



**ENVIRONMENTAL REPORT
2005**

A MODERN FLEET SAVES THE ENVIRONMENT

Finnair takes environmental perspectives into account in all its activities. In this way, the company ensures sustainable, profitable growth also from an ecological standpoint. Finnair operates within the fragile, unique nature of the North, which requires a high standard of environmental activity.

In 2005 the international debate on climate change and the role of air transport gained impetus. Due to the global nature of air transport and to ensure common game rules for operating, Finnair considers it important that targets and measures to reduce air transport emissions apply to airlines all over the world.

The average age of the Finnair fleet is only 4.4 years. As a result of its advanced technology and light structures, a modern fleet saves fuel and reduces emissions. Economic flying methods and direct route selection mean that the environment is being taken into account better than ever before.

International guidelines and cooperation

In all its activities Finnair adheres to current environmental legislation and the environmental protection principles of the International Civil Aviation Organisation ICAO. As a member of the International Air Transport Association IATA, the company is also committed to reducing the environmental effects of its operations in an economically reasonable way without jeopardising air safety. In addition to legislation and international commitments, the well-being of the environment requires, even so, that the airline engage in its own active work.

Towards Europe's most eco-efficient fleet

International air traffic is forecast to grow further in the future. In terms of competitiveness and the environment, it is therefore important to operate with a fleet that loads the environment to the minimum possible extent. A modern fleet is the fastest, most effective way to reduce environmental impacts. The artificial taxes and fees proposed in the public debate would impose a burden on airlines and in reality would put a brake on environmentally positive investments.

Finnair has systematically continued its fleet modernisation programme. The company announced in December 2005 that it will replace its present Boeing MD-11 long-haul fleet with Airbus A340 and A350 aircraft by spring 2012. The kerosene consumption of these types of aircraft is nearly 30 per cent lower than on the Boeing MD-11s. At the same time, the emissions from the new aircraft are also lower.

By next summer, Finnair will have one of the most modern fleets in Europe when the Embraer 170 aircraft replace the Boeing MD-80s. Of the Airbus A320 series aircraft used on European trunk routes, most were built during the current decade and their engines also fulfil future emissions criteria. The fleet's economic fuel consumption and low carbon dioxide emissions support Finnair's efforts to meet the emissions targets set for air transport.

Environmental work on and off the ground

In 2006 the greenhouse emissions of Finnair's aircraft will fall further as the fleet is modernised with the 76-seat Embraer 170 and the 100-seat Embraer 190 aircraft. Key figures describing environmental efficiency, such as fuel consumption and carbon dioxide emissions per passenger kilometre, will improve.

Finnair Technical Services, which carries out aircraft maintenance and repairs, was granted a new environmental permit in December 2005. The Technical Services area is facing a major buildings project as work on an eighth aircraft hangar begins. In the design of the hangar, special attention has been paid to, among other things, energy saving solutions. The ground equipment used by Finnair is also being modernised with the acquisition of low-emission vehicles.

FINNAIR FLEET - NOISE VALUES

Fleet renewal enables noise prevention

The Finnish Civil Aviation Administration is in charge of noise management at Finnish airports. The goal is for the smallest possible number of people to be affected by aircraft noise, and central to reaching this goal is to plan land use close to airports so that as little housing as possible exists in the vicinity of takeoff and approach routes.

For its own part, Finnair is responsible for decreasing the effects of noise by renewing its fleet and optimizing its takeoffs and approaches from a noise perspective. The newest members of the Finnair fleet, the Embraer 170s the first of which arrived in September 2005, already meet the stricter noise limits set for the future. The Embraer 170s are 76-seat aircraft especially suited for regional traffic. They have a significantly lower takeoff weight than the Boeing MD-80s. This factor together with their new engine technology results in a lower noise levels.

Noise certification standards for aircraft are determined by the International Civil Aviation Administration ICAO. Noise measuring points are located beneath the takeoff and landing routes as well as at specific locations on the side of the runway. Noise limits for each measuring point are determined on the basis of the aircraft's maximum takeoff weight.

Aircraft type	Engine type	Noise category	Takeoff noise/ ICAO noise limit	Sideline noise/ ICAO noise limit	Approach noise/ ICAO noise limit
MD-11	GE CF6-80C2D1F	chapter 3	94.7 / 102.3	96.2/1018	104.1 / 105.0
B757-200	P&W 2040	chapter 3	87.3 / 93.7	94.4 / 98.2	98.1 / 101.8
B757-200	P&W 2040	chapter 3	89.7 / 94.1	94.2 / 98.4	98.1 / 102.0
A319-112	CFM56-5B6/2P	chapter 3	83.4 / 90.9	93.0 / 96.4	94.7 / 100.2
A320-214	CFM56-5B4/2P	chapter 3	83.6 / 91.3	94.1 / 96.7	96.0 / 100.4
A320-214	CFM56-5B4/2P	chapter 3	84.9 / 91.6	93.9 / 96.9	96.0 / 100.6
A321-211	CFM56-5B3/2P	chapter 3	86.4 / 92.2	97.9 / 97.2	97.0 / 100.9
A321-211	CFM56-5B3/2P	chapter 3	88.3 / 92.6	97.6 / 97.5	97.0 / 101.1
MD-82	P&W JT8D-219	chapter 3	87.7 / 90.8	97.2 / 96.3	92.9 / 100.1
MD-82	P&W JT8D-219	chapter 3	88.6 / 91.0	97.1 / 96.5	92.9 / 100.2
MD-82/83	P&W JT8D-219	chapter 3	90.8 / 91.4	97.2 / 96.7	93.7 / 100.5
ATR 72	P&W124B	chapter 3	86.5 / 89.0	84.7 / 94.0	94.1 / 98.0
Embraer 170	GE CF34-8E5	chapter 3	84.1 / 89.0	92.3 / 94.2	94.9 / 98.2

Table 1. Finnair's aircraft types, engine types, noise certification classes, noise certification values and ICAO noise certification limits at different measuring points. Values in EPNdB (effective perceived noise). The noise values of the same aircraft type may differ due to different take-off weights.

AIR TRAFFIC EMISSIONS

In 2005 Finnair's fleet green house gas emissions, especially for nitrogen oxides, uncharacteristically increased because due to the fleet renewal process, Boeing MD-80s were operated on short domestic flights. This aircraft type is being retired from Finnair's fleet in the summer of 2006 and it is being replaced with new Embraer 170 aircraft which have low emissions levels. Total fuel consumption went up by 7.5 percent because the Boeing MD-11 fleet grew by a seventh aircraft and the number of long-haul operations by this fleet increased.

Starting from autumn 2006, emissions are expected to drop significantly as the MD-80s are retired. Finnair also decided in December 2005 to replace the MD-11 fleet with new Airbus A340s and A350s starting from 2007. Especially the A350s represent brand new, more ecological technology.

In aircraft engine emissions, figures for nitrogen oxides, unburned hydrocarbons, carbon monoxide and carbon dioxide are reported. Fuel consumption, number of operations as well as performance in revenue passenger kilometres (RPK) and revenue tonne kilometres (RTK) are also reported. Revenue tonne kilometres include the combined mass of passengers, baggage and cargo as well as the distance travelled. The figures are calculated for the Finnair scheduled traffic and leisure traffic fleet.

	Number of operations	Nitrogen oxides tonnes	Unburned hydrocarbons tonnes	Carbon monoxide tonnes	Carbon dioxide tonnes	Fuel consumption tonnes	Flight time hours
Year 2003	94 000	7 100	510	3 620	1 710 000	547 000	176 000
Year 2004	79 000	7 200	500	4 020	1 730 000	552 000	171 000
Year 2005	71 000	7 800	540	4 250	1 860 000	594 000	167 000
Change 04/05	-10.3%	8.4%	8.5%	5.6%	7.5%	7.5%	-1.4%

Table 2. Number of flights, engine emissions, fuel consumption and total flight time from 2003 through 2005 including relative change from previous year.

	Million passenger miles	Nitrogen oxides g/RPK	Unburned hydrocarbons g/RPK	Carbon monoxide g/RPK	Carbon Dioxide g/RPK	Fuel consumption g/RPK
Year 2003	12 900	0.55	0.033	0.28	133	43
Year 2004	15 000	0.48	0.033	0.27	115	37
Year 2005	15 600	0.50	0.034	0.27	119	43
Change 04/05	3.8%	4.5%	4.6%	1.8%	3.6%	3.5%

	Million tonne kilometres	Nitrogen oxides g/RTK	Unburned hydrocarbons g/RTK	Carbon monoxide g/RTK	Carbon dioxide g/RTK	Fuel consumption g/RTK
Year 2003	1 420	5.0	0.36	2.5	1 200	384
Year 2004	1 680	4.3	0.29	2.4	1 030	324
Year 2005	1 770	4.4	0.30	2.4	1 050	336
Change 04/05						

Table 3. Emissions from air traffic compared with revenue passenger kilometres (rpk) and with revenue tonne kilometres (rtk) from 2003 through 2005.

VOLATILE SOLVENT EMISSIONS

Finnish environmental authorities have set a maximum emissions level for VOCs (volatile organic compound) in aircraft repair and maintenance of 31.8 t/a. Finnair Technical Services already comes under this level but it works actively towards lowering VOC emissions even further. Main target areas in coming years are aromatic and halogenated hydrocarbons. Special focus is being placed on cutting halogenated hydrocarbon emissions from paint solvents and trichloroethylene by as much as possible.

	Aliphatic hydro-carbons kg	Aromatic hydro-carbons kg	Ketones kg	Alcohols kg	Halogenated hydrocarbons kg	Misc. solvents kg	Total Year 2005 kg	Total Year 2004 kg	Total Year 2003 kg
Paints									
Paint removers					3 000		3 000	6 000	5 000
Adhesives						360	360	400	700
Solvents		190	670	1 680		4 320	6 860	7 650	5 500
Anticorrosion agents	800						800	750	500
Cleaning agents	400					500	900	300	400
Mineral oil solvents	2 910	200			260		3 370	3 430	4 000
Trichloroethylene					3 256		3 256	2 050	1 100
Total	4 110	390	670	1 680	6 516	10 360	23 726	25 580	21 000

Table 4. Solvent emissions in the Finnair technical area in 2005 and the respective figures for 2003, 2004 and 2005. The table shows both the type of solvent and the source of emissions.

GROUND EQUIPMENT FUEL EMISSIONS

Table 5. The emissions from Finnair's ground equipment at Helsinki-Vantaa Airport from 2003 through 2005 in tonnes. The carbon dioxide emissions have been calculated directly from fuel consumption on the basis of rates give by fuel suppliers. Finnair has approximately 900 ground equipment vehicles.

Ground support equipment at other domestic stations produced about 4% emissions.

	2005 / tonnes	2004 / tonnes	2003 / tonnes
Carbon dioxide (CO₂)	1 458	1 448	5 090
Carbon monoxide (CO)	28	27	29
Hydrocarbons (HC)	7.5	7.4	7.6
Nitrogen oxides (NO_x)	23	23	23

WASTE

FINNAIR CATERING AND CABIN SERVICE

Waste from catering and cabin services is managed by Finnair Catering. On flights to Helsinki, aluminium, glass and some plastics are sorted in the cabin. Finnair Catering implements the ISO 14001 environmental management system.

The amount of unsorted waste grew in 2005 which was due to the increasing of Finnair traffic and especially to increase in the amount of waste coming from outside the EU. Waste from outside the EU is classified as problem waste which must be either burned or dug deep underground.

	Total 2005 tonnes	Total 2004 tonnes	Total 2003 tonnes
Unsorted Waste	1 265	1 198	1 914
Biodegradable waste	66	61	51
Energy waste	199	210	186
Glass	253	258	229
Cardboard	107	203	155
Paper	282	305	372
Plastic (recyclable)	13	4	7
Aluminium (total)	31	33	20
Metals	25	15	12
Exploitable waste total	980	1 089	845
Total	2 251	2 287	2 759
Exploitability %	43.5	47.6	30.6

Table 6. Waste volumes from Finnair cabin services and Finnair Catering by category from 2003 through 2005.

WASTE FROM AIRCRAFT MAINTENANCE

Finnair Technical Services maintains not only the Finnair fleet but also their customer airlines' aircraft. The target is to keep the sorting and recycling rate of waste at a high level.

A large amount of problem waste is produced in aircraft maintenance. The collection and disposal of this waste is done responsibly by the Technical Services storage organisation. These activities are also controlled by strict environmental authority permits.

Finnair Technical Services has been developing and specifying its waste reporting in 2005 and this development will continue. Retrieving of energy waste began in the Technical area at the end of 2004. Thanks to this, the previously reported figures for municipal waste have been expanded upon.

Waste	Waste in 2005 tonnes	Waste in 2004 tonnes	Waste in 2003 tonnes
Ultrafiltration concentrate	19.0	22.9	13
Metallic hydroxide sediment	2.5	1.4	1.4
Cleaning solvent	19.5	19.2	32
Waste oil	105.5	105.7	64
Waste adhesives and paint	23.0	13.2	34
Paint thinner	1.72	10	10
Other waste solvent	3.0	16.4	15
Items containing heavy metals, such as batteries	16.9	18.9	1
Dust from plastic blasting equipment	6.3	8.0	5.8
Electronics waste	2.0	1.1	0.8
Scrap metal	83.0	86.5	58.7
Tires	11	17.8	11
Cardboard	26.6	26.0	30
Paper	5.2	5.0	70
Biodegradable waste from personnel canteens	74.8	59.8	38
Energy waste	85.7		
Unsorted waste	84.0		
Packaging material waste	11.6		
Construction waste	29.9		
Municipal waste		306.6	260

Table 7. Waste produced in aircraft repair and maintenance from 2003 through 2005.

CONSUMPTION

WATER COMSUMPTION

Finnair aims to contribute to the decrease in water consumption by training and giving guidelines to personnel. Wastewater quality is regularly monitored and is controlled by environmental authority permits.

Finnair Technical Services are responsible for approximately 50% of the water consumption described in table 9. The share of Finnair Catering has dropped to under 25%. This is because working methods at Finnair Catering's dish washing department have been rationalised in 2005. Catering equipment from aircraft are now washed with one big dish washing machine instead of the previous two. The use of only one machine has significantly reduced water, electricity and detergent consumption.

Aircraft de-/anti-icing fluids create a dominant share of the wastewater burden at Finnair. This consumption can be seen from table 12.

The quality of wastewater is controlled by samples taken from three different points. In addition, the treatment quality of wastewater containing cadmium is controlled separately.

Year	Water consumption (m3/a)
2005	108 000
2004	115 000
2003	113 000

Table 8. Water consumption by Finnair facilities at Helsinki-Vantaa Airport from 2003 through 2005.

GROUND EQUIPMENT FUEL CONSUMPTION

The use of heating oil has increased because the use of machinery using this type of fuel has been increased. Heating oil causes fewer carbon dioxide and nitrogen oxide emissions than equipment using diesel fuel.

	2005 / litres	2004 / litres	2003 / litres
95E gasoline	69 000	79 000	80 000
Diesel	484 000	507 000	537 000
Heating oil	1 260 000	1 250 000	1 290 000

Table 9. The volumes of liquid fuels used by Finnair's ground support equipment from 2003 through 2005.

HEATING FACILITIES

Thermal energy consumption at Finnair facilities is greatly affected by the heating of large aircraft hangars in the winter. Opening the doors of the hangars makes a great impact on thermal energy consumption. A significant amount of energy can be saved if several aircraft can be moved in to the hangar at one time. Outside temperature also greatly influences consumption figures.

Year	Consumption of thermal energy in Finnair facilities MWh
2005	55 000
2004	59 000
2003	63 000

Table 10. Consumption of thermal energy in Finnair facilities from 2003 through 2005.

ELECTRICITY CONSUMPTION

Energy consumption measures especially at Finnair Catering and Finnair Technical Services have resulted in the decrease of electricity figures for 2005.

Year	Electrical Energy Consumption at Finnair, MWh
2005	54 800
2004	58 200
2003	55 300

Table 11. Electrical energy consumption at Finnair from 2003 through 2005.

INCOMING MATERIAL FLOWS

In 2005 a very strong environmental viewpoint was taken into the assessment de-/anti-icing fluids. The emphasis has been on the Nonylphenol polyethoxylates (NPE) contained in many thickened (Type IV) fluids. New, NPE-free Type IV fluids have been tested and will continue to be tested in 2006. The aim is to have these new fluids in use in the winter of 2006-2007. NPEs have been shown to have a disruptive effect on the reproduction of water animals if NPEs enter the water system.

Material acquisitions by Finnair Catering as well as purchased equipment, spare parts and metallic materials are not included in the table. The consumption of aircraft fuel is presented in the chapters dealing with engine emissions.

	2005	2004	2003
De-icing fluids, total	2 884	2 905	2 870
Type I	2 006		
Type IV	838		
Adhesives and sealants	2.9	3.7	2.8
Paints	12.4	9.8	7.1
Paint removers	7.5	23.6	14
Welding filler rods and thermal spray powder	0.5	0.6	0.9
Chemicals for plating and water treatment	4.4	2.7	21
Anticorrosion agents	1.6	1.4	1.5
Cleaning agents containing solvents	62.7	65.7	84
Oils and hydraulic fluids	88.4	64.8	59

Table 12. Amounts of environmentally significant raw materials and supplies used by Finnair Technical services from 2003 through 2005.