

International Aeronautical Emission: EU Charge of Fees

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ABSTRACT

The aviation sector is one the modern innovations in recent times. According to the Federal Aviation Authority (2005, p. 1) in 1903 the world population was estimated to be 1.6 billion, while presently the same number of people use aviation industry as mode of travel. The industry also provides around 28 million jobs and carries 40% of world carriage. But with growing concerns on environmental health, the aviation sector has significant impact on the environment. These contributions are in the form of noise and atmospheric emission. In this paper, the authors examine aviation emission and its mitigation strategy adopted by the European Union (EU).

Keywords: *Aeronautical Emission, Aviation, Aviation Industry, Emission Trading Scheme (ETS), Environment, Environmental Health*

AERONAUTICAL EMISSIONS: AN INTRODUCTION

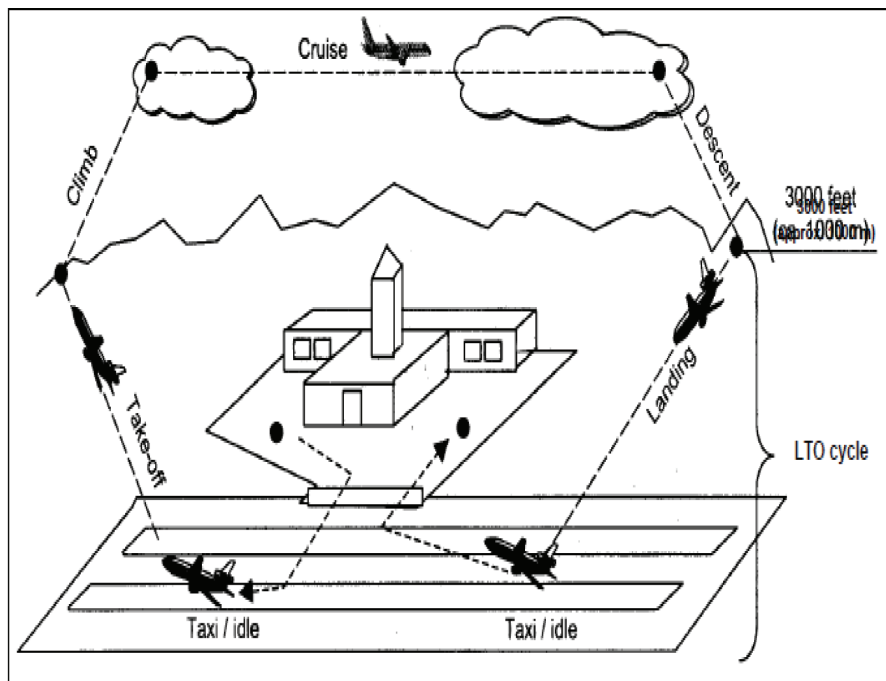
As per (Deuber, 2004, p. 26) aviation emissions can be sub divided into ground level, landing take off, climb and descent and cruise phase. A pictorial illustration of flight phases is appended in Figure 1.

During cruising, as well as at the end of the climb phase and at the beginning of the descent phase, an aircraft in international traffic flies predominantly at an altitude of between 9 and 12 km above sea level. Only supersonic aircraft fly at a higher altitude of around 17 to 20 km. Emissions from subsonic aircraft affect,

for the most part, the upper troposphere, those of supersonic aircraft the lower stratosphere. The boundary layer between both spheres, the tropopause, is also greatly affected. Ozone chemistry, in particular, reacts more sensitively to anthropogenic emissions in these spheres than at ground level. This is attributable to slower blending processes, lower temperatures and more limited background contamination. The altitude of the tropopause depends on geographical latitude, time of the year and current weather conditions. On the equator, it lies at an altitude of around 16 km, at the poles at around 8 km. The chemical composition of the spheres differs. Since this has a decisive influence on the effect of aviation emissions, the point of emission plays an important role with reference to their greenhouse gas effect. Dif-

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Figure 1. Phases of flight



ferentiation according to flight altitude and geographic latitude is of fundamental importance for effect analysis.

As per (Federal Aviation Authority, 2005, pp. 1-2), aircraft produces emissions like automobiles. The jet engine like all other types of engines produces Carbon dioxide (CO₂), Water Vapor (H₂O), Nitrogen oxides (NO_x), Carbon mono oxide (CO), oxides of Sulphur (SO_x), unburned hydrocarbons (Known as Volatile Organic Compounds (VOC)), and other compounds. These particulates and VOC are also known as Hazardous Air Pollutants (HAPs). The exhaust of a jet engine comprise mainly of CO₂ (approximately 70%), H₂O (Under 30% approximately) and under 1% of other combustion by products. These byproducts produced are generally considered as Green House Gases. As per the estimates about 10% of all types of aircraft emissions except CO and VOC. The bulk of aircraft emissions approximately 90% occur at high altitude. Aircrafts are not the only

source of emission the ancillary ground support equipment (like Ground Power Units etc) and other associated airport transportation are also a source of emissions. The impacts aviation emissions on environment are illustrated in Figure 2.

The recent growth of air travel is also one of the eye raiser of environmental aspects of aviation sector. As per (United States Department of Transportation, 2002) 21.5% increase in population, 32% increase in labor force and 90% increase in GDP are the driving factors for growth in demand of air travel. In strategic terms the demand of air travel will be on the rise in preceding years which also means rise in aeronautical emissions.

As per (Federal Aviation Authority, 2005, pp. 3-4) aviation sector has developed significantly during last few decades. The shift from heavy piston engines to powerful jet engines and then evolution in fuel efficiency has been significant. As per (Wickrama, 2003), by 2020

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