GLOSSARY ABC IMPACTS

Annex to the Final Report - Phase I

AAU : Assigned Amount Unit

A Kyoto Protocol unit equal to 1 metric tonne of CO_2 equivalent.

Each Annex I Party issues AAUs up to the level of its assigned amount, established pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol (cf. Kyoto commitments).

Assigned amount units may be exchanged through emissions trading.

(UNFCCC glossary, 7 March 2007)

Adaptation

Adaptation involves all decisions or activities aiming at "adjusting natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities".
(UNFCCC glossary, 14 August 2007)

These decisions/activities can then be classified according to binary characteristics: anticipatory / reactive, autonomous / planned, private / public.
(Müller & Hepburn, 2006)

From a climate policy point of view, adaptation includes among other things R&D funding, technology transfer, monitoring and estimations of future climate impacts, financial means to help countries that will most probably be victims of future climate impacts, etc.

However, following the IPCC definition of adaptation, measures aiming at covering damages from unavoided climate impacts (e.g.: relief, rehabilitation, reconstruction, etc.) or indirect effects ("*impacts of response measures*") are not taken into account.

Some multilateral funds have been set up to support financially adaptation measures (cf. the Special Climate Change Fund of the UNFCCC created by the CoP7 in 2001 ; the Least Developed Countries Fund financed by voluntary contributions of industrialized countries ; the Adaptation Fund established under the Kyoto Protocol in favour of developing countries that are Parties to the protocol ; the Strategic Priority on Adaptation fund of the GEF Trust Fund) but bilateral agreements are the commonest funding solution.

The greatest challenge related to this topic consists in estimating the cost of adaptation measures at the present time and in the future for developed as well as for developing countries.

Afforestation

Afforestation consists in planting of new forests on lands that historically have not contained forests.
(UNFCCC glossary, 8 March 2007)

The establishment of a forest stand or tree crop on an area not previously forested, or on land from which forest cover has very long been absent.
(EEA glossary, 13 August 2007)

Afforestation and reforestation both refer to establishment of trees on non-treed land. Reforestation refers to establishment of forest on land that had recent tree cover, whereas afforestation refers to land that has been without forest for much longer. A variety of definitions differentiate between these two processes. Some definitions of afforestation are based on phrases such as "has not supported forest in historical time;" others refer to a specific period of years and some make reference to other processes, such as "under current climate conditions."

The IPCC Guidelines define afforestation as the "planting of new forests on lands which, historically, have not contained forests."

Some definitions emphasize a change in land-cover or land-use designation - for example, "The establishment of a forest or stand in an area where the preceding vegetation or land use was not forest" *(Helms, 1998)* - although this definition could equally fit many definitions of reforestation.

If afforestation and reforestation are defined in similar terms-distinguished only by the period of time that the land was without forest-then the actual time cut-off between them does not matter. Article 3.3 deals with afforestation and reforestation activities in exactly the same way. Other issues, however, affect the application of these terms. These issues relate to the sequence of human activities prior to, and the actual mode of establishment of, new

trees. The important point, however, is that if both actions are treated equivalently in terms of accounting, their precise distinction is not important for the implementation of the Protocol.
(http://www.grida.no/climate/ipcc/land_use/047.htm)

Aircraft emissions

Emissions from aircraft during a flight depend on:

- the type of aircraft (cf. weight, design, etc.);
- the fuel (e.g. nitrous ans sulphur contents);
- the characteristics of the engine (e.g. technology, fuel efficiency according to load, etc.).
- the location of the operation (altitude) and the phase of the flight (LTO, cruise, etc.)
- the distance of the flight (cf. more fuel burned)

Emission and fuel consumption factors used for the B737-400 type aircraft in the detailed methodology

B737 400		Standard flight distances (nm) [1nm = 1.852 km]						
Distance (km)								
	Climb/cruise/descent	231.5	463	926	1389	1852	2778	3704
Fuel (kg)								
	Flight total	1603.1	2268.0	3612.8	4960.3	6302.6	9187.7	12167.6
	LTO	825.4	825.4	825.4	825.4	825.4	825.4	825.4
	Taxi out	183.5	183.5	183.5	183.5	183.5	183.5	183.5
	Take off	86.0	86.0	86.0	86.0	86.0	86.0	86.0
	Climb out	225.0	225.0	225.0	225.0	225.0	225.0	225.0
	Climb/cruise/descent	777.7	1442.6	2787.4	4134.9	5477.2	8362.3	11342.2
	Approach landing	147.3	147.3	147.3	147.3	147.3	147.3	147.3
	Taxi in	183.5	183.5	183.5	183.5	183.5	183.5	183.5
NOx (kg)								
	Flight total	17.7	23.6	36.9	48.7	60.2	86.3	114.4
	LTO	8.3	8.3	8.3	8.3	8.3	8.3	8.3
	Taxi out	0.784	0.784	0.784	0.784	0.784	0.784	0.784
	Take off	1.591	1.591	1.591	1.591	1.591	1.591	1.591
	Climb out	3.855	3.855	3.855	3.855	3.855	3.855	3.855
	Climb/cruise/descent	9.462	15.392	28.635	40.425	51.952	78.047	106.169
	Approach landing	1.240	1.240	1.240	1.240	1.240	1.240	1.240
	Taxi in	0.784	0.784	0.784	0.784	0.784	0.784	0.784
HC (g)								
	Flight total	817.6	912.9	995.8	1065.2	1118.1	1240.4	1374.1
	LTO	666.8	666.8	666.8	666.8	666.8	666.8	666.8
	Taxi out	321.18	321.18	321.18	321.18	321.18	321.18	321.18
	Take off	3.09	3.09	3.09	3.09	3.09	3.09	3.09
	Climb out	10.58	10.58	10.58	10.58	10.58	10.58	10.58
	Climb/cruise/descent	150.78	246.13	329.05	398.47	451.33	573.67	707.37
	Approach landing	10.74	10.74	10.74	10.74	10.74	10.74	10.74
	Taxi in	321.18	321.18	321.18	321.18	321.18	321.18	321.18
CO (g)								
	Flight total	14252.5	15836.0	17525.5	19060.6	20369.3	23298.2	26426.3
	LTO	11830.9	11830.9	11830.9	11830.9	11830.9	11830.9	11830.9
	Taxi out	5525.45	5525.45	5525.45	5525.45	5525.45	5525.45	5525.45
	Take off	77.19	77.19	77.19	77.19	77.19	77.19	77.19
	Climb out	202.29	202.29	202.29	202.29	202.29	202.29	202.29
	Climb/cruise/descent	2421.54	4005.06	5694.59	7229.65	8538.39	11467.26	14595.41
	Approach landing	500.54	500.54	500.54	500.54	500.54	500.54	500.54
	Taxi in	5525.45	5525.45	5525.45	5525.45	5525.45	5525.45	5525.45

(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

Allocation

In a market mechanism such as emission trading, emission permits have to be shared (or allocated) among the different actors. The most widespread allocation methodologies are:

- the grandfathering
- the auctioning
- and the benchmarking.

In the UNFCCC, the reduction effort has been negotiated and calculated for each industrialized country (Annex I to the UNFCCC) according to the differentiate responsibility and capacity principles.

The European Union (EU15) has negotiated a global reduction objective of -8% of $CO_{2\text{-eq.}}$ emissions in comparison with the 1990 level (= the "European bubble"), that has been shared among the Member States on the basis of the triptych approach.

See also: The Impacts of the Use of Different Benchmarking Methodologies on the Initial Allocation of Emission Trading Scheme Permits to Airlines (http://www.dft.gov.uk/pgr/aviation/environmentalissues/benchmarkingmethodologies/benchmarking)

Ancillary benefits

In climate policy, ancillary benefits refers to the fact that efforts to mitigate climate impacts can also reduce other pollutants and thus other environmental impacts

Annex B countries

The 39 emissions-capped industrialised countries and Economies In Transition (EIT) listed in Annex B of the Kyoto Protocol :

Australia,	Iceland,	Poland,
Bulgaria,	Japan,	Romania,
Canada,	Latvia,	Russian Federation,
Croatia,	Liechtenstein,	Slovakia,
Czech Republic,	Lithuania,	Slovenia,
Estonia,	Monaco,	Switzerland,
EU-15,	New Zealand,	Ukraine,
Hungary,	Norway,	US (Kyoto not ratified)

Annex B countries only account for one-third of global GHG emissions. The risk of a carbon leakage in the current Kyoto Protocol framework is therefore rather high.

Annex B targets of the Kyoto Protocol

Annex B of the Kyoto Protocol lists the 39 countries and their respective emission target for the first commitment period.

Countries included in Annex B to the Kyoto Protocol and their emissions targets

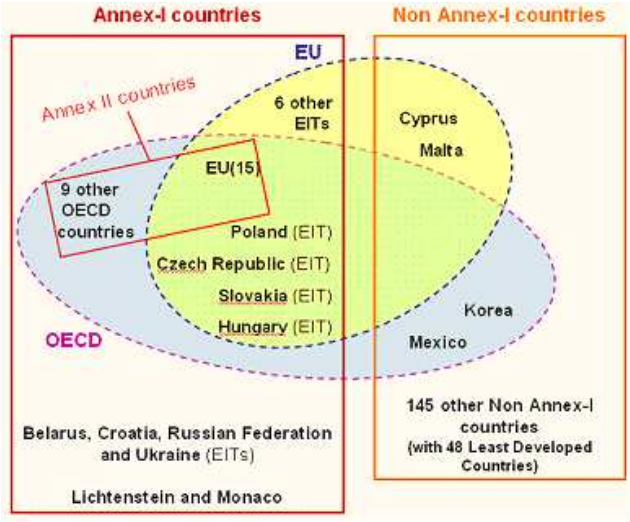
Country	Target (1990** - 2008/2012)
EU-15*, Bulgaria, Czech Republic, Estonia, Latvia,Liechtenstein, Lithuania, Monaco, Romania,Slovakia,Slovenia, Switzerland	-8%
US***	-7%
Canada, Hungary, Japan, Poland	-6%
Croatia	-5%
New Zealand, Russian Federation, Ukraine	0
Norway	+1%
Australia	+8%
Iceland	+10%

* The EU's 15 member States will redistribute their targets among themselves, taking advantage of a scheme under the Protocol known as a "bubble". The EU has already reached agreement on how its targets will be redistributed.
** Some EITs have a baseline other than 1990.
*** The US has indicated its intention not to ratify the Kyoto Protocol.
Note: Although they are listed in the Convention's Annex I, *Belarus* and *Turkey* are not included in the Protocol's Annex B as they were not Parties to the Convention when the Protocol was adopted.

(UNFCCC 2007, http://www.unfccc.org*)*

Annex I countries

The 36 industrialised countries and Economies In Transition (EIT) listed in Annex I of the United Nations Framework Convention on Climate Change (UNFCCC). They were committed to return their greenhouse gas emissions to 1990 levels by the year 2000 as per Article 4.2 (a) and (b). They have also accepted emissions targets for the period 2008-12 as per Article 3 and Annex B of the Kyoto Protocol.
(UNFCCC glossary, 14 August 2007)



from WP1.1 report of the ABC Impacts project

APU : Auxiliary Power Unit

APU is used (for onboard energy appliances) when there is no other power source connected to the aircraft. To avoid the use of APU, which in turn reduces fuel use and improves local air quality, some airports offer Ground Power Units (or GPU).
(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

ASK : Available Seat-Kilometre

ASK is a unit to measure the capacity of an aircraft/airline: the number of seats on an airplane multiplied by the number of kilometres flown by that airplane (e.g.: airline capacity).
With an arbitrary value of 100 kg per passenger, one ATK equals ten ASKs.

Remark: ATK and ASK do not take any load factor into account.

ATK : Available Tonne-Kilometre

ATK is a unit to measure the capacity of an aircraft/airline. One ATK is equivalent to the capacity to transport one tonne of freight over one kilometre.
It is a similar unit for cargo as ASK is for passenger transport.
With an arbitrary value of 100 kg per passenger, one ATK equals ten ASK.

Remark: ATK and ASK do not take any load factor into account.

Auctioning

Auctioning is an allocation methodology to share emission permits among the different actors of a market mechanism (e.g. emission trading) for which a compensation (usually financial) needs to be provided. The stakeholder offering the highest bid obtains the emission permit.

See also: The Impacts of the Use of Different Benchmarking Methodologies on the Initial Allocation of Emission Trading Scheme Permits to Airlines (http://www.dft.gov.uk/pgr/aviation/environmentalissues/benchmarkingmethodologies/benchmarking)

Aviation gasoline

A fuel used only in small piston engine aircraft and light helicopters, and which generally represents less than 1% of fuel used in aviation.
(IPCC 2006, "Guidelines for National Greenhouse Gas Inventories", Volume 2: Energy, Ch3)

See also: Distillation

Belly load

Belly load corresponds to cargo transported in the lower decks, or belly, of a passenger plane.

Benchmarking

Allocation method (e.g. in an emission trading mechanism) in which allowances are allocated for free among market actors on the basis of a specific indicator (output, efficiency, technical characteristic, etc.).

See also: The Impacts of the Use of Different Benchmarking Methodologies on the Initial Allocation of Emission Trading Scheme Permits to Airlines (http://www.dft.gov.uk/pgr/aviation/environmentalissues/benchmarkingmethodologies/benchmarking)

(The European) Bubble

See the “European bubble”.

Bunker fuel

Bunker fuel is a term used to refer to fuels consumed for international marine and air transport.
(UNFCCC glossary, 13 August 2007)

Business aviation

Business Aviation is *that sector of aviation which concerns the operation or use of aircraft by companies for the carriage of passengers or goods as an aid to the conduct of their business, flown for purposes generally considered not for public hire and piloted by individuals having, at the minimum, a valid commercial pilot license with an instrument rating.* Business Aviation is split up in three categories:

- commercial
- corporate
- owner operated.

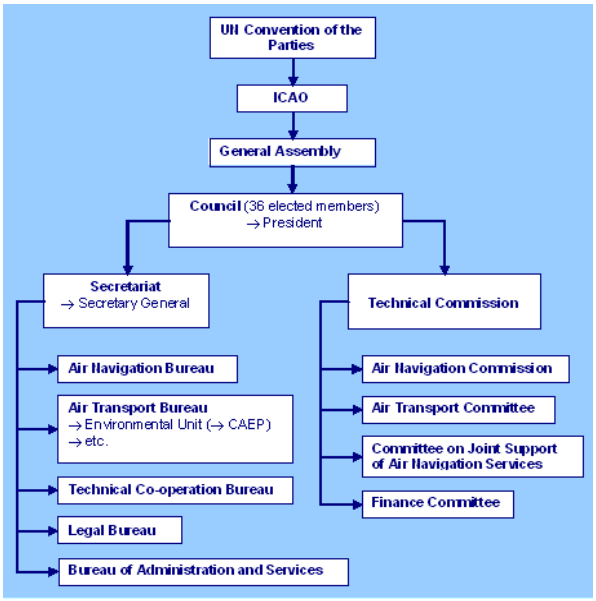
(EBAA website, http://www.ebaa.org)

There is no standard definition of business aviation. It is defined by Eurocontrol via a list of aircraft types (ICAO codes), including jet-, turboprop- and piston-engine aircrafts.

See also: Eurocontrol report on Business Aviation (http://www.eurocontrol.int/statfor/gallery/content/public/analysis/Business%20Aviation%20Study%20Doc176%20v1.0%20FINAL.pdf)

CAEP : Committee on Aviation Environmental Protection

This committee was created in 1983 within the ICAO's structure in order to tackle environmental topics related to aviation, noise and emissions. The ICAO's environmental policy is revised every three years (cf. General Assembly) and reported in a specific document called *"Consolidated Statement of continuing policies and practices related to environmental protection"*. The last version of this document is the Assembly Resolution A35-5 of 2004 (http://www.icao.int/icaonet/dcs/9848/9848_en.pdf).



from WP6 report of the ABC Impacts project

Cap and trade

The Cap and Trade system involves trading of emission allowances, where the total amount of allowances is strictly limited or 'capped' by a regulatory authority.

Allowances are created to account for the total allowed emissions.

At the end of each compliance period each entity must surrender sufficient allowances to cover its emissions during that period.

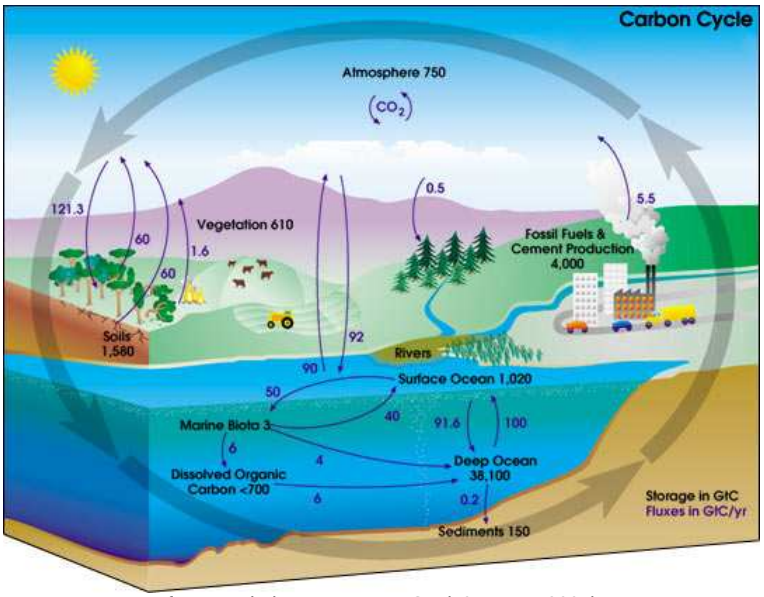
Trading occurs when an entity can reduce units of emission at a lower cost than another entity and then sells the allowance.

A Cap and Trade system is generally based on those entities included in the cap.

(CAEP, ICAO, 2006)

Carbon cycle

The carbon cycle is the cycle by which carbon is exchanged on Earth. This cycle includes exchanges between many carbon compounds: both organic and inorganic carbon. These transfers occur between the biosphere, the geosphere, the atmosphere and the hydrosphere.



from Earthobservatory - NASA (10 August 2007)

Carbon leakage

The definition of "carbon leakage" in the literature can be "strong" or "weak".

In the strong definition, the carbon leakage is equivalent to the increase of CO_2 emissions in non-Annex B countries divided by the reduction of CO_2 emissions in Annex B countries.
(IPCC, Climate change 2007: Mitigation, Contribution of WGIII to the Fourth Assessment Report, 2007)

However, this definition ignores the fact that non-Annex B emissions may raise for other reasons than only the effects of the climate mitigation mechanisms in Annex B countries (cf. flexible mechanisms, shift of production due to too strict environmental legislation in Annex B countries, etc.).
(Peters G.P. and Hertwich E.G., CO_2 embodied in international trade with implications for global climate policy, Environment Science and Technology, Accepted December 18, 2007)

In the weak definition, the carbon leakage corresponds to the CO_2 emissions embodied in imports from non-Annex B countries to Annex B countries.
(Peters G.P. and Hertwich E.G., CO_2 embodied in international trade with implications for global climate policy, Environment Science and Technology, Accepted December 18, 2007)

CC : Climate Change

Climate Change refers to "any change in climate over time, whether due to natural variability or as a result of human activity".
(IPCC)

Remark: For the UNFCCC, climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable periods. This is equivalent with the notion of "anthropogenic climate change".

CDA : Continuous Descent Approach

CDA is a method for landing designed to reduce noise exposure and fuel burn. Instead of the conventional approach, which usually occurs through stepwise reductions of the altitude, the CDA method consists of a constant descent following a given angle until the aircraft meets the instruments landing system (ILS).

CER : Certified Emission Reduction

CER is a Kyoto Protocol unit equal to 1 metric tonne of $CO_{2\text{-equivalent}}$.

CERs are issued for emission reductions from CDM project activities.

Two special types of CERs called temporary certified emission reduction (tCERs) and long-term certified emission reductions (lCERs) are issued for emission removals from afforestation and reforestation CDM projects.

(UNFCCC glossary, 17 August 2007)

CDM : Clean Development Mechanism

CDM is one of the Kyoto flexible mechanisms through which industrialised countries (Annex I countries) may finance GHG emission reductions or emissions removals (see carbon sinks) in developing countries (non-Annex I countries), and receive emissions credits (CERs) for doing so. These emission credits can then be applied to meet mandatory limits on their own emissions (cf. Annex B).

In CDM projects, credits are granted only to emissions having been reduced or removed in comparison with a baseline scenario (BAU) estimating the "normal" trend of GHG emissions in the host country.

Chicago Convention

The Convention on International Civil Aviation, also called the Chicago Convention, established the International Civil Aviation Organization (ICAO) on December 7, 1944 by 52 signatory states. It received the requisite 26th ratification on March 5, 1947 and went into effect on April 4, 1947.

Rules for air navigation, aircraft registration and security are enacted by the Convention, as well as the rights and duties of signatory countries as far as international air transport is concerned.

It should be noted that in most countries, and in accordance with the provisions of the Chicago Convention, international aviation turbine fuel is not taxed.

Cirrus clouds

A type of cloud composed of ice crystals and shaped like hair like filaments that may partly be aviation (AIC : Aviation Induced Cloudiness) induced (linear and spreading cirrus).

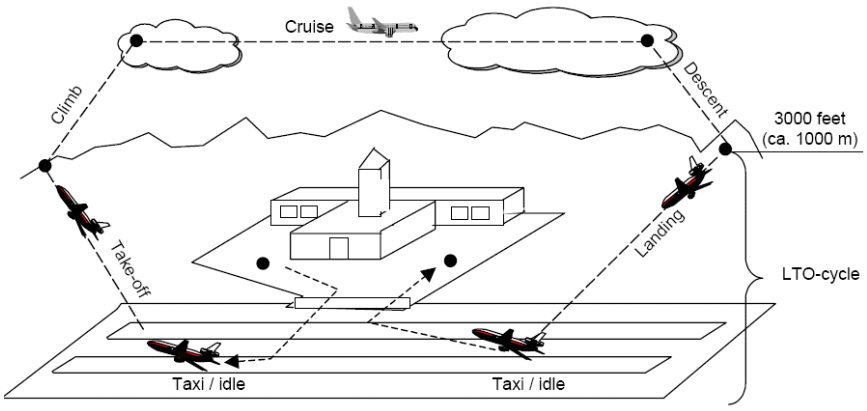
Cirrus clouds formation occurs when the meteorological conditions (i.e supersaturated air with respect to ice) are favourable for the persistence of contrails that are transformed little by little into cirrus clouds. These clouds reflect solar radiation (during the day only ; cooling effect) towards the sky but absorb infra-red radiation from Earth (day and night, warming effect). Global impact is a warming effect that is even more intensified during the night (cf. no cooling effect).

It should be stressed that most of the water in these cirrus clouds comes from layers of supersaturated air in the upper troposphere through which the aircraft fly, the effect of contrails and aerosol emissions is catalytic, creating cloud condensation nuclei. It is only recently becoming possible to model such supersaturation patterns within global and regional climate models.

Andrew Ferrone 2006

Climb

Climb designates the part of a flight of an aircraft, after take off and above roughly 914 metres (3.000 feet) above ground level, consisting of getting an aircraft to the desired cruising altitude.
(IPCC 2006, "Guidelines for National Greenhouse Gas Inventories", Volume 2: Energy, Ch3)



(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

Closed emission trading

A closed emission trading is an emission trading scheme that is designed to limit or reduce emissions within one sector only without providing access to allowances or credits outside the scheme.
(CAEP, ICAO, 2006)

Coastal state

Coastal states exercise sovereignty over their territorial sea.
Coastal states are entitled to enforce pollution control requirements that exceed MARPOL 73/78 standards only in their territorial seas and may not establish regulations that apply to the design, construction, manning, or equipment of foreign ships (Art. 21 UNCLOS).
(ICCT, Air Pollution and GHG Emissions from Ocean-going Ships: Impacts, Mitigation Options and Opportunities for Managing Growth, March 2007)

Code sharing

Code sharing refers to a practice where a flight operated by an airline is jointly marketed as a flight for one or more other airlines. Most major airlines nowadays have code sharing partnerships with other airlines, and code sharing is a key feature of the major airline alliances.
(CAEP, ICAO, 2006)

Commercial schedule

It refers to all commercial aircraft operations that have publicly available schedules, which would primarily include passenger services.

Activities that do not operate with publicly available schedules, such as non-scheduled cargo, charter, air-taxi and emergency response operations, are not included in this definition.

(IPCC 2006, "Guidelines for National Greenhouse Gas Inventories", Volume 2: Energy, Ch3)

Continental shelf

See UNCLOS

Contrails

Contrails refer to the condensation trails left behind jet aircraft.

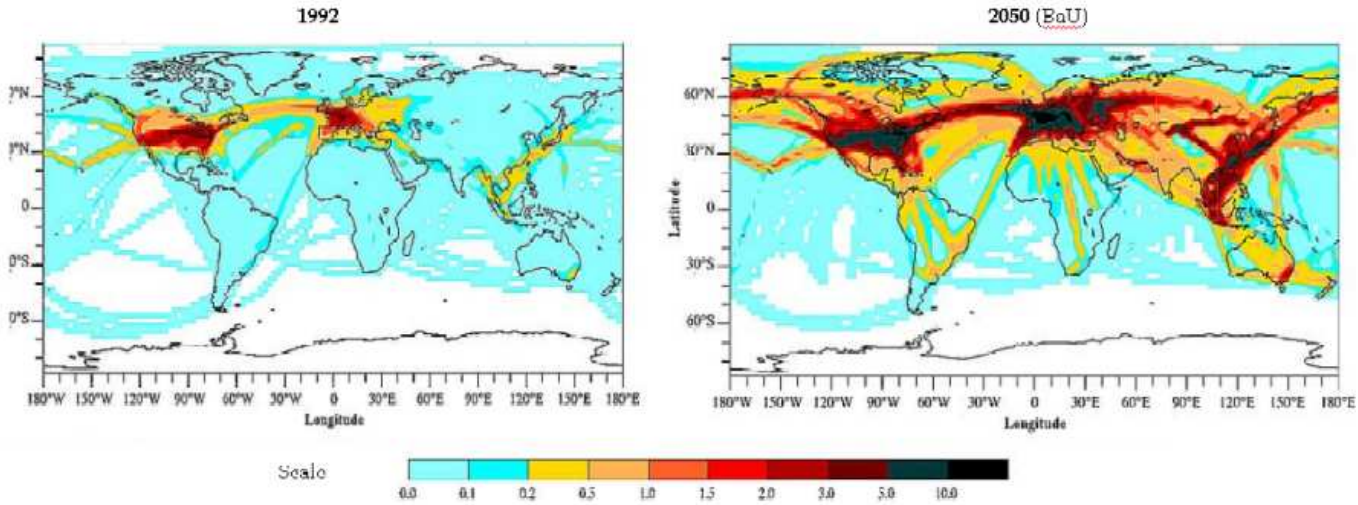
Tim Festraets 2007

Contrails form when hot humid air from jet exhaust mixes with environmental air of low vapour pressure temperature.

See also: http://profhorn.aos.wisc.edu/wxwise/AckermanKnox/chap15/contrail_applet.html. On this webpage, it is possible to "play" with a small applet to see under which meteorological conditions contrails form.

Belgium is situated right in the middle of the area in Europe where the highest air traffic is concentrated and thus where most contrails are forming. This area is expected to grow and be more intensely covered in the following years (see figure below from "Aviation and the global atmosphere", IPCC 1999).

Evolution of the contrail cover



CoP : Conference of the Parties

The CoP is one of the three specialized bodies (CoP, SBI and SBSTA) of the UNFCCC.

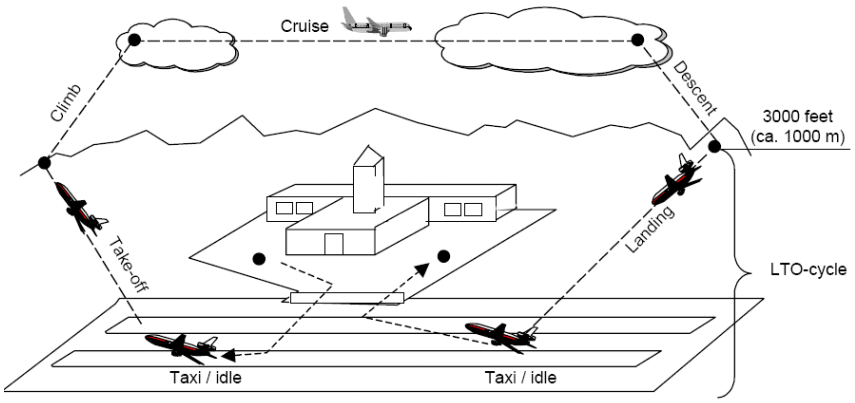
It is the association of all Parties to the Convention that meets every year and the highest decision-making authority of the UNFCCC.

It is responsible for controlling the implementation of the Convention and commitments, for reviewing national communications and emission inventories, for taking into account most recent scientific knowledge and experience gained in implementing climate change policies.

The **Bureau of the Conference of the Parties** consists of one president, 7 vice-presidents, both chairs of the Subsidiary Bodies and the rapporteur.

Cruise

All aircraft activities that take place at altitudes above 914 meters (3.000 feet), including any additional climb or descent operations above this altitude. No upper limit is given.
(IPCC 2006, "Guidelines for National Greenhouse Gas Inventories", Volume 2: Energy, Ch3)



Deforestation

Forests are called "carbon sinks", since CO_2 is removed from the atmosphere in order to increase the "green stock" through the growth of trees and plants.

Deforestation perturbs the carbon cycle (see also "Climate policy") in the way that cut down trees are no more available to capture CO_2 in the atmosphere.

Direct emissions in the transport sectors

In transport, direct emissions refer generally to emissions occurring during travel. They depend mainly on:

- the transport modes (road, rail, inland waterways, aviation, maritime transport, etc.),
- the energy sources (gasoline, diesel, electricity, natural gas, etc.)
- and the technologies used to travel,
- the behaviour of the drivers (if any) and other influencing parameters such as meteorological conditions, the age and the maintenance of the vehicle, etc.

Electric motors, for example, have no direct emissions: all emissions related to electric transport modes are indirect (see indirect emissions).

Distillation of crude oil into different fuel categories

In the distillation processing (boiling off) of **crude oil**, four broad product fractions or categories are generated:

- refinery gas (primarily methane, ethane and hydrogen),
- liquefied petroleum gas (primarily propane and butane),
- gasoline,
- and distillate fuels.

Each of these fuel categories boils at higher temperature ranges, until the oil will not boil without thermal decomposition. The nonboiling fraction is called residuum or **residual oil**.

Distillate fuels are further subdivided into several categories for specific uses.

The "lightest," or lowest temperature boiling fraction (all distillate fuels broadly overlap in boiling range) is called **kerosene**, and is used for commercial jet turbine engines fuels, for small heaters and for wick-fed illuminating lamps.

The next fraction, used during cold weather conditions for automotive or truck fuels in "compression ignition" engines, is called **"diesel" fuel**.

The next higher boiling fraction is used for residential heating furnaces, called **"home heating oil"**. This same boiling range oil is also used in warmer conditions as diesel fuel for larger land-based, on- and off-road engines, such as trucks, busses, earth moving and material lifting and moving equipment, farm equipment and railroad diesel locomotives.

The next heavier fraction supplies fuel for industrial heaters and boilers.

Finally, the "heaviest," or **highest boiling distillate fractions** are often blended with residual oil to make fuels for large steam boilers and, with fuel preheating, for very large compression ignition engines, such as ocean-going ships (e.g. IFO 180 and 380). Small and medium sized marine vessels use distillate fuels in several of these land-based categories (e.g. MDO and MGO).

(EPA, August 1999)

Domestic aviation

All traffic between two airports in one country is considered domestic no matter the nationality of the carrier (exception : technical refuelling stops or domestic trips that only allow passenger or freight to board for an international trip or leave the aircraft after an international trip. These are not considered domestic but international).
(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

Dry lease

A dry lease is a leasing arrangement in which only the aircraft is provided, without crew or maintenance guarantees.
Under a dry-lease arrangement, the aircraft is operated under the AOC of the lessee.
(CAEP, ICAO, 2006)

EEA area : European Environment Agency area

The EEA area covers the EU(27) and 5 associated countries: Iceland, Lichtenstein, Norway, Switzerland and Turkey.

EEZ : Exclusive Economic Zone

See UNCLOS

ECAC : European Civil Aviation Conference

"*Founded in 1955 as an intergovernmental organisation, ECAC's objective is to promote the continued development of a safe, efficient and sustainable European air transport system. In doing so, ECAC seeks to:*

- *harmonise civil aviation policies and practices amongst its Member States;*
- *promote understanding on policy matters between its Member States and other parts of the world.*"

(ECAC : http://www.ecac-ceac.org)

ECAC numbers 42 Member States:

EU(27), Albania, Armenia, Azerbaijan,	Bosnia and Herzegovina, Croatia, Georgia,	Iceland, Moldova, Monaco,	Norway, Serbia, Switzerland,	The former Yugoslav Republic of Macedonia, Turkey, Ukraine.

http://www.ecac-ceac.org/index.php?content=lstsmember&idMenu=1&idSMenu=10

EEI : Emissions Embodied in Imports

In the weak definition of carbon leakage, Emissions Embodied in Imports correspond to the total aggregated CO_2 flows from non-Annex B to Annex B countries.

..."it quantifies how much production in Annex B countries is to meet consumption in Annex B countries ..." or *"... how much Annex B consumption is produced in countries without binding mitigation policies in place."*

(Peters G.P. and Hertwich E.G., CO_2 embodied in international trade with implications for global climate policy, Environment Science and Technology, Accepted December 18, 2007)

EIT : Economy In Transition

EIT refers to a list of 14 countries undergoing the process of transition to a Market Economy under the UNFCCC.

Ten of those countries are members of the EU(27).

Belarus Bulgaria (EU) Croatia Czech Republic (EU)	Estonia (EU) Hungary (EU) Latvia (EU) Lithuania (EU)	Poland (EU) Romania (EU) Russian Federation	Slovak Republic (EU) Slovenia (EU) Ukraine

ERU : Emission Reduction Unit

An ERU is a Kyoto Protocol unit equal to 1 metric tonne of $CO_{2\ equivalent}$.

It is issued for emission reductions or emission removals from JI projects.

ET : Emission Trading

Emission trading is a market-based system that allows entities the flexibility to select cost-effective solutions to achieve established environmental goals (e.g. an emission ceiling).

By means of this mechanism, and in the framework of the UNFCCC and the Kyoto Protocol, Annex-I countries may sell or buy AAUs / RMUs / CERs / ERUs to or from another Annex-I country.

One of the most popular emission trading mechanism is the European Emissions Trading Scheme (EU-ETS) developed by the EU in 2003.

EU-ETS : European Emissions Trading Scheme

The European directive 2003/87/EC establishing a scheme for GHG emission allowance trading (EU-ETS) and its amending directive 2004/101/EC, the "linking directive" between the EU-ETS and the Kyoto Protocol, have established a **CO_2** emission market for **big stationary emitters** (combustion capacity greater than 20 MW) from :

- the power and heat generation industry ;
- combustion plants, oil refineries, coke ovens, iron and steel plants ;
- factories making cement, glass, lime, bricks, ceramics, pulp and paper.

The scheme started on the 1st **January 2005** and includes three main phases :

- 2005-2007 : the test period ;
- 2008-2012 : the first Kyoto commitment period ;
- post-2012 : to be defined according to international negotiations at the UNFCCC level on the extension/modification of the Kyoto Protocol after 2012.

The scheme will be regularly reviewed and each period opens opportunities to extend the scheme to other GHGs or to other emitters.

The mechanism is based on a "cap and trade" system with, during the first phase, at least 95% of emission allowances allocated free of charge to emitters according to their historical emissions ("grandfathering") and to their negotiation capacity with public authorities in charge of setting emission caps. In fact, the EU-ETS does not apply any global specific emission ceiling : it is a national-oriented system where each member state decides for each phase, in a National Allocation Plan, how to share its Kyoto target between installations taking part in the EU-ETS and the rest of its GHG emitters.

The rest of the allowances are allocated to new entrants according to a benchmark.

Each year, emitters will have to comply with their own emission cap.

Allowances can be sold on the market and bought by anyone. They can be "banked" by emitters in order to cover emissions for a coming year of a same period but it will be impossible to use allowances of one phase to cover emissions during another phase.

Member states are in charge of the establishment of a **national GHG emission registry** in accordance with specific guidelines. Emission calculations and inventories are also harmonised within the EU and in accordance with IPCC guidelines for the UNFCCC, by the EMEP/CORINAIR methodology.

(*Based on ABC Impacts WP1.1)*

the European bubble

Within the UNFCCC-Kyoto Protocol scheme, the EU(15) received a general emission reduction target of -8% in comparison with the 1990 GHG emission level (art.4 of the protocole). This is called the European Bubble.

The burden sharing (Council Decision 2002/358/EC) took place between the 15 Member States on the basis of the triptych aproach, a sector-based allocation principle including the energy sector, the industry and domestically oriented sectors.

Within those sectors, the reduction effort has been distributed according to a benchmark :

- in the energy and industry sectors, benchmarks refer mainly to energy efficiency indicators;
- while in domestically-oriented sectors, the benchmark allocates the emission allowances per capita.

Since then, the EU enlarged to ten new eastern countries, Cyprus and Malta.
While the ten new Member States negotiated each an emission reduction objective comprised between -8% and -6% in comparison with a year of reference (not necessarily 1990), Cyprus and Malta have no emission reduction target at all.

Externality

The concept of "externality" is the basis of the development of the "Economy of the environment".

An externality exists when advantages or drawbacks of a transaction between two economic agents are generated towards other economic agents without any payment or compensation therefore. A negative externality (negative monetary amount) corresponds to the depreciation of the natural stock, the well-being, the utility or satisfaction of external (to the transaction) economic agents without any financial compensation.

According to Pigou (1920), advantages and drawbacks related to externalities can be monetarised. The externalities can represent then the imbalance between the "**social cost**" and the "**private costs**" (costs borne by the two economic agents involved in the transaction): social cost = private costs + externalities.

(based on "Economie de l'environnement", Encyclopaedia Universalis, 2007)

In the environmental policy, this notion refers mainly to negative externalities such as pollution and damages to the environment and human health that are not taken into account in the market price of human activities. The existence of negative environmental externalities is the major "economic" justification for the intervention of the public sector to compensate for these market failures and is the basis for the adoption of the "polluter pays principle" (internalization of the environmental externalities).

Flags of convenience

A flag of convenience (FOC) is a flag that does not represent the country to which the vessel belongs. Some countries are attractive as flag states for foreign vessels since their registration fees are cheaper, cheap labour is permitted and taxes are either low or non-existent. Moreover the "FOC countries" ignore national and international fisheries, commercial or environmental laws. These FOC vessels are a permanent danger as they violate rules for fisheries conservation and regulations and standards concerning management, safety and labour.
(EU - DG Fisheries, October 2007)

Flag state

By definition, a flag state is the state in which a vessel is registered. On the high seas, flag states hold sole jurisdiction over ocean going vessels. In other words, ocean-going vessels on the high seas are required only to comply with globally agreed upon standards subject to enforcement by the flag state (Art. 217 UNCLOS). However, the majority of ships above 1.000 GT are registered under flags of convenience.

The flag state is required to “ensure compliance with international rules and standards” for vessels registered to it and to provide for “effective enforcement” no matter where violations occur (Art. 217). UNCLOS requires a “genuine link” between the flag state and the registered shipping company; as such, inter-national legal scholars debate whether states with “open registries,” such as Panama and Liberia, are permitted under UNCLOS.

(ICCT, Air Pollution and GHG Emissions from Ocean-going Ships: Impacts, Mitigation Options and Opportunities for Managing Growth, March 2007)

Flexible mechanisms

It is a generic term referring to the three Kyoto procedures established to reduce GHG emissions with more flexibility and lower costs:

- the **Clean Development Mechanism** (CDM),
- the **Joint Implementation** (JI)
- and the international **Emission Trading** (ET).

Annex I countries, parties to the Kyoto Protocol, may exceed their emission target (see Annex B) and offset the emissions in excess by purchasing emission credits/rights from these flexible mechanisms by means of transactions between national GHG emission registers.

Resorting to flexible mechanisms is however limited by the **“supplementarity principle”**: flexible mechanisms may only be used to supplement emission reductions obtained on the national territory through internal measures.

Fuel combustion

Fuel combustion refers to the intentional oxidation of materials within an apparatus that is designed to provide heat or mechanical work to a process, or for use away from the apparatus.
(IPCC 2006, "Guidelines for National Greenhouse Gas Inventories", Volume 2: Energy)

Fungibility

Fungibility is the inter-changeability of emission units (allowances or credits) among the mechanisms.
(CAEP, ICAO, 2006)

Gas turbine engine

In gas turbines air is first compressed and then heated by combustion with fuel in a combustion chamber and the major part of this is used for propulsion of the aircraft.

A part of the energy contained in the hot air flow is used to drive the turbine, which in turn drives the compressor.

Turbojet engines use only energy from the expanding exhaust stream for propulsion, whereas turbofan and turboprop engines use energy from the turbine to drive a fan or propeller for propulsion.

(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

GAV : Gross Added Value

GDP expressed in market prices.

GCD : Great Circle Distance

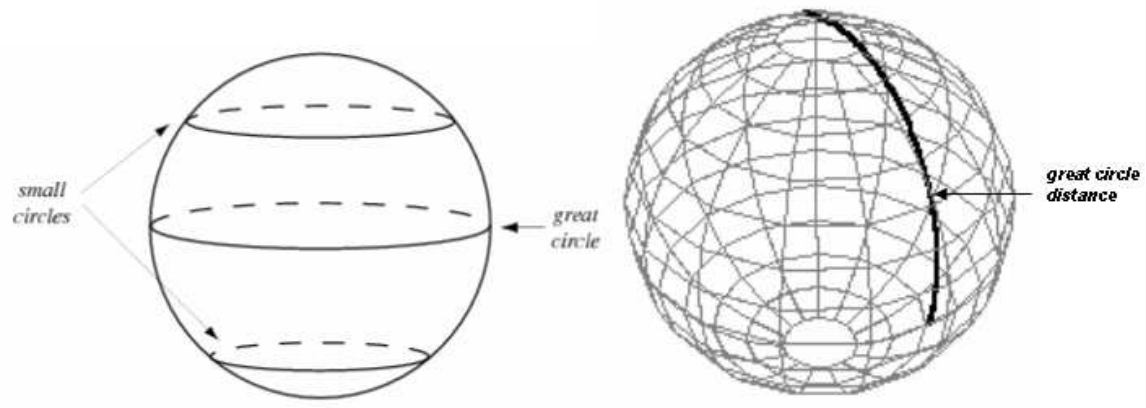
The great circle distance is the shortest distance between two points situated on a sphere.

A great circle is a section of a sphere containing the diameter of the sphere. The GCD between two points is therefore equivalent to the shortest segment in between these points on the great circle that includes both points.

For two points situated on Earth, the GCD gives an approximation of the real shortest distance between these points because the Earth is not perfectly spherical (the Earth is in fact a flattened sphere: its radius changes according to the latitude).

More information to be found on : http://mathworld.wolfram.com/GreatCircle.html

Illustration of the Great Circle Distance



(Source : Weisstein, Eric W. "Great Circle." From MathWorld—A Wolfram Web Resource)

In the aviation sector, the distances really flown between two airports is more important than the GCD mainly because of the routes that have to be followed according to the existing beacons and congestions at airports that force aircrafts to turn a certain time around their target before being authorised to land.

GDP : Gross Domestic Product

The total output of goods and services produced within a country.

Value added (gross, i.e. before deducting depreciation) of the national economy during a given period.

Changes over time are due to changes in the quantities produced (change in real GDP or GDP at constant prices) and price movements.

(BNB glossary, August 2007)

General aviation operations

It refers to all civil aviation operations other than commercial air transport operations or aerial work operations.
(CAEP, ICAO, 2006)

GHG : Greenhouse Gas

Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation.
(UNFCCC, 1992)

A gas that absorbs radiation at specific (infrared) wavelengths of the spectrum emitted by the Earth's surface and by clouds. At altitudes cooler than surface temperature, these gases emit infrared radiation. The net effect is a local trapping of part of the absorbed energy and a tendency to warm the planet's surface.

Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the principal greenhouse gases in the Earth's atmosphere.

(Giving wings to emission trading, CE Delft, 2005)

See also: Kyoto GHGs and climate change.

GPU : Ground Power Unit

Ground Power Units are connected to aircraft when on the ground. They allow the operation of energy appliances onboard without the necessity of the APU to operate. This allows reduction of fuel use and improves local air quality.

GRT : Gross Registered Tonnage

GRT is an industry term that refers to a ship's carrying capacity.

Ships of 100 metric tons GRT or greater include bulk cargo, tanker, and container ships spanning an enormous range of cargo capacity.

(ICCT, Air Pollution and GHG Emissions from Ocean-going Ships: Impacts, Mitigation Options and Opportunities for Managing Growth, March 2007)

Grandfathering

Grandfathering is an allocation methodology to share emission permits among the different actors of a market mechanism (e.g. emission trading). In this methodology, the member state allocates a well-defined amount of emission rights free of charge to an operator based on its historic activities.

GTP : Global Temperature Potential

Global Temperature Potential indicates global mean temperature change as a result of emissions of a greenhouse gas.
(CAEP, ICAO, 2006)

GWP : Global Warming Potential

Metric developed by the IPCC to compare the climate impacts of changes on emissions of long-lived, well-mixed gases to that of CO_2 over a specific time horizon.

GWP are calculated as the ratio of the radiative forcing of one kilogramme greenhouse gas emitted to the atmosphere to that from one kilogramme CO_2 over a period of time (typically 100 years).

Carbon dioxide has been designated a GWP of 1; Methane, for instance, has a GWP of 23.

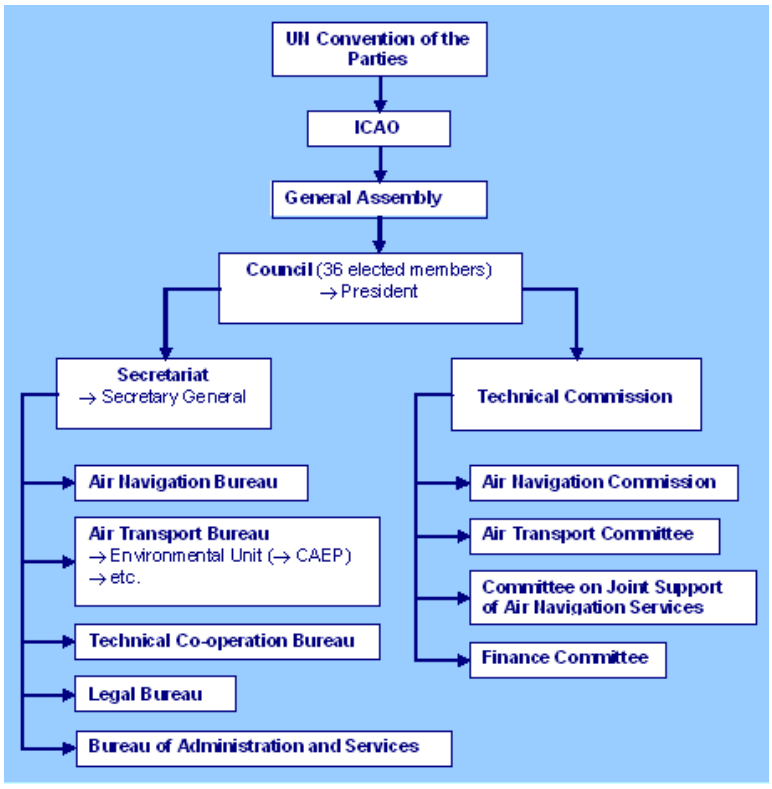
(CAEP, ICAO, 2006)

ICAO : International Civil Aviation Organization

ICAO is a specialized UN agency set up by the Chicago Convention and linked to the Economic and Social Council (ECOSOC). One of ICAO's main activities is the **establishment of international standards, recommended practices and procedures covering the technical fields of aviation**. ICAO came into being on 4 April 1947.
As regards the environment, most topics are treated and negotiated by the **Committee on Aviation Environmental Protection** (CAEP).

One of the last official documents synthesizing ICAO's environmental position is the **Assembly Resolutions in Force A35-5** (2004, http://www.icao.int/icaonet/dcs/9848/9848_en.pdf).
However, in September 2007, ICAO's General Assembly adopted a new resolution (**Assembly Resolution A36-22** http://www.icao.int/icao/en/env/sbsta-27.pdf), where ICAO asks in particular for a mutual agreement between the EU and third countries before including third country airlines in the EU-ETS. The EU and other ECAC Member States reserved their position regarding this aspect of the resolution.

ICAO's structure



from WP6 report of the ABC Impacts project

IFO : Intermediate Fuel Oil

See Marine fuels

IFR : Instrument Flight Rules

IFR refers to all flights that are flown under 'instrument flight rules', i.e. under the control of an air traffic controller. Other flights are flown under VFR : 'visual flight rules' (VFR).
(Eurocontrol)

IFR refers to a set of regulations and procedures for flying aircraft without the assumption pilots will be able to see and avoid obstacles, terrain, and other air traffic. The most important concept of IFR flying is that it allows continued flight operations in reduced visibility, during which time the ability of a pilot to physically see and avoid collision with other aircraft or obstacles is severely reduced, or even impossible.

The distance that is achieved when avoiding obstacles or other aircraft is termed separation.

In controlled airspace, Air Traffic Control (ATC) separates IFR aircraft from obstacles and other IFR aircraft by applying separation rules based on time, distance, and altitude differences between aircraft, by relying either on radar or reports of aircraft positions (traditionally sent as voice radio transmissions, but increasingly as electronic data exchanges).

ILS : Instrument Landing System

ILS is a guiding system typically used for landing in meteorological conditions resulting in reduced visibility. The system is based on a several ground-based radio signals to enable instrument approach. The ILS consists of two subsystems. One of the subsystems provides lateral guidance and the other subsystem provides vertical guidance. Most ILS installations are fitted with marker beacons, typically emitting at 75 MHz.

IMO : International Maritime Organization

IMO is a UN specialized agency aiming at developing and maintaining a comprehensive regulatory framework for shipping and its remit today includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping.

It was established in **1958** and groups up to now **167 Member States** and **3 associated members** (the Faroes Islands, Hong Kong, Macau).

Concerning the environment, topics are treated by IMO's senior technical body on marine pollution related matters, the Marine Environment Protection Committee (**MEPC**). It is aided in its work by a number of Sub-Committees, where representatives from IMO Member States and NGOs meet regularly.

After ratification at the simple majority, IMO standards of a new convention go into force and become binding once they are approved by at least 55 states that represent more than 55 percent of shipping tonnage by registered vessels, which can take many years. The modification of an existing convention is quite easier since IMO has a tacit acceptance principle, which means that the modification enters into force after a set time frame if no objection arises.

The most important environmental legislative texts adopted by IMO are the **International Convention for the Prevention of Pollution from Ships** (MARPOL 1973) and its modification Protocol (MARPOL 1978). The MARPOL 73-78 Convention is binding primarily for flag states but through the United Nations Convention on the Law of the Sea (UNCLOS), it is also binding for port and coastal states.

Several annexes have successively been added to MARPOL. The last annex, Annex VI proposed in 1997 and entered into force on 19 May 2005, aims at limiting SO_x and NO_x emissions and prohibiting deliberate emissions of ozone depleting substances (see Montreal Protocol) from ships. **GHGs are not mentioned** in this annex, nor in any other one.

- **Annex I** : Regulations for the prevention of pollution by oil ;
- **Annex II** : Regulations for the control of pollution by noxious liquid substances in bulk ;
- **Annex III** : Prevention of pollution by harmful substances carried by sea in packaged form ;
- **Annex IV** : Prevention of pollution by sewage from ships ;
- **Annex V** : Prevention of pollution by garbage from ships
- **Annex VI** : Prevention of air pollution from ships.

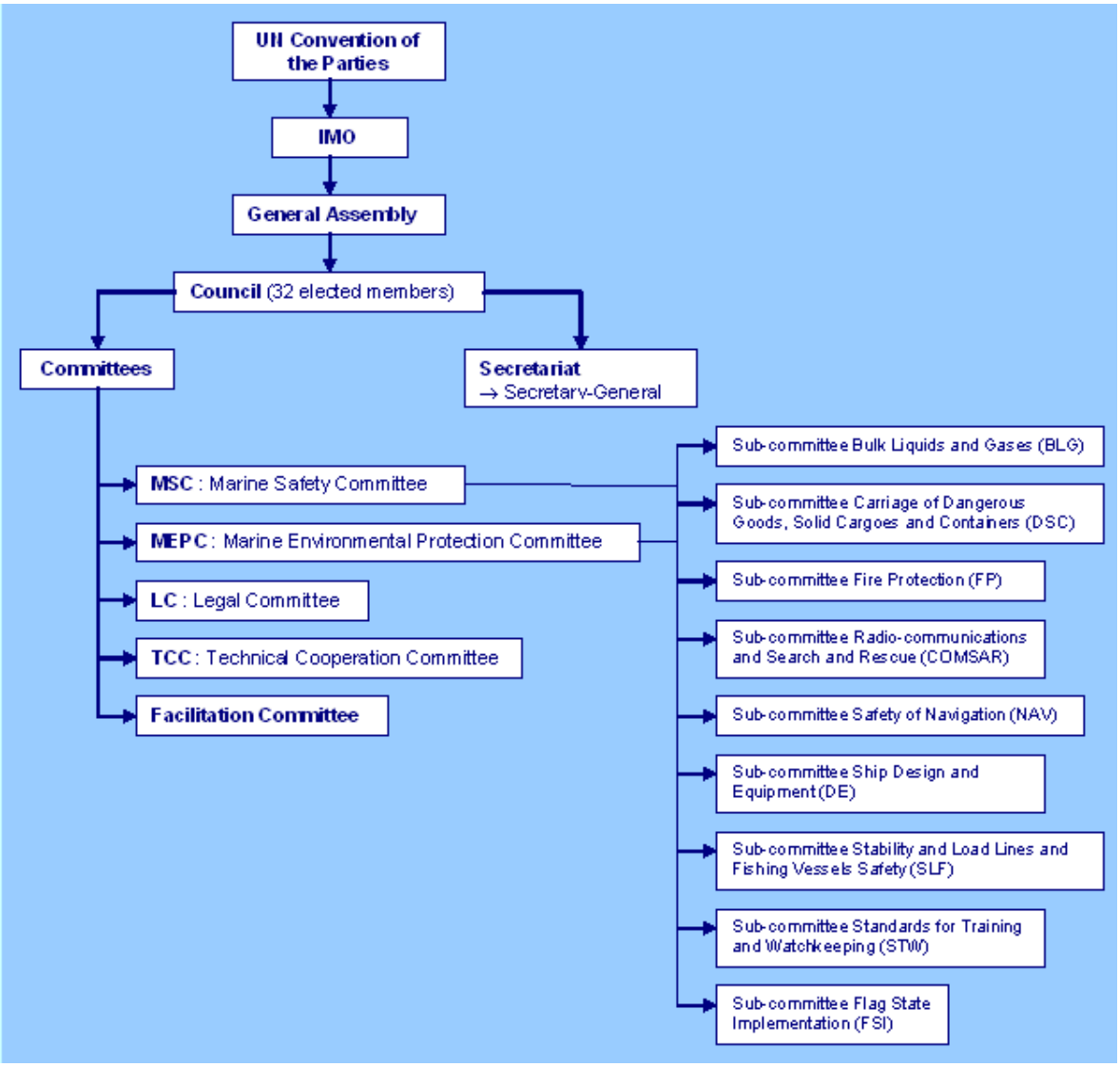
It is only in **November 2003** that IMO adopted a specific resolution on the climate impacts of ships : "**IMO policies and practices related to the reduction of greenhouse gas emissions from ships**" (resolution

A.963(23)), based on a background study (http://unfccc.int/files/methods_and_science/emissions_from_intl_transport/application/pdf/imoghgmain.pdf) . The content of this resolution focuses on the definition of an emission baseline, the methodology for monitoring GHG emissions through a GHG index, guidelines for implementing this GHG index, and the evaluation of different measures to reduce GHGs from ships.

The MEPC tried to develop in **2004** "*Draft Guidelines on the CO_2 Indexing Scheme*" in order to promote the use of a **CO_2 index per ship** (taking into account the six Kyoto GHGs according to their respective global warming potential) as a tool for environmental policies applied to ships in IMO Member States.

Interesting link: http://www.imo.org/Conventions/contents.asp?doc_id=678&topic_id=258

IMO's structure



from WP6 report of the ABC Impacts project

Indirect emissions in the transport sector

In transport, indirect emissions refer generally to emissions occurring during the extraction / production / treatment and delivery of the energy sources (electricity, fossil fuels, biofuels, hydrogen, etc.) used to run a vehicle/boat/aircraft.

Innocent passage

"Passage" means navigation through the territorial sea for the purpose of: traversing that sea without entering internal waters or calling at a roadstead or port facility outside internal waters; or proceeding to or from internal

waters or a call at such roadstead or port facility. Passage shall be continuous and expeditious. However, passage includes stopping and anchoring, but only in so far as the same are incidental to ordinary navigation or are rendered necessary by force majeure or distress or for the purpose of rendering assistance to persons, ships or aircraft in danger or distress.

Passage is **"innocent"** as long as it is not prejudicial to the peace, good order or security of the coastal State. Such passage shall take place in conformity with this Convention and with other rules of international law.

Passage of a foreign ship shall be considered to be "prejudicial" to the peace, good order or security of the coastal State if in the territorial sea it engages in any of the following activities:

- any threat or use of force against the sovereignty, territorial integrity or political independence of the coastal State, or in any other manner in violation of the principles of international law embodied in the Charter of the United Nations;
- any exercise or practice with weapons of any kind;
- any act aimed at collecting information to the prejudice of the defence or security of the coastal State;
- any act of propaganda aimed at affecting the defence or security of the coastal State;
- the launching, landing or taking on board of any aircraft;
- the launching, landing or taking on board of any military device;
- the loading or unloading of any commodity, currency or person contrary to the customs, fiscal, immigration or sanitary laws and regulations of the coastal State;
- any act of wilful and serious pollution contrary to the UNCLOS;
- any fishing activities;
- the carrying out of research or survey activities;
- any act aimed at interfering with any systems of communication or any other facilities or installations of the coastal State;
- any other activity not having a direct bearing on passage.

Internal waters

See UNCLOS

International aviation

All flights taking place between airports in two different countries (exception: technical refuelling stops or domestic trips that only allow passenger or freight to board for an international trip or leave the aircraft after an international trip. These are not considered domestic but international).
(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

IPCC : Intergovernmental Panel on Climate Change

IPCC was created in 1988 by the joining efforts of the UNEP and the WMO.

"The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.

The IPCC does not carry out research nor does it monitor climate related data or other relevant parameters."

*(*http://www.ipcc.ch*)*

The IPCC is a worldwide forum of more or less 2.500 scientists and experts who write a "state-of-the-art" report concerning the climate change issue every five years.

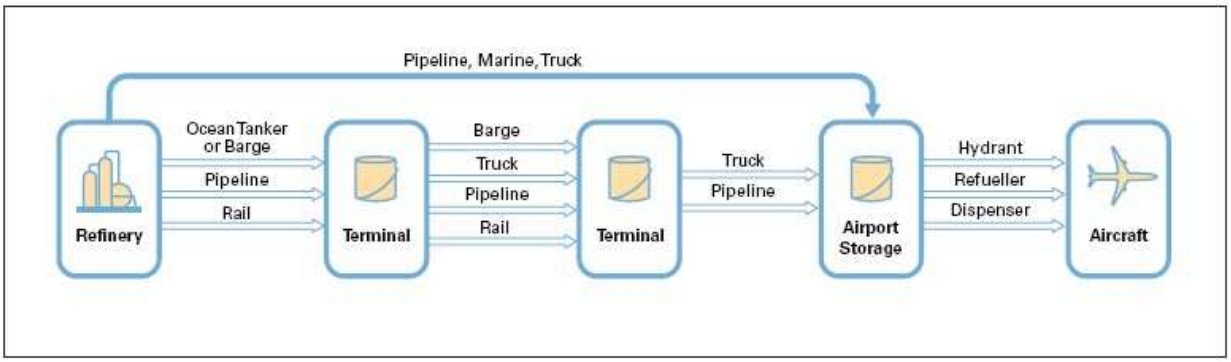
Jet fuel

Jet fuel is mainly composed of two categories of fuel used in the aviation sector:

- the jet kerosene-type
- and the jet gasoline or aviation gasoline.

Jet fuels must have specific characteristics as regards stability, storage stability, thermal stability, lubricity, fluidity, viscosity, freezing point, volatility, non-corrosivity and different other purity (absence of solid particles and water-free) and safety properties (flash point, electrical conductivity). Therefore, many additives are present in the fuel.

Figure A.1
Jet Fuel Distribution System



(Chevron Products Company, Technical review : aviation fuels, 2000)

Jet gasoline / Aviation gasoline

Fuel essentially used in the aviation sector by piston engine aircrafts.

See also: Distillation

JI : Joint Implementation

The JI flexible mechanism is based on the same principle as the CDM but in this case, the host country is a developed country (mainly Economies In Transition).

The emission credits received by the investing country are called Emission Reduction Units (ERUs).

Kyoto commitment period

The Kyoto commitment period is the period in which Annex B countries that have ratified the Kyoto Protocol have committed to reduce their collective emissions of greenhouse gases by an average of 5,2% between 2008 and 2012 compared to the 1990 emission levels.
(CAEP, ICAO, 2006)

Kyoto greenhouse gasses

The major anthropogenic GHGs identified and included in the Kyoto Protocol (Annex A) are:

- CO_2 (carbon dioxide),
- CH_4 (methane),
- N_2O (nitrous oxide),
- PFCs (perfluorocarbons),
- HFCs (hydrofluorocarbons) and
- SF_6 (sulphur hexafluoride).

Some other GHGs are covered by the Montreal Protocol (1st January 1999) on substances depleting the ozone layer.

Kyoto Protocol

The Kyoto Protocol is an international agreement standing on its own, and requiring separate ratification by governments, but linked to the UNFCCC. It sets, among other things, binding targets for the reduction of greenhouse-gas emissions (see Annex B) by industrialized countries (Annex I countries).

(UNFCCC glossary, 17 August 2007)

Parties to the Protocol have two different ways to reach their emission reduction target:

- to develop and to implement a national programme aiming at mitigating GHG emissions
- or to resort to the flexible mechanisms of the Protocol.

See also : Kyoto GHGs | Kyoto sectors | Kyoto commitment period

Documents : Kyoto protocol (http://unfccc.int/resource/docs/convkp/kpeng.pdf) and ratification list (http://unfccc.int/files/kyoto_protocol/background/status_of_ratification/application/pdf/kp_ratification.pdf)

Kyoto sectors

Beside Kyoto GHGs, **Annex A** of the protocol also lists the different categories and sub-categories of sectors covered by the emission reduction target (see Table below). Since the Marrakech Agreements, **some LULUCF activities have been added to the list**. It is important to note that **international transport by air and marine ships**, as well as different LULUCF activities were **not taken into account** in this list seeing that no common position could be reached by the Parties.

Sectors listed in Annex A of the Kyoto Protocol

- Energy
  - Fuel combustion
    - Energy industries
    - Manufacturing industries and construction
    - Transport
    - Other sectors
    - Other
  - Fugitive emissions from fuels
    - Solid fuels
    - Oil and natural gas
    - Other
- Industrial processes
  - Mineral products
  - Chemical industry
  - Metal production
  - Other production
  - Production of halocarbons and sulphur hexafluoride
  - Consumption of halocarbons and sulphur hexafluoride
  - Other
- Solvent and other product use
- Agriculture
  - Enteric fermentation
  - Manure management
  - Rice cultivation
  - Agricultural soils
  - Prescribed burning of savannas
  - Field burning of agricultural residues
  - Other
- Waste
  - Solid waste disposal on land
  - Wastewater handling
  - Waste incineration
  - Other

From Annex A of the Kyoto Protocol

LCC : Low Cost Carrier

Also know as a no-frills or discount airline, a LCC is an airline that offers low fares but eliminates most of the traditional passenger services. A LCC is usually defined by three key elements: offering of a simple product, positioning for non-business-passengers and low operating costs.

Leasing (aviation)

A leasing is a commercial arrangement whereby one party (the lessor) agrees to provide an aircraft for use to another party (the lessee).
(*CAEP*, *ICAO*, *2006*)

See also: dry lease and wet lease.

Lessee

The lessee is the party receiving an aircraft under a leasing arrangement.
(CAEP, ICAO, 2006)

Lessor

The lessor is the party providing an aircraft under a leasing arrangement.
(CAEP, ICAO, 2006)

Load factor

Load factor is the measure of how full aircraft are as a fraction of their full capacity.
For examples:

- RTK divided by available tonne-kilometres;
- the number of fare-paying passengers divided by the total number of seats on that flight (ASK).

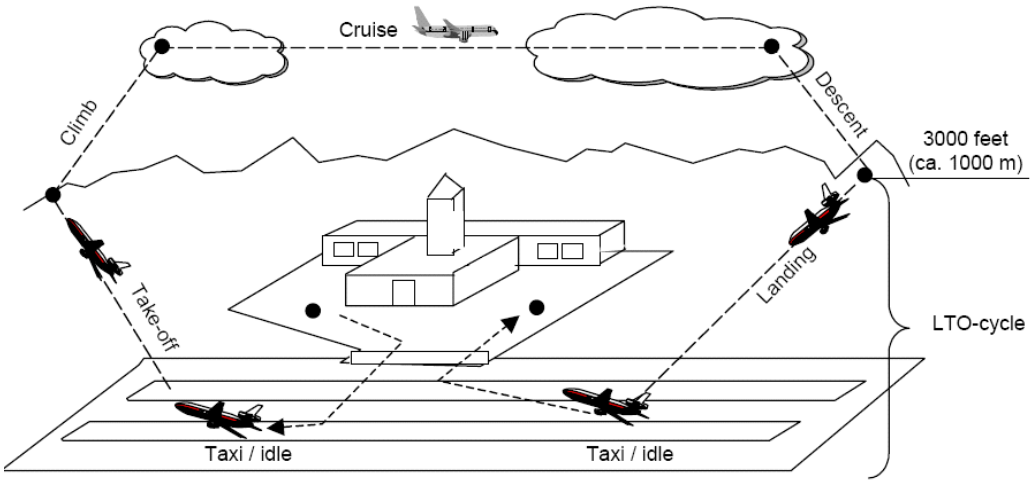
LOLO : lift on / lift off vessels

Ships, generally large ocean-going vessels, dedicated to the transport of goods that have to be loaded and unloaded with the help of a crane.

LTO : Landing and Take-Off

All aircraft activities that take place at altitudes under 914 meters (3.000 feet), including taxi-in and -out, take-off, climb-out and approach-landing.
(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

See also: LTO emissions | Taxi



(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

LTO emissions

Emissions from aircraft during the LTO phase depend heavily on :

- the type of aircraft (cf. weight, design, etc.);
- the fuel (e.g. energy density, nitrous and sulphur contents);
- the characteristics of the engines (e.g. technology, fuel efficiency according to load, etc.).

Table 8.3 Examples of aircraft types and emission factors for LTO cycles as well as fuel consumption per aircraft type, kg/LTO

Aircraft type[a)]	CO_2	CH_4	N_2O[b)]	NO_x	CO	NMVOC	SO_2[c)]	$PM_{2.5}$[d)]	Fuel
A310	4853	0.5	0.2	23.2	25.8	5.0	1.5	0.14	1540.5
A320	2527	0.2	0.1	10.8	17.6	1.7	0.8	0.09	802.3
A330	7029	0.2	0.2	36.1	21.5	1.9	2.2	0.19	2231.5
A340	6363	1.9	0.2	35.4	50.6	16.9	2.0	0.21	2019.9
BAC1-11	2147	2.1	0.1	4.9	37.7	19.3	0.7	0.17	681.6
BAe146	1794	0.1	0.1	4.2	9.7	0.9	0.6	0.08	569.5
B727	4450	0.7	0.1	12.6	26.4	6.5	1.4	0.22	1412.8
B737 100	2897	0.1	0.1	8.0	4.8	0.5	0.9	0.10	919.7
B737 400	2600	0.1	0.1	8.3	11.8	0.6	0.8	0.07	825.4
B747 100-300	10754	3.7	0.3	55.9	78.2	33.6	3.4	0.47	3413.9
B747 400	10717	0.2	0.3	56.6	19.5	1.6	3.4	0.32	3402.2
B757	3947	0.1	0.1	19.7	12.5	1.1	1.3	0.13	1253.0
B767 300 ER	5094	0.1	0.2	26.0	6.1	0.8	1.6	0.15	1617.1
B777	8073	2.3	0.3	53.6	61.4	20.5	2.6	0.20	2562.8
DC9	2760	0.1	0.1	7.3	5.4	0.7	0.9	0.16	876.1
DC10	7501	2.3	0.2	41.7	61.6	20.5	2.4	0.32	2381.2
F28	2098	3.3	0.1	5.2	32.7	29.6	0.7	0.15	666.1
F100	2345	0.1	0.1	5.8	13.7	1.3	0.7	0.14	744.4
MD81-88	3160	0.2	0.1	12.3	6.5	1.4	1.0	0.12	1003.1

(a) For CH_4 and NMVOC it is assumed that the emission factors for LTO cycles be 10% and 90% of total VOC (HC), respectively (Olivier, 1991). Studies indicate that during cruise no methane is emitted (Wiesen et al., 1994).

(b) Estimates based on IPCC Tier 1 default values.

(c) Sulphur content of the fuel is assumed to be 0.05% for both LTO and cruise activities.

(d) $PM_{2.5}$ data (= PM_{10} emissions) Source: ICAO database (ICAO 2006) and DfT PSDH (UK-DfT 2006)

For the DC8 use double the fuel consumption of the B737-100 because it is fitted with four engines instead of two. MD90 goes as MD81-88 and B737-600 goes as B737-400.

Source: Derived from ANCAT/EC2 1998, Falk (1999) and MEET 1999.

The CO_2 emissions are based on the following factor: 3.15 kg CO_2 /kg fuel.

(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

LULUCF : Land-Use, Land-Use Change and Forestry

Following specific activities related to the LULUCF sector will be the only admissible "sink" activities during the first commitment period (2008-2012) of the Kyoto Protocol:

- afforestation, reforestation and deforestation (taking into account eligibility criteria defined by the protocol);
- forest management, cropland management, grazing land management and revegetation (added to the eligible LULUCF activities by the Marrakech Agreements).

Each tonne of $CO_{2\text{-equivalent}}$ removed from the atmosphere through these eligible sink activities give a right to one Removal Unit (RMU).

Any greenhouse gas emissions from eligible activities, in turn, must be offset by greater emission cuts or removals elsewhere.

(http://unfccc.int/kyoto_protocol/background/items/3145.php)

Marine fuels

- **Residual oil**: it is the heaviest fraction of the distillation of crude oil, with high viscosity (=> pre-heating necessary => used only in large ships) and high concentration of pollutants (e.g. sulphur). Its combustion produces a much darker smoke than other fuels and it needs specific temperature for storage and pumping. Due to these drawbacks, it is also the cheapest liquid fuel on the market.
- **IFO 180** (Intermediate Fuel Oil): it is a mix of 98% of residual oil and 2% of distillate oil.
- **IFO 380** (Intermediate Fuel Oil): it is a mix of 88% of residual oil and 12% of distillate oil. Due to the higher content in distillate oil, IFO 380 is more expensive than IFO 180.
- **MDO** (Marine Diesel Oil): it mainly consists of distillate oil and has a lower sulphur content than the three fuels described above.
- **MGO** (Marine Gas Oil): it is pure distillate oil and has the lowest sulphur content.

TABLE 12. Most Common Marine Fuels (Vis 2003, BP 2004, Exxon Mobil Marine 2006, CARB 2005)

INDUSTRIAL NAME	ISO NAME	COMPOSITION	ISO SPECIFICATION SULFUR WEIGHT %	WORLD AVERAGE
Intermediate Fuel Oil 380 (IFO 380)	MRG35	98% residual oil 2% distillate oil	5%*	2.67%
Intermediate Fuel Oil 180 (IFO 180)	RME 25	88% residual oil 12% distillate oil	5%*	2.67%
Marine Diesel Oil	DMB	Distillate oil with trace of residual oil	2%	0.65%
Marine Gas Oil	DMA	100% distillate oil	1.5%	0.38 %

* IMO regulation capping sulfur at 4.5% supercedes ISO specification

(ICCT, Air Pollution and GHG Emissions from Ocean-going Ships: Impacts, Mitigation Options and Opportunities for Managing Growth, March 2007)

Maritime cultural zone

See UNCLOS

MDO : Marine Diesel Oil

See Marine fuels

MEPC : Marine Environment Protection Committee

MEPC is IMO's senior technical body on marine pollution related matters.

Its work is supported by a number of Sub-Committees.

It is only in **2003** that IMO adopted a specific resolution on the climate impacts of ships : "**IMO policies and practices related to the reduction of greenhouse gas emissions from ships**" (resolution A.963(23)), based on a background study.

In 2004, the MEPC tried to develop "*Draft Guidelines on the CO_2 Indexing Scheme*" in order to promote the use of a **CO_2 index per ship** (taking into account the six Kyoto GHGs according to their respective global warming potential) as a tool for environmental policies applied to ships in IMO Member States.

See also: IMO

MGO : Marine Gas Oil

See Marine fuels

Mitigation

In the context of climate change, mitigation is a human intervention to reduce the sources or enhance the sinks of greenhouse gases.

Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to solar energy or wind power, improving the insulation of buildings, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere.

(UNFCCC glossary, 14 August 2007)

Montreal Protocol

After the Convention of Vienna (1985), the Protocol of Montreal is the second worlwide cooperation attempt to protect the stratospheric ozone layer by reducing or even eliminating anthropogenic ozone depletion substances,

mainly halogenated hydrocarbons containing either chlorine (CFCs) or bromine (halons). Those ozone-depleting substances are also powerful greenhouse gases.

The protocol entered into force on the 1st **January 1989** and has been signed by 191 countries up to now. Since 1989, the protocol has been modified 5 times (the last time was in Beijing in 1999).

The depletion of the stratospheric ozone has as an environmental consequence that more ultraviolet-B radiation reaches the surface of the planet (inducing a higher risk of skin cancer, damage to crops and to marine phytoplankton) and that the ozone depletion interacts with the climate change process.

Unfortunately, it has now been proved that several alternative substances, HCFCs (hydrochlorofluorocarbons) and HFCs (hydrofluorocarbons), used to replace the progressively phased-out ozone-depleting substances, still have a great potential impact on the climate change. The protocol calls for a complete phase-out of HCFCs by 2030 in developed countries and by 2040 in developing countries, but does not place any restriction on HFCs up to now.

Transport was not targeted as such but many substances covered by the protocol, such as refrigerants in refrigerated vehicles for fresh goods, gases used in air conditioning systems, etc. are/were in use within the sector. A major stake in the future to reduce these would be to replace current cooling fluids by other substances or mixes of substances having a lower global warming potential.

Related documentation: text of the Montreal Protocol (http://www.globelaw.com/Climate/montreal.htm)

MoP : Meeting of the Parties

The MoP is the highest decision body of the Kyoto Protocol, as the CoP is for the UNFCCC.

However, countries having ratified the Convention but not the Protocol may attend the MoP, without any right of decision.

Since 2005, the year of the entry into force of the Protocol, CoP and MoP meetings are associated.

MTOW : Maximum Take-Off Weight

MTOW corresponds to the maximum gross weight due to design or operational limitations at which an aircraft is permitted to take off.

Narrow-body aircraft

Or single-aisle aircraft are aircraft with a cabin diameter of less than approximately 4m and a seat configuration of 2 to 6 seats per row. Typical examples of narrow-body aircraft are the A320 family and the B737 family.

NAP : National Allocation Plan

"*One of the core tasks in the run-up to the implementation of the EU-wide GHG allowance trading scheme is the elaboration of national allocation plans by Member States.*

Allocation is governed by Articles 9 to 11 and Annex III of Directive 2003/87/EC on the establishment of the EU-ETS.

Each Member State has to establish a national allocation plan for each trading period (see EU-ETS).
In this allocation plan the Member State decides :

- *the total **number of allowances** to be created for the period*
- *and the **distribution** of these allowances to individual plants.*"

(European Commission website - DG Environment)

Offset

Offset corresponds to an emission reduction achieved by undertaking a greenhouse gas emission reduction project.
(*CAEP*, *ICAO*, 2006)

A carbon offset programme aims at mitigating CO_2 emissions of one specific source by reducing CO_2 emissions from another source. The flexible mechanisms (CDM and JI) introduced by the Kyoto Protocol are the most well-known procedures to invest in carbon offset projects to obtain emission credits.

See also:
- the synthesis on Offset programmes and the aviation sector
- the study "Etude comparative des programmes de compensation volontaire des émissions de CO_2 par les passagers d'avion" (http://dev.ulb.ac.be/ceese/ABC_Impacts/documents_abc/Heughebaert_report_compensation.pdf)

Open emission trading

An emission trading system where allowances can be traded in and outside the given scheme or sector (e.g., within an emissions trading scheme for aviation, it's likely that participants would be allowed to buy allowances from sectors outside the aviation emissions trading scheme.)
(*CAEP*, *ICAO*, 2006)

Operator (aviation)

An operator is a person, organization or enterprise engaged in or offering to engage in an aircraft operation.
(*CAEP*, *ICAO*, 2006)

Party

A state (or regional economic integration organization such as the European Union) that agrees to be bound by a treaty and for which the treaty has entered into force.
(UNFCCC glossary, 17 August 2007)

See also: UNFCCC | Kyoto Protocol

Passenger unit (aviation)

One passenger unit in the aviation sector is equivalent to either one passenger or a certain amount of freight and mail.
An equivalency of one passenger per km for 100 kg of freight and mail per km is often used.
(Eurostat)

Port state

As a general rule, foreign ships enjoy no automatic right of access to ports of other nations, except in times of distress when lives are at stake or when another treaty is applicable. States have the right to exclude foreign vessels from their ports and inland waterways, and may apply national laws and regulations to foreign ships when at port.

As a result, the port state has concurrent jurisdiction with the flag state when a ship is at port. Port state efforts to regulate foreign-flagged ships are subject to certain limits. Any regulation must not be an abuse of rights, it must not seek to exercise jurisdiction over matters considered the "internal economy" of the ship, it cannot hamper "innocent passage" and it must not have the practical effect of impacting the "construction, design, equipment or manning (CDEM)" of ships (Art 21(2) UNCLOS).

(ICCT, Air Pollution and GHG Emissions from Ocean-going Ships: Impacts, Mitigation Options and Opportunities for Managing Growth, March 2007)

Raked Wingtips

Are wingtip devices that are designed to improve fuel efficiency by reducing vortices and drag.

Raked wingtips (Boeing.com, 2007)

Reciprocating piston engine

In piston engines, energy is extracted from fuel burned in a combustion chamber by mean of a piston and crank mechanism, which drives the propellers to give the aircraft momentum.

Piston engines are generally used in small aircraft and fuelled with aviation gasoline.

(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

Residual oil

See Distillation

RF : Radiative Forcing

RF is a measure (expressed in W/m²) of the influence that a factor has in altering the balance of incoming and outgoing energy in the Earth's atmosphere system and is an index of the importance of the factor as a potential climate change mechanism.

Positive forcing tends to warm the surface while negative forcing tends to cool it.

(*IPCC*)

Remark: Since RFs are measured at the moment the perturbation is present in the atmosphere, they do not take into account the fact that GHGs may have different lifetimes in the atmosphere. Scientists try to tackle this problem by using Global Temperature Potential.

RFI : Radiative Forcing Index

RFI corresponds to the sum of all the individual radiative forcings divided by CO_2's radiative forcing.
(IPCC 1999 "Aviation and the Global Atmosphere", ch 6, § 6.2.3)

RMU : Removal Unit

RMU is a Kyoto Protocol unit equal to 1 metric tonne of $CO_{2\text{-equivalent}}$.

RMUs are generated in Annex-I Parties by LULUCF activities that absorb carbon dioxide.

(UNFCCC glossary, 7 March 2007)

RORO : roll-on / roll-off vessels

RORO is a ship, generally large ocean-going vessel, dedicated to the transport of wheeled vehicles such as cars, trailers, railroad cars, etc. (e.g. ferries, cargo ships, barges).

RPK: Revenue Passenger-Kilometre

RPK refers to the number of fare-paying passenger multiplied by the number of kilometres.

RTK: Revenue Tonne-Kilometre

RTK refers to the utilized (sold) capacity for passengers and cargo expressed in metric tonnes, multiplied by the distance flown.
(CAEP, ICAO, 2006)

RTK could be one of the output indicators used for the benchmark allocation in the European proposal to include the aviation sector in the EU-ETS.

RVSM : Reduced Vertical Separation Minimum

RVSM is a measure that has been implemented to reduce the vertical separation minima of aircraft flying between flight level 290 (29000 ft) and 410 (41000 ft). This measure enhances the capacity of the airspace which might look as stimulation of the activities and of its consequent emissions. However, this measure also makes it possible to reduce the detours aircraft make to avoid each others vicinity and thus allow to reduce unnecessary emissions.

Since 1997 RVSM has been progressively implemented in large parts of the world (incl. Europe, North Africa, Southeast Asia, North America, Atlantic and Pacific Oceans).

SBI : Subsidiary Body for Implementation

SBI is one of the three specialized bodies (CoP, SBI and SBSTA) of the UNFCCC making recommendations on policy and implementation issues, and also on budgetary and administrative matters, to the CoP and, if requested, to other bodies.

The two permanent subsidiary bodies (SBI and SBSTA) giving advice to the CoP, meet in parallel at least twice a year, and jointly tackle subjects common to both areas of expertise.

SBI key tasks are to examine the information given in the national communications and emission inventories of the different Parties in order to estimate the effectiveness of the Convention, to review the financial assistance given to Non-Annex I Parties in order to help them to respect their commitments, and to give advice to the CoP on guidance to the financial mechanism.

SBSTA : Subsidiary Body for Scientific and Technical Advice

SBSTA is one of the three specialized bodies (CoP, SBI and SBSTA) of the UNFCCC serving as a link between information and assessments provided by expert sources (such as the IPCC) and the CoP, which focuses on setting policy. The two permanent subsidiary bodies (SBI and SBSTA) giving advice to the CoP, meet in parallel at least twice a year, and jointly tackle subjects common to both areas of expertise.

SBSTA's two main missions consist of elaborating guidelines for national communication and emission inventories, and promoting the development and transfer of environmentally-friendly technologies.

It also plays a role as an interface between scientific expert sources (e.g. IPCC reports) and the policy-oriented needs of the CoP.

Scheduled traffic (aviation)

It consists of all flights filing an 'S', the ICAO code for 'scheduled', in their flight plans. Typically scheduled flights operate on a regular basis (daily, weekly, …) between airports.

(Eurocontrol)

Sink (carbon)

A carbon sink is any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.

Forests and other vegetation are considered sinks because they remove carbon dioxide through photosynthesis.

(UNFCCC glossary, 8 March 2007)

Social cost

The social cost refers to all costs borne by all economic agents forming the community.

Social cost (negative monetary amount) = private costs (negative monetary amount) + externalities (negative or positive monetary amount).

(based on "Economie de l'environnement", Encyclopaedia Universalis, 2007)

Sustainability

Sustainability has very different signification in function of the context where it is mentioned.

In the environmental policy, sustainability (or sustainable development) generally refers to a *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

(UNFCCC glossary, http://unfccc.int/essential_background/glossary/items/3666.php, 12 March 2007)
In other contexts, such as the economy for example, “sustainable” often stands for “continuous”.

Tankering

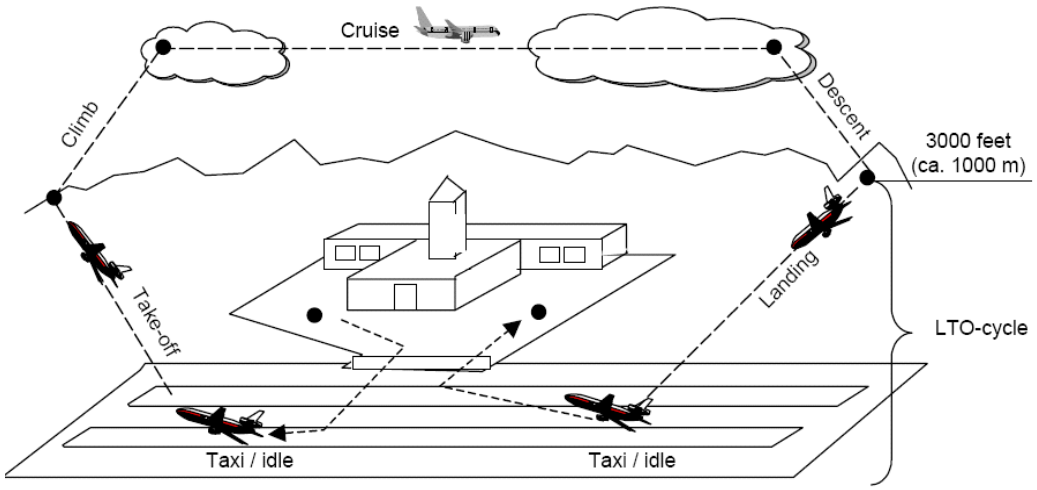
The practice of carrying more fuel than required for a particular sector of flight in order to reduce the quantity of fuel loaded at the destination airport for the following sector of the flight. Tankering can be used for technical (e.g. lack of fuel or of appropriate fuel at destination airport) or economical (e.g. different fuel prices) reasons.

Taxi (aviation)

In the aviation sector, taxi refers to specific operations during the flight phases (see figure hereafter), when the aircraft runs slowly on the airport ways (apron and so-called taxiways) to reach the take-off runway or to reach the gates.

See also: LTO | Cruise

Air taxis can also refer to aircraft activities that are quite similar to the taxi activities of road vehicles and during which an aircraft provides an on-demand service for the customer.



(EMEP/CORINAIR 2006, Emission inventory guidebook, Group 8: Other mobile sources and machinery)

Territorial waters

See UNCLOS

TEU : Twenty-foot equivalent unit

TEU is a *"standard unit for counting containers of various capacities and for describing the capacities of container ships or terminals.*

One 20 Foot ISO container equals 1 TEU. One 40 Foot ISO container equals two TEU."

(OECD Glossary of statistical terms, March 2008)

tkm : tonne kilometre

According to the U.S. Bureau of Transportation Statistics, ton-kilometres are the primary physical measure of freight transport output, and provide the best single measure of the physical volume of freight transport services. *(ICCT, Air Pollution and GHG Emissions from Ocean-going Ships: Impacts, Mitigation Options and Opportunities for Managing Growth, March 2007)*

The triptych approach

Allocation method based on a sector-based approach.

In the "European bubble" (UNFCCC), the reduction objective has been split up among:

- the energy-intensive industry,
- the power sector,
- and domestically oriented sectors.

For the two first sectors, the effort has been allocated to the Member States on the basis of a technical benchmark (energy efficiency), while for the last sector it has been done according to a certain amount of emission allowances per capita.

According to Sijm et al.(Options for post-2012 EU burden sharing and EU ETS allocation, the Netherlands Environmental Assessment Agency, March 2007), the triptych approach takes into account country characteristics but does not necessarily result in equal relative costs for all Member States.

UNCED : United Nations Conference on Environment and Development

International conference, also called the "Earth Summit", which took place in 1992 in Rio de Janeiro and where countries set up the UNFCCC.

UNCLOS : United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea was adopted in **1982** and came into force in **1994**.

It lays down a comprehensive regime of law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources. As a single instrument, it embodies the traditional rules for the use of the oceans and at the same time introduces new legal concepts and regimes and addresses new concerns. The Convention also provides the framework for further development of specific areas of the law of the sea.

(IMO website, October 2007)

UNCLOS defines major zones where different standards, rights and rules are applicable:

- **internal waters**: all waters landward of the baselines (e.g. low-water line)and all harbours (Any law in force in the country, including the common law, shall also apply in its internal waters and the airspace above its internal waters. The right of innocent passage does generally not exist in the internal waters.)
- **territorial waters**: the sea within a distance of 12 nautical miles (~22 km) from the baselines (Any law in force in the country, including the common law, shall also apply in its territorial waters and the airspace

above its territorial waters. The right of innocent passage shall exist in the territorial waters. In the territorial sea, submarines and other underwater vehicles are required to navigate on the surface and to show their flag.)
- **contiguous zone**: the sea beyond the territorial waters but within a distance of twenty-four nautical miles (~44 km) from the baselines (Within its contiguous zone and the airspace above it, the country shall have the right to exercise all the powers which may be considered necessary to prevent contravention of any fiscal law or any customs, emigration, immigration or sanitary law and to make such contravention punishable.)
- **maritime cultural zone**: the sea beyond the territorial waters but within a distance of twenty-four nautical miles (~44 km) from the baselines (Subject to any other law the country shall have, in respect of objects of an archaeological or historical nature found in the maritime cultural zone, the same rights and powers as it has in respect of its territorial waters.)
- **exclusive economic zones (EEZ)**: the sea beyond the territorial waters but within a distance of two hundred nautical miles (~367 km) from the baselines (Subject to any other law the country shall have, in respect of all natural resources in the exclusive economic zone, the same rights and powers as it has in respect of its territorial waters.)
- **continental shelf**

UNEP : United Nations Environment Programme

UNEP was created in 1972 during the UN conference of Stockholm.

UNEP's mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

(http://www.unep.org)

UNFCCC : United Nations Framework Convention on Climate Change

In 1992, during the United Nations Conference on Environment and Development (UNCED) - also called the "Rio Earth Summit" -, it was decided to sign an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), in order to tackle the phenomenon of climate change through the reduction of anthropogenic greenhouse gas emissions.

The treaty recognises the nature of a "**common resource to be protected**" to climate and the **human responsibility** related to the accumulation of greenhouse gasses in the atmosphere at a concentration level far higher than former historical concentrations. The convention aims at achieving *"the **stabilization of greenhouse gas concentrations** in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."* (UNFCCC, art.2)

The conditions for its entry into force were fulfilled on **21 March 1994**. The convention has been adopted up to now by 189 countries (by ratification, acceptance, approval or accession).

This convention is a **legally non-binding instrument** and sets **no mandatory limits** on GHG emissions, but one of the major objectives of this convention are to consider different options to reduce global warming and to cope with the potential temperature increases. The basis principle of the convention depends on the recognition of a "**common but differentiated responsibility**" and on the "**respective capabilities**" of the signatory states (Parties to the convention). The responsibility factor of a country is measured by dividing its total $CO_{2\text{-equivalent}}$ emissions by its number of inhabitants. The capability factor is measured by dividing the GDP of the country by its number of inhabitants.

It is also interesting to note that the convention points out the use of the precautionary principle in case of *"serious or irreversible damage"* and *"lack of full scientific certainty"*.

Related documentation: UNFCCC text (http://unfccc.int/resource/docs/convkp/conveng.pdf) and ratification list (http://unfccc.int/files/essential_background/convention/status_of_ratification/application/pdf/unfccc_conv_rat.pdf)

See also: Annex I countries and Economy In Transition (EIT) ; Synthesis document on International climate policy agreements (http://dev.ulb.ac.be/ceese/ABC_Impacts/glossary/sheet_climate_policy_history.php)

VFR : Visual Flight Rules

Contrarily to the IFR, the pilot is primarily or exclusively responsible for see-and-avoid.

Wet lease (aviation)

A wet lease is a leasing arrangement in which the aircraft is provided plus at least one pilot.

Under a wet-lease arrangement, the aircraft is normally operated under the AOC of the lessor.

A wet lease is typically utilized during peak traffic seasons or annual heavy maintenance checks, or to initiate new routes.

When an air carrier provides less than an entire aircraft crew, occasionally the wet lease is referred to as a *damp lease*.

(CAEP, ICAO, 2006)

Wide-body aircraft

Or twin-aisle aircraft are aircraft with a cabin diameter of more than approximately 5m and a seat configuration of more than 6 seats per row. Typical examples of wide-body aircraft are the A310, the B767, the B747 and the A380.

Winglets

Winglets are wingtip devices applied on fixed-wing aircraft with the aim of enhancing the energy efficiency of the aircraft. The winglets are designed to transform a part of the wingtip vortices into thrust. Additionally, the reduction of vortex is beneficial as it reduces turbulence for other aircraft passing by.

J Stauth, on Wikimedia (2006)

Wingtip devices

Wingtip devices include a.o.: winglets, wingtip fences and raked wingtips and are generally used to improve energy efficiency (and reduce fuel costs) of the aircraft.

Wingtip fences

Is a kind of winglet extending both under and above the wing surface with the aim to improve energy efficiency.

N. Dennis, on Wikimedia (2006)

WMO : World Meteorological Organisation

Since 1951, WMO is the specialised UN agency in charge of weather, climate, operational hydrology and related geophysical sciences.
(http://www.wmo.ch)