

## Air

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### Reduction of air pollutants

Aircraft unavoidably emit air pollutants, primarily from burning fuel. But despite steadily growing air traffic volumes, the fuel consumption situation is definitely getting better.


Aircraft turbines utilize fuel more efficiently than any other kind of engine, and they will continue to improve. In recent years, both fuel consumption and emissions of carbon monoxide and hydrocarbons have been dramatically reduced. New engine designs will also cut down on nitrogen oxide emissions.

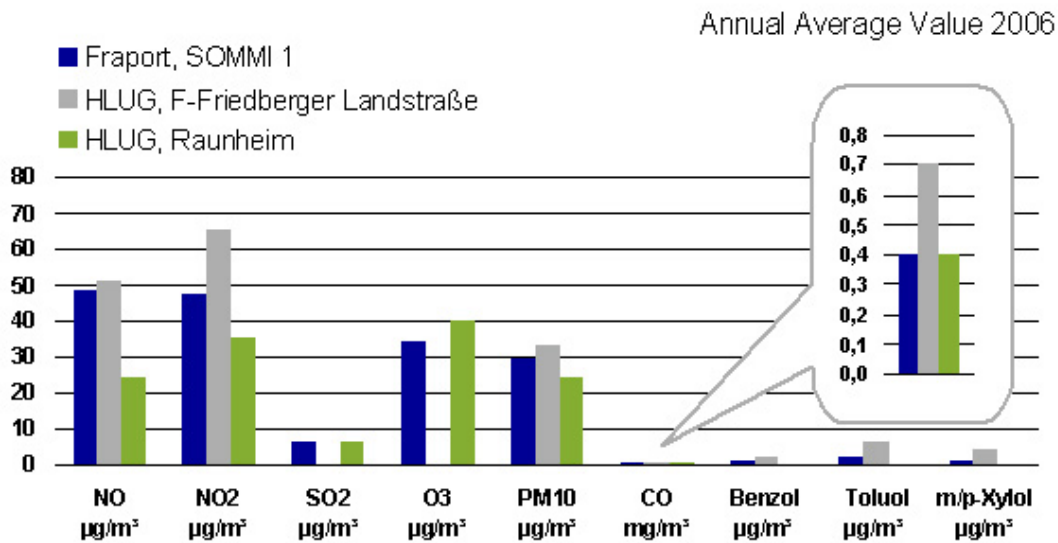
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#### Emission of pollutants and air quality

Exhaust emissions from aircraft engines consist primarily of injected air (90%), carbon dioxide (about 7%) and water vapor (about 3%) - all of which are component parts of the natural atmosphere. In addition, emissions contain less than one percent of pollutants such as carbon monoxide, nitrogen oxides, sulfur dioxide, hydrocarbons and soot in total. The quantities of these pollutants emitted by airplanes are determined annually and documented in the environmental statement  (231 KByte). In the next step the immission contribution of the airport will be mathematically identified by computerized models of the dispersion of pollutants.

A positive indicator is the fact that the pollution levels measured at the airport are no higher than in surrounding urban areas — although the number of flight movements has been increasing steadily. The levels are now even below the strict, precautionary ceilings imposed by the 22nd German Pollution Control Ordinance, which do not apply to the airport premises themselves. Nor do flight operations contribute more than low to ground-level ozone, which can form from nitrogen dioxide.

**Annual average values of 2006 at the stationary installation for air measure SOMMI 1 in comparison with the corresponding data of double installations of the Hesse State Agency for Environment and Geology (source: data of the  HLUG (<http://www.hlug.de/>) "air hygiene annual report" for 2006).**



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The location of the station on the Friedberger Landstrasse is considered to be a traffic nexus, so no SO<sub>2</sub> or ozone is measured there. Because the Raunheim station is in a designated urban area, no benzene, toluene or xylene is measured there.

The results show that the concentrations of relevant air pollutants at the SOMMI 1 airport station are comparable with those measured at the HLU stations. The levels are between those at the traffic nexus and those characteristic of urban areas. Even the concentrations of typical pollutants emitted by motor vehicles, such as NO, NO<sub>2</sub>, benzol, toluol and xylol, are lower than at the HLU station on the Friedberger Landstrasse, a heavily frequented road — despite the fact that nearby motorways also greatly expose the SOMMI 1 site to the effects of motorized traffic.

### Extensive monitoring projects

Our environmental protection program has already included extensive measurement projects conducted jointly with the Federal Environmental Agency and the Hessian Agency for the Environment and Geology. They have included measurements of emissions from aircraft engine in a test cell and measurements of exhaust gases in the wake of taxiing aircraft.

In 2002 the Fraport AG installed two air quality monitoring stations at the airport premises for the continuous monitoring of the local air quality. At an additional monitoring station at the border of Kelsterbach the development of immissions of the most important component, nitrogen dioxide, can be traced in a near residential area, which is affected by automobile traffic and by air traffic.

The results of these evaluations are annually published in a "air quality report", which we provide for download listed below. These Reports are only available in German.

- Air Quality Report 2006  (324 KByte)
- Air Quality Report 2005  (534 KByte)
- Air Quality Report 2004  (2.467 KByte)
- Air Quality Report 2003  (445 KByte)

- Abridged Air Quality Report 2002/2003  (85 KByte)

### **Fuel dumping only in exceptional cases**

In public discussions it is often presumed that aircraft discharge fuel before landing thus causing air pollution. However, this so-called "fuel-dumping" is only practiced in rare emergencies and at considerable altitudes over unpopulated areas.

Fuel can only be dumped by long-haul aircraft with the necessary technology for doing so. This procedure is only used when such a fully fuelled aircraft has to return to the airport due to an emergency or a malfunction. The fuel is dumped in order to reduce the landing weight and thus to reduce the strain on the braking system. In the event of an emergency landing the risk of fire can be reduced.

In order to carry out the fuel dumping procedure only solitary and sparsely populated regions assigned by the German Air Traffic Control (DFS) are approached. High performance pumps "swirl" the kerosene in great altitudes into fine droplets. The by far greatest part of these droplets doesn't sink to the ground, instead it still evaporates in the upper air layers and is partly converted into water and carbon dioxide. In the years 2000 to 2005 a total of 22 incidents of fuel dumping were registered above the Hessian territory.




In wet weather there are frequently clearly visible swirls behind the aircraft wings, which consist solely of condensed water vapour. This effect is often confused with fuel dumping.

### **Effects on the climate**

#### **Air traffic and climate protection - a research topic**

The effects of anthropogenous emissions on the global climate are still being studied. Besides carbon dioxide (CO<sub>2</sub>), water vapour, methane, nitrogen oxides, particles and sulfur compounds are involved in the complex processes that can produce long-term atmospheric warming. While the significance of the various influencing variables is still partly controversially discussed, the particular role of (CO<sub>2</sub>) as a greenhouse gas is by now held assured.

In spring-time 2007 the intergovernmental group of experts for climate matters IPCC (Intergovernmental Panel on Climate Change) concluded their latest investigation. Involved among other things was the German Aerospace Center  (DLR ([http://www.dlr.de/desktopdefault.aspx/tabid-3432/3681\\_read-7363/](http://www.dlr.de/desktopdefault.aspx/tabid-3432/3681_read-7363/))).

Based on model calculations, air traffic is estimated to account for currently 3 percent of all climatically relevant anthropogenous emissions.

