life-at-sea-(solas),-1974.aspx

⁶² http://www.transfreight.com/lean_logistics_overview/lean_terms.aspx

- **Lane metres** the length of parking lanes available for vehicle storage either on the compound or on board ship.
- **Last point of rest (LPR)** is the last official stop before the Carrier takes custody/responsibility of the goods.
- Lead Logistics Provider (LLP) Synonym: Control Tower or Fourth Party Logistics Services Provider (4PL).⁶³
- **Lead Mileage** the distance from a place of loading to a place of delivery.
- Lead time amount of time required for an item to be available for use from the time it is ordered. Lead time should include purchase order processing time, vendor processing time, in transit time, receiving, inspection, and any prepack times. However, based on the way many inventory systems work, there may be problems incorporating internal factors such as post-receipt processing in Lead-time, so in many systems, the lead time just represents the period of time from which the item is ordered to the time it arrives at your dock.⁶⁴
- **Lean** an enabler to identify optimal value for the customer and each product's value stream. Lean focuses on eliminating wasteful activities and creating smooth product and process flow, enabling an effective pull system. As a mindset, culture, and toolkit, lean is applicable to all organizational areas. A lean environment requires all team members' dedication and is focused on ongoing continuous improvement.⁶⁵
- **Licensed Operator** a company or organisation who is granted a licence by the Rail Regulator to operate rail services, and to operate vehicles on the track, under terms and conditions defined by the Rail Regulator.
- Lift-on-lift-off (Lo-Lo) a type of vessel which can transport a range of different products as a result of their flexible cargo space, container capacity and onboard cranes. Lo-Lo cargo is cargo that must be lifted on and off vessels and other vehicles using handling equipment. A Lo-Lo operation is when cargo is loaded and discharged over the top of the vessel using cranes or derricks. Lo-Lo type vessels are loaded and unloaded by a crane, which lifts cargo to a specific location on the Lo-Lo ship. The cargo is loaded pursuant to a specific plan that is necessary in order to balance the Lo-Lo ships as they are not equipped with ballast-adjusting mechanisms.⁶⁶
- Light Commercial Vehicle (LCV) is the term for commercial vehicles with a gross vehicle weight (GVW) of up to 3.5 tonnes. It includes car-derived vans (CDV), panel vans and pick-up trucks.
- **Light dues** are taxes paid by ships entering UK ports to cover the cost of lighthouses, beacons and other navigational aids in the UK and Republic of Ireland waters. Such taxes are not applied in most European Union Member States.
- **Line haul** the intermediate/line hauls stage of transport in the movement of a consignment of goods. Synonym: Main Carriage.
- **Liner Terms** condition of carriage denoting that costs for loading and unloading are borne by the carrier subject the custom of the port concerned.⁶⁷

⁶³ http://www.logisticslist.com/lead-logistics-providers.html

⁶⁴ http://www.logisuite.com/logistics-terms-glossary/

⁶⁵ http://www.transfreight.com/lean_logistics_overview/lean_terms.aspx

⁶⁶ http://www.globalsecurity.org/military/systems/ship/lo-lo.htm

⁶⁷ http://www.tschudilogistics.com/page/122/Glossary_of_Maritime_Terms

- Liquefied natural gas (LNG) natural gas that has been converted to liquid form for ease of storage or transport. It takes up about 1/600th the volume of natural gas in the gaseous state. It is odourless, colourless, non-toxic and non-corrosive. Hazards include flammability after vaporization into a gaseous state, freezing and asphyxia. The natural gas is condensed into a liquid at close to atmospheric pressure by cooling it to approximately –162 °C (–260 °F); maximum transport pressure is set at around 25 kPa (4 psi).⁶⁸
- Liquefied petroleum gas or liquid petroleum gas (LPG or LP gas), also referred to as simply propane or butane, are flammable mixtures of hydrocarbon gases used as fuel in heating appliances, cooking equipment, and vehicles.⁶⁹
- Load factor a term describing the transport efficiency of a system, such as a vehicle, a route, a logistic strategy or any other system that performs transportation work. Possible interpretations are for example that a load factor of 100% is a theoretical term that means that no further goods can be added to the transport system, or that 100% means that all vehicles within the transport system are fully loaded. Many other interpretations may also be considered, hence suggesting that the term needs to be defined or replaced by a more precise term to describe transport efficiency.
- **Loading Gauge** the dimensions of height and width which must not be exceeded by a rail vehicle or its load, so as not to foul lineside fixtures or structures. Similarly, the dimensions in respect to the rails which must not be infringed by such structures (structure gauge).
- **Loading yard** a rail yard for freight transport, designed for loading and unloading cargo and sorting locomotives.
- **Location ID / Location code** unique identifier for a specific physical location of any type. There are several identification schemes like UN location codes, GS1 location numbers or similar coding based on ISO Data Identifiers.
- **Locomotive** a self-propelled, non-revenue rail vehicle designed to convert electrical or mechanical energy into tractive effort to haul trains of non-powered carriages and freight cars.
- Logistics all activities involved in the management of product movement; delivering the right product from the right origin to the right destination, with the right quality and quantity, at the right schedule and price to satisfy consumer demand. The process of planning, implementing and controlling the efficient and cost-effective flow and storage of raw materials, in-process stocks, finished goods and related information from the point of origin to the point of consumption for customers. Logistics encompasses warehousing, transport, added-value/pre-retailing services and IT solutions and covers inbound, outbound, internal, international and reverse product flows.⁷⁰
- **Logistics Service Provider (LSP)** an organisation that provides logistics services.
- Logistic unit in this context Logistic Unit is equivalent with Package, Piece and Transport Handling Unit. It describes a unit that carries/contains the goods. Can be a parcel, packaging material, pallet, box, bag, container or a trailer unit. Represents lowest packaging unit handled by the transport service provider.
- **Logistics label** See Transport label. The wording of "Transport label" and "Logistics label" are not always used in a similar way, some strictly differentiate between the two while others see them as synonyms.

⁶⁸ http://en.wikipedia.org/wiki/Liquefied natural gas

⁶⁹ http://en.wikipedia.org/wiki/Liquefied_petroleum_gas

⁷⁰http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf

- **Mafi Trailer** is a German brand name of a trailer used for terminal haulage and stowage on board of Roll-on Roll-off vessels, also known as Roll Trailer.⁷¹
- **Manifest (in transport)** listing of goods comprising the cargo carried in a means of transport or in a transport-unit. The manifest gives the commercial particulars of the goods.
- Marshalling yard / shunting yard is a railroad yard found at some freight train stations, used to separate wagons on to one of several tracks.
- **Modal split** the amount of total traffic volume (tonnage) according to the transportation mode (road, rail, ship).
- **Muda (Jap.)** means "futility; uselessness; wastefulness" in Japanese. It is a key removal-of-waste concept (along with Mura (unevenness) and Muri (overburden) in lean manufacturing that focuses on the removal of non-value adding steps.⁷²
- **Multi-modal traffic** freight transportation involving at least two different modes of transport (*e.g.* rail, truck, aircraft *etc.*)
- **Multi-purpose vehicle (MPV)** a large car, similar to a van, designed to carry up to eight passengers.
- Narrow Gauge a railway gauge narrower than standard gauge. A gauge of 24 inches or less is commonly employed for industrial railways. Metre gauge is often used in territories at some time under the influence of Germany and France while UK influenced areas are dominated by 3ft6in tracks (1067mm).
- **Node (railway)** a set of stations in an urban area interconnected by tracks.⁷³
- **Operating Phase** –used to define emissions produced during use of fuel (= 'Tank to Wheel' emissions).
- **Original consignor** the party that initiates the shipping process. Synonym: Original shipper
- **Original Equipment Manufacturer** (OEM) In the context of these Guidelines, an automotive manufacturer.
- Outbound logistics process related to the movement and storage of products (new vehicles) from the end of the production line to the end user.⁷⁴
- Package See Logistic unit.
- **Package ID** unique identifier of an individual package as visible from outside the package, also communicated in the EDI message.
- **Panel van** is a form of solid (rigid-bodied, non-articulated) van, smaller than a lorry or truck, without rear side windows.
- Passenger car (PC) a road motor vehicle, other than a motor cycle, intended for the carriage of passengers and designed to seat no more than nine persons (including the driver).⁷⁵ All PCs are classified by industry segment. Each segment is designated by a separate capital letter, e.g. A-segment: mini cars; B-segment: compact cars; C-segment: medium cars; D-segment: large cars; E-segment: executive cars; J-segment: sport utility cars (including off-road vehicles); M-segment: multi purpose cars; S-segment: sport coupes.⁷⁶ In

⁷¹ http://www.iss-shipping.com/cargo/cargo library glossaryr.asp

⁷² http://www.innolution.com/resources/glossary/muda

⁷³ http://www.optimization-online.org/DB_FILE/2013/11/4136.pdf

⁷⁴ http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf

⁷⁵ https://stats.oecd.org/glossary/detail.asp?ID=3524

⁷⁶ https://en.wikipedia.org/wiki/F-segment

general clasification PCs includes Saloon (4-5 doors), estate/wagons, 4x4 (including 4x2), SUV, MPV and Crossover (SUV/MPV).

Payee – party to whom a payment is to be made.

Pick up of goods – See collection of goods.

Pick-up instruction – an instruction given to the driver for picking up logistic unit(s) from a pick-up location.

Pick-up location – See Place of Despatch.

Pick-up request – the process of making a reservation for space on a means of transport for the movement of goods.

Pick-up request confirmation - the notification issued by the transport service provider to confirm the status of the pick-up request, e.g. it is accepted (and that space has been reserved on means of transport for the movement of goods) or that it is rejected. Functional after business validation. Technical - after system acceptance.

Pick-up truck – is a light duty truck having an enclosed cab and an open cargo area with low sides and tailgate.77

Piggyback transport – transport of road vehicles by rail.⁷⁸

Place of collection – See Place of Despatch.

Place of delivery – place to which the goods are to be delivered under transport contract terms. This may be different from the location of the consignee.

Place of departure – place from which the means of transport or transport equipment is departing.

Place of despatch – place at which the goods are taken over for carriage (operational term), this place can be different from the transport contract place of acceptance.

Place of destination – same as the delivery address if existing in the message, otherwise same as the receiver's address.

Place of Terms of delivery – a place which describes the conditions related to the Terms of delivery.

Platooning / truck platooning - is the linking of two or more trucks in convoy, using connectivity technology and automated driving support systems. These vehicles automatically maintain a set, close distance between each other when they are connected for certain parts of a journey, for instance on motorways. The truck at the head of the platoon acts as the leader, with the vehicles behind reacting and adapting to changes in its movement - requiring little to no action from drivers. In the first instance, drivers will remain in control at all times, so they can also decide to leave the platoon and drive independently.⁷⁹

Port of Entry (POE) – a port used by a specific manufacturer to import their vehicles into a country or region.

Port of Loading – a port where cargo is loaded aboard the vessel.

Post Production Option (PPO) - any vehicle enhancement carried out after factory line-off and before delivery to a customer.

⁷⁷ https://en.wikipedia.org/wiki/Pickup truck

⁷⁸ http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/glossen4.pdf

⁷⁹ https://www.acea.be/uploads/publications/Platooning_roadmap.pdf

- **Pre-Delivery Inspection (PDI)** a standard procedure carried out before handover to the customer. In a PDI, the vehicle is checked over to ensure that everything is working properly and safely. Often a checklist is worked through. The items on the checklist include such things as the exterior of the vehicle which is inspected for its condition and the installation of panels and attachments.⁸⁰
- Privately Owned Vehicle (POV) is any vehicle that is primarily designed to transport passengers, not cargo or freight, and owned by an individual and not a company.
- Private wagon owner companies that hire freight cars out for freight operations on a commercial basis.
- **Product life cycle assessment** a technique to assess the environmental aspects and potential impacts associated with a product, process
- **Proof of collection (POC)** evidence for transition of liability, either in printed or in electronic format.
- **Proof of delivery (POD)** evidence for transition of liability, either in printed or in electronic format.
- Pull logistics system "Just in time" logistics system driven by customer demand and enabled by telecommunications and information systems rather than by manufacturing process and inventory stockpiling.
- Purchase order (PO) purchaser's authorization used to formalize a purchase transaction with a supplier. The physical form or electronic transaction a buyer uses when placing an order for merchandise.
- **Push logistics system** inventory-based logistics system characterized by regularly scheduled flows of products and high inventory levels.
- Radio-frequency identification (RFID) the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by electromagnetic induction from magnetic fields produced near the reader. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery and may operate at hundreds of metres from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object. Radio frequency identification (RFID) is one method for Automatic Identification and Data Capture (AIDC).81
- Railway Undertaking (RU) any public or private transport operator which provides services for the transport of goods and/or passengers by rail.
- Reverse logistics specialized segment of logistics focusing on the movement and management of products and resources after the sale and after delivery to the customer (includes product returns and repair for credit).82
- **Receiver (of goods)** See Consignee.

⁸⁰ http://www.privatefleet.com.au/glossary/what-is-a-predelivery-inspection/

⁸¹ http://en.wikipedia.org/wiki/Radio-frequency_identification

⁸² http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf

Registration Plate – a license plate is assigned to a transport unit by its issuer. The license plate is used for globally unique identification of transport units but could also be used in other applications. Any license plate issuer shall be authorised by an issuing agency in accordance with the rules set up by that agency and ISO 15459-1.

Regulation concerning the International Carriage of Dangerous Goods by Rail (RID) – the rules constitute annex I of the Uniform Rules concerning the contract of international transport of goods by rail (CIM) and are included in Annex B to the convention on international railway transport (COTIF) signed on 9 May 1980.

Road train – goods road motor vehicle coupled to a trailer.

Roll-on-lift-off (Ro-Lo) — a hybrid type of a vessel, with ramp(s) serving cargo to be driven on at origin and off at destination on certain decks and crane to lift cargo on and off other decks.

Roll-on-roll-off passenger (Ro-Pax) – a Ro-Ro vessel built for freight vehicle transport along with passenger accommodation. Technically this encompasses all ferries with both a roll-on/roll-off car deck and passenger-carrying capacities.⁸³

Roll-on-roll-off (Ro-Ro) – a type of ship designed to permit cargo to be driven on at origin and off at destination; used extensively for the movement of automobiles.⁸⁴

Roll Trailer - See Mafi Trailer.

Rotation – is a sequence in which a vessel calls at the ports on its itinerary.⁸⁵

Sailing frequency – is the frequency of departures from a port per day/week/month, *etc.* on specific route or rotation.

Second Party Logistics Services Provider (2PL) – carriers that are providing a transport service over a specific segment of a transport chain. It could involve a maritime shipping company, a rail operator or a trucking company that are hired to haul cargo from an origin to a destination. ⁸⁶

Seller (of goods) – party selling goods or services to a buyer.

Semi-trailer – goods road vehicle with no front axle designed in such way that part of the vehicle and a substantial part of its loaded weight rests on a road tractor unit on a fifth wheel.⁸⁷

Sender (of goods) – See Consignor.

Ship from – See Consignor.

Ship to – See Consignee.

Shipment - a separately identifiable collection of packages/pieces (available to be) transported from one original consignor to one final consignee via one or more modes of transport. A shipment can be consolidated to one consignment per transport leg, i.e. possibly several different consignments during the whole transport assignment.

Shipment ID – a shipment issuer's unique reference that is non-repeatable within a calendar year.

Shipper – a company or a person that ships cargo to the consignee. See Consignor.

⁸³ http://en.wikipedia.org/wiki/Roll-on/roll-off

⁸⁴ http://www.logisuite.com/logistics-terms-glossary/

⁸⁵ http://www.iss-shipping.com/cargo/cargo_library_glossaryr.asp

⁸⁶ http://cerasis.com/2013/08/08/3pl-vs-4pl/

⁸⁷ http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/glossen4.pdf

- **Shipping instruction** information providing all details required for the physical movement of a consignment/shipment.
- **Short sea shipment** refers to the historical terms coastal trade, coastal shipping, coasting trade and coastwise trade, which encompass the movement of cargo and passengers mainly by sea along a coast, without crossing an ocean. 88
- **Shunting** the act of moving the cargo (vehicles) within the terminal/port or from one terminal to another in the same port on its own wheels. In rail it is the process of sorting items of rolling stock into complete train sets, or the reverse.
- Single Administrative Document (SAD) also known as Form C88 in the UK, is the main customs form used in international trade to or from the European Union Customs Union. Traders and agents can use the SAD to assist with declaring import, export, transit and community status declarations in manual processing situations. It was introduced in 1988. The SAD breaks down into 54 boxes and the full version comes in 8 parts for use at different points in the trading process.
- **Single Wagon Load (SWL)** a wagon or group of wagons containing goods of one customer with a single consignment note.
- Slot a license that allows its holder, usually a railway company, to run a train on a specific section of track at a specific time, similar to an airport slot in civil aviation. Rail infrastructure companies such as Network Rail in Great Britain and DB Netze in Germany own the tracks and stations in their area of responsibility and make money by selling train slots to companies which operate freight and passenger services.
- **Splat Chart** a 2D representation of a vehicle, normally, used to annotate damage during an inspection procedure.
- **Sport utility vehicle (SUV)** a vehicle similar to a station wagon, estate car, or a van which is often equipped with four-wheel drive for on-road or off-road ability. Some SUVs include the towing capacity of a pickup truck with the passenger-carrying space of a minivan or large sedan.⁸⁹
- **Stevedore** individual or company that employs longshoremen (or dockers, dock workers, or port workers) to load and unload vessels.⁹⁰
- **Subcontractor** in this context the party undertaking transport of goods from one location to another on behalf of the carrier.
- **Supply chain** starting with unprocessed raw materials and ending with final customer using the finished goods.
- **Supplier** party which provides goods and/or services to one or more customers.
- **Survey** is the inspection of the goods made by a surveyor.
- **Swap body** is a freight-carrying unit optimised to road vehicle dimensions and fitted with handling devices for transfer between modes, usually road/rail.⁹¹
- **Terminal** an assigned area in which freight is prepared for loading into a vessel, train, truck, or airplane or is stacked immediately after discharge from the vessel, train, truck, or airplane.⁹²

⁸⁸ http://en.wikipedia.org/wiki/Short_sea_shipping

⁸⁹ https://en.wikipedia.org/wiki/Sport utility vehicle

⁹⁰ http://www.seinemaritime.net/suports/uploads/files/Glossary%20of%20Port%20and%20Shipping%20Terms.pdf

⁹¹ http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/glossen4.pdf

- **Terms of delivery** all the conditions agreed upon between parties with regard to the ownership of the various responsibilities involved in the delivery of goods and/or services
- Third Party Logistics Services Provider (3PL) describes businesses that provide one or many of a variety of logistics-related services. Types of services would include public warehousing, contract warehousing, transportation management, distribution management, freight consolidation. A 3PL provider may take over all receiving, storage, value added, shipping, and transportation responsibilities for a client and conduct them in the 3PL's warehouse using the 3PL's equipment and employees, or may manage one or all of these functions in the client's facility using the client's equipment, or any combination of the above. 93
- **Track & Trace** process of recording the progress of a consignment through the supply chain, usually in or near real-time, in order to track its status or trace its movements. Sophisticated control tower systems function as a single point of control, delivering centralized command of the supply chain, with full visibility. 94
- **Tractor unit** road motor vehicle designed, exclusively or primarily, to haul other road vehicles which are not power-driven.

Trailer – goods road vehicle designed to be hauled by a road motor vehicle. 95

Transshipment / transhipment – is the shipment of goods or containers to an intermediate destination, then to yet another destination. One possible reason for transshipment is to change the means of transport during the journey (*e.g.*, from ship transport to road transport), known as *transloading*. Another reason is to combine small shipments into a large shipment (consolidation), dividing the large shipment at the other end (deconsolidation). Transshipment usually takes place in transport hubs. Much international transshipment also takes place in designated customs areas, thus avoiding the need for customs checks or duties, otherwise a major hindrance for efficient transport.⁹⁶

Trans loading – the process by which goods are transferred from one means of transport to another.

Transit time – is the planned travelling time between terminal to terminal.

Transport buyer – the party that is commercially contracting the transport service provider.

Transport equipment – a separately identifiable non powered device (*e.g.* a 20/40 ft. container, a trailer, a rail car, a handling equipment), but not packaging. See also Logistic unit.

Transport Handling Unit – See Logistic unit.

Transport ID – a unique identifier for a mode of transportation.

Transport information – a generic term for all information exchanged throughout the transport chain

Transport instruction – a generic term for the information providing the mandatory details to arrange transportation.

⁹² http://www.logisuite.com/logistics-terms-glossary/

⁹³ http://www.logisuite.com/logistics-terms-glossary/

⁹⁴ http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf

⁹⁵ http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/glossen4.pdf

⁹⁶ http://en.wikipedia.org/wiki/Transshipment

- Transport label a label containing barcoded and human readable information about the transport and the goods. Also containing an ID with some kind of uniqueness. The wording of "Transport label" and "Logistics label" are not always used in a similar way, some strictly differentiate between the two while others see them as synonyms.
- **Transport mode** the method of transport used for the conveyance of goods or persons, e.g. by rail, by road, by sea.
- **Transport request** See pick-up request.
- Transport Service Provider any company who provides a transport service note: a transport service provider can be a freight carrier (acting directly for shippers or as sub-contractor for another freight carrier or for a freight forwarder), a freight forwarder, and a logistics service provider which provides transport services.
- **Transport status** the status of goods during a transport service. For example, in transit, damaged, delayed, or diverted.
- **Transport user** user (often buyer) of transport services offered or performed by transport service providers. Can include transport buyer, consignor and consignee.
- **Truck / lorry** a rigid road motor vehicle designed, exclusively or primarily, to carry goods. ⁹⁷
- Twenty-foot equivalent unit (TEU) a container size standard of twenty feet. Two twenty-feet containers (TEUs) equals one FEU. Container vessel capacity and port throughput capacity are frequently referred to in TEUs.98
- **T1 transit declaration** is a transit document used to transport goods from the customs office at the place of departure to the customs office at the destination without paying customs duties and taxes within the territories of the countries included in the transit agreement.99
- **Ultimate consignee** See Final consignee.
- Uniform Rules concerning the Contract of International Carriage of Goods by Rail (CIM) is an Appendix B of the COTIF Protocol¹⁰⁰ (Convention concerning International Carriage by Rail). The COTIF Protocol regulates international transport of goods by rail and it was signed by OTIF¹⁰¹ members in 9 June 1999, Vilnius. Rail transport document prepared according to Appendix B of COTIF Convention is called CIM Rail Consignment Note. In 2011, the European Union accepted COTIF 1999. 102
- Unique Consignment Reference (UCR) a globally unique identification of consignment for customs declarations (WCO framework).
- **Vehicle Operation System (VOS)** information on how one or several vehicles operate to execute a certain transport service. (Term used in CEN Standard).

⁹⁷ http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/glossen4.pdf

⁹⁸ http://www.seinemaritime.net/suports/uploads/files/Glossary%20of%20Port%20and%20Shipping%20Terms.pdf

⁹⁹ http://www.f1express.fi/en-gb/node/66

¹⁰⁰http://otif.org/fileadmin/user_upload/otif_verlinkte_files/04_recht/03_CR/03_CR_24_NOT/COTIF_1999_01_12_201 0 e.pdf

¹⁰¹ The Intergovernmental Organisation for International Carriage by Rail (OTIF) was set up on 1 May 1985. 48 States are Members of OTIF at the present time (Europe, Asia and North Africa) and one State is an Associate Member (Jordan). OTIF has developed the uniform systems of law which apply to freight in international through traffic by rail. These systems of law are known as the Convention concerning International Carriage by Rail (COTIF) of 9 May 1980 (1999 Protocol).

¹⁰² http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A52014PC0338

- **Vehicle Processing Centre (VPC)** usually a dedicated building within a compound where PPO and/or PDI operations are carried out.
- VIN Number a vehicle identification number, is a unique code including a serial number, used by the automotive industry to identify individual motor vehicles, towed vehicles, motorcycles, scooters and mopeds as defined in ISO 3833. VINs were first used in 1954. From 1954 to 1981, there was no accepted standard for these numbers, so different manufacturers used different formats. In 1981, the National Highway Traffic Safety Administration of the United States standardized the format. It required all over-the-road-vehicles sold to contain a 17-character VIN, which does not include the letters I (i), O (o), or Q (q) (to avoid confusion with numerals 1 and 0).¹⁰³
- **Warehouse** covered place for the reception and storage of goods. Principal warehouse activities include receipt of product, storage, shipment and order picking. See also distribution centre. ¹⁰⁴
- **Waybill** is the official shipping document that travels with the shipment, identifies its consignor, consignee, origin and destination, describes the goods, and shows their weight and freight charges. Unlike the Original Bill of Lading, the waybill is not a document of title to the goods.
- **Well to Wheel Analysis** is the life cycle assessment of the efficiency of fuels used for transportation. The analysis is often broken down into two stages such as "well-to-station" and "station-to-wheel, or "well-to-tank" and "tank-to-wheel." Well-to-Tank includes feedstock extraction, transport, storage, processing, distribution, transport, and storage. Tank-to-Wheel includes refuelling, consumption and evaporation. 106

Yard – a classification, storage or switching area.

¹⁰³ For more information see: http://en.wikipedia.org/wiki/Vehicle_identification_number

http://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/explore13593/\$FILE/DistributionFactsheet1Glossary.pdf
105 http://ecology.wikia.com/wiki/Well-to-wheel

¹⁰⁶ http://www.energy.ca.gov/2007publications/CEC-600-2007-002/CEC-600-2007-002-D.PDF

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